



Republic of Uganda

Ministry of Water and Environment

**INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT
PROPOSED LARGE SOLAR-POWERED PIPED WATER SUPPLY
SYSTEMS AND SANITATION FACILITIES IN BUKIZIBU - BUMWENA IN
MAYUGE DISTRICT**

ENVIRONMENTAL AND SOCIAL IMPACT

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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
DED	Detailed Engineering Design
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
SAS	Senior Assistant Secretary
SDGs	Sustainable Development Goals
SEA/H	Sexual Abuse and Exploitation or Harassment
SH/SEA	Sexual Harassment/Sexual Exploitation 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
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

EXECUTIVE SUMMARY

THE PROJECT

The Government of Uganda received credit from the World Bank towards implementation of the Integrated Water Management and Development Project (IWMDP). The Project Development Objective (PDO) is to improve access to water supply and sanitation services, capacity for integrated water resources management and the operational performance of service providers in project areas. The project will also contribute to the achievement of National Development Plan III objectives, Vision 2040 and Sustainable Development Goals.

Component 1.1 Support to Small Towns and Rural Growth Centers (RGC) will support activities designed to improve the sustainable provision of water supply and sanitation services in small towns and RGCs. Part of this subcomponent will be implemented by the Rural Water Supply and Sanitation Department and will include construction of 25 solar powered piped water supply and sanitation systems 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.

As a requirement in the National Environment Act, 2019 and the World Bank Safeguards policies, an Environment and Social Impact Assessment (ESIA) for the proposed water and sanitation system in Bukizibu Mumwena was undertaken by JBN Consults and Planners Limited on behalf of the Ministry of Water and Environment (MWE). The ESIA was aimed at preparing a framework to ensure that environmental and social impacts and risks accruing from the proposed infrastructure are identified and mitigation measures proposed. Basing on the ESIA findings, the proposed IWMDP project triggered several WB-OPs namely – Environmental Assessment (OP4.01), Natural Habitats (OP4.04), Physical Cultural Resources (OP 4.11), Involuntary Resettlement (OP4.12). This report therefore presents the findings of the ESIA exercise undertaken for the Water supply and sanitation system of Bukizibu Bumwena RGC in Mayuge District.

PROJECT JUSTIFICATION

Bukizibu Bumwena Rural Growth Centre (RGC) in Mayuge District was selected to benefit from the project due to the low safe water and sanitation coverage at 20% and 56% respectively compared to the district averages 53% and 96% respectively, as indicated in the Uganda Water Atlas, 2022 and Mayuge District Development Plan III (DDP III) 2020/21 – 2024/25. The RGC will therefore be supported with a large solar powered piped Water Supply System and one improved sanitation facility.

PROJECT LOCATION AND COMPONENTS

The Water Supply and Sanitation project in Bukizibu-Bumwena RGC will serve 4 villages; namely; Bukizibu A, Bukizibu B, Bukizibu C and Bumwena B, all located in Bumwena Parish, Malongo Sub County, Mayuge District.

The main project components will include a borehole (DWD 60824) located in Bukizibu A village at coordinates 556696.00 m E, 29164.00 m N, a 130 cubic reservoir tank in Bumwena C Village at coordinates 557241.00 m E, 29204.00 m N, a distribution network of approximately 7.349km, a water field office at Malongo Sub County offices (555638.46 m E, 27935.09 m N) and a sanitation facility in

Bukizibu trading centre (557791.70 m E, 28537.35 m N). A total of 50 service connections are planned for the initial year, increasing to 355 in subsequent years.

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.

POLICY, LEGAL AND REGULATORY FRAMEWORK

The assessment was guided by the following key policies, laws, regulations;

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.

Legislations

- 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 Roads Act, 2019,
- 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)

- 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.

ENVIRONMENTAL AND SOCIAL BASELINE

The Biophysical Environmental baseline conditions indicate that:

Climate and weather: The project area experiences tropical monsoon climate which has monthly mean temperatures above 18 °C in every month of the year. The area experiences extreme seasonal variations in monthly rainfall throughout the year; two rainy seasons (March to May and September to November) and a dry season. The annual rainfall varies between approximately 1450 mm and 1565 mm (Figure 18). Spatially, rainfall is more concentrated in the North Eastern part of the project area, gradually reducing towards the South West.

Water resources and hydrology: Bukizibu - Mwena RGC project area is drained to L.Victoria in all directions. The borehole site is about 300m from the nearby lake shore. No river/stream was identified in the vicinity.

Topography: The project area is gently sloping with maximum and minimum elevations of 1130m and 1205m respectively. It is well drained to either direction because it's surrounded by the arms of L. Victoria.

Geology and Geomorphology: According to the geological map of Uganda (GTK, 2014), the project area lies in the Lake Victoria Terrane (LVT) of the Tanzania Craton which extends into the south-eastern corner of Uganda. The LVT comprises predominantly of mafic metavolcanic rocks overlain by a unit composed of felsic metavolcanics and met sediments and several granitoids. This includes the Iganga suite that covers the project area.

Soils: The project area has reddish-brown sandy loam and red clay loams underlain by the basement complex gneisses and granites of Kabira Catena commonly known as the Lixic Ferralsols. The red and brown sandy loams over murram and ironstone are underlain by the Quartzites sandstones and relic laterite of the Lake Victoria.

Air quality monitoring for pollutant gases such as SO₂, NO₂, VOCs and CO; and particulate matter as undertaken at two major receptor locations within the project are indicated that all parameters were within permissible levels according to the WHO and National Standards.

Water quality assessment was undertaken for *ex-situ* measurements. Water samples were picked from the borehole (DWD 60824) indicated that all parameters were with the National Drinking Water Standards.

Vegetation: The vegetation range in the project area of Bukizibu-Bumwena RGC is basically described by the species available and is influenced by the prevailing environmental conditions. Bukizibu is one of these places in the great former Bunya County which has lost almost 100% of its natural forests basically due to human-induced factors which are primarily; - infrastructure development, the extension of agriculture, and unsustainable harvesting of wood. The project area is not rich in plant species biodiversity with only a total of ninety-three (93) individual species recorded around the project sites from 32 families.

Fauna: Considerable anthropogenic modification of habitats has occurred in the project area. Anthropogenic activities have impacted negatively on the flora of most areas of the proposed project activities which also affects the fauna that depend on the flora for food, cover, and shelter. And as such, the survey recorded nineteen species of butterflies, only one species of dragonfly, eight species of amphibians, five species of reptiles, Eighty-nine species of birds.

SOCIO-ECONOMIC BASELINE

Administrative settings: Bukizibu-Bumwena RGC is in Bumwena parish, one of 7 parishes in Malongo sub-county, Mayuge District. Bukizibu and Bumwena towns centres that form the project area are approximately 500m apart and separated by a swamp through which an access road connects both town centres. The RGC project area will comprise 4 villages within the core of the RGC and these are Bumwena A, B, C, & D and Bukizibu A, B & C, all located in Bumwena Parish.

Population & Demographics: A review of 2022 Village Health Teams (VHT) population records indicate that the core beneficiary villages of Bukizibu-Bumwena RGC have a total population of 9,757 people and 1,867 households. The most populated is Bukizibu B (516 HHs), Bumwena A (360 HHs), Bumwena B (281 HHs), Bukizibu A (226 HHs).

Human settlement patterns: There are 3 major human settlement patterns namely

- 1) Compact or Nucleated settlements - this is common in trading centers where large number of dwellings are constructed very close to each other such as in Bukizibu trading center.
- 2) Dispersed or dotted settlements with dwelling located far apart and often within a village landscape, as observed in source area.
- 3) Linear settlements along roads.

Informal settlements - these are illegal dwellings often in restricted and/or prohibited areas such as wetlands, river banks, fishing sites on Lake Victoria shorelines such as Namasoko village.

Water Access in Health Centres: Within Bukizibu-Bumwena RGC, only one health facility (Namoni HC II) has access to piped water (2 PSPs) connected to an on-site motorized borehole. There are 2 RWHTs with capacity of 7,000 liters located in 2 health facilities

Water access in Schools: In all the schools, the major water source are deep boreholes, 2 functional RWHTs in two schools.

Water storage: Water is mainly collected using plastic jerrycans and stored in plastic drums.

Capacity of RWHTs: The total water tank capacity in the 2 schools is 2,000 liters serving a school population of 442 learners as shown in Table 4 below.

Average distance to water source: The average distance to a water source (deep borehole) for schools in RGC is less than 100 meters.

Ethnicity: The project area has a rich ethnic diversity comprising a mixture of several Ugandan tribes. Overall, the dominant ethnic group recorded were the Basoga (71.9%), Bagwere (8.4%), Banyole(9%) Bagisu(4.8%) and Itesot 3.6%.

Health Care: In the project area, (61.1%) of the respondents indicated that they were using Privately run clinic /drug shop 29.3% health center III to access healthcare services. 4.8% of the respondents went to referral hospitals to access healthcare services and Community Health center respectively for the same services.

Land ownership and use: Majority (71.9%) were land owners, 25.7% tenant Kibanja owners and licensee (2.4%).

Livelihood and source of income: Majority (74.3%) of households are engaged in crop production. About 3% of households are engaged in fishing and 7.2% in petty trade. Other economic activities include service provision (3.6%), daily labor (1.8%), carpenter and masonry (7.2%).

STAKEHOLDER ENGAGEMENT

Several stakeholders were engaged in various ways including meetings, Focus Group Discussions and Key Informant Interviews.

The target stakeholder groups included,

- a. Ministries, Agencies, and national agencies.
- b. District local government authorities, technical and political officials.
- c. Project-affected communities and households ensuring representation of all gender.
- d. Relevant community-based organisations among other interested parties.

Officials from MoWE, Mayuge District Local Government, Malongo Subcounty, Bumwena Parish and the beneficiary villages local community members were consulted, and their views incorporated in

this ESIA Report. The major issues from the stakeholders included, appreciation and willingness of the stakeholders to support the project, compensation for land take, employment, and other opportunities (supplies) consideration for the local community, environmental protection amongst others.

ALTERNATIVES ANALYSIS

The alternatives analysis investigated aspects as follows:

- a. The No-Action alternative (Zero alternative).
- b. Water source alternatives.
- c. Sanitation Systems alternatives
- d. Technology alternatives

Implementation of the proposed Bukizibu-Bumwena RGC solar powered water supply and sanitation system was the preferred and the most sustainable option owing to its associated benefits such as enhanced access to clean water supply, and sanitation facilities under Bukizibu-Bumwena RGC, reduced expenditure on public health related cases, enhance economic production and improved livelihoods and standards of living among the beneficiary population among others. The best alternative was ground water source as opposite to surface. This option is considered feasible and less capital intensive both in the short and long runs owing to less water treatment requirements (good water quality) as well as minimal additional infrastructure components

POSITIVE IMPACTS

The project is associated with the following positive impacts:

- Creation of temporally and permanent employment opportunities to the local people
- Enhanced market for goods and services
- Skills transfer and development among the local populace
- Increased quality water supply
- Transformation of Bukizibu and Bumwena RGC into an Improved Semi-urban centre
- Generation of Income from the water vending activities
- Improved Hygiene, Sanitation and Public Health Conditions

NEGATIVE IMPACTS

Several negative impacts associated with proposed project implementation were discussed as below.

- Risk of increasing the spread of HIV-AIDS and other venereal diseases
- Impacts on Land Use/cover and Ownership
- Risk of Contracting and Spreading COVID19
- Risk of Sexual exploitation and abuse of community members by project workers
- Risk of Gender Based Violence and Family / Marriage Breakdown
- Risk Violation of children rights by contractor and labour force on site
- Risk of Non-Payment of Workers, Suppliers and Subcontractors
- Liability for loss of life, injury, or damage to private property
- Vegetation clearance
- Deterioration of Landscape and Visual Quality
- Potential Loss of Fauna
- Potential introduction of Invasive Plant Species

- Soil erosion and Sedimentation
- Impacts relating to construction materials extraction and transport
- Proliferation of construction waste
- Poor Sanitation at the construction site and auxiliary facilities
- Air Quality Impacts due to Vehicular Emissions
- Dust nuisance
- Erection of temporary material storage sites
- Accidents due to traffic and moving equipment
- Area and Project sites security
- Noise generation
- Vibrations
- Risks arising from increased air pollution
- Depletion of Groundwater Resources
- Solid Waste Generation
- Land Pollution, Waste and Drainage Problems
- Impacts from Damage of the Pipe Network
- Increased Cost Per unit / Reduced Affordability
- Loss of Livelihood by Water Vendors

ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The proposed Environment and Social Management and Monitoring Plan specifies 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 and affected communities by the implementation of the proposed Bukizibu-Bumwena RGC WSSS project activities. Monitoring will begin immediately and will continue throughout all project implementation phases.

Reference should always be made to the Contractor's Environmental and Social Management Plan as the overarching document that contains general Control Statements for management of various impacts. The implementation of the mitigation measures and the occurrence of impacts shall be monitored on a daily, weekly, monthly, and quarterly basis depending on the aspect. The implementation of the performance of the mitigation measures will be reported in the Contractor's monthly ESHS reports.

The developer will also ensure that several licenses, permits, and approvals are obtained from the relevant bodies before commencement of construction activities and prior to 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.

Recommendation

Based on the results of the ESIA, the ESIA study recommends the approval of the proposed project and its components for implementation on condition that the recommended mitigation measures are implemented, and as any other stakeholders may recommend during review of this report or following audit.

CONCLUSIONS

The proposed implementation of the the Solar-powered WSSS Project under Bukizibu-Bumwena RGC will not only have positive impacts like improved access to clean and safer water, creation of employment opportunities, skills transfer, creation of market for local goods and services, enhanced sanitation, hygiene and public health among the urban communities, rural dwellers and social amenities local and national economy benefits within the project area (4 villages in Bumwena Parish in Malongo Subcounty, Mayuge District) but also, the water supply and sanitation project upon completion will spur the country's economic development through enhancement of sectoral growth for sectors like tourism, agriculture, health, industry and trade within and beyond the project area at large especially facilitated by access to quality and adequate water supply.

The above notwithstanding, project implementation works under Bukizibu-Bumwena RGC will trigger negative effects such land uptake, loss of vegetation, loss of livelihoods among the water vendors, impact on water source depletion, waste generation, dust nuisance, noise, occupational health, and safety amongst others. Also, important to note is that the water transmission and distribution pipe network will be within the existing access roads reserves to ensure minimal land uptake, loss of property such as crop gardens among others thus minimal need for compensation and resettlement activities. Consequently, the anticipated impacts on vegetation and faunal species will be minimal.

From the assessment, it is established that, most the anticipated negative impacts will be of reversible nature, short-term and can be mitigated through implementation of an Environmental and Social Management and Monitoring Plans proposed by this study whose implementation will rest largely with the Contractor under the supervision of MoWE, will have an overall monitoring responsibility.

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. The project will also contribute to the achievement of National Development Plan III objectives, Vision 2040 and Sustainable Development Goals.

Component 1 of IWMDP is tagged to support Water Supply and Sanitation (WSS) systems 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, twenty five (25) solar powered piped water supply and sanitation systems 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.

One of the planned 25 water supply and sanitation systems will be Bukizibu Mumwena Water Supply and Sanitation System located in in Bumwena parish, Malongo sub county Mayuge District.

1.2 PROJECT JUSTIFICATION

Uganda has experienced two decades of economic growth, leading to large population movements from rural areas to informal settlements around urban centers known as small towns and rural growth centres². High population growth stresses the existing water and sanitation services. Currently, over seven million Ugandans lack access to safe water and 28 million do not have access to improved sanitation facilities by 2020 (UNICEF, 2018³). Furthermore, due to disparities in access to safe water in Uganda, urban people living in poverty pay as much as 22 percent of their income to access water from water vendors (Water.org, 2022⁴). Spending such a high percentage of earnings on water reduces overall household income, limits opportunities to build savings and break the cycle of poverty.

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.

²<https://www.macrotrends.net/countries/UGA/uganda/rural-population#:~:text=Uganda%20rural%20population%20for%202020,a%203.01%25%20increase%20from%202017> (Accessed on 25th March 2022).

³ <https://www.unicef.org/media/97281/file/WASH%20affordability%20case%20study-Uganda.pdf> (Accessed online on 25th March 2022)

⁴<https://water.org/our-impact/where-we-work/uganda>. (Accessed online on 25th May 2022)

Sanitation coverage poses another significant challenge. The United Nations Joint Monitoring Program⁵ reports that only 28 percent of the urban and 17 percent of the rural populations had access to individual improved sanitation facilities by 2020. Sewerage coverage is less than 7 percent in large towns and negligible in small towns (WHO, 2021). Low sanitation coverage, unimproved on-site sanitation facilities, inadequate wastewater treatment and poor fecal sludge management are among the key factors that hamper Uganda from meeting global Sustainable Development Goal 6 (Ensure access to water and sanitation for all).

The proposed IWMDP water supply and sanitation infrastructure will be implemented as part of the strategy to improve access to clean water, improved sanitation and hygiene in small towns and rural growth centres in Eastern Uganda, specifically Mayuge District.

Bukizibu Bumwena Rural Growth Centre (RGC) was selected among the emerging amalgamation of small towns in Mayuge District to benefit from the project due to the low levels of safe water coverage (20%) and sanitation coverage (56%) compared to the district average of 53% and 96%, as indicated in the Uganda Water Atlas, 2022 and the Third Mayuge District Development Plan (DDP III) 2020/21 – 2024/25, respectively. The proposed project implementation will increase the availability of safe drinking water, reduce the distance people must travel to access safe WSS systems, secure water sources to ensure sustainable supply, and improve sanitary conditions at the household and community levels. Local communities will also benefit from catchment management activities focused on building capacity for modern land use management and improved agroforestry farming practices. The Project will also strengthen the resilience of the systems to water-related shocks. Service providers (Umbrella Water Authorities and the NWSC) and their staff will benefit from Technical Assistance (TA) and investments focused on strengthening their financial and operational performance. In addition, local communities and regional and local organizations will be empowered to identify, prioritize, and support investments in water-related infrastructure and services.

1.3 PROJECT CATEGORIZATION

Based on the World Bank Safeguard Operational policies, IWMDP is assigned an Environmental Assessment (EA) Category B type given that significant adverse environmental and social impacts are not expected due to the nature of the proposed activities described above, that is, interventions are mainly small to medium scale. This conclusion was based on a thorough review of specific subprojects and after considering of the environmental and social screening of potential subprojects conducted under the project ESMF.

Other considerations that guided the categorization included:

- a) Social impacts intrinsic to the project implementation works will be of short-term in nature and will be localized and can readily be mitigated through implementation of mitigation measures which will be outlined in the ESMP.
- b) Possible instances of land acquisition will be minimal and restricted to areas for project auxiliary sites such as reservoir tanks, water treatment plants, transmission and distribution infrastructure, sanitation facilities and field offices to be acquired by GoU through MoWE;

⁵ World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) 2021. Progress on household drinking water, sanitation and hygiene 2000-2020: Five years into the SDGs ISBN: TBD <file:///C:/Users/JBN/Downloads/JMP-2021-progress-report.pdf> (Accessed on 25th May 2022).

- c) In addition, the planned IWMDP and subprojects implementation activities falls under the category projects under Schedule 5 of the National Environment Act 2019 requiring mandatory ESIA to be undertaken before its implementation i.e., *“Utilization of Water Resources and Water Supply involving construction of large-scale gravitational water schemes and support facilities of more than 1000 m³/day or where the ecosystem is fragile and sensitive”*.

1.4 PURPOSE AND OBJECTIVES OF THE ESIA

1.4.1 PURPOSE

The purpose of this ESIA is to detail the potential adverse bio-physical and socio-economic impacts of the proposed Water Supply and Sanitation System and propose mitigation measures in compliance with the National Environment Act 2019. Section 4 (j&k) of Schedule 5 of this Act lists Utilisation of water resources and water supply involving construction of large scale gravitational water schemes and support facilities of more than 1000 m³/day or where the ecosystem is fragile and sensitive among projects for which environmental and social impact assessments are mandatory. The ESIA has also been prepared to comply with the World Bank Environmental and Social Safeguard Policies and subsequent Operational Policies (OP) and Bank procedures (BP) specifically, OP/BP 4.01: Environmental Assessment, 4.04: Natural Habitats, 4.11: Physical Cultural Resources and 4.12: Involuntary Resettlement, which will be triggered during project implementation activities as documented in the IWMDP Environment and Social Management Framework (ESMF). The ESIA follows the procedures and requirements defined in the ESMF and the World Bank Group EHS Guidelines, namely; (a) EHS Guidelines - Water and Sanitation, (b) EHS Guidelines - Air Emissions and ambient air quality, (c) EHS Guidelines - Waste Management, (d) EHS Guidelines - Hazardous Materials Management, and (e) EHS Guidelines - Construction and decommissioning.

1.4.2 SPECIFIC OBJECTIVES OF THE ESIA

The specific objectives of the environmental and social impact study were to:

- i. Describe the Policy, Legal and Regulatory Frameworks;
- ii. Provide a baseline description of bio-physical and socio-cultural environment of the project area;
- iii. Determine social risk assessment and identification of existing referral pathways including but not limited to gender issues, inclusion of vulnerable groups, stakeholder engagement and labour influx, including social conflict, Gender Based Violence (GBV), Violence against children (VAC), HIV/AIDS, community health and safety, economic and physical displacement among others;
- iv. Analysis of proposed alternatives identified during the feasibility study;
- v. Conduct evidence based meaningful and participatory consultations with project stakeholder groups, including potentially affected persons, ensuring their views and comments are documented and taken into consideration;
- vi. Determine, analyse, and evaluate potential (positive and negative) environmental and social impacts (direct, indirect, and cumulative impacts) likely to result from the proposed Bukizibu-Bumwena RGC Piped Water Supply and Sanitations Systems (WSSS) project implementation activities;
- vii. Identify feasible and cost-effective mitigation measures for the impacts identified.

- viii. Prepare an Environmental and Social Management Plan (ESMP) and other relevant management plans to guide environmental and social management of the project during implementation;
- ix. Develop chance finds procedures to facilitate the handling of any unknown or known physical cultural resources, recommend grievance redress mechanism to facilitate the handling of any complaints that may arise during project implementation; and
- x. Propose recommendations to ensure overall environmental and social sustainability of the project.

1.5 ESIA PROCESS

ESIA for the Solar Powered WSSS Bukizibu-Bumwena RGC was undertaken in line with the Uganda ESIA process and is guided by NEMA EIA Guidelines 1997 as well as World Bank ESIA tools. Schematically, the study process is summarized below (Figure 1-1).

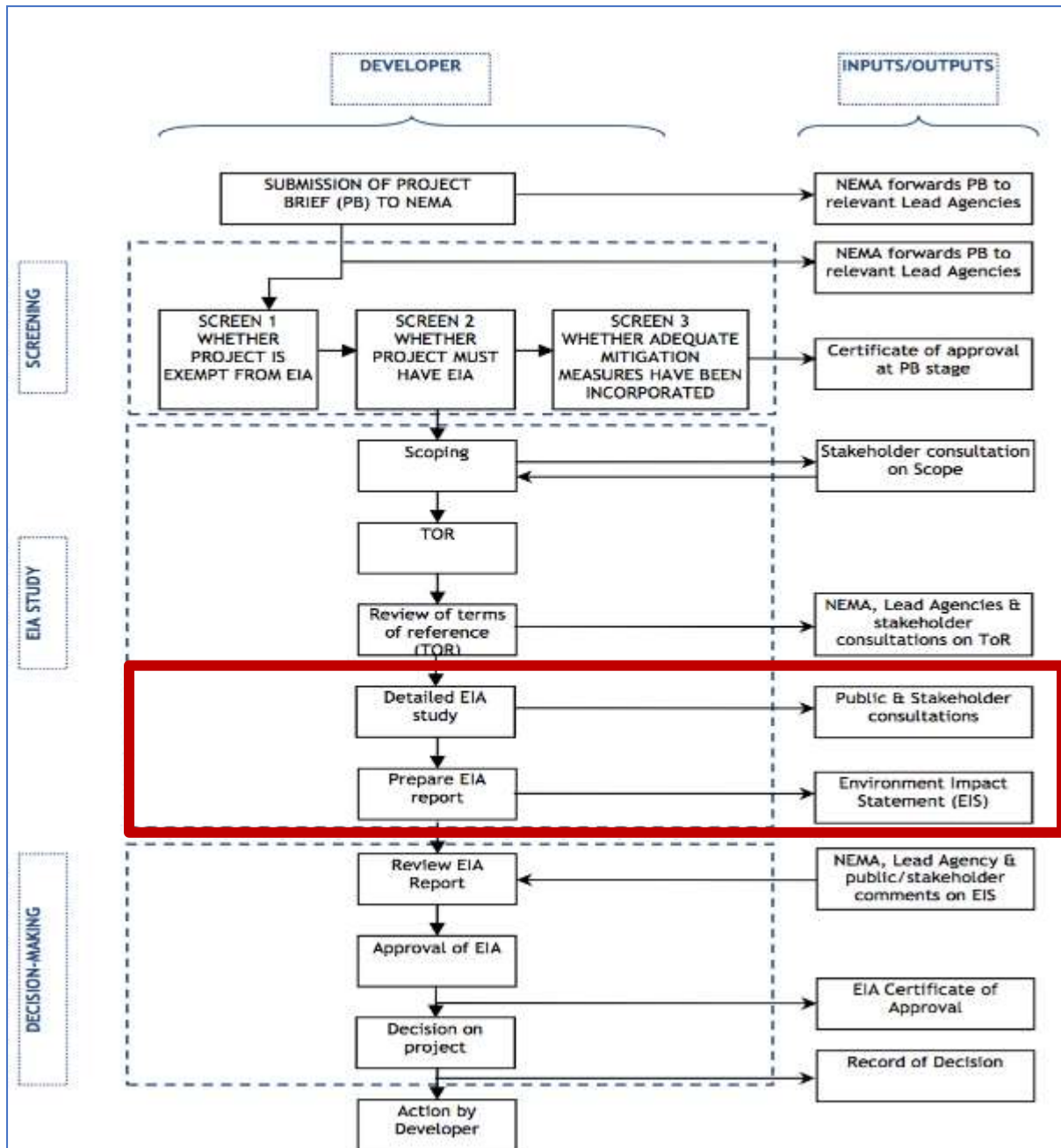


Figure 1-1: ESIA Process in Uganda according to ESIA Reference Manual, NEMA, June 2002

(a) Screening: The proposed Bukizibu-Bumwena 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.

Scoping: This was the first step in the ESIA, and it determined 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 study. This culminated in the preparation of an

E&S Scoping Report and Terms of reference, which was submitted to NEMA in line with EIA practice and procedures on 7th June 2022 and was approved by NEMA. The NEMA conditions of approval of the terms of reference for this ESIA and how they have been incorporated in the study are presented in Appendix 1 of this report.

(b) Detailed ESIA study and information collection: Upon completion of the Scoping study and approval (Appendix 1), detailed field investigations and consultations were undertaken leading to the preparation of this Environmental Social Impact Assessment Report for stakeholder review and consideration by NEMA as part of its approval process; and Decision-making. Submission of the ESIA report to NEMA for due approval in accordance with the provisions of the National Environment Act 2019 and EIA Regulations 2020. Structure of the ESIA report

This ESIA Report is organized in different sections as summarized in **Table 1-1** below:

Table 1-1: Report structure

Section	Content
Technical Summary	The Executive Summary presents a summary of the project and its activities, ESIA study methods, key findings and impacts as well as proposed mitigation measures.
Chapter 1	Introduction with brief background, the Bukizibu-Bumwena RGC Solar Powered WSSS project works, justification, categorization of the Project and ESIA process.
Chapter 2	Has principally, information on the methodologies employed during the ESIA study
Chapter 3	Has information on the description of the project, its location, project parameters and proposed activities to be undertaken during its phases.
Chapter 4	Outlines the key policy, legal/regulatory, institutional framework and international guidelines and conventions relevant to the planned project.
Chapter 5	Presents biophysical and Socioeconomic baseline information of the project area
Chapter 6	Presents information of public consultation and stakeholder engagement processes and the outcomes of such meetings.
Chapter 7	Has information on the project alternatives, a comparison of the options and their significance.

Chapter 8	Has details of the project anticipated environmental and social impacts and their mitigation measures as well as the Environmental and Social Management Plan (ESMP).
Chapter 9	This section presents the Environmental and Social Monitoring Plan.
Chapter 10	Has Commitment, Recommendations and Conclusion
Chapter 11	References
Chapter 12	Has Appendixes and their details.

2 ESIA STUDY METHODOLOGY

2.1 INTRODUCTION

This section describes the methodology that was used to study the physical, biological, and socioeconomic baseline conditions and further assess and predict the significance of impacts resulting from the proposed implementation of the Water supply and sanitation system for Bukizibu Bumwena RGC. The study adopted conventional methods to document baseline conditions including document review (review of design reports, Statistical abstracts from UBOS, District Development Plans, National Development plans and various pieces of legislation). Field studies were carried out to establish the baseline conditions. Social economic surveys were also undertaken to obtain data on demographic parameters, access to infrastructure and services, land ownership aspects of gender and vulnerability, livelihoods among other parameters.

A summary of the study methods employed are given as follows:

2.2 KICK-OFF MEETING

At the onset of the ESIA study, a kick-off meeting was held between the ESIA Consultant team and the Client (MoWE) to amongst others, confirm the scope of the study/work, timelines for the delivery of the assignment, and confirm communication lines and secure available information for the ESIA. The meeting also agreed on the dates of reconnaissance visits as well as availability of requisite documentation from the client.

2.3 DOCUMENT REVIEW

To gain a clear insight on baseline parameters and project characterization, several planning, regulatory documents, and reports were reviewed as presented below.

- i. Relevant policies and legislation of Uganda;
- ii. Relevant international covenants
- iii. Project Draft Feasibility Study and Draft Preliminary Engineering Design Report
- iv. ESMF for Integrated Water Management and Development Project.
- v. Mayuge District Development Plan
- vi. National Environment Act 2019.
- vii. National and Mayuge District statistics as contained in UBOS Abstracts of 2014, 2016 and 2017
- viii. Project Appraisal Document (PAD) for Integrated Water Management and Development Project.
- ix. IWMDP Resettlement Policy Framework
- x. Water Resources Assessment Reports for Gaspa RGC;
- xi. Borehole Drilling & Test Pumping Reports for Gaspa RGC;
- xii. UBOS National and District Statistical Abstracts for 2014, 2016 and 2017;
- xiii. National and Mayuge District statistics as contained in UBOS Abstracts of 2014, 2016 and 2017,
- xiv. Project Appraisal Document (PAD) for Integrated Water Management and Development Project,

- xv. The Water Act, and accompanying regulations [Water Resources Regulations (1998), Waste Discharge Regulations (1998), the Water Supply Regulations (1999), Sewerage Regulations (1999),
- xvi. 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,
- xvii. The National Red List for Uganda 2016, published by Wildlife Conservation Society,
- xviii. The International Union for Conservation of Nature (IUCN) Red List of threatened species 2019, and
- xix. Biodiversity Inventory Reports for Central Forest Reserves by Forest Department 1996.

2.4 BASELINE DATA COLLECTION AND SURVEYS

The description of the baseline for social and environment conditions provides information on receptors and resources that were identified during scoping as having the potential to be significantly affected by the proposed Project activities. It also describes baseline conditions that have been used to make the assessment. It also provides conditions that have been used to make the assessment.

2.4.1 PHYSICAL ENVIRONMENT

2.4.1.1 WATER QUALITY ANALYSIS

2.4.1.2 FIELD AND LABORATORY WATER QUALITY MEASUREMENT/ANALYSES

Water quality assessment was done through water sample collection for laboratory analysis of parameters. An *ex situ* measurement, a water sample was picked from a borehole (**Error! Reference source not found.**) approximately 150m from the proposed Bukizibu-Bumwena RGC water source point (Bukizibu-Bumwena borehole), stored in cooler boxes (for easy transportation and preservation) and tested for different parameters at Ministry of Water and Environment Analytical Laboratories in Entebbe (Results attached as Appendix 3). The sample was delivered to the laboratory within 24 hours from the time of its withdrawal from the field. Water quality parameters that were analysed in the laboratory included; turbidity, pH, Electrical Conductivity (EC), total dissolved solids (TDS), total hardness (CaCO₃), fluoride, sulphates, chlorides, nitrate (N), Nitrites (N), Manganese, total iron, and E. Coli.

During water quality sampling and analysis, quality control was followed, according to the standard methods (APHA/AWWA/WCF, 2020). The results of water quality analysis were used to provide a baseline for monitoring future impact of the project on the water quality in the water resources assessed.



Figure 2-1: Water sample collection from a borehole near the project Bukizibu-Bumwena project borehole

2.4.2 NOISE, AIR QUALITY AND VIBRATION ASSESSMENT

Baseline measurement of noise, air quality and vibration were undertaken at two locations within the project area from 14th-18th February 2022. The baseline measurements sites were selected considering the sensitivity of receptor to noise and air pollution, and vibration impact.

2.4.2.1 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 part of the ESIA studies, the consultant undertook a drive through the proposed sites of the different project components (water source, reservoir tank, sanitary toilet facilities, pump house, and along the distribution/transmission lines) to ascertain the number, distribution of the sensitive receptors and their distance from the different project components sites. The selection of location and number of points was guided by the project area topography, which is mainly characterized by flat terrain. Furthermore, the selection of sampling points in the detailed ESIA was guided by the provisions of the National Environment (Noise standard and Control) Regulations, 2003 which defines noise limits for various land uses zones i.e., commercial (urban centres, 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.

Considering the above, the selected receptors for noise, air quality and vibration assessment were clustered according to **Error! Reference source not found.** and then randomly sampled within the project area. The sampled sensitive receptors were:

- a. A representative of the different land use zones within the project area.
- b. Candidates for noise and air pollution mitigation through site hoarding.
- c. Representative of the project area coverage/scope

Table 2-1: Air quality, Noise and Vibration Sampling Points

Location	Date and Time	Coordinates - 36N
Nawampongo village	18/02/2022; 10:05am-12:00pm	0556708 E; 0029090 N
Bukizibu Trading Centre	18/02/2022; 13:54pm-15:24pm	0557653 E; 0028571 N

2.4.2.2 MONITORING OF PARTICULATE MATTER AND GASES

Ambient air quality monitoring for a range of parameters was undertaken at locations with sensitive receptors where pollution impacts including dust nuisance will likely be a major concern. These were selected as suitable for future monitoring during the project implementation phases. A total of two sites were sampled within Mayuge RGC project area i.e., Bukizibu Trading Centre and Nawampongo village. The sites represent the following land uses and receptors as shown in **Error! Reference source not found.** below.

Table 2-2: Selected points for baseline air quality monitoring

No.	Location	GPS Coordinates (36N)	Key land use and receptor
1.	Nawampongo village	0556708 E, 0029090 N	This represents areas with sensitive receptors (households) to noise, vibrations, and air pollution.
2.	Bukizibu Trading Centre	0557653 E, 0028571 N	This represents the general public as well as the business community that often is concerned about dust that stains goods hence decreasing their value.

2.4.2.3 AIR QUALITY MEASUREMENT PROCEDURE

Air quality monitoring was undertaken using the Portable Aeroqual S500 Monitor to establish the baseline values for PM_{2.5}, PM₁₀, NO₂, SO₂, VOCs and CO by simply swapping the particulate matter (PM) sensor head for the gas sensor head of choice. 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 on a PC using Aeroqual S500 V6.5 Software and analyzed. The software generates mass concentration graphs and provides minimum (min), average (ave) and maximum (max) values for each parameter logged.



Figure 2-2: Air quality monitoring at different sections in selected points of the project area

2.4.2.4 NOISE MEASUREMENTS

Ambient noise measurements were undertaken at selected receptors (homesteads and Trading centres) within the project area for Bukuzibu-Bumwena RGC. A duly calibrated Casella CEL-633B Environmental & Occupational Noise Meter was used for the assessment. The CEL-633B instrument provides SPL, 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, LZ 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.
- 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

Set-up and Measurement

The instrument was first calibrated using Acoustic sound level calibrator type CEL-251 for sound level meter at 114.0 dB (A) for every point measured (**Error! Reference source not found.**). The equipment was then placed on a tripod stand (1.2 m high) from ground. It was 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 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. The execution of measurements was conducted entirely in the absence of rain and strong wind conditions. In total, 2 acoustic measurements of 6-hour duration each, were undertaken within the two selected sensitive receptors in the project area.



Figure 2-3: Set up for noise measurements at points of Mayuge (Bukizibu-Bumwena) RGC

2.4.2.5 VIBRATIONS

Vibrations measurements were undertaken at a randomly selected site in **Error! Reference source not found.** above using **Extech SDL800: Vibration Meter/Datalogger (Error! Reference source not found.)**. 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 as an Excel format. The distance from the point of measuring and the vibration source (project component sites) 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 building where vibrations were being measured. 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.



Figure 2-4: Field measurements for vibrations

2.4.3 BIODIVERSITY ASSESSMENT

2.4.3.1 FLORA ASSESSMENT

To study the vegetation structure and composition in the planned project sites was done through a combination of methods such as; field observations, and plots were used. Plots were set near the borehole site, reservoir site and along the proposed Transmission and Distribution lines. Other areas assessed include the site allocated to the sanitation facility and the field water office. A diameter tape was used to record tree diameters at 1.3 m or breast height, a pair of tape measures and stick poles were used to demarcate the quadrats along and within sites. Measuring tree heights was made possible by using yardstick and estimates. Regional flora keys were used in the field for better species identification. Cover classes this method uses six separate cover classes.

Table 2-3: Vegetation 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%

2.4.3.1.1 APPROACH AND PROCEDURES

The systematic sampling technique was operationally more convenient for this work, as it ensures that each unit has 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 30m alternating along the proposed Transmission and Distribution routes bearing in mind the road effect but within the limits of thirty meters (30m) from the road centre (*Error! Reference source not found.*).

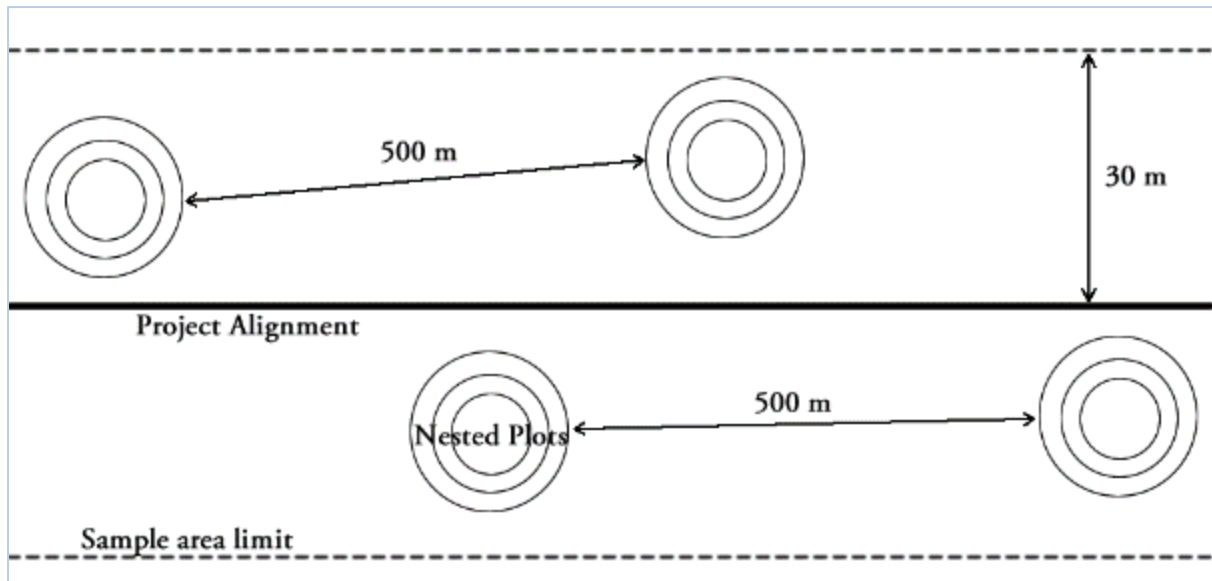


Figure 2-5: Illustration of the flora sampling technique

2.4.3.2 SAMPLING

Standard nested circular plots were located across the study areas, 0.5km intervals were used along Water transmission and distribution lines from the intake/WTP to the reservoir sites and along the distribution lines. 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 Diameter at breast height (DBH) are identified and counted), 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).

2.4.3.3 OPPORTUNISTIC RECORDS

Although Plots 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.

2.4.3.4 VOUCHER SPECIMENS

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

2.4.3.5 ANALYSIS

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

2.4.3.6 FAUNA ASSESSMENT

Fauna assessment were undertaken within the proposed project area, especially at proposed sites for establishment of different project facilities, namely; at the borehole, along the transmission line, at the reservoir site and along the transmission lines, the project water offices and proposed site for the sanitary facility.

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

Different literature was reviewed to establish known habitat types, fauna species diversity and ecological communities in the project area, the following publications were reviewed.

- Biodiversity Inventory Reports for Central Forest Reserves by Forest Department 1996
- The National Red List for Uganda 2016, published by Wildlife Conservation Society
- 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 organisations. 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 (Informal Local Consultations)

During the field visit (14th-18th February 2022), the fauna specialist informally consulted the community members. The purpose 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.

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 following methods were used to study the different fauna species in and around the proposed project area.

2.4.3.6.1 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 500 m of sampling point. The method was used to document the butterfly species richness, as well as estimate their relative abundance. The choice of this method was informed by its time-efficiency and the fact that the negative effects associated with handling of individuals are avoided (Nowicki, P *et al.*, 2008).

At each of the sampling points, transects of 10m wide and 100m long were established. The fauna ecologists moved through the transect along a fixed line with a 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, recording fauna species sighted within the 10m width. Sampling was conducted between 9am-5pm when the weather has warmed up (21-25°C) during the time when butterflies are known to be the most active.

On spotting an individual butterfly, the fauna ecologist swept the net back and forth to capture the seen butterflies. In 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 the 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,

- i) Estimating species richness based on recorded species presence or absence at the different sites that were sampled.
- ii) Estimating species relative abundance by counting and recording the number of individuals of the different butterfly species that were encountered while sampling.
- iii) 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 by matching with Makerere University Museum collections. The species were arranged into families Hesperidae, Lycaenidae, Nymphalidae, Pieridae and Papilionidae and genera.

2.4.3.6.2 DRAGONFLIES

Pollard'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 during warm/sunny weather. Each sampling event was conducted between 09:00h to 17:00h time and lasted about 1 hour 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.

2.4.3.6.3 HERPETOFAUNA (AMPHIBIANS AND REPTILES)

Herpetofauna (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:

i. Visual Encounter Surveys (VES): The method involves moving through a habitat watching out for, and recording surface-active herpetofauna 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.

ii. 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.

iii. Dip netting: Using a dip net, ponds, pools, and streams and other water collection points were surveyed for different amphibian species. Adult amphibians and tadpoles encountered were also recorded.

iv Opportunistic Encounters: Herpeto-fauna species encountered opportunistically while moving in the project area were also recorded.

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) establishing a Species checklist, 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.

2.4.3.6.4 AVI-FAUNA (BIRDS)

A combination of Timed Species Counts (TSCs), transect walks, and opportunistic observations were used to survey bird fauna diversity within the project area (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 different access roads 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 within the project area. 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 criteria in **Error! Reference source not found.** below:

Table 2-4: Criteria for categorizing avi fauna in the project area

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 utilise woodland and forested habitats.
Migrants	A	Afrotropical	Species migrating within Africa

	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, and (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.

2.4.3.6.5 MAMMALS

The mammals were surveyed using three main methods:

i. **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;

ii. **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;

iii. **Local consultations:** The fauna specialists held formal and informal interviews with 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.



Borehole Water Source in Malongo Sub-county;
36 N 0556693, 0029165



Surrounding Areas near the drilled borehole



Distribution and supply pipeline will pass through Trading centres

Distribution and supply pipeline will move along village roads

Rocky habitats where the distribution and supply pipeline will pass

Distribution and supply pipeline pass through wetlands

Figure 14: Some of the project areas survey for fauna species diversity

2.4.4 SOCIO-ECONOMIC SURVEYS

Mixed Methods approach in collecting and analyzing data and information was used. Survey questionnaire as a quantitative method was applied during May 2022. 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

2.4.4.1 SAMPLING PROCEDURES

Study Area & Population: The study covered 4 core villages (**Error! Reference source not found.**) that make up Bukuzibu-Bumwena RGC with a study population of 1,240 households (UBOS, 2018).

Table 2-5: Population of the target villages in the RGC

Sub County	Parish/Ward	Village	UBOS HHs	HH size	Popn 2018
Malongo	Bumwena	Bumwena B	360	4.6	1,881
		Bukizibu A	226	4.6	1,181

	Bukizibu B	516	4.6	2,696
	Bukizibu C	138	4.6	721
Total Project Area		1,240	18.4	6,479

Sample Size: A sample size of 167 respondent households was covered representing 57.4% of determined sample using Morgan and Krejcie (1970) Sample Size Determination Table as shown in Appendix 4.

Sampling Methods: The ESIA applied 1) Probability (random) sampling methods that included a) Stratified random (divided households into strata based on location, beneficiary area; b) Simple random 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 first stage, it involved identifying and sub dividing beneficiary villages and non-beneficiary areas, and the second stage it involved identifying respondent household members, Key Informants, and groups.

Sampling Methods	Adult Female	Adult Male	Total	REMARKS
Probability (random) sampling methods				
a) Stratified random	84	83	167	This sampling methods overlaps in all the others.
b) Simple random	87	80	167	
Non-probability (non-random) sampling methods				
c) Purposive sampling				Applied after stratified sampling
Widow / Windower	21	13	34	
d) Cluster sampling	48	20	68	Applied after stratified sampling

2.4.4.2 DATA COLLECTION INSTRUMENTS

- 1) **Survey Questionnaire:** The consultant applied Survey Questionnaire to collect baseline data on socio-economic characteristics that include water, sanitation & hygiene, among others. Analysed data had corresponding GPS Coordinates which were stored in GIS Database for detailed GIS mapping and analysis.
- 2) **Using Digital Tools (KOBO COLLECT):** The structured questionnaire was converted, validated, loaded, and aggregated them into a digital form called KOBO COLLECT FORM. The form was loaded

and uploaded on mobile devices (smart phones or tablets), used to collect the data. This process increases efficiency, minimize errors and ensures timely collection and analysis of data.

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

2.4.4.3 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 KoboCollect. All Likert Type Data was analyzed by determining the frequency and percentage of Likert Type Items for selected variables. The Likert Items included (but not limited) Highly Agree, Agree, Disagree, among others.

2.4.4.4 DATA QUALITY MANAGEMENT

The consultant ensured proper quality management of all data processes, protocols, and methods i.e., design and pretest 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.

2.4.4.5 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.

2.4.4.6 STAKEHOLDER AND PUBLIC CONSULTATIONS

In this ESIA, the process of stakeholder engagement involved:

- a. Stakeholder identification and analysis.
- b. planning the stakeholder engagement method and process.
- c. disclosure of information.
- d. consultation with stakeholders.
- e. addressing and responding to concerns and issues; and
- f. reporting to stakeholders.

In order to adequately appreciate the views and concerns of stakeholders regarding the proposed the Bukizibu-Bumwena Solar Powered WSSS project, a wide range of persons and groups within the local communities, government, and other interested parties were identified and consulted. The Consultant employed consultative approaches including group discussions and meetings with women, youth, the elderly, People Living with Disabilities, business people and local leaders. Key Informant interviews

were conducted with key people such as Government officers and Local leaders in order to capture their views and concerns regarding the implementation of the proposed project.

2.4.4.6.1 STAKEHOLDER IDENTIFICATION

Stakeholders are individuals and organisations 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. For this project, a list of key stakeholders was identified and assessed through stakeholder mapping. Several stakeholders, important to this project were identified and analyzed 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 components sites. Community members of all the four (4) villages where the project implementation activities will be undertaken were considered as primary stakeholders using this criterion.
- b. Interest criteria was used in analysis to refer to the level of concern and significance to the project sites and 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.
- 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 the 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.

2.4.4.6.2 STAKEHOLDER CONSULTATION AND ENGAGEMENT PROCESSES

Stakeholder engagement comprised consultations with district local government officials of Mayuge District, together with the Sub- County officials of Malongo Sub County, the security agencies (police) and other interested parties. Notifications for the meetings at district level were made through the CAO of Mayuge District while the lower-level meetings were through Sub- County chief or LCI chairpersons for the village meetings. These communications were made one (1) week prior to engagements through telephone communication and following up with an introductory letter introducing the consultants.

After consultations with the district technical and political wings together with the sub-county officials and local council leader in the project area, plans were made with the respective villages to organize engagements with communities. Stakeholders engaged are represented in **Error! Reference source not found.**, shown in **Error! Reference source not found.** below and participant lists attached as Appendix 5.

Table 2-6: Engaged Stakeholders

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
18th February 2022, 4 th May 2022	Mayuge District Technical and Political Teams	<ul style="list-style-type: none"> • Chief Administrative Officer, • Deputy Chief Administrative Officer, • District Water Officer, • Asst. District Health Officer, • District Health Inspector, • District Environment Officer, • District Community Development Officer, • Local Council V Chairperson, • Resident District Commissioner, 	Mayuge District Board room	9	0	9
18th February 2022, 4 th May 2022	Malongo Sub County Technical and Political Teams	<ul style="list-style-type: none"> • Local Council III Chairperson, • Chair person LCII- Bumwena • Chair persons LCI (04) • Deputy Speaker • Senior Assistant Secretary, • Community Development Officer, • Secretary for Production, • Secretary for works and transport, • Bumwena Parish Chief, • Parish chief (02) • Women councillors (03) • Catholic Representative, Councillors – Malongo Sub County (03) 	Malongo Sub County Headquarters	17	5	22

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
4 th May 2022	Bukizibu village	<ul style="list-style-type: none"> Community members 	Bukizibu Trading Centre	50	36	86
4 th May 2022	Bumwena village	<ul style="list-style-type: none"> Community members 	Bumwena Trading centre	22	10	32
25 th March 2022	Uganda National Roads Authority -	<ul style="list-style-type: none"> Head of Design – Roads and Bridges 	UNRA Head Quarters	2	0	2
	Ministry of Gender Labour and Social Development	<ul style="list-style-type: none"> Directors: Occupational Safety and Health 	MGLSD Head quarters	2	0	2
Total					51	153



Conducting a FGD in Bukizibu RGC



Consultations with Bumwena B Locals



Meeting Malongo sub county officials



KII with Malongo Health Centre III In charge



Consultation with Mayuge District Officials



Consultations with Mayuge District Water Officer



Consultation with the LCV Chairperson

11



Meeting with CAO, Mayuge District



Meeting with DHI, Mayuge District



Community engagement in Bukizibu village



Community engagement in Bukizibu village



Community engagement in Bumwena village



Community engagement in Bumwena village



Consultations with Bumwena local leaders

Figure 2-6: Consulting with relevant stakeholders for Bukizibu-Bumwena RGC – WSSSP

2.4.5 HEALTH AND SAFETY ANALYSIS

The H&S assessment study assessed the likely direct and indirect safety and health effects of the project activities during both the project construction and operation phases. The study reviewed the project designs, relevant secondary information relating to the project. Additionally, consultative meetings were undertaken with key stakeholders such as Government Ministries and Departments (OSH Department, Ministry of Gender, labour and Social Development, Uganda Police Force), statutory agencies and non-statutory agencies like schools, administrative offices etc.

Generally, OSH assessment targeted both workers' safety and health and community/public safety and healthy parameters within the direct and indirect impact areas and some of the focus parameters included:

- a) Community Health and Safety
 - Life and fire safety from construction and operation works.
 - Traffic safety especially by material haulage fleet (hotspot areas; - schools, markets, trading centres and junctions etc.)
 - Transport of hazardous materials
 - Disease prevention
 - Emergency preparedness and Response
- b) Occupational safety and health
 - Communication and training
 - Hazards (physical, chemical, biological, radiological) and risk management
 - Personal protective equipment
 - Labour and working conditions
 - Construction equipment/machinery safety
- c) Safety and Health Management Systems

2.5 IMPACT IDENTIFICATION AND ASSESSMENT

2.5.1 IMPACT INTENSITY (MAGNITUDE)

Impact severity (Magnitude) 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 magnitude 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

Criteria	Intensity Description (considering duration of the impact, spatial extent, reversibility, ability of comply with legislation, etc)	Rating scales
	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

2.5.2 IMPACT 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.**

Table 2-8: Criteria for rating impact 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

2.5.3 IMPACT EVALUATION AND DETERMINATION OF SIGNIFICANCE OR SEVERITY

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 magnitude 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;

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

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 2-9: 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
	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 2-10: Impact Severity

Impact Rating	Impact Description	Rating scales
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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
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2.5.4 CUMULATIVE IMPACT ASSESSMENT (CIA)

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. These included aspects 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.

2.6 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.

3 PROJECT DESCRIPTION

3.1 PROJECT LOCATION

Bukizibu-Bumwena RGC is in Bumwena Parish, Malongo sub-county, Mayuge District.

Malongo sub-county is bordered by Kityerera sub-county to the North and Lake Victoria to the East, West and South thereby making the sub-county a Peninsula.

The RGC is located approximately 40km by road from Mayuge District headquarters along the Mayuge-Bumwena-Malongo road. Bukizibu and Bumwena towns centres that form the project area are approximately 500 m apart and separated by a swamp through which an access road connects both town centres.

The project area comprises of four villages within the core of the RGC. These are; Bukizibu A, Bukizibu B, Bukizibu C and Bumwena B, all located in Bumwena Parish.

The project main components will be located at GPS coordinates and villages indicated in **Error! Reference source not found.** and shown on a map in in *Error! Reference source not found.* below.

Table 3-1 Location of Main Project Components

No.	Component	UTM, 36N	Village	Parish
1	Borehole (DWD 60824)	556696.00 m E, 29164.00 m N	Bukizibu A	Bumwena
3	Reservoir Tank	557241.00 m E, 29204.00 m N	Bumwena C	Bumwena
5	Water field office	555638.46 m E, 27935.09 m N	Bukizibu A	Bumwena
4	Sanitation facility	557791.70 m E, 28537.35 m N	Bukizibu B	Bumwena

The project location is shown on a map in figure 2-1 below

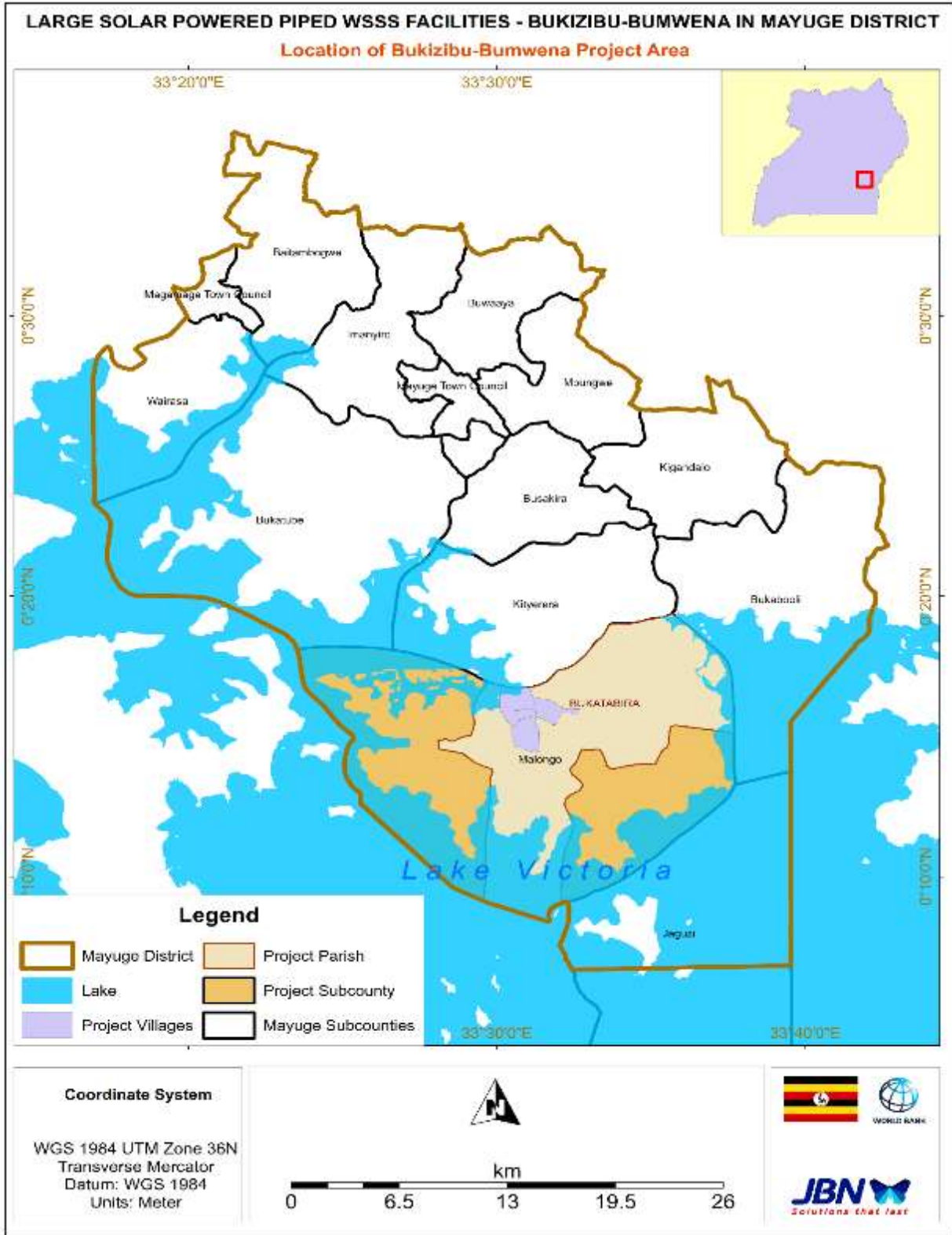


Figure 3-1 Location of Bukizibu-Bumwena RGC in Mayuge District

3.2 DESIGN CRITERIA

The Bukizibu-Bumwena RGC WSS was designed based on a 20-year design period, starting with the initial year 2019 up to the ultimate year 2040. The projected population to be served by the Bukizibu-Bumwena RGC water supply system by ultimate year is 8,922 people. The Maximum Day Demand (MDD) over a 16-hour pumping regime, which depicts the daily water consumption by domestic and nondomestic consumers is of 397 m³/day. This demand will serve the entire Bukizibu Villages (A, B & C) and a fraction of Bumwena villages as summarized in Table 3-2 below.

Table 3-2: Projected water demand in the project area

Bukizibu-Bumwena						
Served	2019	2020	2025	2030	2035	2040
Popn.	4,568	4,716	5,530	6,487	7,607	8,922
Domestic	102	106	124	145	171	200
Govt/Inst	23	23	27	32	38	44
Ind/Com	0	0	0	0	0	0
UFW	31	32	38	44	52	61
Average Day Demand (ADD)	156	161	189	222	260	305
Maximum Day Demand (MDD)	203	210	246	288	338	397

Source: MWE, feasibility Study and Design Report, 2019

3.3 PROPOSED PROJECT COMPONENTS

The proposed project is implementation/establishment activities of a solar powered piped water supply system and sanitation facilities under Bukizibu-Bumwena RGC in Mayuge District. The piped water supply system will comprise of different components as listed and further shown in **Figure 3-2** below: Technical drawings of the project components are attached as Appendix 2.

- i. Motorized borehole (DWD 60824) as the water source
- ii. Solar Pumps and Solar Panels for power supply,
- iii. A transmission main (Borehole to storage) for water transmission,
- iv. Storage reservoir for water storage,
- v. Distribution Network,
- vi. Intensification Network, and
- vii. Service Connections

- viii. Water field offices for administration and operations and maintenance of the system.
- ix. A waterborne public toilet, to improve sanitation in the RGC.

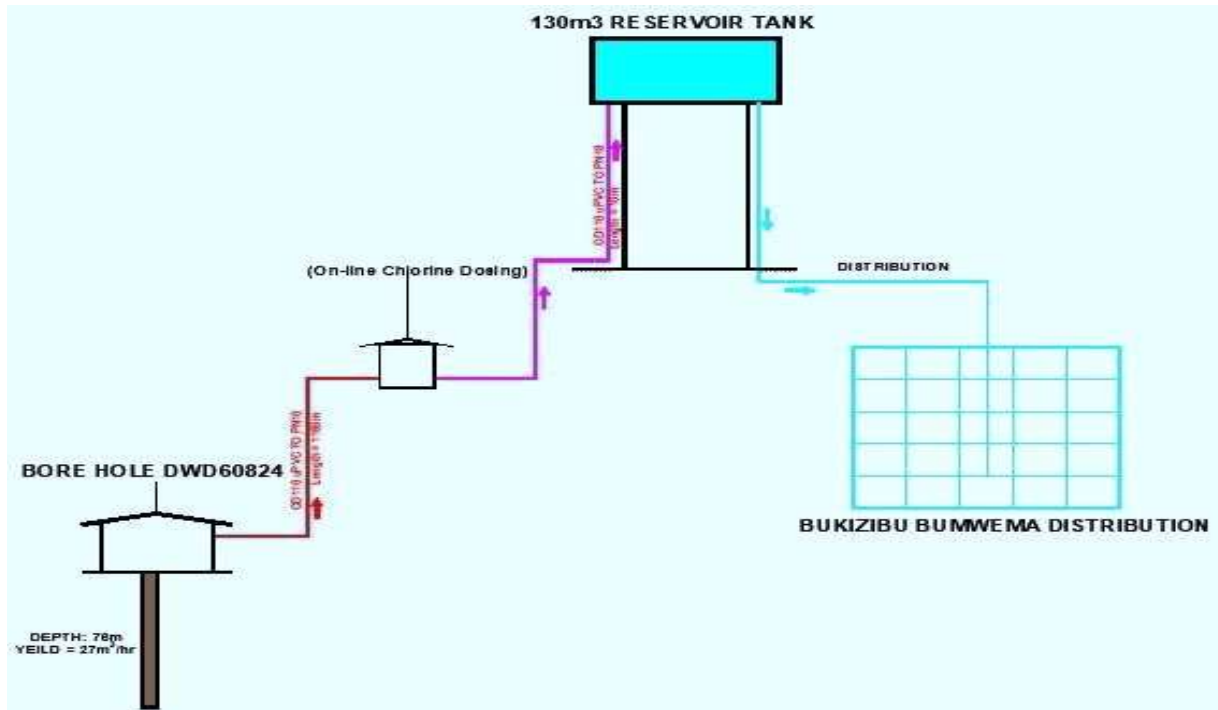


Figure 3-2: Bukizibu-Bumwena general water supply system thematic designs

3.3.1 THE WATER SOURCE

The proposed water supply system for Bukizibu-Bumwena RGC will utilize water abstracted from ground water sources (borehole - DWD 60824) using submersible pump installed at boreholes, complete with control kit and dry run protection as further detailed in **Table 3-3** below. 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 dimension (30m x 30m) will be constructed using G12 chain link and barbed wire fastened to G.I poles of dimension 75 x 75 x 3mm at a spacing of 2.5m c/c. G.I poles will be secured in a concrete foundation. Paspalum grass will be planted in the compound area. The current borehole site is shown in **Figure 3-3** below.

Table 3-3: Bukizibu-Bumwena Borehole (water source) details

Borehole Number	BH DWD 60824
Location	Bukizibu A
GPS Coordinates	556696.00 m E, 29164.00 m N
Supply Area Demand (m ³ /d)	397
Test Pump Yield (m ³ /hr)	26.50

Borehole Yield to be Used (m³/hr)	25.2
Hours of Pumping (hr)	16.0
Efficiency Pump (%)	60.0%
Efficiency Motor (%)	80.0%
Total Daily Delivery (m ³ /day)	403
Pumping Main Section No. 01 (From Pump Installation Point to Ground Level at Borehole)	
Ground Level at Borehole (m AMSL)	1146.39
Pump Installation Depth in Borehole (m BGL)	75.000
Cwh	140
Pipe Details	OD110 HDPE PN16
Pipe Diameter ND (mm)	90.00
Pipe Diameter ND (m)	0.090
Flow in Pipe (m ³ /hr)	25.175
Flow in Pipe (m ³ /s)	0.007
Velocity (m/s)	1.10
Length of Pipe Section No. 01 (m)	75.00
Friction Loss (m)	1.07
Fittings losses - 10% (m)	0.11
Total Headloss in Section 01 (m)	1
Pumping Main Section No. 02 (From Ground Level at Borehole to Ground Level at Reservoir)	
Ground Level at Tank (m AMSL)	1179.520
Ground Level at Borehole (m AMSL)	1146.390
Static Lift (m)	33.130
Cwh	140
Pipe Details	OD110 uPVC PN10

Pipe Diameter ND (mm)	99.40
Pipe Diameter ND (m)	0.099
Flow through pipe section 02 (m ³ /hr)	25.175
Flow through pipe section 02 (m ³ /s)	0.007
Velocity (m/s)	0.90
Chainage at Reservoir	1+160
Chainage at Borehole	0+000
Length of Pipe Section No. 02 (m)	1,160.00
Friction Loss (m)	10.24
Fittings losses - 10% (m)	1.02
Total Head loss in Section 02 (m)	11
Source: DED.	



Figure 3-3: Drilled borehole for Bukizibu-Bumwena RGC

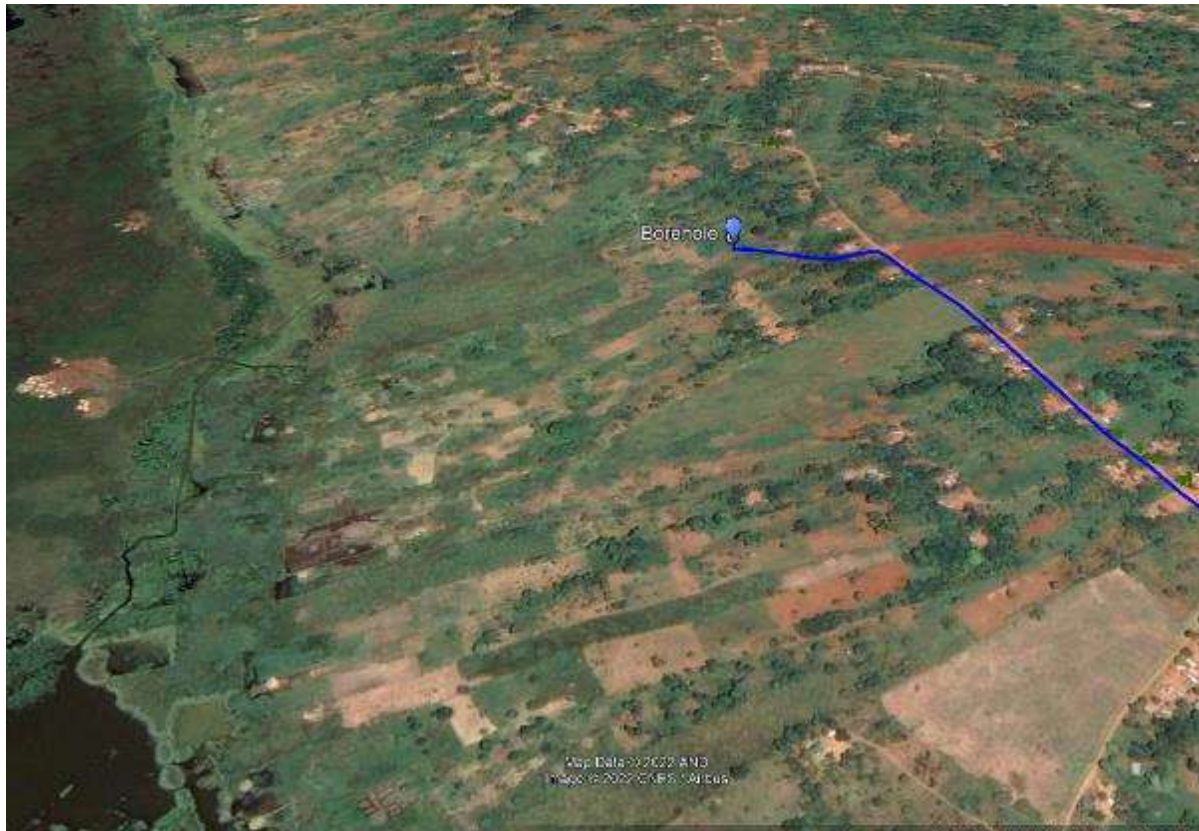


Figure 3-4: Google image of the borehole site

3.3.2 WATER TREATMENT/DISINFECTION FACILITIES

Disinfection of the water from the Bukibu-Bumwena RGCs production wells will be achieved by the installation of a DOSATRON online proportional chemical dozer at the sump according to the Detailed Engineering Design report for water supply and sanitation system of Bukizibu Bumwena RGC. 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.

3.3.3 WATER TRANSMISSION

Water from borehole will be pumped using a solar powered pump through a using 75 m long riser mains based on 16-hour pumping regime for 1.16km from Bukizibu A village to storage reservoir at Bukizibu C village. The transmission corridor will be along existing public roads and community access roads, and the pipes will be buried in the road reserves. There were no ecologically sensitive areas traversed by the transmission pipelines. The design specifications for the transmission line are presented in **Table 3-4** and transmission line shown in [Figure 3-5](#) below.

Table 3-4: Details of the water transmission line

Total Pumping Head from Borehole to Reservoir	
Total Static Head from Borehole Installation Point to Reservoir	108
Total Head loss from Borehole Installation Point to Reservoir	12
Total Pumping Head from Borehole to Reservoir	121
Summary of the Design	
Total Length of Transmission	
OD110 HDPE PN16 (m)	75
OD110 uPVC PN10 (m)	1160
Capacity of pump in the borehole	
Head (m)	121
Flow (m ³ /hr)	25.2
Power (kW)	17.2
Source: DED.	



Figure 3-5: Google image of the Bukizibu Bumwena RGC Transmission Network Model

3.3.4 WATER RESERVOIR

The main concepts adopted for the reservoirs are pressed steel reservoir tanks erected on steel towers (**Table 3-5**) to allow adequate gravitational pressures on the distribution network to distribute water to far reaches of the network based on the topographical nature of the project areas. The proposed site for establishment of the water reservoir for Bukizibu-Bumwena RGC is in Bukizibu C Village, Bumwena Parish. The main reservoir will also include an internal ladder of galvanised steel, wall mounted level indicator, vents on the tank roof, and roof level access cover of galvanised steel.

Table 3-5: Specifications of Bukizibu-Bumwena RGC Reservoir

RGC	Village	Parish	Sub County	GPS Coordinates	Capacity (m3)	Tower Height (m)
Bukizibu- Bumwena	Bukizibu C	Bumwena	Malongo	557241E, 29204N	130	15
Item	Storage projections					
	2019	2020	2025	2030	2035	2040
MD Demand- m ³ /day	203	210	246	288	338	397
Storage Capacity (m ³)	130	130	130	130	130	130
Hours of Storage	15	15	13	11	9	8
Storage Capacity (%)	64%	62%	53%	45%	38%	33%
Source: DED						



Figure 3-6: Typical set up of an elevated reservoir



Figure 3-7: Proposed location of Bukizibu-Bumwena RGC water reservoir in Bukizibu C village



Figure 3-8: Google image of the reservoir location in Bukizibu C village

3.3.5 DISTRIBUTION

The feeder mains shall convey water from Reservoir to all distribution areas of the projects by gravity. The total length of the distribution network is 7,349km with 33 service connections out of which 18 are Public Stand Posts or kiosks.

Table 3-6: Bukizubu-Bumwena RGC specification of distribution network

Pipe Details	Length (m)
OD160 uPVC PN6	139.6
OD110 uPVC PN6	320.3
OD90 HDPE PN6	497.0
OD63 HDPE PN6	629.0
OD50 HDPE PN6	5,763.1
Total Distribution Length (km)	7,349.0
Service connections	33

Pipe Details	Length (m)
Public tap stands/ kiosks	18
Source: DED	

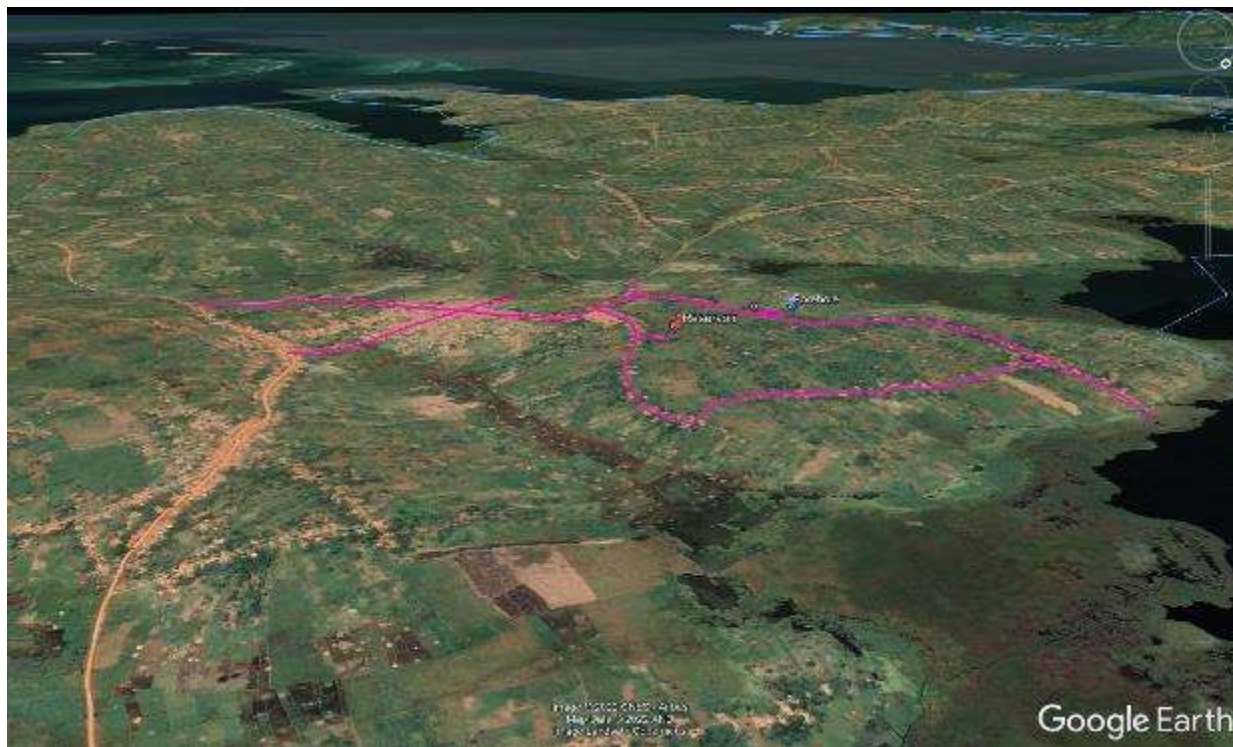


Figure 3-9: Bukizibu Bumwena RGC Distribution Network Model

3.3.5.1 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. Estimated quantities for this item have thus been included in the Bills of Quantities to cater for this.

3.3.5.2 POWER SUPPLY

The power supply option to the borehole is by use of solar power and it will be augmented by Hydro Electric Power. The pump power requirement is summarized in Table 3-7 below.

Table 3-7: Pumps and Power Requirements

Location	Head (m)	Flow (m ³ /hr)	Power (kW)	Required Motor Size KW	Available Motor (kW)	duty	kva	Total power (KVA)	Amperage (A)	Starting KVA
BH DWD 60824	121	25.2	17	19.8	20.0	1	25.00	25.00	34.78	25.00
Source: DED.										

While the solar energy per hour required to run the pumps was calculated using the formula above and the required motor size presented in Table 3-7 includes 15% of power presented in **Error! Reference source not found.** and number of panels in Table 3-8

Solar panel rating is (1x280pW)

Solar Panel Area = (number of solar panels required) / (@ solar panel area)

- Length of each panel = 1.65m
- Width of each panel = 1.0m

Table 3-8: Solar Power

Location	Solar Panels No. (1x280pW)	Solar Panels area (m2)
BH DWD 60824	83	50.3
Source: DED.		

The power requirement for the borehole includes the supply of and installation of 83No. of mono crystalline PV Solar panels rated at 280pW 12 Volts DC, including: PV solar panel support structure (solar array) for mounting solar panels; all electrical accessories; complete as per specifications.

Since 16-hrs pumping is required to meet the demand in the ultimate year (2040), Hydro Electric Power was considered into the design in order to meet necessary power requirements. This was done due to the limitation of solar working hours considered at 6 hrs maximum per day for design purpose. The energy cost has been optimised by taking into the account the power requirements to meet the demand at the intermediate year (2030) and at the ultimate year. (2040) To the intermediate year, the HEP shall be used for 4 hrs which takes the total pumping hours to 10 hrs and then between the intermediate year to the ultimate year, the system runs on HEP for 8 hrs, this takes the pumping hrs to 16 hrs. Through this, the energy cost for running the system is optimised without compromising pumping delivery to the tank.

Bukizibu Bumwena town centres are both connected to the national electricity grid which is the main source of power within and around the two project areas. Power will be evacuated to the site for approximately 800m.

3.3.5.3 ROAD CROSSINGS AND ACCESS ROADS

Water transmission and distribution will be gained through existing public access roads, given their convenient location in closed proximity to the existing road network.

From the reservoir tank, the transmission and distribution mains will make four road crossings within Bukizibu and Bumwena trading centres at coordinates 557039.25 m E, 28727.76 m N (road crossing 1), 557259.10 m E, 28832.65 m N (road crossing 2), 557606.95 m E, 28569.65 m N (road crossing 3) and 556832.89 m E, 29132.42 m N (road crossing 4) as shown in Figure 3-11 below. Project works at road crossings have potential to disrupt traffic if planning and execution is not well planned.

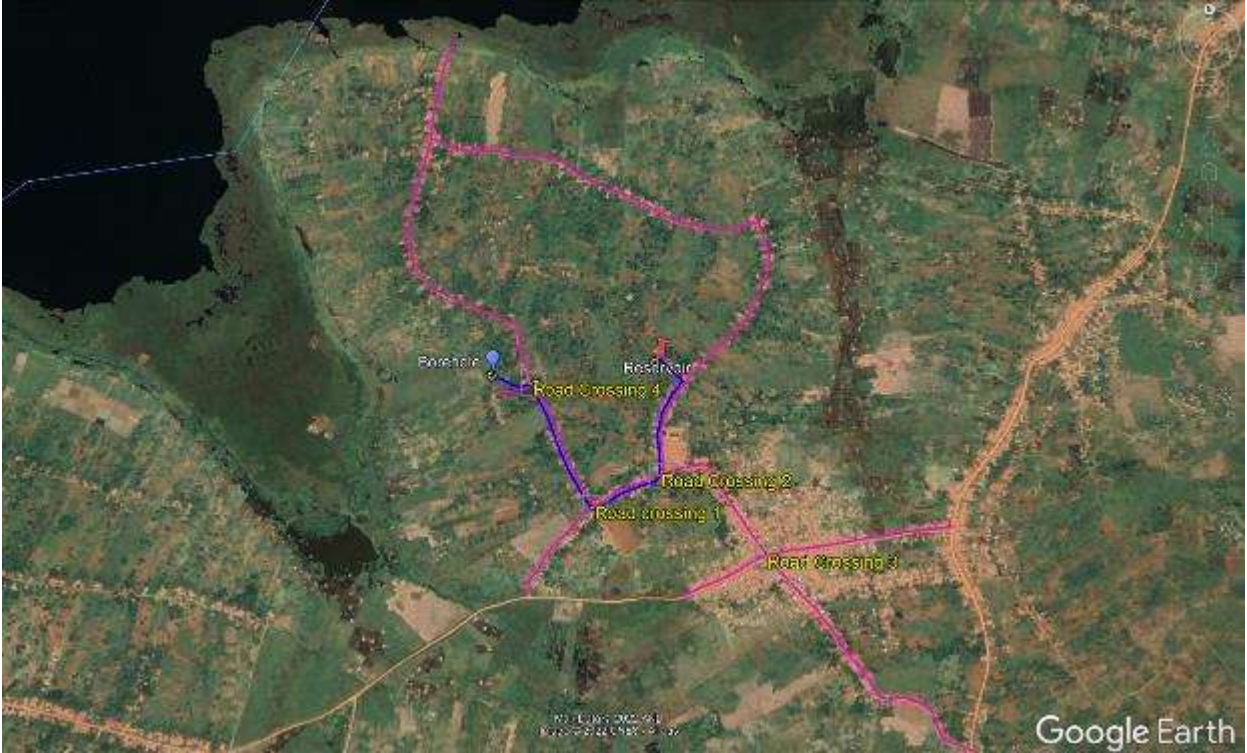


Figure 3-10: Water pipes road crossings



Figure 3-11: Road crossings in Bukizibu Bumwena RGC

The project borehole is located approximately 135 m from an access road to a landing site in Bukizibu A village as shown in Figure 3-12 below. The project will be required to open up an access road to the site during the construction phase to allow easy access of materials to the site and open access for operations and maintenance team during the operation phase of the project.



Figure 3-12: Location of the borehole about 135 m off an access road to a landing site

3.3.6 WATER OFFICES

According to the preliminary designs and project feasibility report, Bukizibu-Bumwena RGC will have a water office block to aid the day-to-day running of the water supply and sanitation system. The office block will be a host to a store, general office and front desk, Manager’s office, Accounts office, overseer and plumber’s office, sanitary facilities among others as indicated in the **Error! Reference source not found.** below.

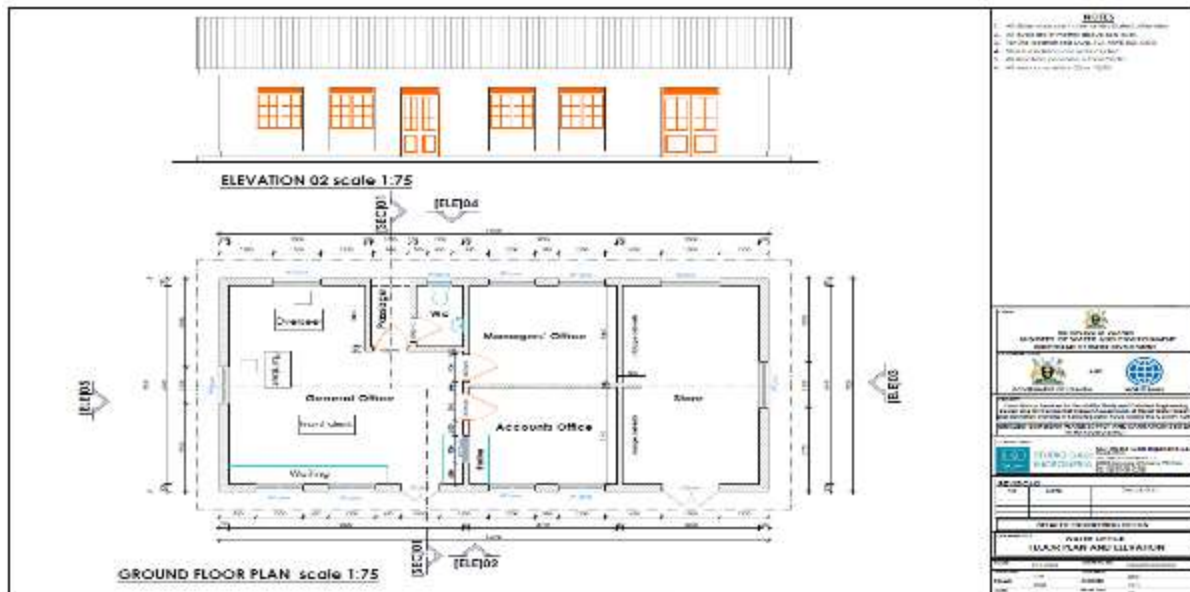


Figure 3-13: Proposed water office block layout plans

The field water office will be located at Malongo Sub County offices in Bukizibu A village, Bumwena Parish at GPS coordinates 555638.46 m E, 27935.09 m N.

3.3.7 SANITATION FACILITIES

Two (2No.) 6 stance water borne toilets whose locations are proposed at and for the Bukizibu-Bumwena RGC as indicated in the Figure 3-14 below. Each sanitation facilities will be gender disaggregated, with a 1000 litre water storage tank for the hand washing facility 1No. Stance on each side will cater for the disabled men and women.

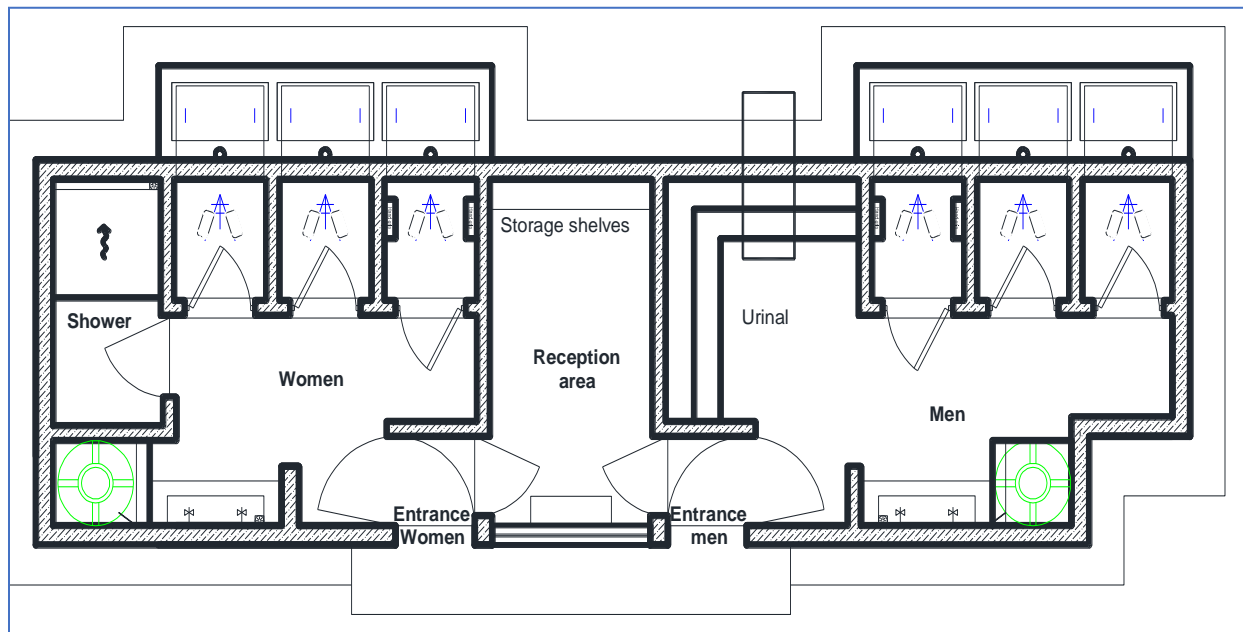


Figure 3-14: Layout of Proposed Public Water Borne Toilet

The public water borne toilet will be located in the center of Bukizibu Trading Centre (Bukuzibu B Village, Bumwena Parish) at GPS coordinates 557791.70 m E, 28537.35 m N.

3.4 PROJECT IMPLEMENTATION PHASES

The proposed Bukizibu-Bumwena RGC solar powered WSSS works will be implemented in three phases, namely:

- a) Construction activities and installation of different water system infrastructure facilities;
- b) Water system and sanitation facilities operation and maintenance works.

3.4.1 CONSTRUCTION PHASE

This will involve preparation of different project facilities and sites involving vegetation clearance, site excavations and levelling for foundational and civil works and subsequent installation of different infrastructure and equipment such as water distribution pipes, reservoir tanks, solar water pump among others. Major civil works will be undertaken for establishment of water offices and public toilets. Similarly,

major excavation works will be undertaken for borehole drilling and establishment of water distribution pipes trenches among other water supply system infrastructure.

3.4.1.1 CONSTRUCTION EQUIPMENT AND MATERIALS

Equipment

The construction equipment to be used during the implementation activities of the proposed solar-powered water supply and sanitation systems and support facilities under Bikizibu-Bumwena 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.

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.

3.4.1.2 HUMAN RESOURCE

During construction phase, the project shall have a supervising consultant who shall oversee the implementation of the project on behalf of the developer. The supervising consultant shall among others hire 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 technical workforce on the project. These will typically include civil engineers, architects, Environmentalists, Sociologists, Health and Safety officers, Site Nurse, site supervisor, foremen, equipment operators, administrators and support staff including about 50-60 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.

3.4.1.3 AUXILIARY FACILITIES

Secondary facilities associated with implementation activities of the proposed solar-powered water supply and sanitation system for Bikizibu-Bumwena RGC will include materials stockpile areas, workshops, equipment parking/storage yards, temporary site stores and sanitary facilities, site clinic among others. Additionally, it will be necessary for the contractor to establish a workers' camp to provide accommodation for experts that might come from outside the project area as well as project offices for the contractor and supervising consultant. The facilities shall all be acquired temporarily and established by the contractor in consultation with the local government with approval of the supervising consultant and local leadership. The identification, selection, construction, and operation of such facilities shall be in line with the provisions in NEA 2019 and other relevant statutory requirements. All the auxiliary facilities shall be subjected to independent and comprehensive Environmental and social impact assessments or project briefs and the necessary approvals shall be secured. On completion of the project implementation activities, all support infrastructure shall be decommissioned, and all disturbed areas shall be restored close to their original state through landscaping and re-vegetation.

3.4.1.4 MATERIALS SOURCES

Materials such as sand, gravel, aggregates and cement will be required for the construction of the sump, anchoring the reservoir tank; and construction of water kiosks among others. These materials are available within Malongo Sub County and for some such as cement can be purchased from Mayuge town. However, the contractor shall be required to get such materials from legally existing and authorized/licensed sources.

3.4.1.5 WASTE HANDLING AND DISPOSAL

During the construction, the contractor shall generate both hazardous and non-hazardous wastes including vegetation stripped from site, soil excavated from foundation sites, packaging waste (cement bags, paper, polythene sheets, and wood pallets), metal scrap, wire cuttings, wooden planks, polythene sheets, PET water bottles, empty paint and solvent containers and waste oil from construction equipment or vehicles. Some of the waste materials such as paints, cement, adhesives, waste oil and cleaning solvents contain hazardous substances. The generated waste must be managed in by a licenced waste handler in accordance with the national environment (waste management) regulation 2020 and Local Government Act (Amended) 1997.

3.4.2 PROJECT OPERATION PHASE

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:

- i) Operating the system in accordance with the set guidelines
- ii) Maintaining the system,
- iii) Developing the system,
- iv) Billing the consumers,
- v) Collecting revenue,
- vi) Receiving applications for and making new connections,
- vii) Making extensions to the system or assets,
- viii) Attend to all customers,
- ix) Prepare draft business plans for the authority,
- x) Prepare regular status reports for the operations of the system,
- xi) Maintain regular accounts for submission to the Ministry.
- xii) Operation of the Management Information System (MIS) as provided by the Ministry.
- xiii) Keep records of the operation of the water supply system - both physical and technical,
- xiv) Ensures that all accounts are audited, and
- xv) Set and publish Tariff & Charges.

3.4.2.2 SANITATION FACILITIES

The public toilets will be properly maintained by users paying a fee set by the local authorities. This will be in the form of;

- A monthly fee being charged to the residents within the locality of the public toilet who would wish to use it, while the non-residents paying a fee for every time, they use the toilet or,
- A standard user fee charged for using the toilet at any one time.

When the sanitation facilities fill up, they will be emptied and fecal sludge disposed of at the waste stabilization ponds in Iganga Town.

3.4.2.3 LABOR FORCE

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.

3.4.3 PROJECT DECOMMISSIONING

At the end of the project implementation works period, the contractor shall ensure restoration of the disturbed natural sites within the different project components site premises through environmental rehabilitation, backfilling and restoring topsoil and natural re-grassing to restore the sites to their near original natural state. The decommission phase will focus on removal and site restoration of temporally facilities at the two sites such as the temporally workers' shelter, workshop and equipment parking/storage yards, construction material holding/stockpile yards among others. All these works must be cleared by the supervising consultant from Ministry of Water and Environment and representatives of local leadership in the project area.

Specifically, the process of rehabilitating and restoring the sites shall be in line with the following sequential approach:

- a. All facility structures shall be demolished; the rubble/debris shall be used for fill purposes with approval of the Project Engineer and/or supervising consultant or dumped in approved dumping sites.
- b. All obsolete equipment, vehicles, trucks, and machinery shall be removed from project sites.
- c. In consultation with the local leadership all temporary access/diversion routes shall be closed and scarified and re-grassed.
- d. Backfilling and levelling of excavations with stocked topsoil.
- e. Planting of approved trees and grasses to stabilize slopes especially along cut site slopes and seeding of such reclaimed surface with native species; and
- f. Protecting of planted trees in a manner and duration in the contract with approval by the Engineer.

Important to note is that, decommissioning and restoration activities will be undertaken in line with the broader Decommissioning Plan of the project and is to be prepared and submitted to MoWE and NEMA for review and approval. Joint site inspections will be conducted to ensure full and adequate site restoration before hand-over of the project to MoWE.

3.5 PROJECT PROPONENT AND COST ESTIMATES

3.5.1 PROJECT PROPONENT

Permanet Secretary,
Ministry of Water and Environment,
Directorate of Water Development,
Plot 3-7, Kabalega Crescent Road,

3.5.2 PROJECTED INVESTMENT COST

The project has a Capital Investment Cost Estimate of US\$ 2,148,800,665 (Two Billion One Hundred Forty-eight Million Eight Hundred Thousand Six hundred sixty-five) as summarized in the table below:

Table 3-9: Project Investment Cost

Bill No	Description	Investment Costs (US\$)
GENERAL		
BUK G-1	General Items	176,600,000
BUK G-2	Method Related Charges	41,000,000
BUK G-3	Dayworks	6,944,200
WATER SUPPLY, SANITATION AND EQUIPMENT		
BUK W-1	Borehole Pump Station	73,511,691
BUK W-2	Borehole Pumping Mains	44,825,668
BUK W-3	Storage Reservoir and Site Works	262,217,237
BUK W-4	Distribution Network	147,532,765
BUK W-5	Intensification Network	287,087,470
BUK W-6	Borehole Guard House	20,433,080
BUK W-7	Chemical House	28,547,983
BUK W-8	Water Office	103,077,903
BUK ME-1	Mechanical & Electrical Works	369,523,820
BUK ME-2	Tools and Equipment	32,444,850
BUK S-1	6 Stance Waterborne Toilet (1No.)	61,723,800
	Sub-Total 1	1,655,470,466
	Allow for 10% contingency	165,547,047
	Sub-Total 2	1,821,017,513
	Allow for 18% VAT	327,783,152
	GRAND TOTAL	2,148,800,665

4 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This section presents a summary of key policies, laws, regulations, and guidelines relevant to the environmental and social aspects of the proposed implementation of Bukizibu-Bumwena RGC solar powered piped water supply system and sanitation facilities in Mayuge District. It also identifies agencies, departments, and institutions responsible for the monitoring and enforcement of legal requirements specified therein.

4.1 NATIONAL POLICY AND LEGAL FRAMEWORK

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

Table 4-1: Summary of Policies and Legislations Applicable to the Project

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
01.	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.	The developer has undertaken an ESIA for the proposed project, for which this ESIS has been prepared.
02.	Uganda Vision 2040	Uganda’s Vision 2040 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.	In the provision of the proposed water and sanitation facilities, the ESIA has indentated positive and negative impacts and has proposed appropriate enhancement and mitigation measures in the implementation of these facilities. Increased access to safe water and improved sanitation is in line with the aspirations of Vision 2040.
03.	The National Equal Opportunities Policy 2006	<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> <ol style="list-style-type: none"> a. Guide the planning processes, affirmative action, and implementation of programmers and allocation of resources to all stakeholders. b. Guide the establishment of legal, policy and institutional frameworks of all stakeholders. 	Discrimination and stigmatization, which act 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.

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
		<ul style="list-style-type: none"> c. Provide a framework for assessing responsiveness of programmers and activities to equal opportunities, in redressing any imbalances therein. d. Empower marginalized and vulnerable groups for their full participation in all development processes. e. Enhance capacity of implementing agencies to provide quality services with a view to monitoring compliance with affirmative action and the constitutional provisions. 	
04.	The National Environment Health Policy 2010	This policy establishes the environmental health priorities of the Government of Uganda and provides a framework for the development of services and programmers 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.	During the project implementation, all risks and impacts related to environmental health such as waste management, sanitation and hygiene, air pollution, vermin and vector control will be mitigated through appropriate mitigation measures in line with the policy.
05.	The National Policy on Conservation and Management of Wetland resources 1995	The overall goal of this policy is to maintain an optimum 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	Proposed project activities have to adhere to this policy requirements and undertake proper impact assessment to ensure that the implementation works of the solar-powered water supply and sanitation project under Bukizibu-Bumwena RGC in Mayuge District avoid or adequately mitigate adverse impacts on the wetland ecosystems within the project area.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		wetlands concerns into the planning and decision making of other sectors. This policy outlines guidelines for wetland resource developers.	Efforts will be accorded towards ensuring protection/conservation of wetlands traversed by any of the implementation activities of the different project components.
06.	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, 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 will abstract only the amount of water stipulated in the abstraction permit and will also endeavour to adhere to the permit conditions in line with the water policy. Meaningful stakeholder engagement will be undertaken from time to time to ensure the sound management of the water resource in line with this policy.
07.	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 district officials (especially District Community Development off Officer) will undertake several initiatives to guard against/prevent cases of Gender Based Violence relating to project implementation activities.
08.	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" while the goal of the policy is: "to ensure efficient, equitable and sustainable utilization and management of Uganda's land	Minimal land acquisition is expected according to the project design. Land acquisition processes have been initiated especially for establishment of different project components such as pumphouse, reservoir tanks, water source (borehole) area and sanitary toilet facilities among others. Thus, any aspects of the project

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
		and land-based resources for poverty reduction, wealth creation and overall socio-economic development”.	implementation relating to land acquisition and compensation will be addressed as guided by this policy. Similarly in line with OP/BP 4.12 where the project triggers land acquisition or restriction on land use, whether permanent or temporary), MoWE will offer affected persons compensation at replacement cost, and other assistance as may be necessary to help them improve or at least restore their standards of living or livelihoods.
09.	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.
10.	Uganda Gender Policy 2007	The Uganda Gender Policy mandates the Ministry of Gender, Labor 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.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
11.	The National HIV/AIDS Policy, 2004	<p>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.</p> <p>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>	The contractor in liaison with different district relevant offices such as DCDO, District HIV/AIDS Focal Personnel among others will ensure mainstreaming HIV/AIDS interventions into project plans and activities.
12.	The National Policy for Older Persons 2009	<p>The Policy promotes and contributes to the attainment of the development goals. This policy informs other policies, programmes, and sectoral plans. It will provide a framework for:</p> <ul style="list-style-type: none"> ▪ Enhancing the recognition of the roles, contributions, and potentials of older persons in the development process. 	The Policy seeks to assure older persons that their concerns are national concerns and they will not live unprotected, ignored, or marginalized. The goal of the Policy is the wellbeing of older persons. It aims to strengthen their legitimate place in society and help older persons to live the last phase of their life with purpose, dignity, and peace. The contractor will undertake the

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
		<ul style="list-style-type: none"> ▪ Strengthening the informal and formal community-based support systems and actions for older persons dignity. ▪ Promoting actions that encourage older persons to pass knowledge to the younger generation. ▪ Guiding, coordinating, and harmonizing interventions for older persons by stakeholders; and ▪ Promoting research on issues of older persons. 	<p>proposed project works for Mayuge (Bukizibu-Bumwena) RGC with caution in residential areas especially with the noise levels and air quality which have the main effect on the elderly.</p>
13.	National Policy on Disability 2006	<p>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 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>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 employment even where they have the necessary qualifications and experience. During recruitment of workers to be employed in proposed implementation of solar-powered water supply and sanitation project under Mayuge (Bukizibu-Bumwena) RGC, there are PWDs who will apply for some jobs, the contractor should at least give chance to some PWDs who can compete for those jobs.</p>
14.	The National Orphans and other Vulnerable	<p>The Policy focuses on full development and realization of rights of orphans and other vulnerable children. The policy objectives amongst others provides for:</p>	<p>Families living with orphans and other vulnerable children often lack resources to cater for their needs. Therefore, interventions like the contractor carrying out Corporate Social Responsibility (CSR) through provision of</p>

N°.	Policy	Brief description and its key provisions	Relevance in the Project
	Children's Policy 2004	<p>Access to basic and essential services for vulnerable children and their families.</p> <p>interventions that benefit orphans and other vulnerable children are mobilized and efficiently utilized; and</p> <p>capacity enhancement of duty-bearers for orphans and other vulnerable children in the provision of essential services.</p>	<p>scholastic materials, food, and education to needy children in the area will enhance coping mechanisms of the affected households and communities will be promoted.</p>
Legislations			
01.	The Constitution of the Republic of Uganda, 1995	The Constitution requires that the project to be implemented without endangering human health and the environment.	The proposed project works under Bukizibu-Bumwena RGC in Mayuge District will be undertaken while ensuring safe and healthy environment is maintained as provided for in the Constitution.
02.	The National Environment Act 2019	The Fourth and Fifth Schedules of the Act lists projects to be considered for ESIA. Schedule 4 listed projects requires Project Briefs (ESMPs) to be prepared whereas Schedule 5 lists projects for Mandatory detailed ESIA including Scoping. Specifically, this project falls under Section 4 (j&k) of Schedule 5 of the National Environment Act 2019 which lists Utilization of water resources and water supply involving construction of gravitational water schemes and support facilities of more than 1000 m ³ /day or where the ecosystem is fragile and sensitive, for which Mandatory ESIA is required.	The proposed solar-powered water supply and sanitation project under Bukizibu-Bumwena RGC in Mayuge District falls under Schedule 5 for projects which require mandatory ESIA's before implementation, as such, the need to conduct this study.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
03.	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.
04.	The National Environment (Mountainous and Hilly Areas Management) Regulations, 2000.	Every landowner or occupier shall while utilizing land in a mountainous and hilly area shall amongst others, observe all necessary measures for sustainable management of such ecosystems as prescribed by these Regulations.	There are no major hills within the proposed project area for implementation of proposed project activities under Bukizibu-Bumwena RGC in Mayuge District. As such, a Hilly and Mountainous area use permit is not required. However, in areas where the project activities especially transmission/distribution lines traverse an elevated landscape, appropriate measures will be implemented to curb soil erosion, deposition, and siltation incidences.
05.	The Physical Planning Act, 2010 and The Physical Planning	It is 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	This is a relevant Act to the proposed solar-powered water supply and sanitation project under Bukizibu-Bumwena RGC in Mayuge District. Different provision of this act will be implemented during the establishment and operations of the different proposed project components.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
	(Amendment) Act 2020	<p>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>	
06.	The Uganda Wildlife Act, Cap 200, 2000	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.	The project area is not located within a wildlife conservation area and the ESIA did not establish any wildlife conservation concerns. However, measures will be undertaken to ensure any wildlife resources that maybe encountered during works are identified and protected in collaboration with Uganda Wildlife Authority.
07	Penal Code Act, 1950, Cap 120, Amended in 2007	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 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.	Implementation of the proposed project (the contractor, MWE, consultants, etc...) should follow provisions in the Penal Code Act to avoid committing offences in Bukizibu-BumwenaRGC that require application of the Act. In cases where offences are committed, the Law should be allowed to take its course.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
08.	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.	Some cultural sites or objects of significance to indigenous communities might be encountered/affected during project implementation.
09.	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.	For the construction of workers camps, the provisions of this Act will be relevant for inspection of the project machinery/equipment and project workers work conditions. Project implementation activities will take all possible mitigation measures 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.
10.	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.	Any disposal of waste shall need to be in line with the waste discharge regulations; proper management of fuel/oil spills is essential for minimizing chances of water contamination.
11.	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	The contractor will ensure that all project machinery (equipment and raw materials haulage fleet) observe traffic and road safety procedures including observing minimum speed

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		reasonable consideration for other persons using the road commits an offence.	limits, routine maintenance and observing road signs among others.
12.	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.
13.	The Land Act, Cap 227, of 1998 (as amended)	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.	Land acquisition will be undertaken for most of the project components under the Bukizibu-Bumwena RGC and therefore, a due procedure for land acquisition and compensation will be followed in line with this Act.
14.	The Employment Act, 2006	This Act provides for matters governing individual employment relationships in terms of circumstances of provision of labor. It is quite explicit on matters of forced labor that, no one should be forced to work, there should be no discrimination about recruitment process, and it prohibits sexual harassment in employment. It also Act provides for matters of grievance settlement and issues of payment of wages and salaries.	This Act is relevant in that, it addresses matters of engagement of workers and their rights while at work. The contractor shall adhere to the provision of this Act for all project-related recruit of workforce.

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
15.	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 Bukizibu-Bumwena RGC solar-powered water supply and sanitation facilities project implementation activities are expected to employ many people depending on their skillsets and need. The Act seeks to safeguard the workers and ensure that they are appropriately compensated in case of injuries resulting from project implementation activities.
16.	The Prohibition of Burning of Grass Act, 1974	Section (2) of this Act prohibits the burning of grass by any person in all areas of Uganda.	During project implementation works, the contractor must not engage in biomass disposal through burning unless otherwise expressly authorized by NEMA, MoWE or DEOs.
17.	Children Act Cap 59	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.	Child labor is to be prohibited during project implementation activities i.e., no employment of children below 18 years for project implementation activities.
18.	Domestic Violence Act 2010	The Act provides for the protection and relief of victims of domestic violence; provides for the punishment of perpetrators of domestic violence and spells procedures and guidelines to be followed by the court in relation to the protection and compensation of victims of domestic violence	This act gives guidance to the contractor and their workers on how to handle cases of domestic violence.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		as well as matters relating to cases of domestic violence in general.	
19.	Traffic and Road Safety Act Cap 361, 1998	The Act provides for administration, registration, and licensing of motor vehicles, driving permits, licenses for public service, private omnibus, and goods vehicles, use of motor vehicles, control of traffic, enforcement, and information on the national roads and safety council.	This Act gives guidance to management of safety during project implementation works. The relevant licenses shall be obtained for the contractor vehicles especially material haulage fleet and other equipment that will be used during project implementation.
20.	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 area this act will be relevant in this project. With regard to compensation the Act stipulates as follows: “Where any demand for compensation is made as a result of the clearance of any boundary or other line , a Government surveyor shall, as soon as conveniently may be, inspect any trees, fences, or standing crops which are alleged to have been cut down or damaged, and , if he or she shall consider that any compensation should be paid, shall pay or tender to the owner of the trees, fences or standing crops the amount of compensation which in his or her opinion should be allowed for them” .	In instance where the MoWE finds it necessary to undertake land survey for this project implementation works, the process will be guided by the Act and conducted by a registered surveyor authorized by the commissioner for surveys in Ministry of Lands, Housing and Urban Development.
21	The Local Government Act, 1997	The Act provides for decentralization and devolution of government functions, powers, and services from the central to Local Governments and sets up the political and	At the District Level, the District Environmental Officers, District Water Officer, District Engineer and Community Development Officers in the

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		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. Local government structures are important for mobilising support for the project as well as monitoring its social-environmental impacts both during construction and operation phases.	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.
22	Access to Information Act,	Provides for the right to access to information pursuant to Article 21 of the constitution	ESIA has disclosed/ documented part of the critical project information to the stakeholders and has documented stakeholder concerns which have formed basis for further stakeholder engagement and disclosure strategies.
Regulations and Standards			
01.	The Environmental Impact Assessment Regulations, 2020	The National Environment Management Authority (NEMA) issued Environmental Impact Assessment Regulations, S.I. N°. 13/2019 and amended in 2020 for conduct of EIAs, which are now part of the Environmental Legislation of Uganda. The actual implementation of the EIA process remains a function of the relevant line ministries and departments, the private sector, NGOs and the general	The developer and the contractor have undertaken this ESIA study with particular focus on the content specified within the First Schedule of these Regulations.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
02.	Water Resources Regulations, 1998	The Regulations apply to motorized water abstraction from boreholes or surface watercourses or diverting, impound or using more than 400m ³ of water within a period of 24 hours. Part II, Regulation 3 requires a water permit for operation of motorized water pump from a borehole or waterway.	Water needs for different aspects of project implementation activities including water source, construction activities and workers' camps domestic water requirements will be met through water abstraction from both surface and ground water sources within the project area. The Contractor will be required to abide by provisions of this law regarding abstraction of water to be used for project implementation works and at associated project facilities such material yards, workers' camps among others.
03.	The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations 2000.	These Regulations guides on the development procedures to be followed where developments are to be undertaken in wetlands, riverbanks, and lakeshores.	The proposed project activities for Bukizibu-Bumwena RGS Solar-powered water supply and sanitation activities may traverse several wetlands and rivers/streams; and it's likely that project implementation activities will to a certain extent affect these resources. m. Guided by these regulations, the contractor will adopt and implement appropriate mitigation/offset measures to minimise, avoid or prevent impacts on these resources.
04.	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.	Several proposed project activities such as material haulage, material extraction of both murram and stones, construction works among

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
		<p>The draft National air quality standards provide the following regulatory limits for these emissions.</p>	<p>others will likely impact on the local ambient air quality. Guided by provisions of these standards, the contractor will adopt appropriate measures to minimise, mitigate and prevent air quality deterioration resulting from project implementation activities.</p>
05.	<p>The National Environment (Waste Management) Regulations, 2020</p>	<p>A person who generates waste, a waste handler or a product steward shall, in compliance with the environmental principles set out in section 5 of the Act:</p> <ul style="list-style-type: none"> a. apply measures in the management of waste to prevent harm to human health and ensure safety of human beings b. Apply measures in the management of waste to prevent pollution, harm to biological diversity and contamination of the wider environment by waste. c. use best available technologies and best environmental practices to manage waste; and d. ensure resource efficiency <ul style="list-style-type: none"> (i) By the application of the waste management hierarchy and the control or minimization of the generation of waste to the greatest extent possible. (ii) by promoting proper cyclical use of resources; and 	<p>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.</p>

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		By ensuring proper disposal of circulative resources not put into cyclical use.	
06.	The 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, among others.
07.	The National Environment (Noise Standards and Control) Regulations, 2003	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 Bukizibu-Bumwena RGC and other associated activities will trigger noise generation. These standards shall however be applied to keep the noise levels in permissible limits as well as mitigating noise generation at the source.
08.	National Environment (Control of Smoking in Public Places) Regulations, 2004	According WHO, Secondhand 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	Requirements of these regulations should be fulfilled by the contractor through instituted structures especially within workers' camps, on site and other auxiliary project facilities to avoid exposure of workers to tobacco SHS and associated health risks.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		<p>areas, toilets, and public service vehicles. The regulations task owners of such places to designate "NO SMOKING" and "SMOKING AREAS" in premises. In the proposed 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>	
09.	<p>The National Environment (Audit) Regulations 2020</p>	<p>Part III of these regulations require the developer of a project or activity listed in Schedule 3 to these Regulations shall carry out an environmental compliance Audit. 12months after start of works hence, this project will commission an Audit after 12 months of its start.</p>	<p>These regulations require developers/operators of development projects whose activities are likely to have a significant impact on the environment to establish an environment management system. The contractor of the proposed BuKizibu-Bumwena RGC project activities under the supervision of MoWE will develop and appropriately implement an EMS, as part of a contractual obligation.</p>
10.	<p>National Environment (Management of Ozone Depleting Substances & Products) Regulations S.I. No. 48 of 2020</p>	<p>The Regulations prohibit any developer/proponet/person without valid authorisation granted under these Regulations to produces, import, sell, distribute, use, export, or re- export any restricted substance or produce.</p> <p>Part II of these regulations stipulates that any person who intends to import, produce, sell, distribute, export or re-export a restricted substance or product under regulation 4(2) or (4) shall apply to the Authority for authorisation in the format set out in Schedule 4 to these Regulations.</p>	<p>The project through its implementation activities such as operations of project equipment may undeliberately release some of the substances. In such instances, provisions of these regulations will be applied.</p>

4.2 INTERNATIONAL PROTOCOLS AND CONVENTIONS

The relevant international protocols and conventions for which Uganda is a signatory to as presented in **Table 4-2** below.

Table 4-2: 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.
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.
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>
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 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

Protocol or Convention	Purpose
	future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities
Stockholm Convention on Persistent Organic Pollutants, 2001	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.
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.

4.3 WORLD BANK ENVIRONMENTAL AND SOCIAL SAFEGUARDS POLICIES TRIGGERED

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

Table 4-3: Safeguards Policies triggered by the project

Safeguards Policies	Triggered?	Key provisions/requirements	Measures adopted
Environmental Assessment (OP/BP/GP 4.01)	Yes	The Project is Category B and therefore requires environmental and social assessment. Safeguards policy OP 4.01 has been triggered, given that the project will include civil works for the proposed Solar-Powered Water supply and Sanitation Project under Bukizibu-Bumwena RGC are associated with amongst others noise, dust, waste generation, materials sourcing, and transport. These must be assessed, and mitigations identified.	This Environment and Social Impact Assessment fulfils the requirements of this policy. The ESIA Report presents the potential social and environmental impacts associated with implementation of project activities and the appropriate enhancement for positive impacts and mitigation measures for negative impacts have been proposed.
Natural Habitats (OP/BP 4.04):	No	The project is not anticipated to have a potential for significant adverse impacts on critical natural habitats or lead to significant conversion of natural habitats.	<p>The objective of this policy is to promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.</p> <p>Implementation of some project activities will traverse some ecosystem areas such wetlands, grasslands, shrubs, rivers/streams among others. The raw water intake (borehole) is adjacent to Lake Victoria.</p>

Safeguards Policies	Triggered?	Key provisions/requirements	Measures adopted
			<p>This project has been designed to minimize any adverse impacts on natural habitats as a result of Water Supply System development while strengthening the management of vulnerable catchment areas.</p> <p>To attain the objectives of this policy, the ESIA study assessed the natural habitats in terms of their flora and fauna diversity and water quality. The risk of introduction of foreign material through dumping of wastes and introduction of invasive species will have to be mitigated by sensitization of workers and use of approved waste disposal areas. A comprehensive assessment of the condition of the natural habitats and impacts and their mitigation measures are outlined in this ESIA (ESMP).</p>
Forests (OP/BP 4.36):	No	The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services.	<p>This policy applies, among others, to projects that may or will have impact on the health and quality of forests. The policy requires Bank financed investments to address the potential impacts of projects to forests.</p> <p>There are no Forest Reserves in the project area hence no need for a Forest Management Plan.</p> <p>Although no forest will be affected, the project will put in place measures that enhance tree cover in the project area inline with the National forestry and tree planting guidelines.</p>

Safeguards Policies	Triggered?	Key provisions/requirements	Measures adopted
Physical Cultural Resources (OP 4.11)	Yes	The project implementation civil works may lead to accidental excavations of physical cultural resources especially along the transmission/distribution among other project components sites.	<p>Whereas there are no serious cultural properties along the proposed water transmission and distribution corridors like graves, shrines have been found above ground in the project area, chance finds of archaeological / paleontological value could be encountered during construction especially while trenching channels for the water transmission pipes. Hence there is a possibility this safeguard may be triggered by the project.</p> <p>A detailed procedural guideline in the Chance Finds Procedure to be developed shall be considered if previously unknown heritage resources are exposed or found during project implementation works.</p> <p>When RAP studies are carried out, any physical cultural resources in the water transmission corridor will be enumerated as structures and all affected PAPs will be compensated for such structures to ensure that they are relocated in accordance with cultural norms of the affected people and society.</p>
Involuntary Resettlement (OP/BP 4.12)	Yes	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	Land acquisition procedures under this project will be thorough and undertaken through free 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.

Safeguards Policies	Triggered?	Key provisions/requirements	Measures adopted
		communities and persons; and, for this project, economic loss is possible.	
Indigenous Peoples (OP/BP 4.10)	No	The Bank recognizes that the identities and cultures of Indigenous Peoples are inextricably linked to the lands on which they live and the natural resources on which they depend. These distinct circumstances expose Indigenous Peoples to different types of risks and levels of impacts from development projects, including loss of identity, culture, and customary livelihoods, as well as exposure to disease.	No known Indigenous Peoples exist within the project area and therefore, this safeguard is not triggered or considered under the Bukizibu-Bumwena RGC in Mayuge District.
World Bank Policy on Access to Information (2015)	Yes	The Bank allows access to any information in its possession that is not on a list of exceptions. In addition, over time the Bank declassifies and makes publicly available certain information that falls under the exceptions. Notwithstanding the broad intent of this policy, the Bank reserves the right, under exceptional circumstances, to disclose certain information covered by the list of	There is need for disclosure of information to all the project stakeholders through the sharing of information with stakeholders such as district technocrats, Town council/ Sub County leaders, Local council leaders, and communities among others during the consultations process. Project information will remain accessible by them.

Safeguards Policies	Triggered?	Key provisions/requirements	Measures adopted
		exceptions, or to restrict access to information that it normally discloses.	

4.4 WORLD BANK EHS GUIDELINES

The World Bank has several sectors 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:

- a. EHS Guidelines – Water and Sanitation
- b. EHS Guidelines – Air Emissions and ambient air quality
- c. EHS Guidelines – Waste Management
- d. EHS Guidelines – Hazardous Materials Management
- e. EHS Guidelines – Construction and decommissioning

The study explicitly and adequately evaluated all the occupational health and safety aspects of the proposed project activities including those of project workforce and the general public during the implementation phase. Appropriate mitigation measures have been recommended for adoption at relevant stages of project implementation.

4.4.1 WBG EHS GUIDELINES: WATER AND SANITATION

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

- a. Potable water treatment and distribution systems
- b. 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;

- a. Environmental issues associated with water and sanitation projects may principally occur during the construction and operational phases, depending on project-specific characteristics and components.
- a. Drinking water – water withdrawal, water treatment, water distribution,
- b. 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).

- b. 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:
 - a. Accidents and injuries
 - b. Chemical exposure
 - c. Hazardous Atmosphere
 - d. Exposure to pathogens and vectors
 - e. Noise
- c. Community health and safety impacts during the construction of water and sanitation projects are discussed including;
 - a. Drinking Water – Water Intake (Water Supply Protection), Water Treatment (Drinking Water Quality and Supply, Hazardous Chemicals) and Water Distribution.
 - b. 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).

4.4.2 WBG EHS GUIDELINES: AIR EMISSIONS AND AMBIENT AIR QUALITY

4.4.2.1 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 (NO_x): 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.

4.4.3 WBG EHS GUIDELINES: WASTE MANAGEMENT

4.4.3.1 GENERAL APPROACH

In relation to the proposed solar-powered water supply and sanitation project works under Bukizibu-Bumwena RGC, this guideline provides for how construction waste generated by and throughout all implementation phases should be handled. 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).

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.

4.4.4 WBG EHS GUIDELINES: HAZARDOUS MATERIALS MANAGEMENT

4.4.4.1 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.

4.4.4.2 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.

4.4.5 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
 - a. **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.
 - b. **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.
 - c. **Solid Waste:** During project implementation, non-hazardous solid waste generated at construction sites including domestic waste and other wastes such as wood and metals.

d. **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 in the project area.

4.4.6 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.

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 like 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 4-4 & Table 4-5 below:

Table 4-4: Summary of Gap Analysis between Uganda and World Bank Safeguards

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. 	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).
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; • The Uganda Wildlife Act 2019; • The Land Act Cap 227; • The Fish Act Cap 197; • The Plant Protection Act Cap 31. 	There are general gaps which include lack of Regulations to implement the National Forestry and Tree Planting Act and the Wildlife Act.	Mitigation of cutting of trees included as follows: Contractor should get permit for tree cutting in case they fall within the project foot prints

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
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 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. 	This ESIA included the Chance Find Procedures (10.1.14) to facilitate and assign responsibility for identification, handling, and preservation of both tangible and intangible physical cultural resources during project implementation.
<p>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.</p>			

Table 4-5: 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	The Constitution of Uganda, 1995 recognizes four distinct land tenure systems, Customary tenure, Freehold tenure,	World Bank Policy recognises the rights of those affected people:	The Ugandan law does not compensate those without legal right or claim to the land.	Alternative land (wherever available) or Cash compensation at full replacement value or (based

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	<p>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>	<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>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>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 number 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 number 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	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	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
	of redressing 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.	are not fully 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).	Consult project-affected persons, host communities and local NGOs, as appropriate. Provide them opportunities to participate in	While the consultation requirement is inherent in the ESIA, it contains several	No gap.

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	<p>The Land Acquisition Act, 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.</p>	<p>the planning, implementation, and 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.</p>	<p>differences with the requirements of Bank policy.</p>	
<p>Grievance mechanism and dispute resolution</p>	<p>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.</p>	<p>Establish appropriate and accessible Grievance Redress Mechanism.</p>	<p>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.</p>	<p>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.</p>

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
Calculation of compensation and valuation	<p>According to the Land Act, Cap 227 (section 77), the value of Customary land shall be the open market value of the unimproved land. 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>Bank policy requires: (a) prompt compensation at full replacement cost for loss of assets attributable to the project; (b) if there is 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>There is no equivalent provisions on relocation assistance, transitional 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>Market value is based on recent transactions and thus if alternative property is purchased within a reasonable period of the 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>

4.5 INSTITUTION ARRANGEMENT

The proposed implementation/establishment activities of a solar-powered piped water supply system and sanitation facilities project under Bukizibu-Bumwena RGC in Mayuge District will require coordination involving several national lead and regulatory agencies assisted by local district level sectoral Departments. Table 17 below presents a profile of relevant institutions for the implementation of the proposed project activities.

Table 4-6: Relevant institutions for proposed project activities implementation

No	Institution	Mandate
1	Ministry of Water and Environment	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 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.
a)	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. DWRM issued the water abstraction permits for the project and will monitor compliance to the conditions of the permits throughout the project's lifetime.
b)	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. WMD will issue wetland use permits for activities to be carried out in wetlands and monitor compliance to the conditions of the permit, to ensure sustainable utilisation of wetland resources.
4	National Environment Management Authority	The National Environmental Act establishes NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental management activities in Uganda. NEMA has a cross-sectoral mandate to oversee the conduct of ESIA's through issuance of

No	Institution	Mandate
	(NEMA)	ESIA guidelines, regulations, and registration of practitioners. It reviews and approves environmental impact statements (EIS) in consultation with sectoral agencies. NEMA and the network of District Environment Officers will undertake third party monitoring compliance with project approval conditions during implementation and decommissioning.
5	Ministry of Gender, Labour and Social Development (MoLGSD).	The Ministry is responsible for ensuring workers are protected while at work and have good working conditions. The Ministry is also responsible for the welfare of workers including enforcing workplace laws and regulations, worker compensation and disputes, Child protection and management of Gender based violence.
6	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 while undertaking the Resettlement Action Plan. MoLHUD will also issue certificates of titles for land purchased by and registered to the Government under this project.
7	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 Bukizibu and Bumwena Trading Centres, which are considered District roads under road categorisation. Mayuge District will authorise 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.
8	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.

No	Institution	Mandate
		The project will be implemented in Bukizibu- Bumwena RGC, Malongo Sub County, Mayuge District. The police post at Malongo Sub County will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Mayuge 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	Mayuge District 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. Local government structures are important for mobilising support for the project as well as monitoring its social-environmental impacts both during construction and operation phases. At the District Level, the District Environmental Officers, District Water Officer District Engineer and Community Development Officers in the respective areas of project implementation will participate in monitoring the project to ensure that mitigation measures are adequate and advice or point out additional compliance requirements following their inspections.
13	Local Communities	These are the direct affected people. All project implementation impacts will be on communities especially those near areas earmarked for water transmission/distribution and establishment of other components such as the borehole, reservoir tank, water pump, sanitary toilets among others.

4.6 APPROVALS, PERMITS AND LICENSES

Several approvals and licenses will be required before commencement of certain construction activities. Securing of approvals requires preparation of the relevant documentation and payment of fees. This needs to be done during mobilization to ensure that all approvals are secured in a timely manner to avoid construction delays. It is important to ensure that all materials (sand and aggregates) are sourced from quarries, borrow pits and sand mines have relevant Environmental and Social Assessments carried out and approved by the World Bank and NEMA in compliance with environmental laws. For all auxiliary sites to be opened, NEMA approval must be secured while all existing sites should undertake/provide proof of having undertaken environmental compliance audits. A list of permits and licenses necessary for execution of the project are indicated on the Table 16.

Table 4-7: Permits, Licenses and Approvals required by proposed Bukizibu-Bumwena RGC activities

	Permits/Licences/ Approvals	Issuing/Approving agency	Use	Responsibility	Legal Framework
1	Environmental approval ESIA certificate.	NEMA	Approval for commencement of the project	MoWE	National Environment Act 2019
2	Water abstraction permit.	Water Resources Management Directorate, (WRMD)	Abstraction of water at the source (borehole)	MoWE	Water Act, cap 152
3	Waste Disposal Permit	NEMA	Contractor	Contracted Licensed Waste Handler	National Environment Act 2019; National Environment (Waste Management) Regulation 2020
4	Mining Permit, Extraction of minerals, opening of quarries and sand pits	DGSM/ MEMD/ NEMA approval	Contractor	Contracted licensed Supplier	Mining Act, Cap 148
5	Wetlands Resource Use permit, if need arises	NEMA	Approval to conduct work on/ in a wetland.	MWE	National Environment Management (Wetland, Riverbank, Lakeshore) Regulation 2020
6	Hazardous waste storage, transportation,	NEMA	Onsite storage of hazardous	Contracted licensed	National Environment Act 2019; National

	Permits/Licences/ Approvals	Issuing/Approving agency	Use	Responsibility	Legal Framework
	and disposal license.		waste (e.g., used oil).	Waste Handler	Environment (Waste Management) Regulation 2020
7	Workplace registration	MGLSD	Registration of project and auxillary sites as workplace	Contractor	OHS Act, 2006
8	Work permits for foreign nationals	Ministry of Internal Affair	Contractor & Supervising, Consultant/ MWE	Contractor	Immigrations Act, Cap 66
9	Building and hoarding Plan Approval (Workers camps, Workshops, and other structures to be used as operation areas or accommodation for staff)	District Government Local	The plan must conform to regulatory standards for human occupancy	Contractor	
10	OTV licences	Ministry of Works and Transport	Transportation of workers	Contractor	
11	CESMP Document Approval	Client/MWE	Operationalize the ESMP from the ESIA	Contractor	Construction Contract
12	Permit for Storage of Petroleum Products and dispensing license	PSD/MEMD	Use of petrol, diseasl and other petroleum products for project equipment	Contractor	Petroleum Act, Cap 2003

	Permits/Licences/ Approvals	Issuing/Approvingagency	Use	Responsibility	Legal Framework
13	Road Reserve Use Permit	UNRA	To allow installation of pipelines in the road reserve	Contractor	The Uganda National Roads Authority (General) Regulations 2017
14	Certification of statutory equipment	MGLSD, UNBS	Regulation and standadising equipment	Contractor	OHS Act, UNBS Act
15	Traffic Diversions consent	Uganda Police	Diversion of traffic	Contractor	Traffic and Road Safety Act 1998
16	RAP approval conditions for this project	CGV	Implementation of the RAP	MWE	The Land Act Cap 227

5 BASELINE ENVIRONMENTAL AND SOCIO-ECONOMIC SETTINGS IN THE PROJECT AREA

5.1 PHYSICAL ENVIRONMENT

5.1.1 CLIMATE AND WEATHER

Mayuge 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. The area experiences extreme seasonal variations in monthly rainfall throughout the year. The project area experiences two rainy seasons. The first rainy season is from March to May followed by a less pronounced rainy season from September to November. The annual rainfall varies between approximately 1450 mm and 1565 mm (Figure 5-1). Spatially, rainfall is more concentrated in the North Eastern part of the project area, gradually reducing towards the South West.

Generally, June is the driest month with maximum precipitation of about 58 mm. The rainy season commences in March until May where maximum precipitation (about 244 mm) occurs. Between January and February, the precipitation is low at about 65 mm, while from September to November, high precipitation is experienced to a peak of about 150 mm. December shows gradual decline in precipitation to a low of about 91 mm (Figure 56). The project area is estimated to have an annual average temperature that typically varies from 16.7°C to 28.9°C and is rarely below 15.6°C or above 32.8°C. The monthly ambient temperature varies throughout the year with the high maximum temperatures observed in January, February, March, November, and December, while the minimum temperatures occur in April to October (Figure 5-1).

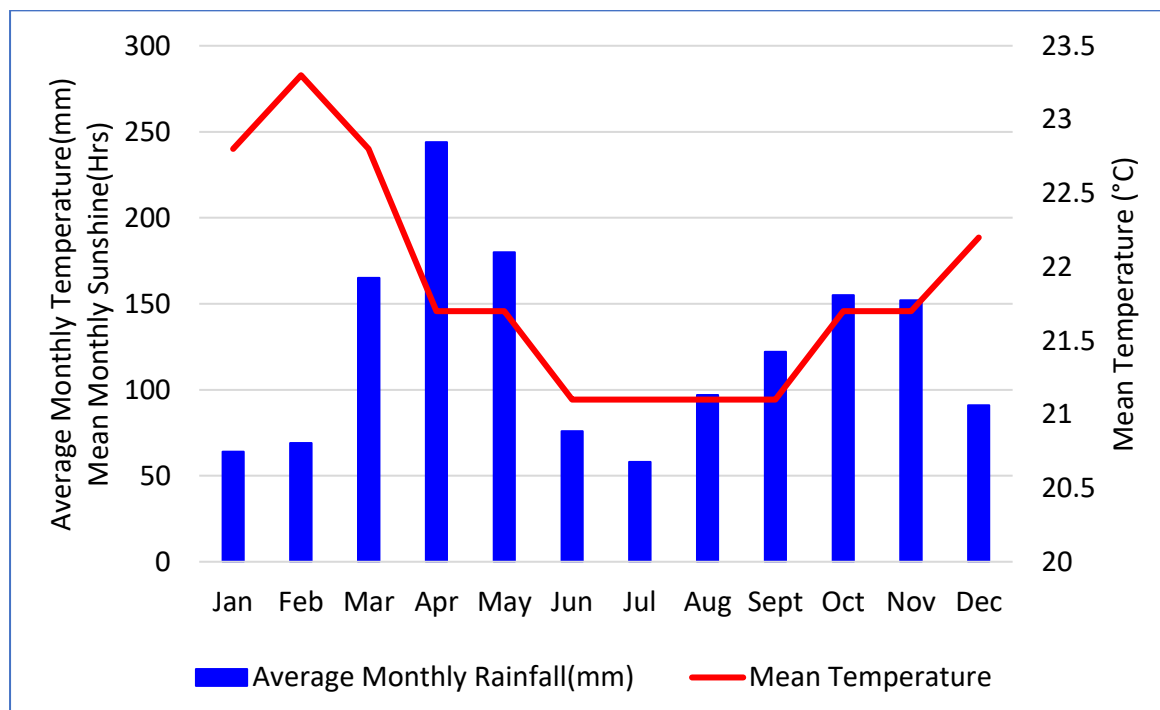


Figure 5-1: Mean monthly precipitation in the Mayuge District

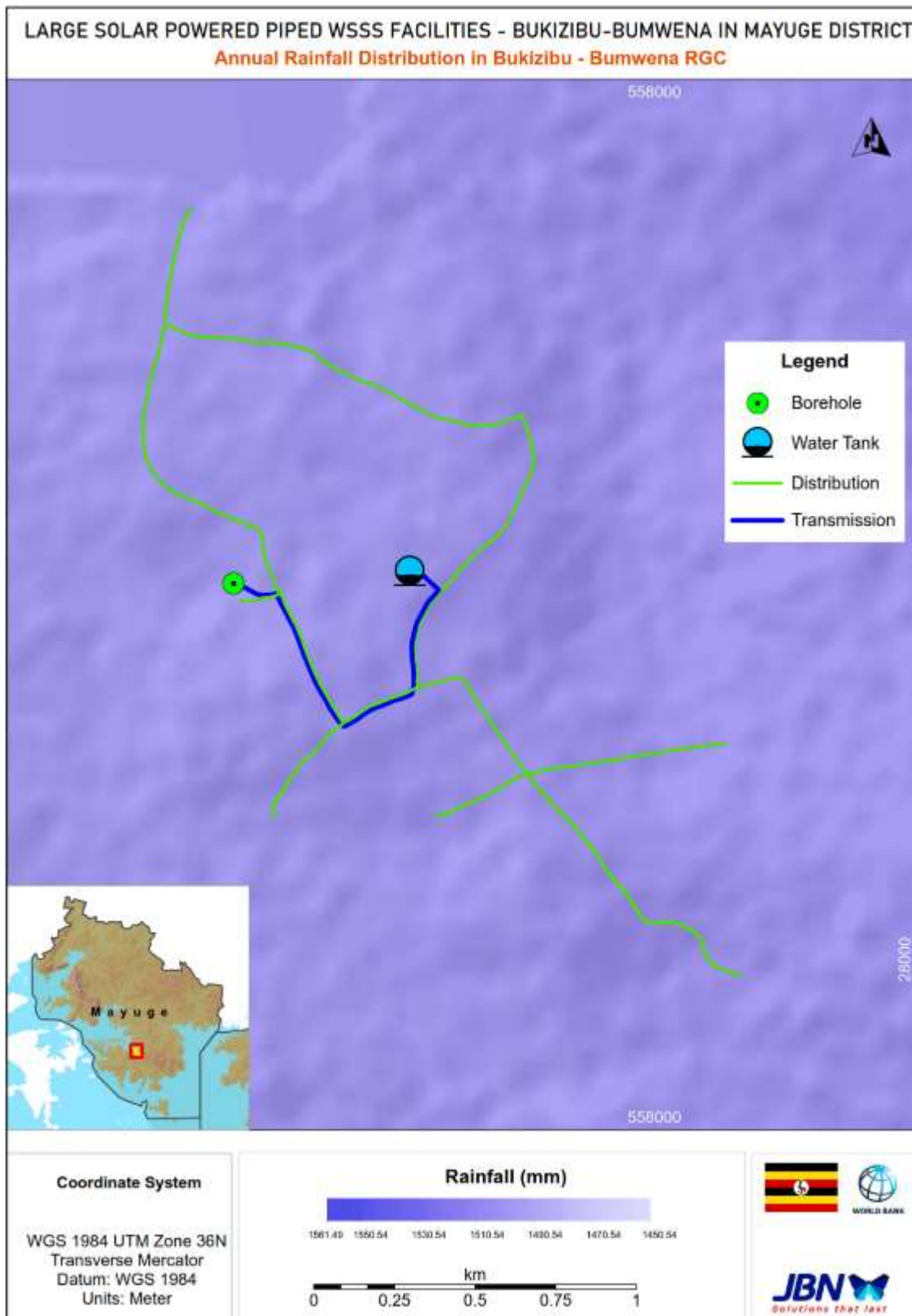


Figure 5-2: Mean annual rainfall distribution over Bukizibu - Bumwena project area

5.1.2 WATER RESOURCES AND HYDROLOGY

According to the Uganda Water Supply Atlas records by 25th April, 2022, 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). Mayuge district is located in Eastern Uganda partly along Lake Victoria shores and on Islands in Lake Victoria. Actually, a bigger portion of Mayuge district is occupied by Lake Victoria. The district has both surface and groundwater resources in form of streams and rivers with wetlands, especially along the shores of Lake Victoria. Situated in between two WMZs, the district drains into Lake Kyoga and Victoria Basin. Much of the low-lying areas are characterised by wetlands drained by seasonal and permanent rivers into Lake Kyoga. There are numerous wetlands in the catchments with the main wetland systems being Kabere, Bukumbi, Naigombwa and Lumbuye. Bukizibu - Mwena RGC project area is drained into L. Victoria (largest surface water source in the district) in all directions (Figure 5-3). The borehole site is about 300m from the nearby lake shore but no river/stream was identified in the vicinity.

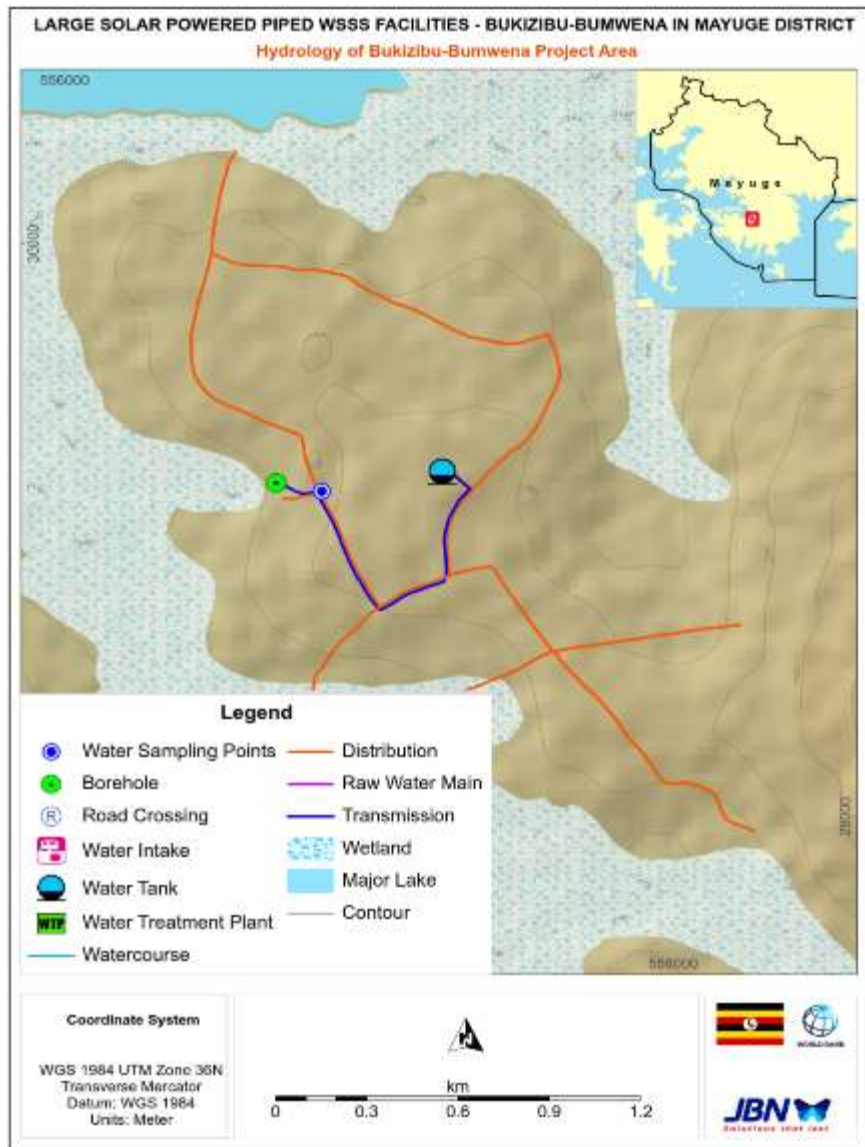


Figure 5-3: Project area hydrology

5.1.3 TOPOGRAPHY

Mayuge District is characterized by extensive undulating lowlands, isolated hills, and pediments of approximately 115m with linear and convex slopes between 2 and 8%. There are flat valley bottoms with slopes less than 2%. The general surface slopes range from 120m in the south-west near Lake Victoria 100m in the North. The district is sculptured into a rolling landscape with gentle slopes and swallow valleys (occupied by papyrus swamps) of amplitude far less than 115m and a large portion of ridges/hilltops, so much so that a lot of arable land is available on hilltops, slopes and the valleys and it is where most of the socio-economic activities take place. The project area is gentle sloping with

maximum and minimum elevations of 1130m and 1205m respectively. It is well drained to either direction because it's surrounded by the arms of L. Victoria (Figure 5-4).

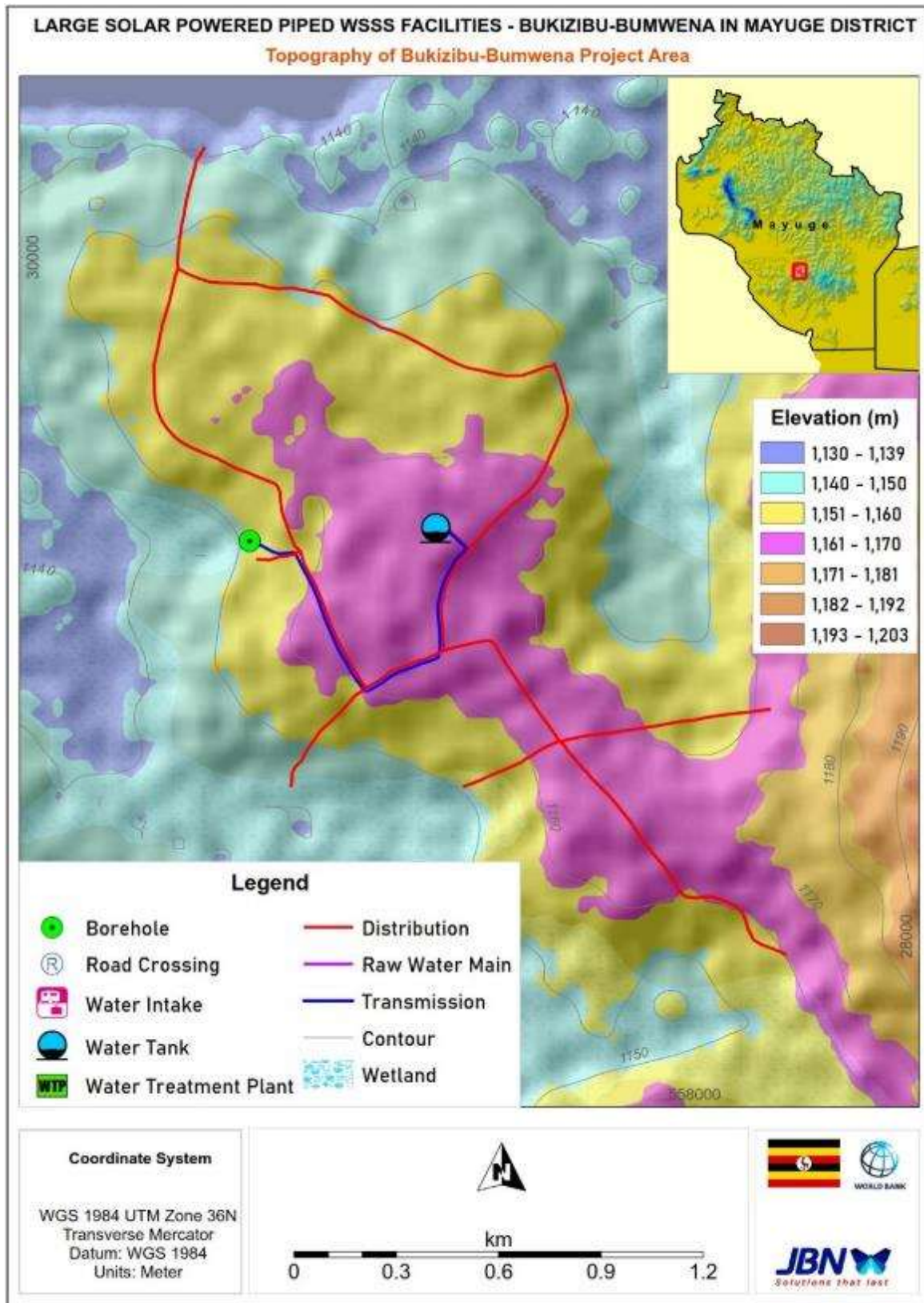


Figure 5-4: Project area topography

5.1.4 WATER QUALITY ANALYSIS

5.1.4.1 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 conducted. 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, since the project borehole was sealed to avoid contamination, a nearby borehole (approximately 150m from the project borehole) was identified as the potential source of the water sample (Figure 5-5).

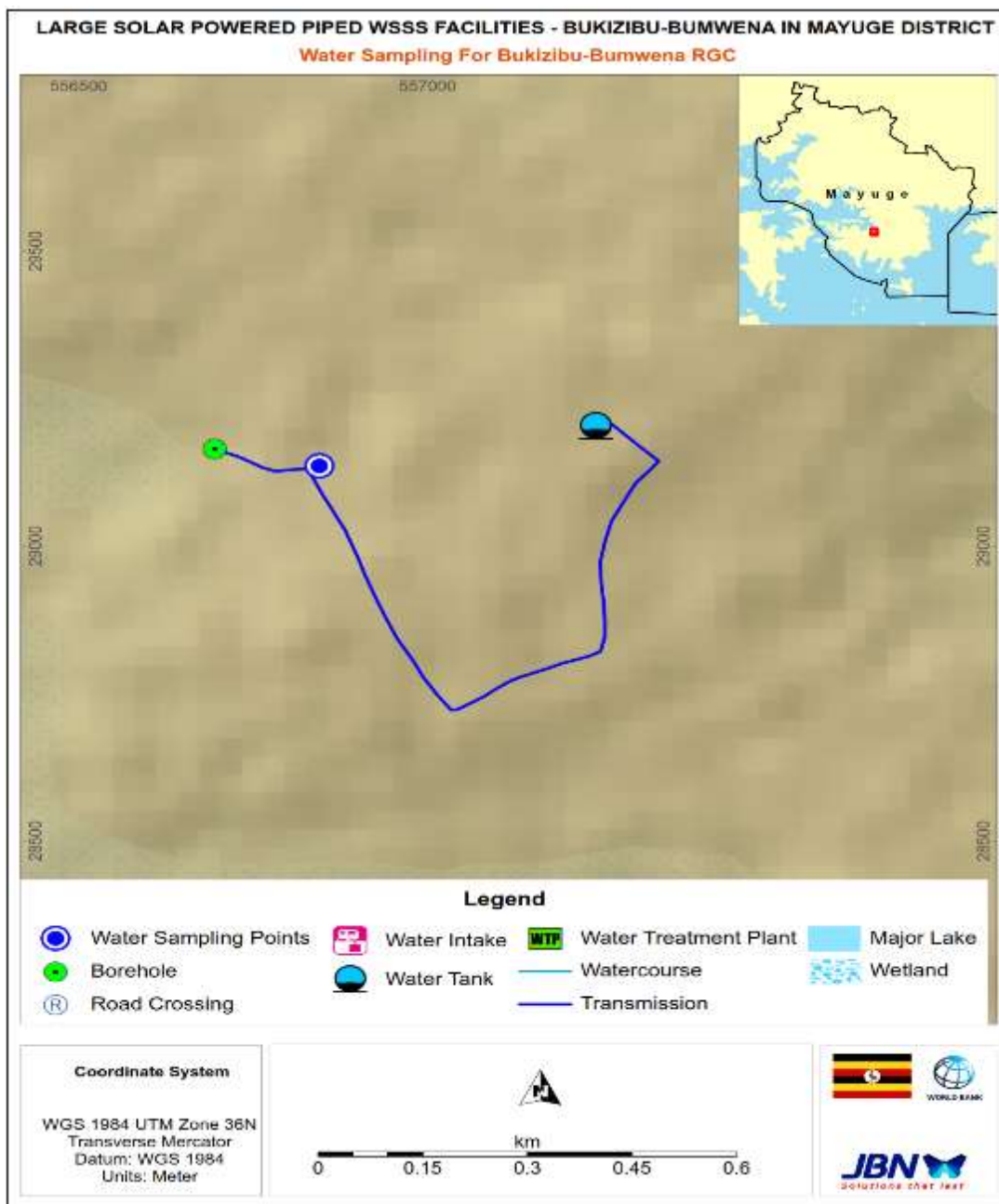


Figure 5-5: Location of the water quality measurement/sampling points

5.1.4.2 WATER QUALITY LABORATORY ANALYSIS RESULTS

According detailed engineering design, the water quality of the drilled borehole (DWD60824) meets the national standard for natural portable water as indicate in water quality analysis certificate **Appendi 3b**.

However, the ESIA team carried out water quality assessment from nearby borehole at Bukizubu for comparison purposes for water source proposed for development. The results are presented in *Error! Reference source not found.1*. All the parameters tested for were within drinking water standards (IDEAS 12 2018 Maximum permissible for natural potable water) except the Nitrite and Manganese. The water quality analysis certificate is presented in Appendix 3a.

Table 5-1: Water quality of the Bukizubu Borehole

Parameter (unit)	Test results	Uganda National Bureau of Standards Drinking water standards (DUS ISO 24510:2007 - Maximum permissible for natural potable water)
Turbidity (NTU)	0.65	25
pH (Units)	6.54	5.5-9.5
Electrical Conductivity ($\mu\text{S}/\text{cm}$)	585	2500
Total dissolved solids (mg/L)	410	1500
Total Hardness as CaCO_3 (mg/L)	175	600
Fluoride (mg/L)	0.19	1.5
Sulphate (mg/L)	31	400
Chlorides (mg/L)	43	250
Nitrates as N (mg/L)	0.28	10
Nitrites as N (mg/L)	0.0176	0.003
Manganese (mg/L)	0.0047	0.001
Total Iron (mg/L)	0.36	0.5
<i>E. coli</i> (CFU/100 mL)	<1	<1

5.1.5 GEOLOGY AND GEOMORPHOLOGY

Geology of Uganda is composed predominantly of Archaean basement rocks formed mainly between >3.08 Ga and 2.55 Ga and formerly attributed to a crystalline rock. The Archaean basement is divided into five domains composed of a) Lake Victoria Terrane (LVT) which is a classical Neo Archaean granite-greenstone terrane; b) North Uganda Terrane (NUT) - separated by a major mid-crustal pre-2.6Ga dislocation by the ~1.0 Ga Madi-Igisi Belt from the West Nile Block; c) West Tanzania Terrane (WTT)

and the RW = Rwenzori Terrane (Palaeoproterozoic). According to the geological map of Uganda (GTK, 2014), Mayuge lies in the Lake Victoria Terrane (LVT) of the Tanzania Craton extends into the south-eastern corner of Uganda. The LVT comprises predominantly mafic metavolcanic rocks overlain by a unit composed of felsic metavolcanics and met sediments and several granitoids. This includes the Iganga suite that covers the project area. The Iganga Suite covers an area of over 2000 km² from north of Iganga town to Lake Victoria (Figure 5-6) and is unconformably overlain by quartzites and shales of the Palaeoproterozoic Buganda Group in the west. The Iganga Suite is further divided into 7 related calc-alkaline granitic to granodioritic members of which (1) the locally porphyritic Mayuge granite is the most extensive (where the project site is located). Others include: Gogero porphyritic granite, Kibuye porphyritic granite, Butte granite, Porphyritic granodiorite, and Medium-grained granite. Mayuge granite, locally porphyritic covers an extensive area a red to pink, medium- to coarse-grained, generally equigranular but, locally, also porphyritic rock, exhibiting occasionally a weak E-W oriented planar fabric. It is a genuine alkali granite composed of quartz (30–50 vol%) and feldspar (40–60 vol%), whereby K-feldspar is dominant with white plagioclase only occurring in subordinate amounts (Figure 5-7).

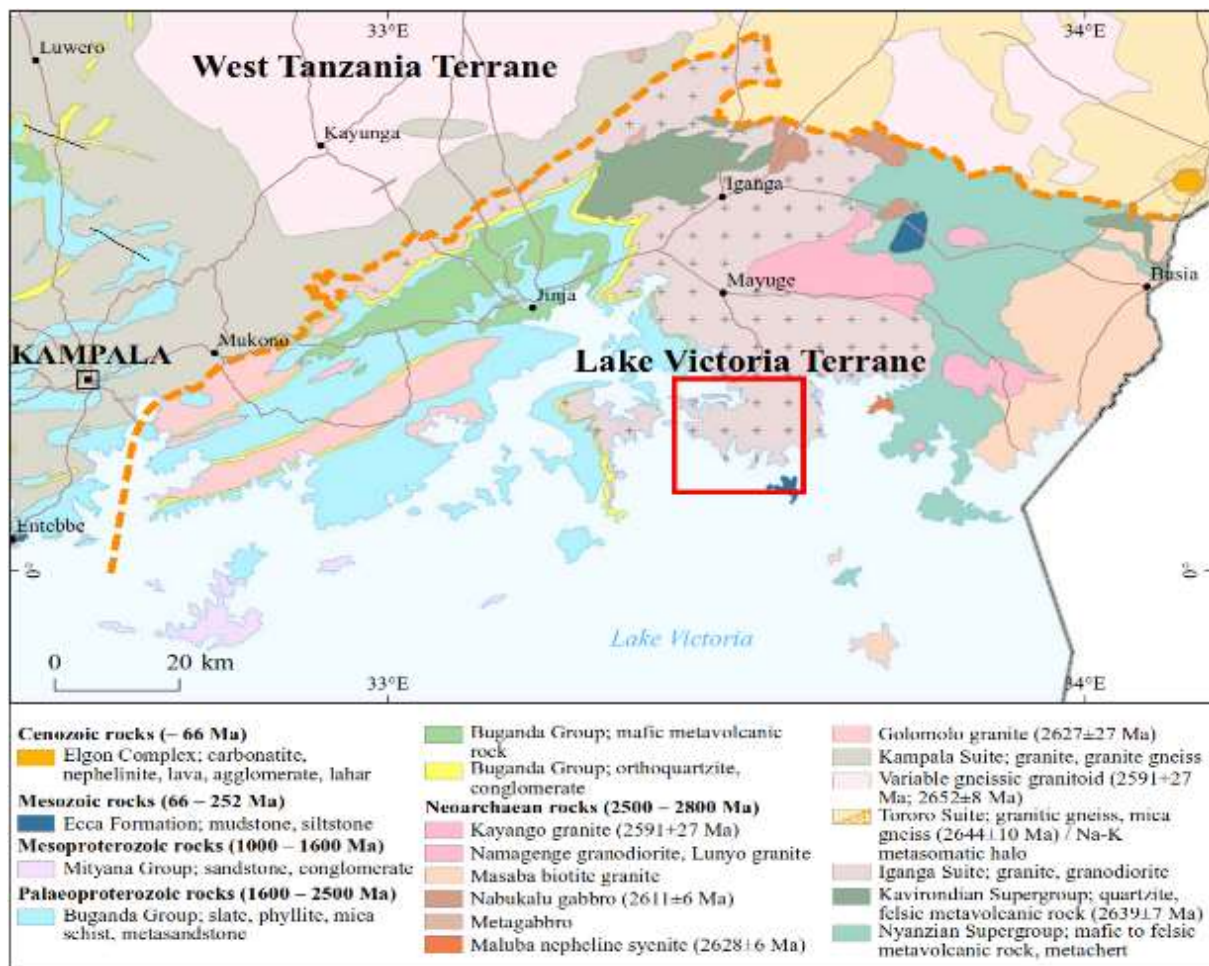


Figure 5-6: Geological map of Mayuge District Lake Victoria Terrane (LVT)

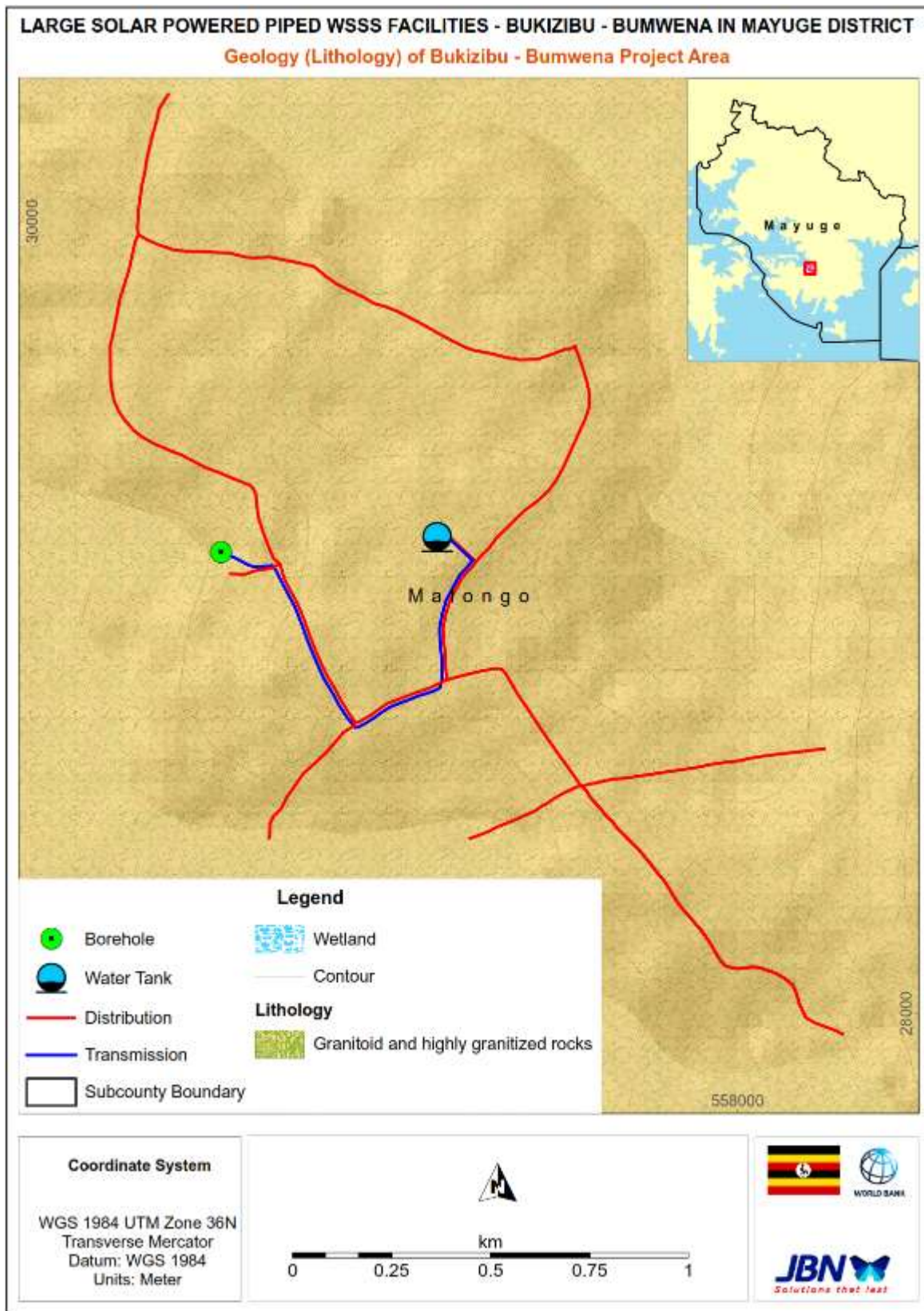


Figure 5-7: Project area geology

5.1.6 SOILS

Black and grey clays often calcareous; These soils have strongly pedal surfaces of fine clay aggregates which grade into coarse and fine structured strongly pedal heavy clays. The lower subsoil may be less dark or even mottled and grade into a carbonate layer. These soils have high nutrient levels including sodium. Some may be saturated for at least three months of the year due to topographic and groundwater positions, regarded as waterlogged soils. Notable characteristics include: high shrink-swell potential, strong structure, self-mulching surfaces, high organic matter content in upper soil, some mottling at depth, and high clay content throughout. They are deep to very deep (>2 m). The black and grey clays often calcareous soils were formed as a result of geological and weathering processes. They are mainly hydromorphic soils characterised by undifferentiated river alluvium. These commonly known as the Histosols.

Red and brown sandy loams over murrum and ironstone and on red clay loams; these are mainly used for gardening. This soil is normally made up of sand along with varying amounts of silt and clay. Most people prefer sandy loam soil for their gardening because this type of soil normally allows for good drainage. Sand particles are often larger and more solid than other types of particles found in soil, and for this reason, there is normally more room for water to move freely through it. If water cannot drain well, plants are often at greater risk of becoming oversaturated, which might increase the likelihood that they will rot and develop diseases or fungus. The reddish-brown sandy loam on red clay loams are underlain by the basement complex gneisses and granites of Kabira Catena commonly known as the Lixic Ferralsols. The red and brown sandy loams over murrum and ironstone are underlain by the Quartzites sandstones and relic laterite of the Lake Victoria (Figure 5-8 & Figure 5-9).



Figure 5-8: Soil type at the water source (borehole)

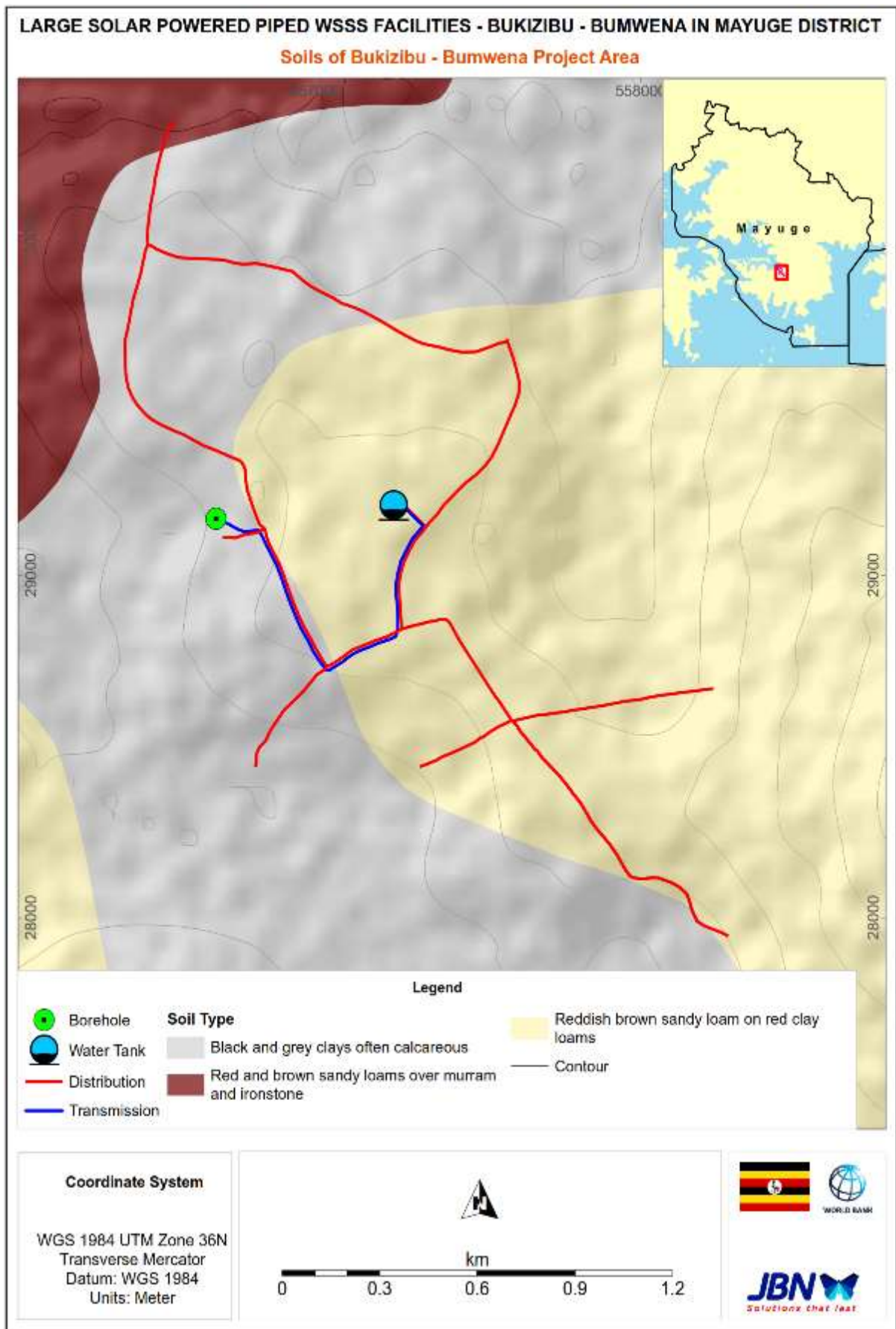


Figure 5-9:Project area soils

5.2 AIR QUALITY BASELINE (PARTICULATE MATTER AND GAS MEASUREMENT)

5.2.1 MONITORED PARAMETERS

Baseline investigations considered the following parameters: particulate matter, PM (measured as particles with an aerodynamic diameter <10 µm (PM10) and <2.5 µm (PM2.5)), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), volatile organic compounds (VOCs) and carbon monoxide (CO). PM2.5 is an important indicator of risk to health from particulate pollution and might also be a better indicator than PM10 for anthropogenic suspended particles in many areas. PM2.5 and PM10 baseline data will be useful in monitoring the dust nuisance around construction sites as well as vehicular emissions. The baseline for the gases (SO₂, NO₂, VOCs and CO) will also be useful in monitoring impact of construction activities on ambient air quality especially due construction fleet, use of volatile compounds, etc.

5.2.1.1 RESULTS FOR PARTICULATE MATTER

The Table below presents results for PM2.5 and PM10 taken at selected receptors within the Bukizibu-Bumwena RGC project area (Table 5-2, Figure 5-10 & Figure 5-11).

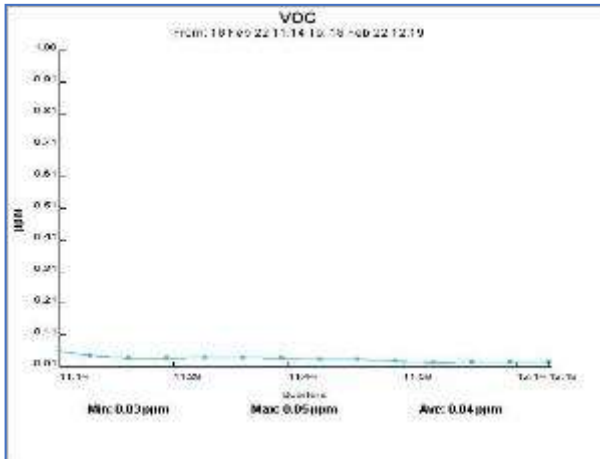
Table 5-2: Summary of baseline Particulate matter for Bukizibu-Bumwena RGC

Location	Date and Time	Coordinates 36N	PM10 (mg/m ³)				PM2.5 (mg/m ³)			
			Min	Aver	Max	WHO AQG	Min	Aver	Max	WHO (AQG)
Nawampongo village	18/02/2022 10:05am- 12:00pm	0556708 E 0029090 N	0.02	0.025	0.031	0.045	0.016	0.019	0.025	0.015
Bukizibu Trading Centre	18/02/2022 13:54pm- 15:24pm	0557653 E 0028571 N	0.031	0.062	0.177	0.045	0.016	0.023	0.031	0.015
WHO AQG (2021): PM2.5: 0.015 mg/m ³ (24hr averaging), PM10: 0.045 mg/m ³ (24hr averaging)										

The ambient average levels of PM 2.5 ranged from 0.019mg/m³ to 0.023mg/m³ while the average levels of PM10 ranged from 0.025mg/m³ to 0.062mg/m³. The values recorded at Nawampongo village was within the WHO Air quality limits for particulate matter. The low values of particulate matter recorded at Nawampongo village was attributed to the vegetation cover (trees and grass) of the area and the residential nature of the area. The values recorded at Bukizibu Trading Centre were however slightly above the WHO Air quality limits for particulate matter. The high levels of dust particles were mainly emanating from road users (hauler trucks, salon vehicles and motorcycles) along Bukizibu-Bumwena marrum road bisecting through the trading centre.

Bukizibu Centre	Trading	18/02/2022	Min: 0.00	Min: 0.097	Min: 0.10	Min: 0.03
		13:47pm - 16:47pm	Ave: 0.282	Ave: 0.105	Ave: 0.115	Ave: 0.04
			Max: 1	Max: 0.11	Max: 0.15	Max: 0.06
WHO AQG: NO ₂ : 0.2mg/m ³ or 0.106ppm (1-hour averaging), WHO AQG: SO ₂ : 0.5mg/m ³ or 0.2ppm (10-minute averaging), WHO, 1999: CO: 10mg/m ³ or 9ppm (8-hr averaging)						

The average values monitored at the two (2) sites; Nitrogen dioxide (NO₂) ranged from 0.105 ppm – 0.113 ppm, Carbon monoxide (CO) ranged from 0.282 ppm – 0.367 ppm, Sulphur Dioxide (SO₂) ranged



from 0.033 ppm – 0.115 ppm and 0.04 ppm for Volatile Organic Compounds (VOC). All average values of gases were in conformity with WHO Air quality Standards during the assessment, with exception from levels of Nitrogen dioxide (NO₂) recorded at Nawampongo village. The low levels of other gases recorded at Nawampongo village were attributed to residential setting of the area with no economic activities. Activities within Bukizibu trading centre were limited to movement of vehicles and boda boda cyclists that would ignite emission of these gases especially (NO₂), explaining the low levels

recorded as indicated in Table 5-3 above and Figure 5-12 & Figure 5-13 below .

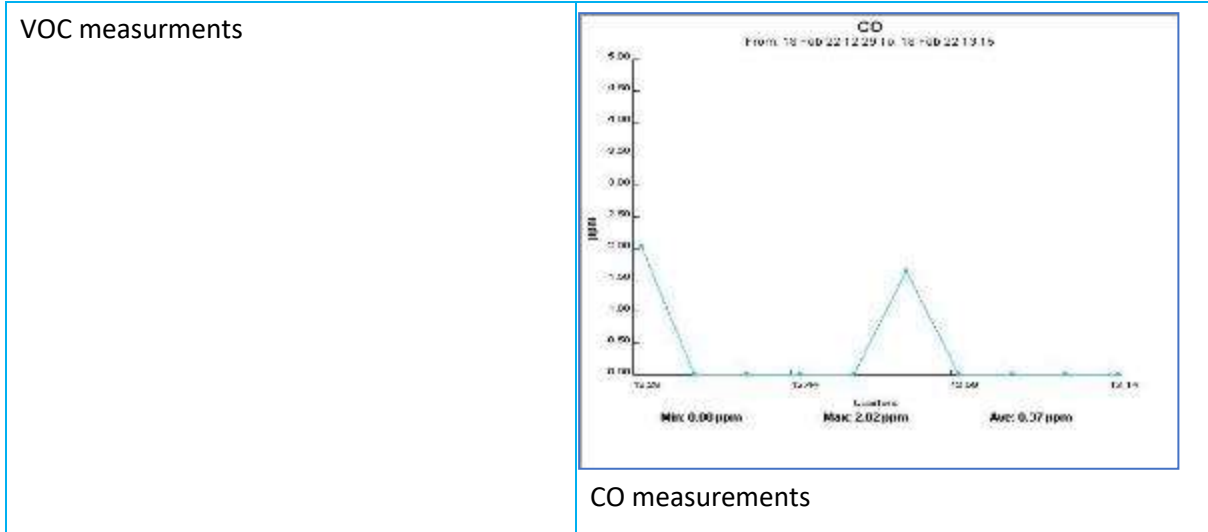


Figure 5-12: Variation of VOC and CO levels with time of day at Nawampongo village

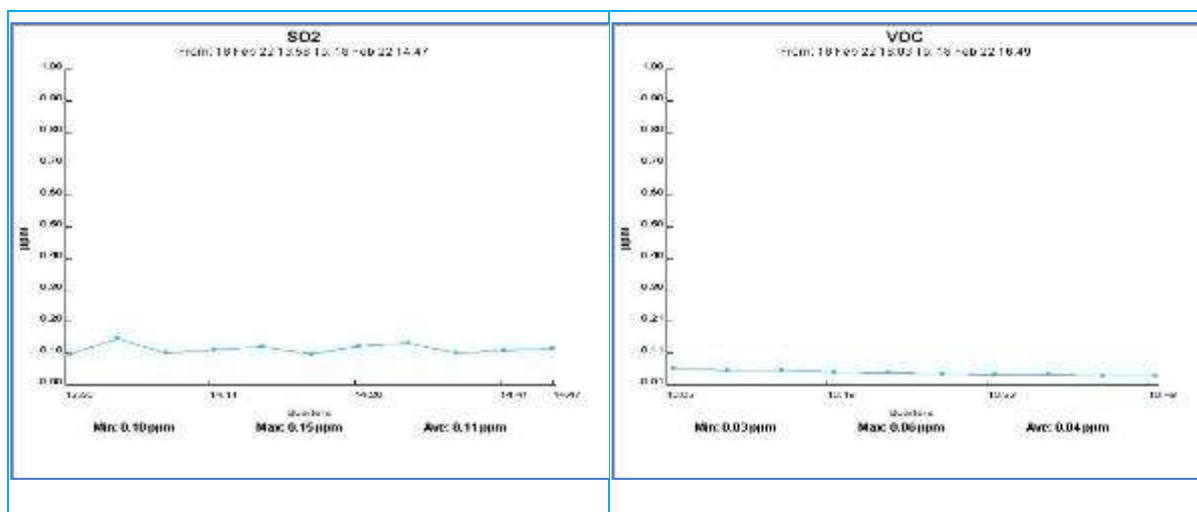


Figure 5-13: Variation of VOC and CO levels with time of day at Bukizibu Trading Centre

5.2.2 NOISE MEASUREMENTS

The equivalent continuous sound pressure level with A-weighting (i.e. LAeq) was monitored (Table 5-4). The findings are compared with the limits as stipulated in The National Environment (Noise Standards and Control) Regulations 2003.

Table 5-4: Summary of noise results at selected receptors

Location & Details (e.g., school, hospital, residence, etc.)	GPS Coordinates	LAFmin (dB)	LAFmax (dB)	LAeq (dB)	Maximum Permissible Noise Limits Day (dBA)
Site 1: Nawampongo village	0598043 E 0021617 N	31.1	89.1	54.0	50
Site 2: Bukizibu Trading Centre	0533930 E 0136545 N	51.0	92.3	73.3	55

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

Noise levels (LAeq) for the monitored sites ranged from 54.0 dBA (Site 1: Nawampongo village in residential area) to 73.3 dBA (Site 2: Bukizibu trading centre in a mixed residential area). 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 in the two (2) sites. The noise levels in Bukizibu trading centre emanated from an advertising mobile vehicle selling herbal medicine and a video library across the road that stroke a loud peak of LCpeak 103.5 dB at 14:10:42 EAT during the assessment, accruing to an increase in the equivalent sound level (LAeq). The noise levels in Nawampongo village were attributed to sound from the kraal as indicated in Table 5-4 above.

5.2.3 VIBRATIONS

Ground vibration is measured in terms of Peak Particle Velocity (PPV) with units in mm/s which refers to the movement within the ground of molecular particles and not surface movement. The displacement value in mm refers to the movement of particles at the surface (surface movement). 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 (Table 5-5). The results of vibration measurements are presented in Table 5-6 below.

Table 5-5: Guidelines for the Treatment of Noise and Vibration for Ireland

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 10 Hz	10 to 50 Hz	50 to 100 Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

(Source: Guidelines for the Treatment of Noise & Vibration in for Ireland)

Table 5-6: Summary of vibration results at the selected receptors

Location	Date and Time	Coordinates 36N	VEL mm/S			
			Min	Aver	Max	Allowable Vibration Velocity (mm/s)
Nawampongo village	18/02/2022 10:15 am - 13:09 pm	0598043 E 0021617 N	0.1	0.75	2.7	12.5
Bukizibu Trading Centre	18/02/2022 13:51 pm - 16:47 pm	0533930 E 0136545 N	0.0	0.41	7.6	12.5

The seismic occurrences were measured at an average velocity of 0.75 VEL mm/S at Nawampongo village and an average velocity of 0.41 VEL mm/S at Bukizibu Trading Centre. The vibration values within the measured receptors were sufficient with no severity to cause damage as indicated in Table 5-6 above.

5.3 BIOLOGICAL ENVIRONMENT

5.3.1 LAND COVER AND LAND USE

Vegetation can be influenced by landform, soils, climate, and anthropogenic factors such as; - Agriculture, infrastructure development, fire, logging, mining, settlement, etc. Bukizibu is one of these places in the great former Bunya County which has lost almost 100% of its natural forests basically due to human-induced factors which are primarily; - infrastructure development, the extension of agriculture, and unsustainable harvesting of wood.

The terrestrial habitats within the Bukizibu project footprint are uniform and well known for subsistence agriculture and shifting cultivation. All those factors have a great impact on the existence of natural vegetation in the project area. The borehole and reservoir sites are in a coffee mixed plantation, and the proposed transmission lines will go through gardens, homesteads, and social gathering centers (Figure 5-14). All the species recorded are those that grow in formerly cultivated and fallows.

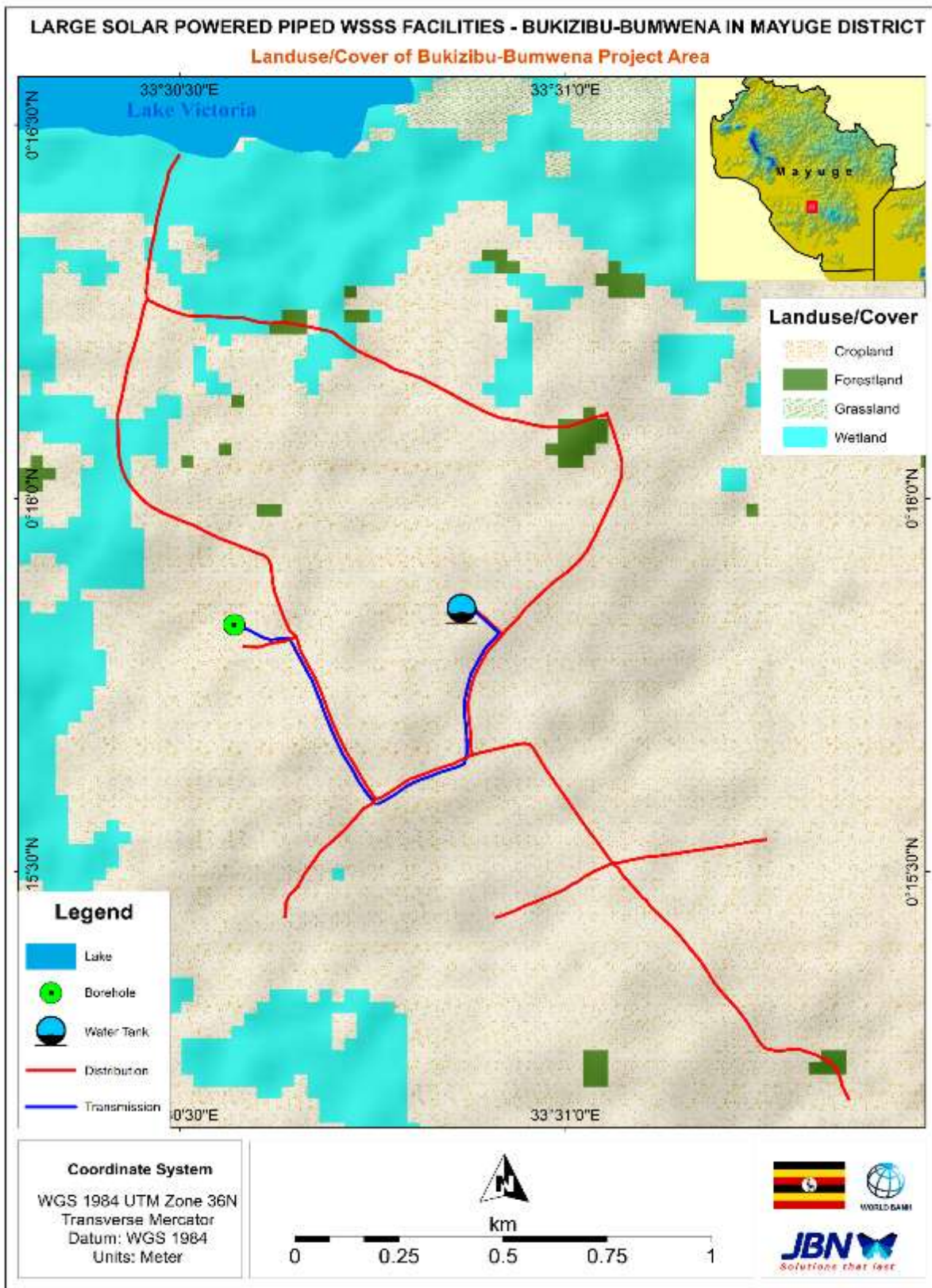


Figure 5-14: Land cover and land use in Bukizibu-Bumwena RGC

Additionally, customary land tenure system is the most predominant in the project area and most of the land is owned by men. Due to the land tenure systems in place, land is owned in perpetuity and

hence the owner is able to sell off any of his/her piece of land at their wish, a factor that has caused land fragmentation.

About 87% of Mayuge district land cover is under open water, of total surface area, this has exerted pressure on the natural environment by the increasing human population. Bukizibu like any other place in the Mayuge district, agriculture is done on small scale due to the small landholding capacity per household. There were various land uses encountered within the project footprints, and among these include; - cultivation, grazing, business transaction, and little fishing. Some of the common crops encountered were; - coffee, rice, maize, cassava, sweet potatoes, g. nuts, tomatoes, cabbages beans, matooke (varieties of Musa), Cocoyam (*Colocasia esculenta*), and exotic (Figure 5-15). Fishing is practiced on a small scale.

Location	Description	Photograph
Bumwena swamp 36 N. 558016, 28629.	The wetland is used for rice and cocoyam growing.	

Figure 5-15: Land use in the project area

5.3.2 VEGETATION

The vegetation range in the project area of Bukizibu-Bumwena RGC is basically described by the species available and is influenced by the prevailing environmental conditions. All the species recorded are those that grow in formerly cultivated and fallows.

From all the surveyed sites and transmission routes, a total of ninety-three (93) individual species were recorded, from thirty-two (32) families. Herbs or grasses recorded the highest individuals with fifty-two (52) contributing 68%, followed by trees/shrubs with twenty-six (26) representing 28%, and lastly liana with nine (9) species contributing only 10% of the species composition. All the study sites were not rich in terms of plant species diversity. The number of species recorded in any geographical location depends more on the time factors and sample size than other factors such as; ecological and anthropogenic.

5.3.2.1 SPECIES RICHNESS AND DIVERSITY

The diversity of an area is the number of different species. From the field surveys conducted from the project area footprint, diversity was high according to the log series. The Figure 5-16 below, reveals a low species diversity from all the study sites. Poaceae (Graminaea) family registered the highest number of species with 18, followed by Asteraceae, Fabaceae, and Euphorbiaceae 9 each, Moraceae 7, Lamiaceae 6, Malvaceae 4. The rest registered 3 or fewer.

The similarities in species composition from different study sites for plants. All sites were dissimilar at only 30%. The borehole site and transmission line to the reservoir was like Bukizibu trading center pipeline. The reservoir site the most dissimilar in terms of plant communities and species composition.

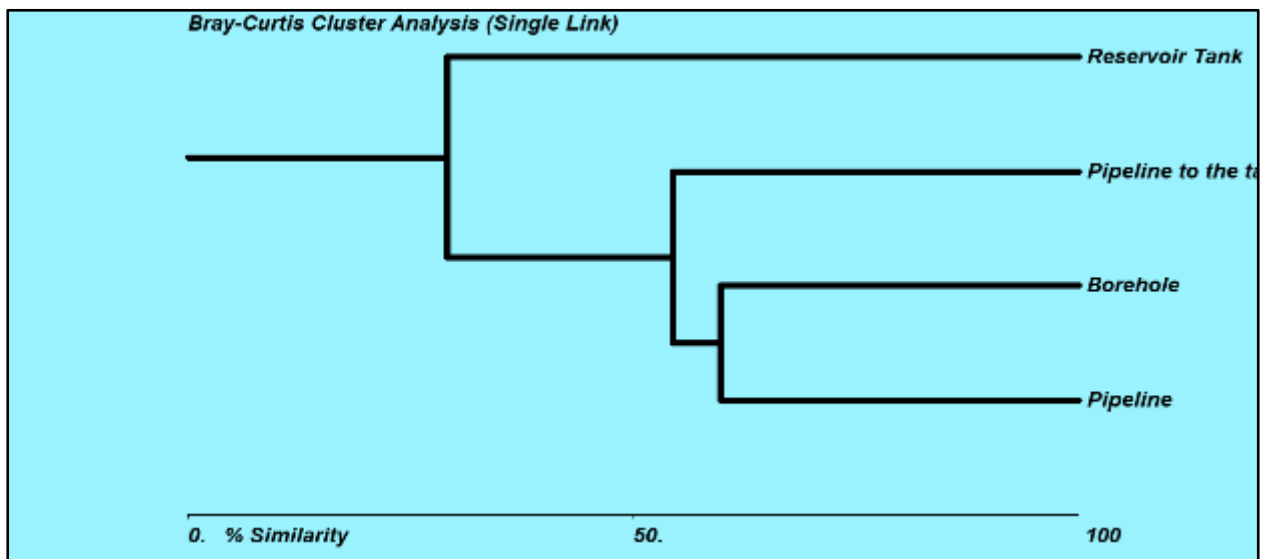


Figure 5-16:Species diversity and Richness analysis

Table 5-7:Shannon-Wiener and Alpha species diversity values

Index	Pipeline	Pipeline to the tank	Reservoir Tank	Borehole
Shannon H' Log Base 10.	1.643	1.602	1.041	1.799
Shannon Hmax Log Base 10.	1.643	1.602	1.041	1.799
Alpha	484679.125	440617.4	121169.8	693972.4

5.3.2.2 CONSERVATION STATUS OF THE SPECIES

Using the IUCN Red List Categories and Criteria at Global, Regional and National Levels, there are eleven categories to consider when carrying out global, regional, and national Red List assessment as indicated in Table 5-8 below.

Table 5-8: Vegetation conservation status categories

EX	Extinct
EW	Extinct in the Wild
RE	Regionally Extinct
CR	Critical in the region
EN	Endangered in the region
VU	Vulnerable in the region

NT	Near-threatened in the region
LC	Least Concern
RR	Regional Responsibility
DD	Data Deficient
NE	Not Evaluated

Out of the ninety-three (93) plant species encountered in all study sites, only one (*Milicia excelsa*) has been listed under the IUCN Red List of Uganda, 2018. Therefore, the species is of great conservation concern in the country and in the region, but bearing in mind the impact and effect of deforestation and forest degradation on the ecosystem. *Milicia excelsa* (Mvule) in Moraceae, globally listed as Near-threatened and nationally as (EN A2acd,). The tree species were sighted along the transmission line from the landing site but a linear structure like water transmission may not affect the existence the tree.

5.3.2.3 SPECIES ABUNDANCE

Abundance is measured by species presence/absence in each area (density). In this study, species density defined by the count of individual tree stems and not species within the plot was used. Tree abundance was low, with only 36 stems which had a Density of only 95.541 per hectare.

5.3.2.4 INVASIVE SPECIES

Only six (6) species were identified as invasive from the project footprints of Bukizibu-Bumwena RGC in Mayuge (Table 5-9). Some species like- *Cassia siemea* (Fabaceae) tree was commonly found planted at schools, trading centers, and homestead to act as shade, and *Maesopsis eminii* (Rhamnaceae), are planted to serve the purpose of wood source, *Artocarpus heterophyllus* (Jackfruit), and *Mangifera indica* (mango tree), are planted different purposes (

Table 5-10).

Table 5-9:A list of invasive species, their distribution, and lifeforms

Family	Species	Pipeline	Pipeline to the tank	Reservoir Tank	Borehole	Lifeform	Status
Asteraceae	<i>Bidens pilosa</i>	1	1	0	1	Herb	Invasive
	<i>Chromolaena odorata</i>	1	0	0	0	Liana	Invasive
Euphorbiaceae	<i>Ricinus communis</i>	0	0	0	1	Shrub	Invasive
Lamiaceae	<i>Hyptis suaveolens</i>	1	0	1	1	Herb	Invasive
Sapindaceae	<i>Cardiospermum halicacabum</i>	0	1	0	1	Liana	Invasive

Verbenaceae	<i>Lantana camara</i>	0	0	0	1	Shrub	Invasive
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Table 5-10: 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>	native to South and Central America	high reproductive potential and fast-growing rates to rapidly spread and colonize new areas. outcompete and eliminate crops and native vegetation.	Medicinal
	<i>Chromolaena odorata</i>	Introduced	One of the world's worst weeds. highly competitive that can great colonize an entire area where it occurs hence reducing grazing space for animals	Can be used in mulching degraded sites
Euphorbiaceae	<i>Ricinus communis</i>	Introduced	highly prolific and precocious producer of toxic seeds and it has a negative impact on Biodiversity	
Lamiaceae	<i>Hyptis suaveolens</i>	Introduced	Forms dense thickets and can shade out and displace native vegetation.	
Sapindaceae	<i>Cardiospermum hallicacabum</i>	Native	It forms dense infestations that can impede access, and intensity of fires, and harbour pests and diseases	
Verbenaceae	<i>Lantana camara</i>	Introduced	Damaged ecosystem services, fire regime, negatively impacts: agriculture animal health; forestry; Reduced native biodiversity	Fodder, ornamental, Erosion control, Fuelwood

5.3.3 FAUNA

Considerable anthropogenic modification of habitats has occurred in the project area. Subsistence agriculture with sedentary farmers has meant that crop cultivation is a significant feature of the landscape hence influencing fauna distribution within Bukizibu-Bumwena RGC project implementation area. Anthropogenic activities have impacted negatively on the flora of most areas of the proposed project activities which also affects the fauna that depend on the flora for food, cover, and shelter as discussed below.

5.3.3.1 BUTTERFLIES

Nineteen (19) species of butterflies were recorded along and in the different project areas during the survey (Table 5-11). The butterflies are grouped into four (4) families and 15 genera. Most butterflies recorded (11 species) are grouped under family Nymphalidae. Other families include Lycaenidae with two species recorded, Papilionidae with one species and Pieridae with four species recorded. Butterflies also appear at different times of the year depending on season. No species with restricted / limited distribution were encountered. Most species are of wide distribution.

One (1) Forest-dependent species was recorded at the time of the survey. Three (3) of the species were forest non-dependent species and occur in a variety of forest, forest edge, degraded forest, and woodland habitats. One species was open habitat species that occur in a range of open savanna, grassland and or swamp / wetland habitat. Seven (7) of the species are categorized as migratory in nature and Seven (7) of the species recorded are known to occur in wide range of habitats and are described as wide spread.

Table 5-11: Checklist of butterflies encountered within the proposed project site

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
Lycaenidae	<i>Euchrysops malathana</i> Smoky Bean Cupid - O	Least Concern			1
Lycaenidae	<i>Zizeeria knysna</i> African Grass Blue – W	Least Concern	1		
Nymphalidae	<i>Precis octavia</i> Gaudy Commodore - W	Least Concern		1	
Nymphalidae	<i>Acraea serena</i> Orange Acraea – W	Least Concern			2
Nymphalidae	<i>Acraea uvui</i> Tiny Acraea – f	Least Concern	1	2	
Nymphalidae	<i>Belenois creona</i> African Caper – M	Least Concern			3
Nymphalidae	<i>Danaus chrysippus</i> African Queen- M	Least Concern	2	1	
Nymphalidae	<i>Hypolimnas misippus</i> Diadem – M	Least Concern			1
Nymphalidae	<i>Junonia oenone</i> Blue Pansy - W	Least Concern		1	2
Nymphalidae	<i>Junonia sophia</i> Little Commodore - W	Least Concern	5	4	5
Nymphalidae	<i>Junonia stygia</i> Brown Pansy – f	Least Concern		3	2
Nymphalidae	<i>Neptidopsis ophione</i> Scalloped Sailer – f	Least Concern	3	1	

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
Nymphalidae	<i>Phalanta eurytis</i> African Leopard Fritillary - M	Least Concern			1
Papilionidae	<i>Papilio demodocus</i> Citrus Swallowtail - M	Least Concern			1
Pieridae	<i>Catopsilia florella</i> African Migrant - M	Least Concern	8	12	4
Pieridae	<i>Colotis evippe</i> Round Winged Orange Tip - W	Least Concern	1		
Pieridae	<i>Eurema brigitta</i> Small Grass Yellow - M	Least Concern	1		
Pieridae	<i>Eurema desjaridinsi</i> Angled Grass Yellow - W	Least Concern			1
Pieridae	<i>Nepheronia argia</i> Large Vagrant – F	Least Concern		1	
Total species count			8	9	11
Key: Borehole (BH), Reservoir Tank (RT), Distribution and Supply pipelines(D&TL)					

Eight (8) species were recorded at the Borehole Water Source site, nine (9) species were recorded at the Reservoir Tank site and Eleven (11) species were recorded along the Distribution and Supply pipeline site areas. As already mentioned, the season determines the type of species you encounter in an area. More time is needed if a complete species list is to be compiled.

During the survey of the project area, African Migrant *Catopsilia florella* was the most common species relative to other species with 24 individuals encountered. Another species which was relatively common is Little Commodore *Junonia sophia* which had 14 individuals encountered during the survey.

All the butterfly species recorded during the survey are categorized as Least Concern (LC) by IUCN 2019 Red List of Threatened Species and the National Red List for Uganda published by Wildlife Conservation Society. Some of the butterfly species identified in the project are presented in Figure 5-17 below.



Blue Pansy *Junonia oenone*



Citrus Swallowtail *Papilio demodocus*



Figure 5-17: Identified butterfly species in the project area

5.3.3.2 DRAGONFLIES

Out of 231 species of dragonflies recorded in the whole of Uganda, only one species of dragonfly the Southern Banded Groundling *Brachythemis leucosticta* was recorded in the project area. The *Brachythemis leucosticta* Southern Banded Groundling belongs to family Libellulidae. The dragonfly was recorded at the Borehole Water Source and along the distribution and Supply pipeline areas.

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.

5.3.3.3 AMPHIBIANS

Overall, a total of Eight (8) species of amphibian were recorded at the water infrastructure sites (Table 5-12). They included two toads and Six frogs. The species are grouped into 5 families and 5 genera. Families Bufonidae, Hyperoliidae and Ptychadenidae had two species each represented. At the time of conducting the survey, it was a dry season. The amphibians recorded were mainly encountered in moist areas in and around wetlands, streams, culvert points and ponds and pools of water in the project area. Amphibians are secretive creatures and they require ample time to compile a complete species list. No species was recorded at the Borehole Water Source area. One species was recorded at the Reservoir Tank area and seven species were recorded along the distribution and supply pipeline areas. Mascarene Rocket Frog *Ptychadena mascareniensis* had the highest number of individuals recorded during the study, implying that it is the most abundant relative to other species. Fourteen individuals were encountered during the survey. None of the Amphibian species recorded during the survey is of conservation significance. All species are listed as Least Concern (LC) by the IUCN Red List of threatened species 2020. The Mascarene Ridged Frog *Ptychadena mascareniensis* is also listed as Data Deficient (DD) by the National Red List for Uganda (WCS, 2016).

Table 5-12: Amphibian species recorded within the project area

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
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Bufonidae	<i>Sclerophrys gutturalis</i> Guttural Toad	Least Concern		1	
Bufonidae	<i>Sclerophrys steindachneri</i> Steindachner's Toad	Least Concern			3
Dicroglossidae	<i>Hoplobatrachus occipitalis</i> Eastern Groove-crowned Bullfrog	Least Concern			5
Hyperoliidae	<i>Hyperolius kivuensis</i> Kivu Reed Frog	Least Concern			2
Hyperoliidae	<i>Hyperolius viridiflavus</i> Common Reed Frog	Least Concern			6
Phrynobatrachidae	<i>Phrynobatrachus natalensis</i> Natal Puddle Frog	Least Concern			3
Ptychadenidae	<i>Ptychadena anchietae</i> Anchieta's Rocket Frog	Least Concern			1
Ptychadenidae	<i>Ptychadena mascareniensis</i> Mascarene Rocket Frog	Least Concern (U-DD)			14
Total Species count			0	1	7

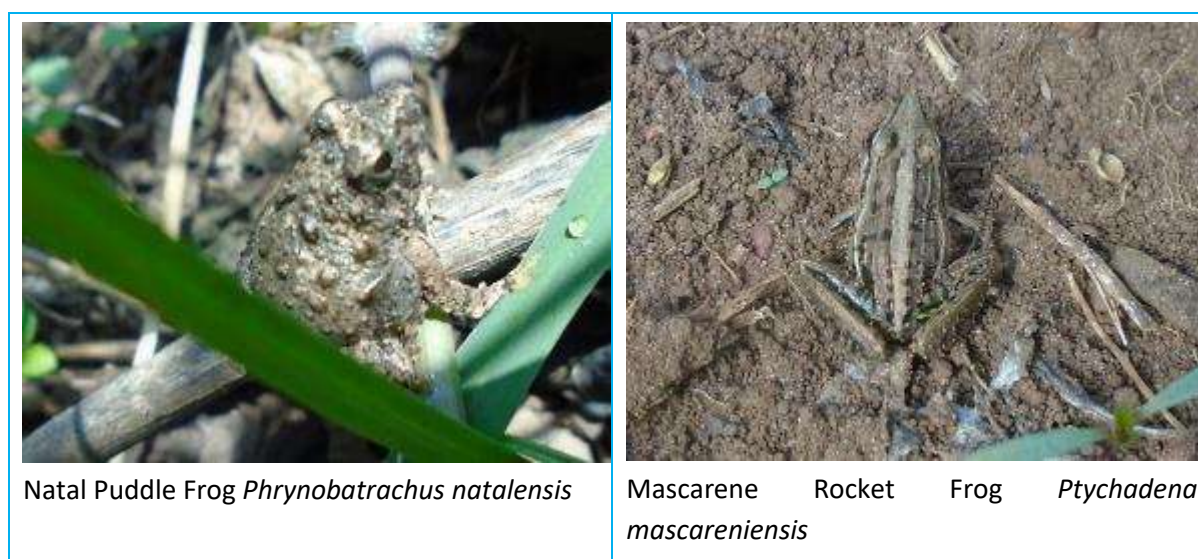


Figure 5-18: Photographic catalogue of some amphibian species encountered within the project area

5.3.3.4 REPTILES

Five (5) species of reptiles were recorded around and along Bumwena water facilities infrastructure (Table 5-13). Only two (2) species were physically encountered during the field survey and the occurrence of the three (3) species were reported by the community. The species include two Lizards, One snakes, One skink and a crocodile. The species represent five families and five genera. Green snakes were also reported but their descriptions as given by the community were not enough to enabled the fauna ecologists to arrive at the identity of the species. No literature of previous work or

records on reptiles in the project area is available. At the Borehole Water Source area three species were reported as occurring at the site and four species were recorded along the distribution and Supply pipeline area. No species was recorded at the Reservoir Tank area.

No species of conservation significance were registered during the survey. IUCN 2019 Red List of threatened species categorizes all species recorded during the survey as Least Concern. However, the Nile Monitor Lizard *Varanus niloticus* and the Central Africa Rock Python *Python sebae* are listed under the Endangered Species Decree of 1985, which means that international trade of the species is prohibited. The Species are listed under CITES Appendix II (Branch 1998). However, in Uganda the species were down listed from Appendix II because they are still abundant and wide spread in the Country.

Table 5-13: Reptile species encountered within the project area

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
Agamidae	<i>Acanthocercus atricolis</i> Blue Headed Tree Agama	Least Concern			R
Crocodylidae	<i>Crocodylus niloticus</i> Nile Crocodile	Lest Concern	R		R
Pythonidae	<i>Python sebae</i> Central Africa Rock Python	Least Concern, CITES Appendix II Listed	R		
Scincidae	<i>Trachylepis striata</i> Striped Skink	Least Concern			10
Varanidae	<i>Varanus niloticus</i> Nile Monitor	Least Concern, CITES Appendix II Listed	R		1
Total Species Count			3	0	4
Key: Borehole (BH), Reservoir Tank (RT), Distribution and Supply pipelines(D&TL), Reported (R)					

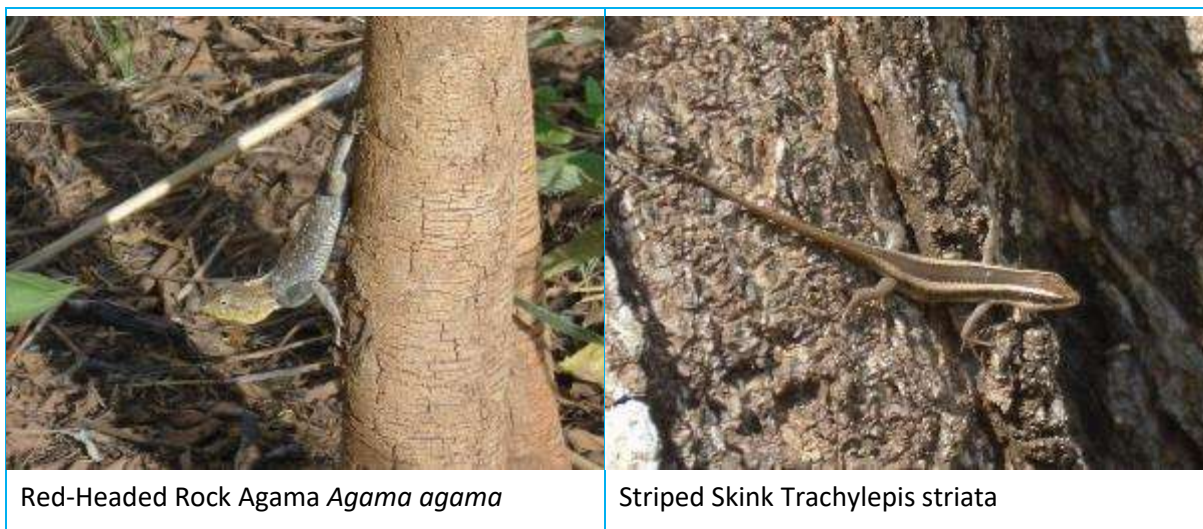


Figure 5-19: Photographic Catalogue of some of the reptile species encountered in the project area

5.3.3.5 BIRDS

The survey recorded a total of Eighty-nine (89) species at the Forest Reserve which when combined with previous records gives an overall total of 123 species (Table 5-14). This forms the nearest known avian fauna records of surveys done in and around the project area. A relatively high proportion of forest dependent and aquatic/swamp species of birds were recorded. Sixteen restricted-range species were recorded including; Little Grebe, Greater Cormorant, Darter, Squacco Heron, Open-billed Stork, Egyptian Goose, Red-billed Teal, Jacana, Wood Sandpiper, Greenshank, White-collared Pratincole, Grey-headed Gull, Lesser Black-backed Gull, White-winged Black Tern, Gull-billed Tern and African Sand Martin. Except for African Sand Martin (*Riparia paludicola*), all other restricted species are associated with aquatic or swamp habitats. No globally threatened species is known to occur (Collar et al., 1994, Dowsett and Forbes Watson, 1993).

During the survey forty-three (43) species of birds were positively identified in the project area (Table 31). The birds are grouped into 28 families and 39 genera. The project area is generally a modified environment. Indications are that the project area was originally a woodland, interspersed with papyrus wetlands. The woodlands have been cleared to provide land for settlements and cultivation. Wetlands have also been degraded for rice and sugarcane growing. Twenty-One species were recorded at the Borehole Water Source area, fourteen species recorded at the Reservoir Tank and twenty-six species recorded along the distribution and Supply pipeline areas.

In terms of ecological characterization, One Forest-dependent species was recorded during the survey (Table 32). Forest dependent species are birds that prefer the interior of forest habitats of undisturbed forest, although they may also be encountered in secondary forest and forest patches. Forest dependent species are usually less common at the forest edge and are rarely seen in non-forest habitats. One Forest non-dependent species was recorded during the survey. Forest non-dependent species are birds which are not infrequently recorded in forest but are not dependent on it; they are usually more common in non-forest habitats where they are most likely to breed. Seven non-forest (open habitat) species were registered. These are birds that prefer habitats with trees as an ecological feature. Four species were water specialists which are restricted to wetlands or open water and these were recorded where wetlands or open waters are represented. Four species were water generalists and these comprise wetland visitors. Nineteen species are grassland specialists and prefer open habitat or grassland areas. Four species are categorized as widespread. Also recorded were migrants, four (4) species of Afrotropical migrants were recorded. The Afrotropical migrants migrate within African countries. No palearctic and Afro-palearctic migrants were recorded. The Black Kite *Milvus migrans* is also categorized as migratory but the tropical ones are resident. It is widely distributed in Uganda.

Table 5-14: List of Birds recorded around with in the project area

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
ACCIPITRIDAE	73 - Elanus caeruleus Black-Shouldered Kite - G	Least Concern	2		

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
ACCIPITRIDAE	75 - <i>Milvus migrans</i> Black Kite – pA (widespread)	PM			2
ALCEDINIDAE	375 - <i>Halcyon senegalensis</i> Woodland Kingfisher - A	Least Concern	1		
APODIDAE	358 - <i>Cypsiurus parvus</i> African Palm Swift - G	Least Concern		1	
APODIDAE	365 - <i>Apus affinis</i> Little Swift – O	Least Concern			3
ARDEIDAE	17 - <i>Bubulcus ibis</i> Cattle Egret - G	Least Concern		7	11
ARDEIDAE	21 - <i>Egretta garzetta</i> Little Egret - W	Least Concern	1		
ARDEIDAE	26 - <i>Ardea melanocephala</i> Black-Headed Heron - w	Least Concern			1
BUCEROTIDAE	420 - <i>Lophoceros nasutus</i> African Grey Hornbill – O (G)	Least Concern	1		9
CICONIIDAE	30 - <i>Anastomus lamelligerus</i> African Openbill Stork - AwG	Least Concern			2
CISTICOLIDAE	677 - <i>Cameroptera brachyura</i> Grey-Backed Cameroptera - f	Least Concern		3	
Cisticolidae	645 - <i>Cisticola chiniana</i> Rattling Cisticola - O	Least Concern	1	1	
COLLIIDAE	369 - <i>Colius striatus</i> Speckled Mousebird - O	Least Concern		4	5
COLUMBIDAE	270 - <i>Turtur tympanistria</i> Tambourine Dove - F	Least Concern	2		
COLUMBIDAE	281 - <i>Columba guinea</i> Speckled Pigeon - f	Least Concern	1		
COLUMBIDAE	284 - <i>Streptopelia decipiens</i> African Mourning Dove - O	Least Concern	1		
COLUMBIDAE	283 - <i>Streptopelia semitorquata</i> Red-Eyed Dove - f	Least Concern	2		

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
Corvidae	855 - <i>Corvus albus</i> Pied Crow-widespread	Least Concern			4
CORVIDAE	858 - <i>Ptilostomus afer</i> Piapiac – G	Least Concern	1	1	1
CUCULIDAE	309 - <i>Cuculus solitarius</i> Red-Chested Cuckoo - AF	Least Concern			2
CUCULIDAE	323 - <i>Centropus superciliosus</i> White-Browed Coucal – O	Least Concern			1
ESTRILIDIDAE	963 - <i>Lagonosticta rubricata</i> African Firefinch – O	Least Concern	1	1	1
ESTRILIDIDAE	974 - <i>Uraeginthus bengalus</i> Red-Checked Cordon-Bleu – G	Least Concern	2		
ESTRILIDIDAE	980 - <i>Spermestes cucullata</i> Bronze Mannikin - widespread	Least Concern	1		
ESTRILIDIDAE	981 - <i>Spermestes bicolor</i> Black-and-White Mannikin – f	Least Concern			3
HIRUNDINIDAE	509 - <i>Hirundo smithii</i> Wire-Tailed Swallow – w	Least Concern			1
LANIIDAE	815 - <i>Lanius excubitoroides</i> Grey-Backed Fiscal - Afw	Least Concern	1	3	3
MALACONOTIDAE	843 - <i>Laniarius erythrogaster</i> Black-Headed Gonolek - f	Least Concern	5		
MOTACILLIDAE	516 - <i>Motacilla capensis</i> Cape Wagtail - W	Least Concern			2
MUSOPHAGIDAE	305 - <i>Crinifer zonurus</i> Eastern Grey Plantain-Eater - widespread	Least Concern		1	1
NECTARINIIDAE	784 - <i>Cyanomitra olivacea</i> Olive Sunbird - FF	Least Concern	3		
PASSERIDAE	880 - <i>Passer cordofanicus</i> Rufous Sparrow – O	R-RR	2		3
PASSERIDAE	881 - <i>Passer griseus</i> Northern Grey-Headed Sparrow - O	Least Concern		3	7

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
PLOCEIDAE	903 - <i>Ploceus intermedius</i> Lesser Masked Weaver - W	Least Concern			23
PLOCEIDAE	908 - <i>Ploceus cucullatus</i> Black-Headed Weaver - O	Least Concern	2		
PSITTACIDAE	292 - <i>Poicephalus meyeri</i> Brown Parrot - O	Least Concern		2	6
PYCNONOTIDAE	732 - <i>Pycnonotus barbatus</i> Common Bulbul - f	Least Concern	3	5	6
RALLIDAE	178 - <i>Zapornia flavirostra</i> Black Crake - W	Least Concern			6
SCOPIIDAE	28 - <i>Scopus umbretta</i> Hamerkop - w	Least Concern			2
STURNIDAE	872 - <i>Lamprotornis purpuroptera</i> Ruppell's Starling - O	Least Concern	3	2	5
THRESKIORNITHIDAE	39 - <i>Bostrychia hagedash</i> Hadada Ibis - w	Least Concern			2
TURDIDAE	612 - <i>Turdus pelios</i> African Thrush - f	Least Concern		1	
NUMIDIDAE	142 - <i>Numida meleagris</i> Helmeted Guineafowl - G	Least Concern	1		
Total Species count			21	14	26

Table 5-15: Ecological Characterization of birds encountered in project area

Ecological description	Numbers	Descriptions
Forest specialists (FF)	1	Forest interior birds
Forest generalists (F)	1	Normally breed in the forest or fragments but may occur outside the forest
Forest visitors (f)	7	Non-forest birds
Water specialist (W)	4	Restricted to wetlands or open water
Water generalist (w)	4	Often found near water

Open habitat (O) and Grassland specialist (G)	19	Characteristic of open grasslands
Afrotropical (A)	4	Species migrating within Africa
Wide Spread	4	Species with a wide distribution

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.

5.3.3.6 MAMMALS

Because of the degradation in the project area, the environment has been highly modified and the mammal fauna has been affected and is rare. Four mammal species were reported by residents in and around the borehole water source, reservoir tank as well as along the distribution and supply pipeline areas. The species include the *Rattus rattus* Black Rat, *Canis mesomelas* Black-Backed Jackal, *Tragelaphus scriptus* Bushbuck and *Atilax paludinosus* Marsh mongoose. The species belong to four families and four genera. Two species were recorded at the Borehole Water Source area, one species was recorded at the Reservoir Tank area and three species were recorded along the distribution and Supply pipelines area. All the mammal species reported by the community are least concern according to the IUCN 2020 Red List of threatened species and the National Red List of threatened species for Uganda.

5.4 SOCIOECONOMIC BASELINE CONDITIONS WITHIN THE PROJECT AREA

5.4.1 INTRODUCTION

This section examines the socio-economic characteristics in the project areas such as, livelihood sources, employment, health and safety, vulnerable groups, and related gender issues as expounded below.

5.4.2 ADMINISTRATIVE STRUCTURE

Bukizibu-Bumwena RGC is in Bumwena parish, one of 7 parishes in Malongo sub-county, Mayuge District as seen in Figure 5-20 below. Bukizibu and Bumwena towns centres that form the project area are approximately 500 m apart and separated by a swamp through which an access road connects both town centres. The RGC project area will comprise 4 villages within the core of the RGC and these are; Bumwena B and Bukizibu A, B & C, all located in Bumwena Parish.

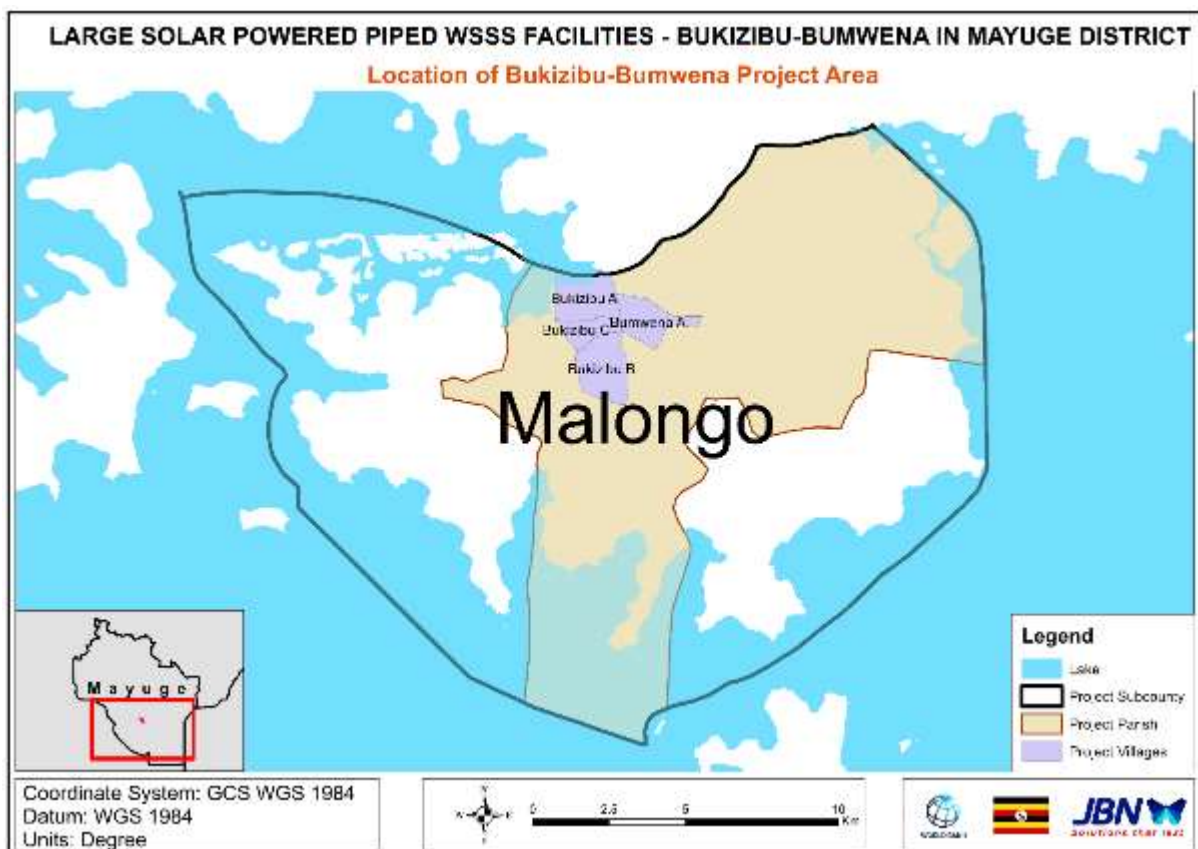


Figure 5-20: Location of Bukizibu-Bumwena RGC in Malongo Sub-county

5.4.3 POPULATION & DEMOGRAPHICS

5.4.3.1 POPULATION

The district population was estimated at 565,100 people with 275,400 females (49%) and 289,700 males (49%) in 2020, giving a 94.6 sex ratio (UBOS, 2020). The district has a total of 61,199 households with an average household size at 5.2 and population density of 224.7 people per Km² compared to

101.7 persons per Km² in 2002. Of the total district population, 20.1% (65,777) live in Kidera Town Council, 32,561 of whom are males and 33,216 females (UBOS, 2020).

UBOS population records indicate that the core beneficiary villages of Bukizibu-Bumwena RGC have a total population of 6,067 people and 1,161 households. The most populated is Bukizibu B (586 HHs), Bumwena A (310 HHs), Bukizibu A (257 HHs) and Bukizibu C (157) as shown in Table 5-16 below.

Table 5-16: Population in beneficiary villages

Sub County	Parish/Ward	Village	UBOS HHs	HH size	Popn 2018
Malongo	Bumwena	Bukizibu A	257	4.6	1,181
		Bukizibu B	586	4.6	2,696
		Bukizibu C	157	4.6	721
		Bumwena A	310	4.6	1,468
TOTAL PROJECT AREA			1,161	4.6	6,067

Source: UBOS 2014 Mayuge District, Project Estimates

Implications: According to the design report (water demand assessment) for Bukizibu-Bumwena RGC, its notable that the project borehole (DWD 60824) yield (397 m³/day) will satisfy the maximum day demand of 397 m³/day for a projected population of 8,922 people in the ultimate year (2040).

5.4.3.2 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. From the field survey, the age structure indicates that most of the household members (21.8%) are between the age of 0-4 years, 16% 5-9 years, 11.9% 15-19 years and 11.1% 10-14 years. The various age -structures at household level are shown in the Figure 5-21 below.

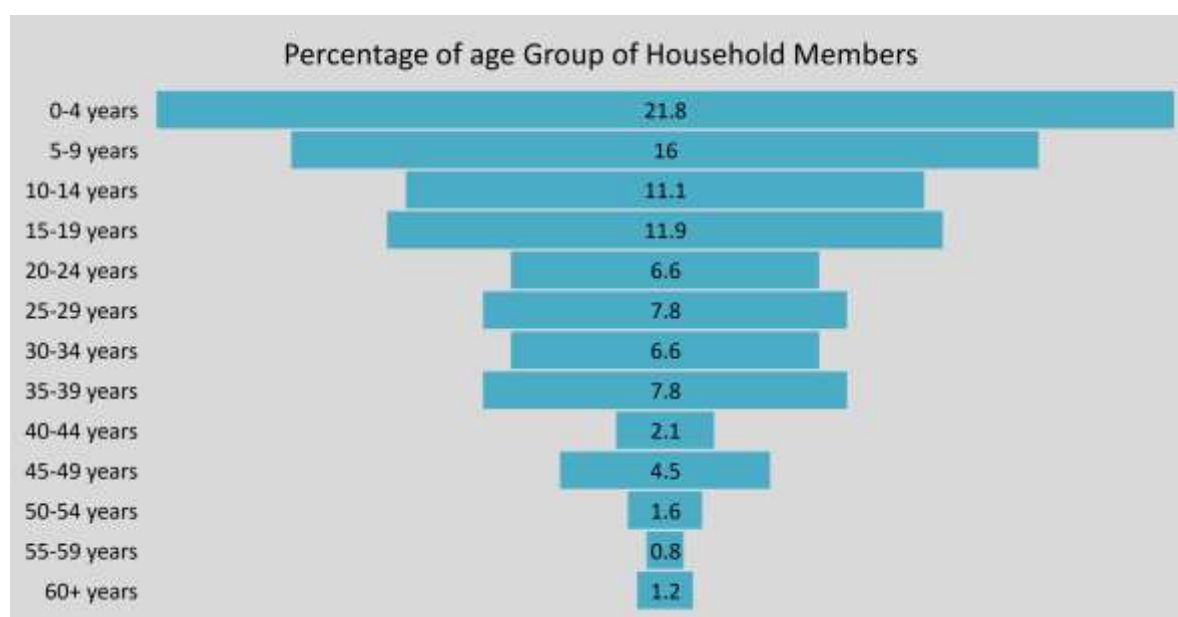


Figure 5-21: Age groups of members in households

This is consistent with the Uganda National Survey Report 2019/2020 UBOS which indicates that the population pyramid of Mayuge district is generally bell-shaped, 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 and steadily decreases with increasing age.

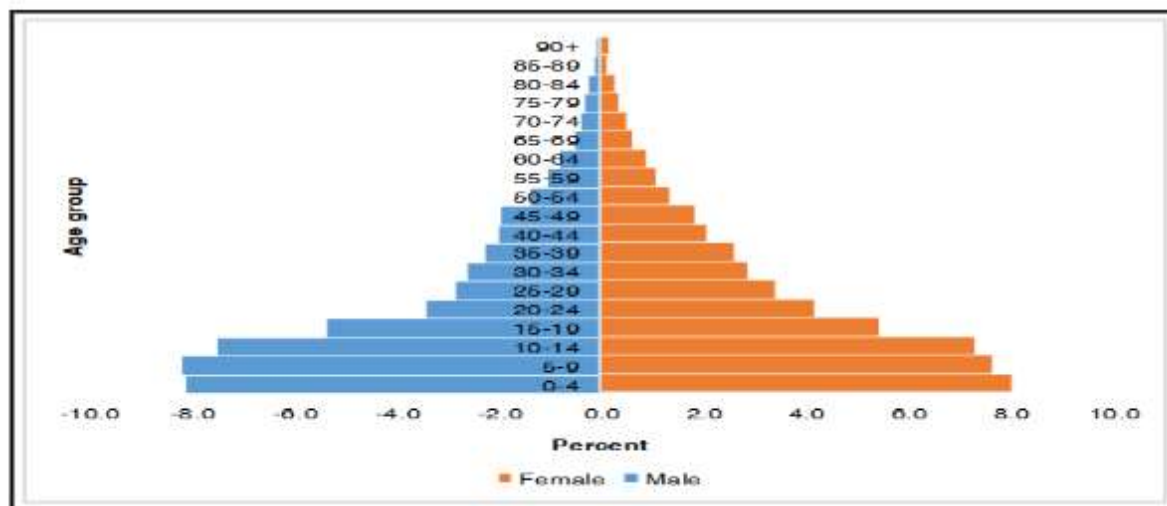


Figure 5-22: Population structure in Mayuge District

5.4.4 GENDER

According to the UBOS, 2020 Statistical projections Malongo Sub County in which Bukizibu-Bumwena is found has a population of 121,900 of whom 62,169 are males and 59,731 are females (UBOS, 2020).

From the field survey, it is evident that a large percentage of the household heads interviewed were male (91.6%) compared to female (7.8%) headed households (Table 5-17).

Table 5-17: Type of household heads

Gender of household head	Percentage (Frequency)
Female headed	7.8% (13)
Male headed	91.6% (153)
Child headed below 18yrs (Male)	0.6% (1)
Total	100% (167)

With regard to marital status, most respondents interviewed indicated being married (85%), followed by single (7.2%), (7.2%) were separated/divorced and widowed recorded 0.6% (Figure 5-23).

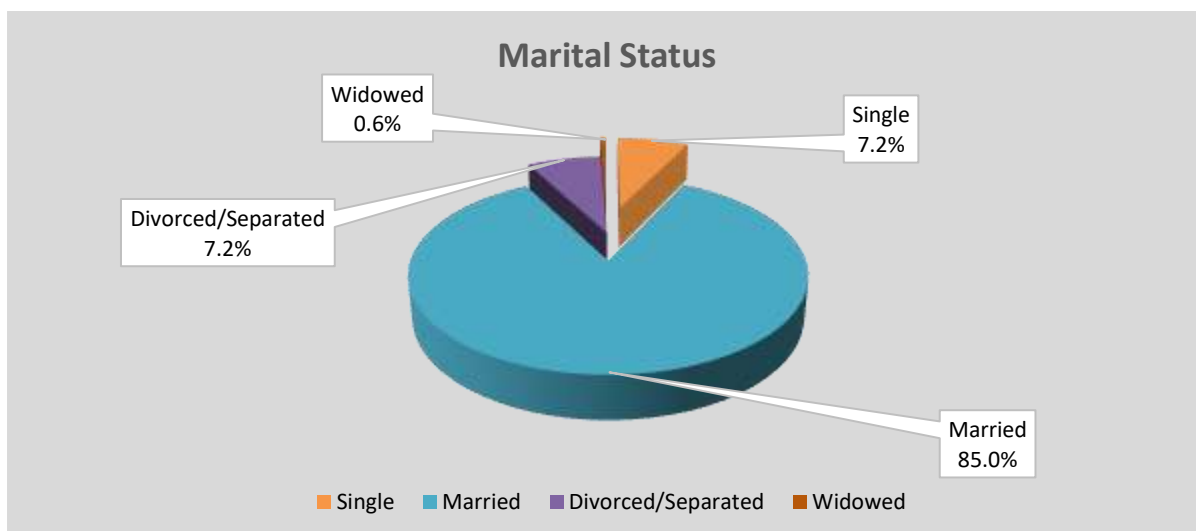


Figure 5-23: Marital Status

Further analysis indicates that the female-headed households were mainly cases of widowed women or those that are divorced. However, some of the women declared as heads of household appear to be married, given that 85% of heads of household are married while 7.2% are single and the remaining 0.6% are widowed as shown in the Figure 5-23 above.

Gender equity is critical for good governance as it ensures the effective participation of women and men, boys and girls in the democratization process, leadership, decision-making and law enforcement⁶. As such, there should be gender inclusive employment practices for both men and women during the project construction and operation phase. Similarly, design and implementation of this water project should involve women, since at a local level women play a central role in providing water supply and sanitation. They have primary responsibility for the management of household water supply, sanitation, and health (UN Water, 2006) and should therefore be involved from the onset of the project.

5.4.4.1 GENDER ROLES IN COLLECTING WATER

In African households where water is collected from outside the residence, the burden reflects in the division of labour along gender lines within the households (Dos Santos, 2012). In line with socially-constructed gender roles, the burden of water collection and storage usually falls on the women and girls of a given household (UNDP 2006)⁷. The survey collected information on who in the household was involved in fetching water and whether they were males, females, adults, or minors.

Field results indicate that the burden of collecting water is largely lies on adult females (46.7%), followed by boy children (21.6%), girl children (16.8%) and adult males (15%) at household level (Table 5-18).

Table 5-18: Gender roles in water collection

Person mainly involved in water collection	Percentage (Frequency)
Adult Male	15% (25)
Adult Female	46.7% (78)
Girl children	16.8% (28)
Boy children	21.6% (36)
Total	100% (167)

5.4.5 VULNERABILITIES

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 their 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 the elderly, widowed, child headed households and physically 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 data on them, they have not been included in this study. In the project affected area very few vulnerable people were identified. Table 5-19 below shows the types of vulnerable person groups identified among the households in the Bukizibu-Bumwena RGC villages.

Table 5-19: Vulnerability in households

Types of vulnerabilities	Frequency	Percentage (%)
Physical Impairment	7	4.2
Hearing Disorder	1	0.6
Blindness	6	3.6
Old Age	1	0.6
Any other	2	1.2
None of the above	151	89.9
Total	168	100

5.4.6 RELIGION

Field surveys revealed that the project areas had rich ethnic diversity comprising a mixture of several Ugandan tribes. Overall, the dominant ethnic group recorded were the Basoga (71.9%), Bagwere (8.4%), Banyole (9%) Bagisu (4.8%) and Itesot 3.6% (Figure 5-24). According to data from the field survey, Islam is the predominant religion (52.7%), 22.8% Protestants, 18.6% Catholics, 4.2% Pentecostal/born again and 0.6% SDA.

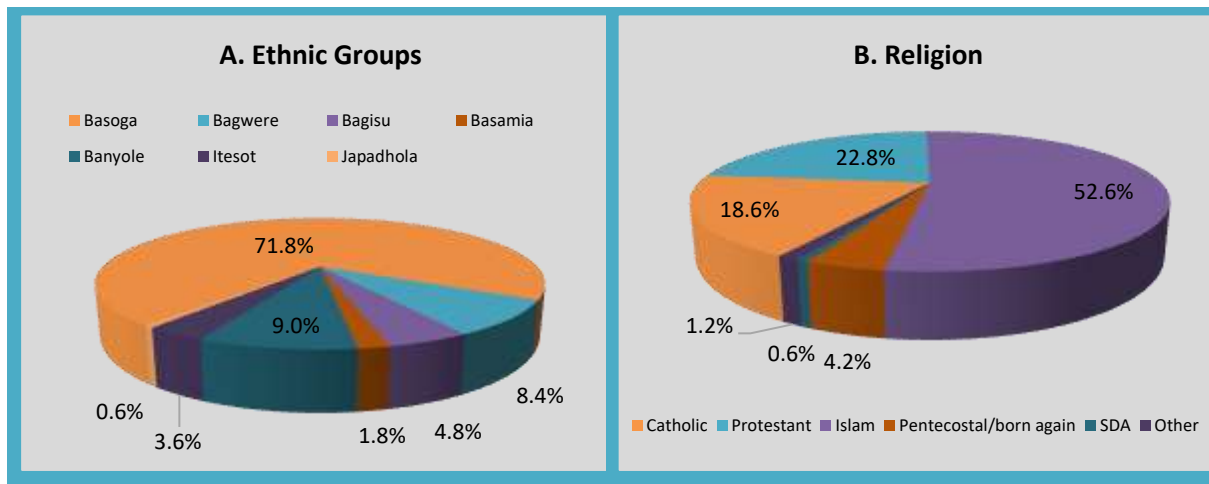


Figure 5-24: Ethnicity and religion affiliations

5.4.7 HOUSING AND SETTLEMENT

5.4.7.1 HUMAN SETTLEMENT PATTERNS

There are 3 major human settlement patterns in the project area namely:

- 4) Compact or Nucleated settlements - this is common in trading centers where large number of dwellings are constructed very close to each other such as in Bukizibu trading center.
- 5) Dispersed or dotted settlements with dwelling located far apart and often within a village landscape, as observed in source area.
- 6) Linear settlements along roads as shown in Figure 42.
- 7) Informal settlements - these are illegal dwellings often in restricted and/or prohibited areas such as wetlands, river banks, fishing sites on Lake Victoria shorelines such as Namasoko village as shown in (Figure 41).

Implications: Both the project components and human settlement patterns will impact on each other in positive and negative ways. In a positive way, the proposed **7.349 Km** distribution Network will serve 33 No. service connections and 18 PSPs. In a negative way, the construction phase (transmission and distribution mains, reservoir tank, access routes) will in some way affect traffic flow in short run, restrict resource use such as open water source, grazing through fencing off the site, and economic displacement (loss of land, assets, or access to assets leading to loss of income sources or other means of livelihood).



Figure 5-25: Beneficiary Namasonko village located i within buffer zone of 100 meters of L. Victoria

5.4.7.2 URBANIZATION

There is increasing rural-urban migration evidenced through the expansion of villages into urban agglomerations. A Historical Trend analysis of urbanization in for the last 10 years indicates a changing urban morphology of RGC, more so Bukizibu trading center (Figure 5-26). The area has over the years transformed from small human settlement (hamlet), into village and its now growing into a trading center. There are observable characteristics of an expanding congested dwellings with inappropriate sanitation and hygiene facilities especially pit latrines and solid waste management facilities. There are also many other expanding urban agglomerations.

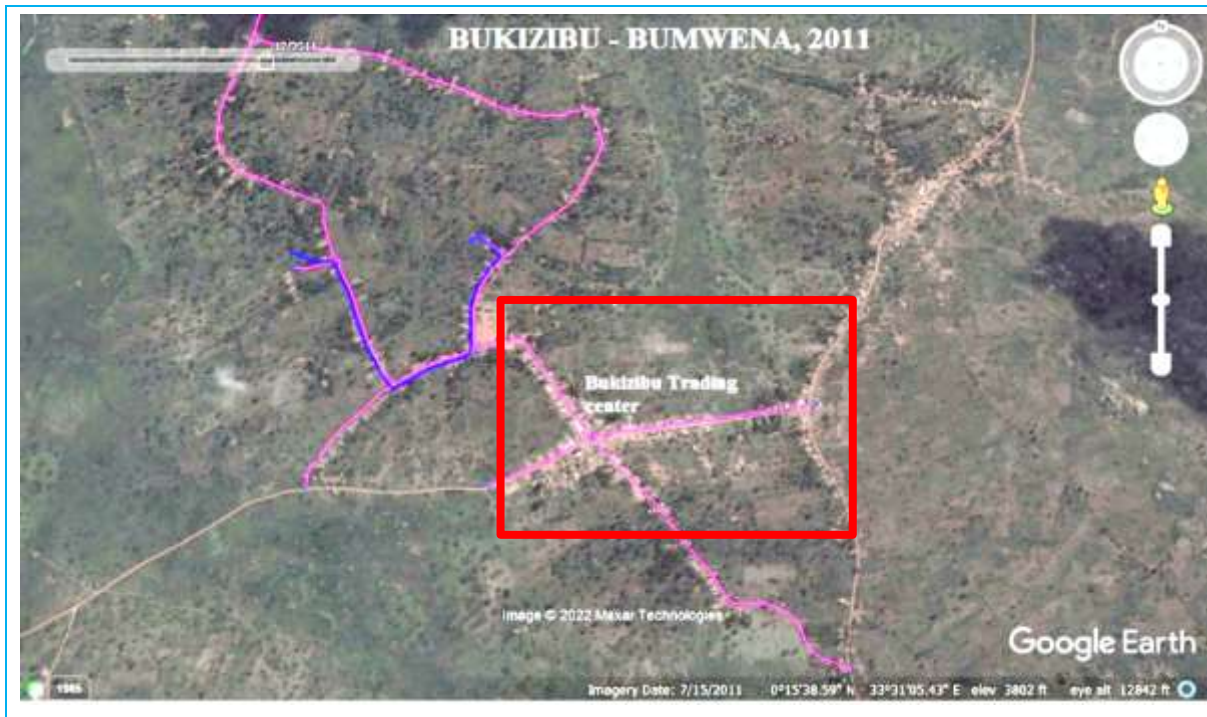




Figure 5-26: Google Earth imagery showing changes in settlement patterns between 2013- 2022

5.4.7.3 HOUSING & SHELTER

The survey findings indicate that majority of houses in the villages are semi-permanent and constructed from mud and wattle walls with iron roofs (Figure 5-27). Permanent structures are made of permanent brick, are roofed with iron sheets, and are only experienced in the trading centers. As one advance deep in the villages the structures are mostly of mud and wattle walls with grass thatched roofs. The table below show the various types of structures in the project area with the majority being Mud block with plaster (51.9%) and Mud and wattle (33.3%).

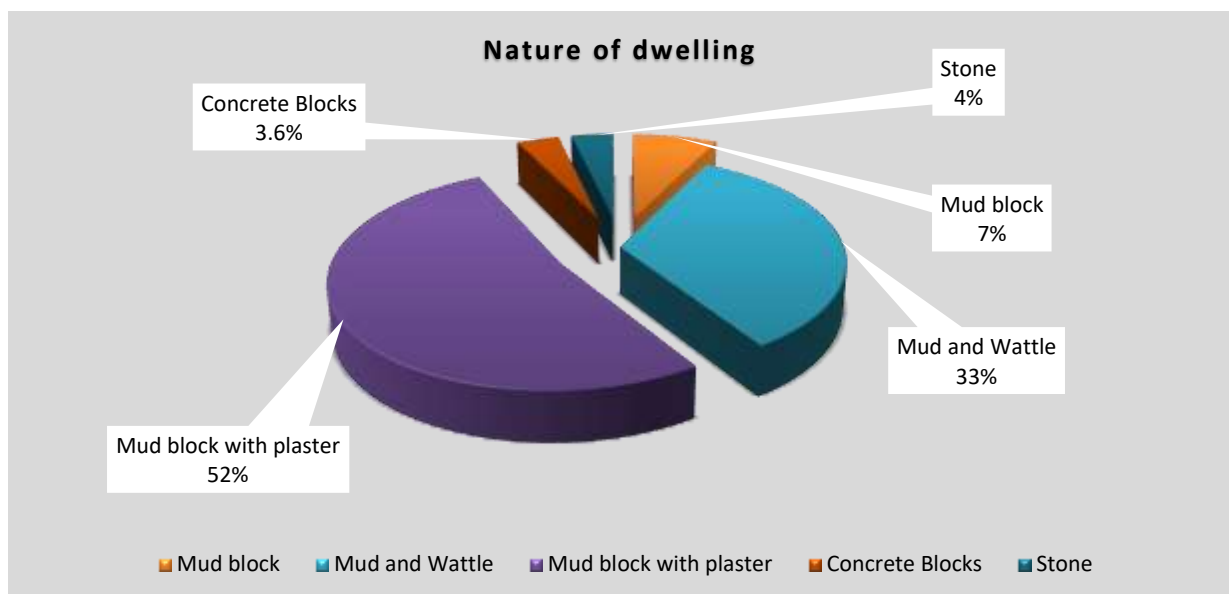


Figure 5-27: Type of housing among residents in the RGC

Implications: The housing and shelter characteristics have direct influence on the design of required connections such as house Connections, Yard Taps, Stand Posts and Part Time Users.

5.4.8 LAND OWNERSHIP AND ACQUISITION

Construction of project facilities such as the pipeline will require easement in some cases while permanent footprint of project facilities namely the borehole and reservoir sites will also be required. Results from the field survey indicated that the majority (71.9%) were land owners, 25.7% tenant Kibanja owners and licensee (2.4%) as indicated in Table 5-20 below.

Table 5-20: Land ownership in Bukizibu-Bumwena RGC

Type of land ownership	Frequency	Percentage (%)
Customary Landowner	120	71.9
Tenant (Kibanja)	43	25.7
Licensee[renting]	4	2.4
Total	167	100

The survey further revealed that out of 167 respondents, 7 female headed households owned land under customary, where as 6 female headed households were tenants on customary land. It is vital that both men and women are fully engaged in process of land acquisition.

When questioned on how they acquired the land, majority of the respondents (63.5%) indicated that they bought it ,26.9% inherited from parents and 9.6% are renting the land (Table 5-21).

Table 5-21: Method of land acquisition

Method of acquisition	Frequency	Percentage (%)
Bought	106	63.5
Inherited from parents	45	26.9
Renting (tenant)	16	9.6
Total	167	100

Land ownership dynamics in the RGC might present challenges at the stage of compensation especially for Kibanja owners because there is likelihood of Project Affected Persons (PAPs) claiming ownership of land which is not rightfully theirs. Table 5-22 below presents land requirements for the intake, and reservoir. The details of land requirements for the transmission and distribution lines are appended as Appendix 6 of this report.

Table 5-22: Land requirements on the project

Project Component	Size Of Available Land (Acres)	Land Requirement by Project (M ²)	Village	Owner (Name, Contact)	Land Tenure
Water Source Site	0.1780	900	Nawapongo	Bwekwaso Badru	Customary
	0.0444			Tamale Kalimu	Customary
Reservoir Site	0.2224	900	Nawapongo	Kumida Fred, 0756338719	Customary
Sanitation Facility Site	0.0247	100	Nawapongo	Bukizibu Primary School	Customary

Source: RAP report

5.4.9 LIVELIHOODS AND INCOME

5.4.9.1 LIVELIHOODS

Results from the main Project area indicate that agricultural practice is a major livelihood strategy for households with 74.3% of households are engaged in crop production. About 3% of households are engaged in fishing and 7.2% in petty trade. Additional livelihood strategies include service formal employment (3.6%), daily labor (1.8%), carpenter and masonry (7.2%) as shown in Figure 5-28 below. It is pertinent to note that over 93% of the district population is employed in the agricultural sector, which is dependent on the climatic and soil conditions, which is uncertain due to climate change and unpredictable weather conditions. Climate change has had adverse impacts on agricultural production and food security.

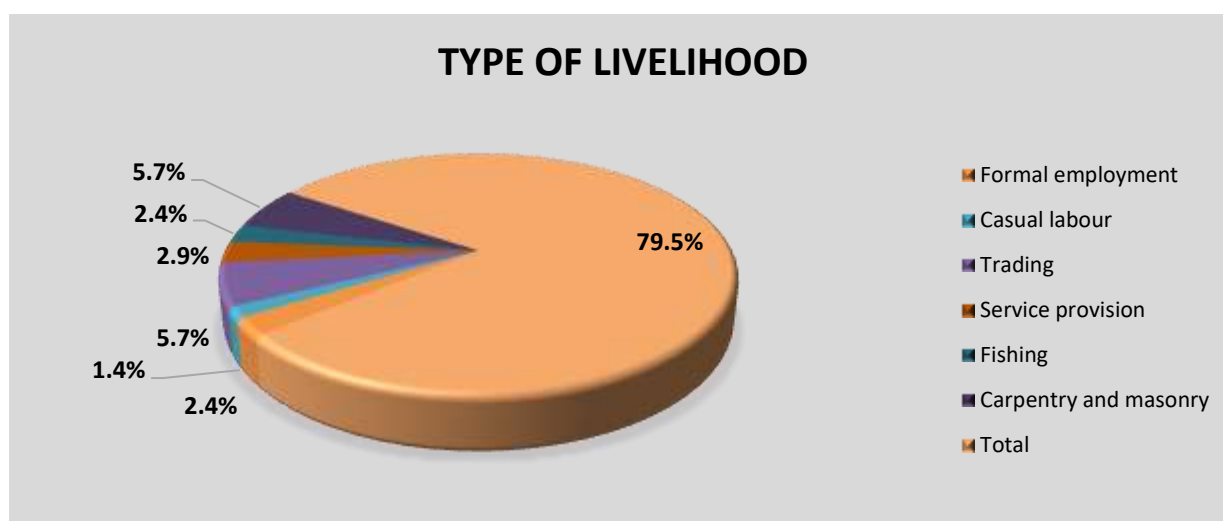


Figure 5-28: Livelihoods in the RGC

5.4.9.2 CROPS GROWN IN THE RGC

In agriculture, the main crops are cereals, and among the cereals, households grow mainly maize (25.4%), beans (16%) and rice 8.3% (Table 5-23). These crops are most often intercropped. This information is consistent with the Mayuge Third District Development Plan (DDPIII) 2020/2021 – 2024/2025 which indicates the production volumes from the sub-county of Malongo as shown in the Figure 5-29 below.

Table 5-23: Commonly grown crops in the RGC

Crops grown	Percentage (%)
Beans	16
Maize	25.4
Irish potato	5.3
Sweet potato	16.6
Cassava	20.3
Sorghum	2.4
Vegetables	3.2
Rice	8.3
Others	2.4

Total

100

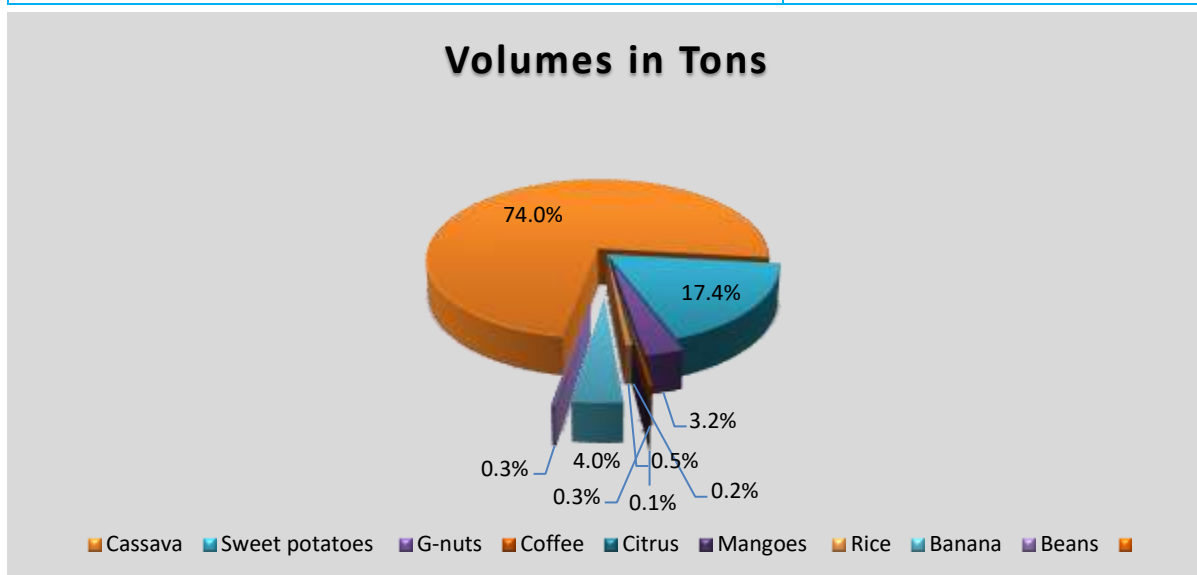


Figure 5-29: Volumes of crops grown in Malongo Sub County

5.4.9.3 OWNERSHIP OF ASSETS

Ownership and control of physical and financial assets are essential to an individual’s well-being. 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) hence the importance of establishing asset ownership at household level. From the field survey, respondents owned a variation of physical assets which included houses, domestic animals, mobile phones radios and bicycles among other. Figure 5-30 below reveals a range of physical assets owned by the householders in the project area.

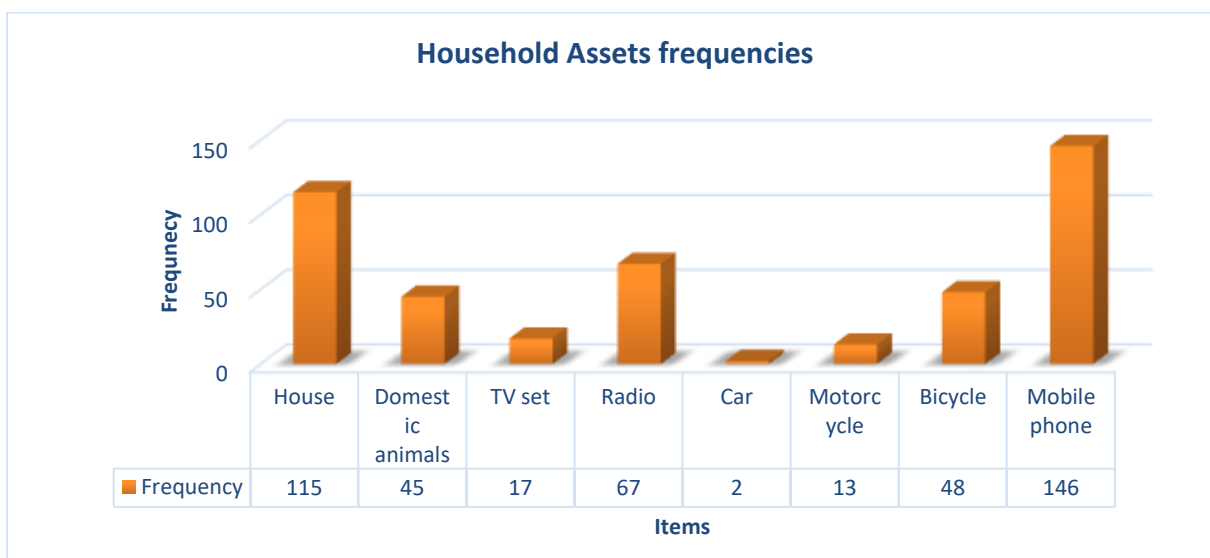


Figure 5-30: Ownership of household assets

5.4.10 ACCESS TO WATER

5.4.10.1 WATER SOURCES

The overall District water coverage is 62.6% for all communities. By June 2019 the functionality of deep boreholes in entire district was 94% from 87% in 2010/11; The rate of functionality of water sources in the entire District stood at 71% in 2019/20 from 67% 2010/11. The number of safe water sources in the district increased from 276 in 2010/11 to 508 in 2019/20.

Results from the field survey indeed indicated that community boreholes serve as the main sources of water (85%), followed by the lake (7.2%), protected springs (4.2%) and unprotected springs (3.6%).

Table 5-24: Common water sources within Bukizibu-Bumwena RGC

Main water source	Frequency (Percentage)
Community Borehole	142(85%)
Protected Spring	7(4.2%)
Unprotected spring	6(3.6%)
River/Lake	12(7.2%)
Total	167(100)

When questioned about the reasons for the preference of the specific water source, 30.7% cited the distance or proximity to the source, 24.5% indicated accessing the water for free, 20.6% mentioned clean water and 22.7% indicated having no other option (Figure 5-31).

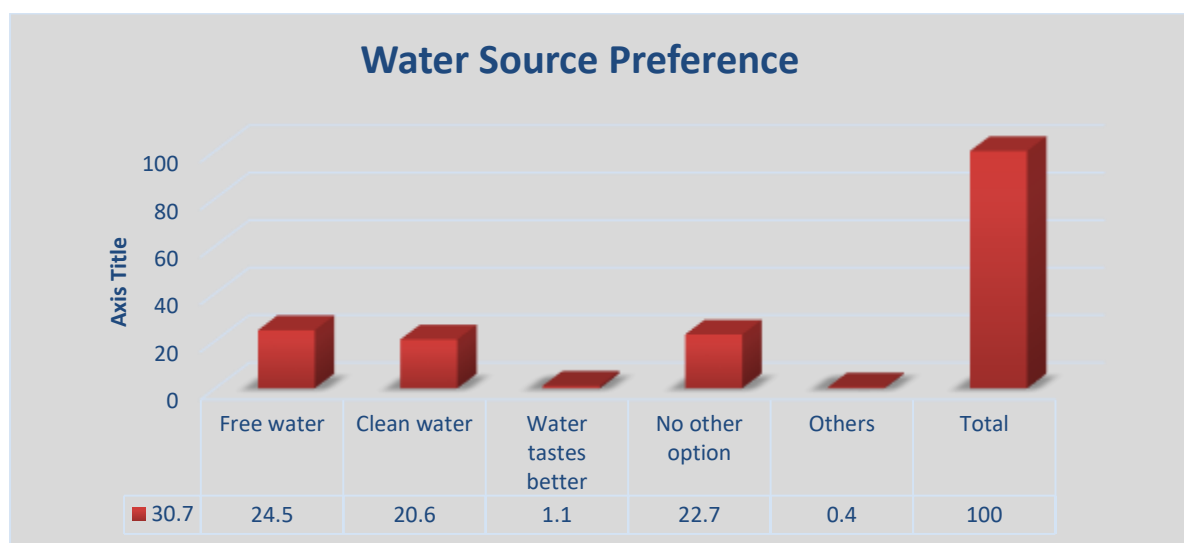


Figure 5-31: Water Source Preference

5.4.10.2 DISTANCE AND TRIPS MADE TO WATER SOURCE

Regarding distance to the water source, 64.6 % of the respondents reported travelling for 100-500 meters (Table 5-25) to access the water source while only (0.6%) travelled over 5km to access the nearest water source in the proposed project area.

Table 5-25: Distance to a water source

Distance to water source	Frequency (Percentage)
--------------------------	------------------------

100m	20.1% (33)
100-500m	64.6% (106)
1-1.5km	14.6% (24)
Above 5km	0.6% (1)
Total	100% (164)

On the issue of number of trips made to collect water, most respondents (67.7%) indicated making 1-3 trip ,30.5% making 3-5 trips and only 1.8% making more than 5 trips (Figure 5-32).

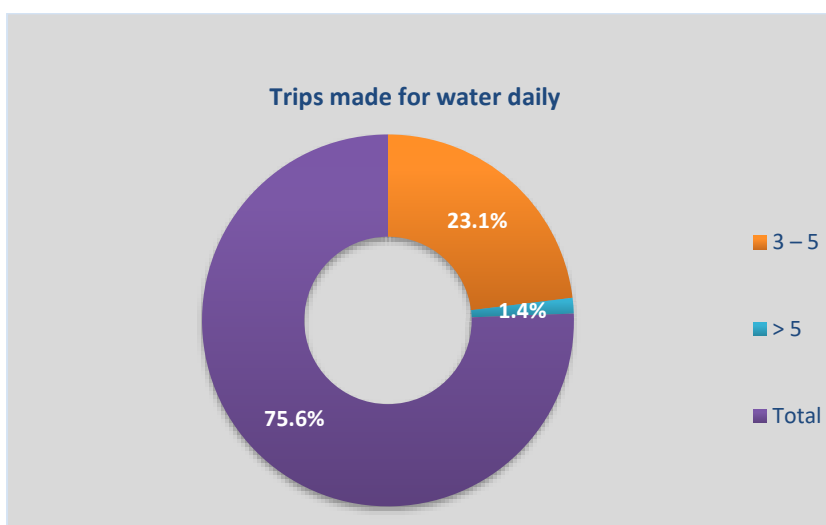


Figure 5-32: Trips made to a water source daily

5.4.10.3 TIME SPENT FETCHING WATER

In terms of the time households spent fetching water, from the main water source, majority of respondents 67.7% indicated spending 1 hour, 24.6% 1-2 hours and 7.2% 3-5 hours for round trip including waiting time at a water source. Survey respondents attributed the longer time taken at springs to their slow recharge rates at the end of the dry season, and long waiting queues at boreholes which are usually used by many in the community.

Table 5-26: Time taken to reach a water source

Time taken to reach drinking water source	(Percentage (Frequency))
1	67.7% (113)
1 - 2	24.6% (41)
3 - 5	7.2% (12)
Above 5	0.6% (1)
Total	100% (167)

5.4.10.4 AMOUNT OF WATER USED PER HOUSEHOLD/BUSINESS USE PER DAY

Regarding amount of water used per day, respondents used a variation of quantities with over fifty percent (51.5%) using 50 liters and above ,19.4% using 41-50 liters, 12.1% using 21-30 liters, 10.9% using 31-40 liters and 6.1% 10-20 liters as shown in the Figure 5-33 below.

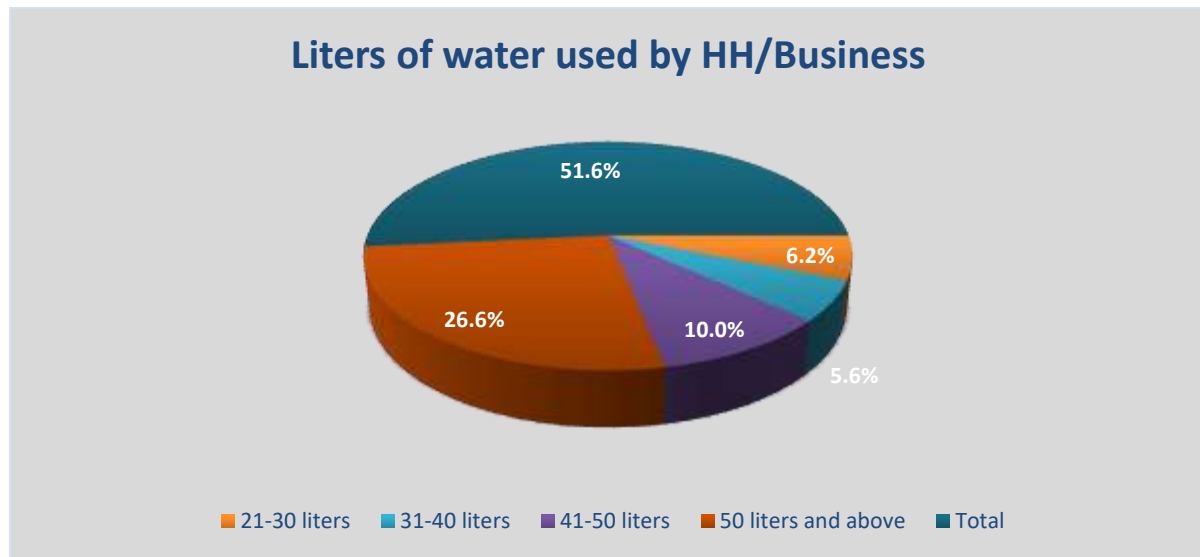


Figure 5-33: Amount of water used per HH/Business per day

5.4.10.5 MAIN USES OF WATER AT HOME/BUSINESS

Domestic water uses include drinking (35.1%), food preparation (29%), washing clothes (34.2%), and livestock (Figure 5-34). Few households (0.9%) provide a portion of the fetched water for livestock and no household uses water for irrigation/crop production.

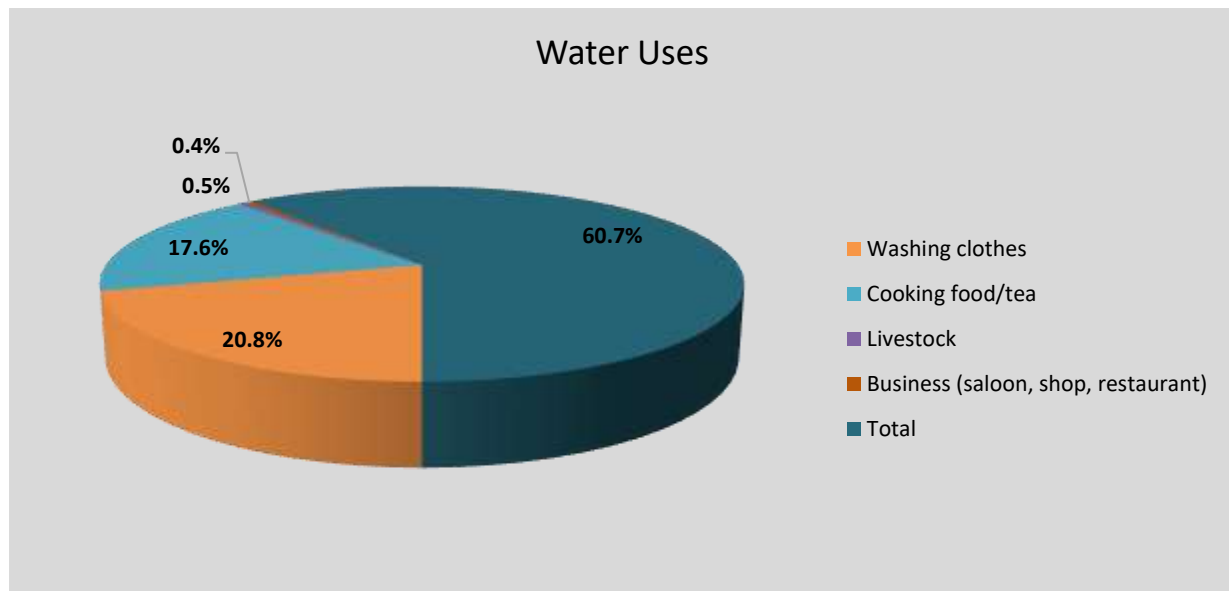


Figure 5-34: Main Domestic Water Uses

5.4.10.5.1 METHOD OF MAKING DRINKING WATER SAFE

During the baseline survey, participants were also asked to report methods of making water for drinking. Majority of respondents 83.5% indicated boiling, use of water guard (10.6%) and filtering (5.9%) as the most commonly used methods of making water safe for drinking (

Table 5-27).

Table 5-27: Method of making drinking water safe

Water safety	Frequency
Boiling	83.5% (157)
Water guard	10.6% (20)
Filtering	5.9% (11)
Total	100% (188)

5.4.10.6 PAYMENT FOR WATER

On the issue of payment for water, 58.7% of the respondents indicated not paying for water while 41.3% paid for it (Table 5-28). Regarding sale of water, majority of the respondents 78.3% indicated that they fetch the water from the main water source while 21.7% revealed accessing water from a bicycle vendor.

Table 5-28: Payment for water

Payment for water	Percentage (Frequency)
Yes	41.3% (69)
No	58.7% (98)
Total	100% (167)
Who sells water to Household	
Water vendor on bicycle	21.7% (15)
Collect from main water source	78.3% (54)
Total	100% (69)

Among the households that pay to access water, 46.4% indicated being charged daily while 53.6% revealed that they were billed monthly (Table 5-29).

Table 5-29: Frequency of billing of water supplied

Frequency of billing the water supplied	Percentage (Frequency)
Daily	46.4% (32)
Monthly	53.6% (37)
Total	100% (69)

With regard to cost of water, 46.4% indicated paying more than 600/= for a jerrycan, 31.9% 200/=, 10.1% less than 100/= and 8.7% 300/= (Figure 5-35).

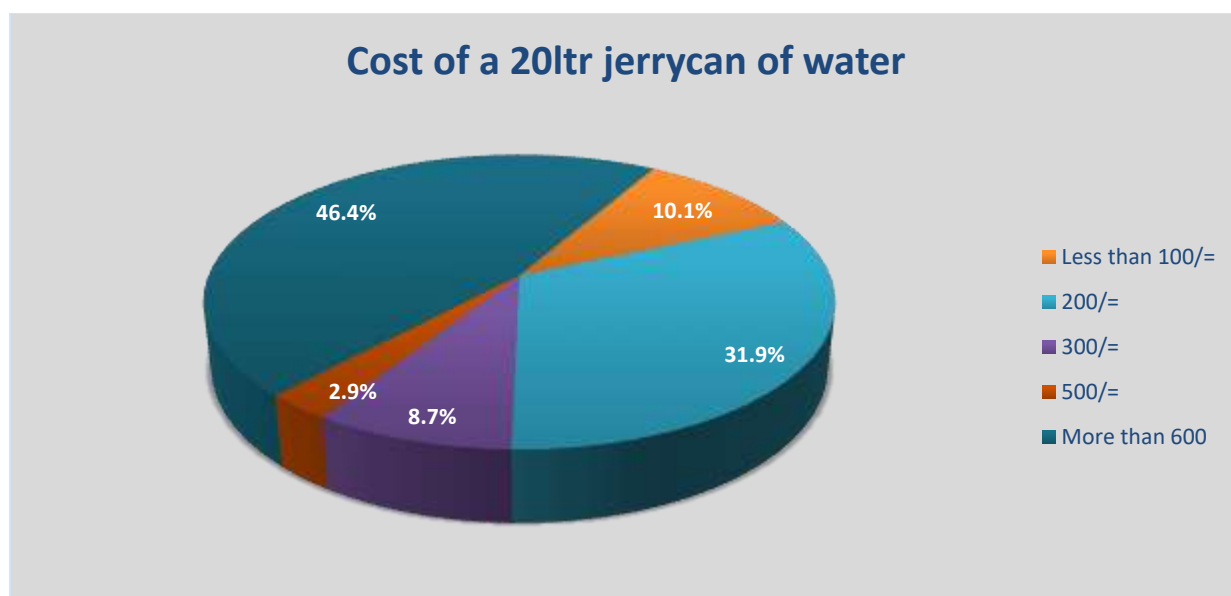


Figure 5-35: Cost of a 20litre jerrycan of water

5.4.10.7 SERVICE OPTIONS

Regarding the preferred service options on the proposed Bukizibu-Bumwena RGC piped water system, 56.95% of respondents preferred a Yard tap connection, 23.4% public stand pipe and 19.8 a house connection (Table 5-30).

Table 5-30: Preferred service options

Preferred service option	Percentage (Frequency)
House Connection	19.8% (33)
Yard Tap	56.9% (95)
Public Standpipe	23.4% (39)
Total	100% (167)

5.4.10.8 WILLINGNESS TO PAY

5.4.10.8.1 HOUSEHOLD CONNECTION

Survey respondents were also interrogated on their readiness to pay for a new house connection service and they gave a variation of rates they could afford with the majority 51.5% indicating 5,000-10,000/= (Figure 5-36).

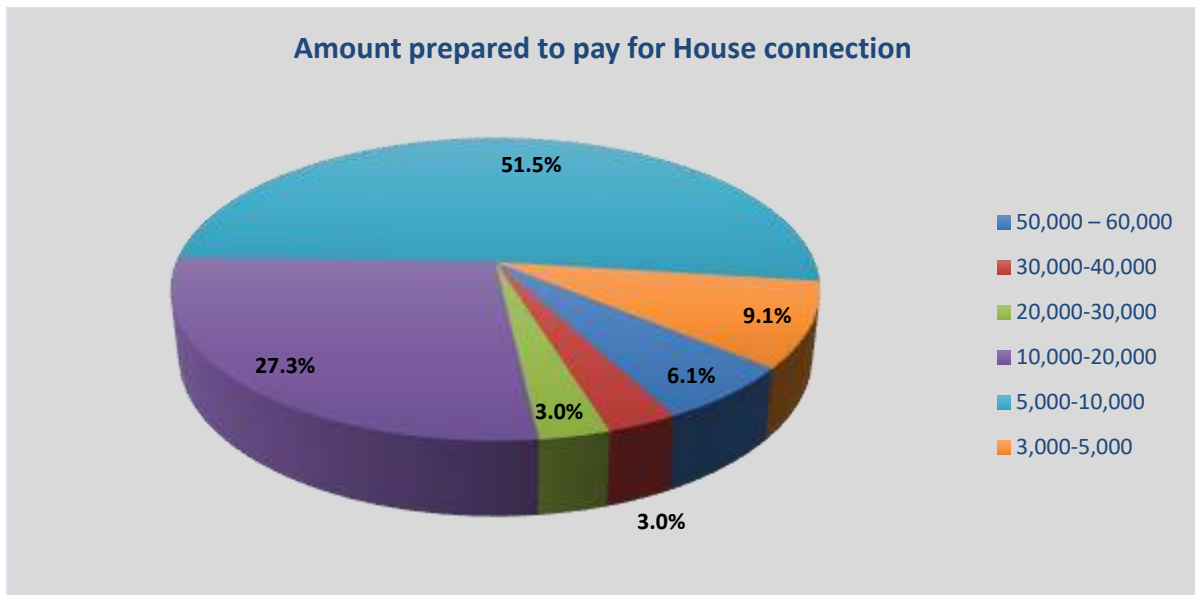


Figure 5-36: Amount respondents can pay for House Connection service

Similarly, 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 (50.5%) indicating that they would be willing to pay 100 Ugx (31.6%) 300 Ugx.

5.4.10.8.2 PAYMENT FOR WATER

Table 5-31: Amount prepared to pay for 20l jerry can

Amount prepared to pay for 20ltr jerry can	Percentage (Frequency)
500	2.1% (2)
400	3.2% (3)
300	31.6% (30)
200	3.2% (3)
100	50.5% (48)
50	5.3% (5)
40	1.1% (1)
30	1.1% (1)
20	1.1% (1)
Don't Know	1.1% (1)

Total	100% (95)
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5.4.10.9 PREFERRED PAYMENT SCHEDULE

On the issue of preferred payment schedule over half 51.5% of the respondents indicated monthly, 40.7% daily, 5.4% whenever collected and 2.4% bi-weekly (Figure 5-37).

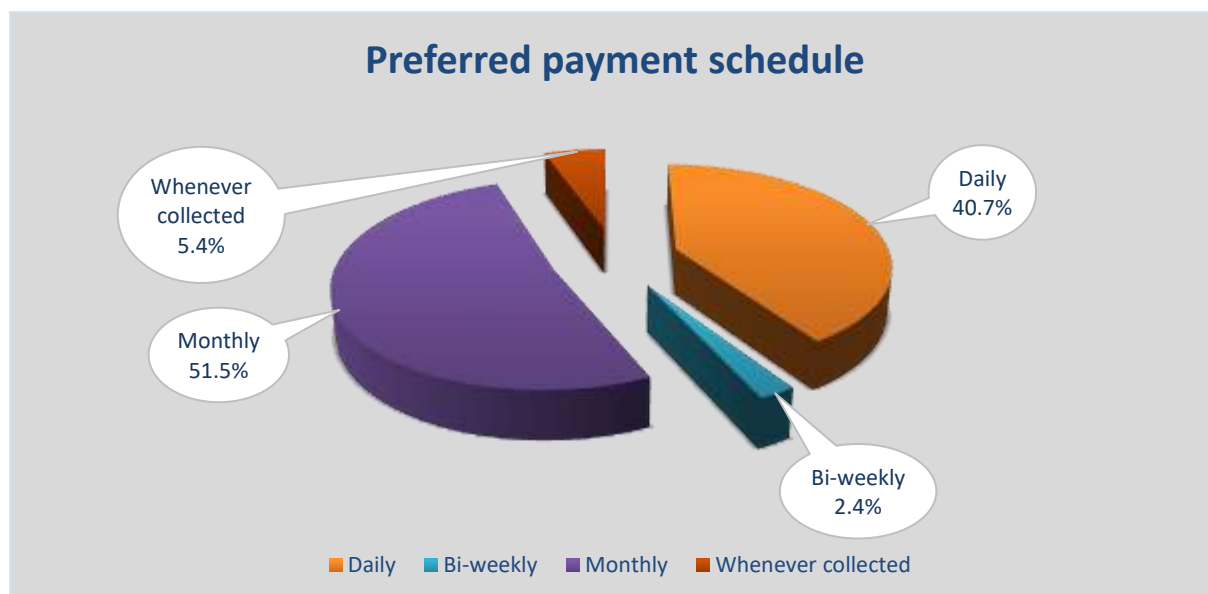


Figure 5-37: Preferred payment schedule

Mobile money can be defined as an electronic wallet service that enables one to send and receive money anywhere using a mobile/cellular phone. On owning a mobile handset 87.4% of the respondents indicated having mobile handsets and 92.1% (Table 5-32) indicated having access to mobile money payments which is indicative of increasing financial inclusion. Additionally, this points to the adoption of the mobile phone as a means of accessing financial services by the growing number of low-income earners in rural areas.

Table 5-32: Ownership of handsets and use of mobile payments

Ownership of handset	Frequency
No	12.6% (21)
Yes	87.4% (146)
Total	100% (167)
Access to mobile money payment	
Yes	92.1% (152)
No	6.7% (11)
Don't know	1.2% (2)
Total	100% (165)

5.4.11 HEALTH SERVICES

5.4.11.1 HEALTH FACILITIES

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, (61.1%) of the respondents indicated that they were using Privately run clinic /drug shop 29.3% health center IIIs to access healthcare services (Figure 5-38), 4.8% of the respondents went to referral hospitals to access healthcare services and Community Health center respectively for the same services.

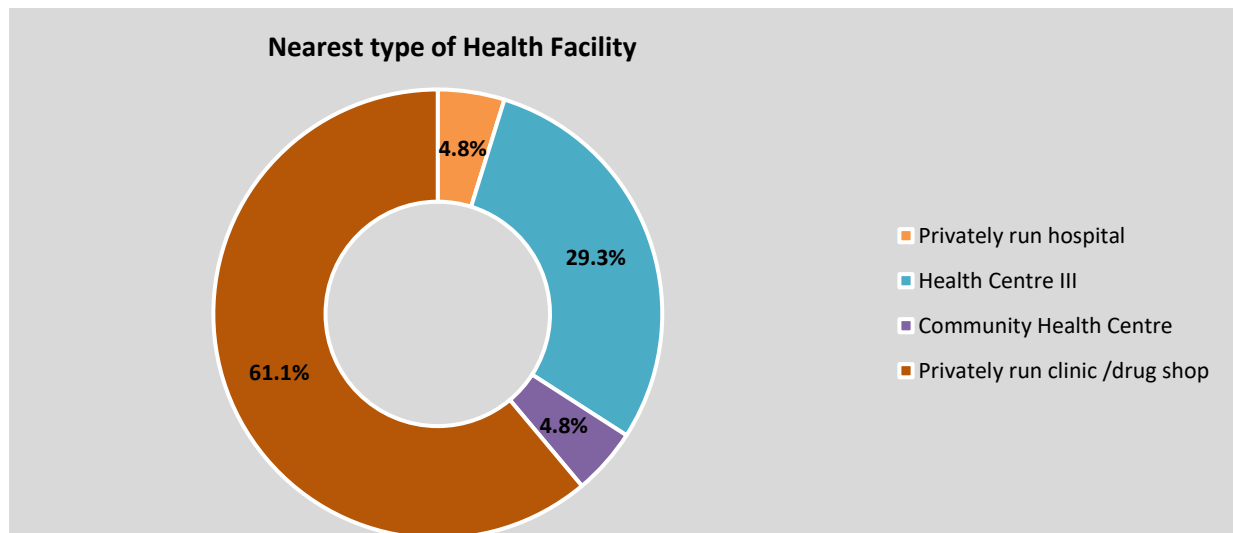


Figure 5-38: Nearest type of Health Facility

Distance to a health facility has a strong influence on access to healthcare, which influences the health outcomes. Patient travel to attend medical clinics in many cases is reliant on the distances they must travel. Ministry of Health Uganda recommends a maximum distance of 5 km to the nearest health facility. From the field survey, majority of the respondents indicated that 47% travel 100-500m ,27.1%1-1.5km 18% 100m and 7.8% over 5km (Figure 5-39).

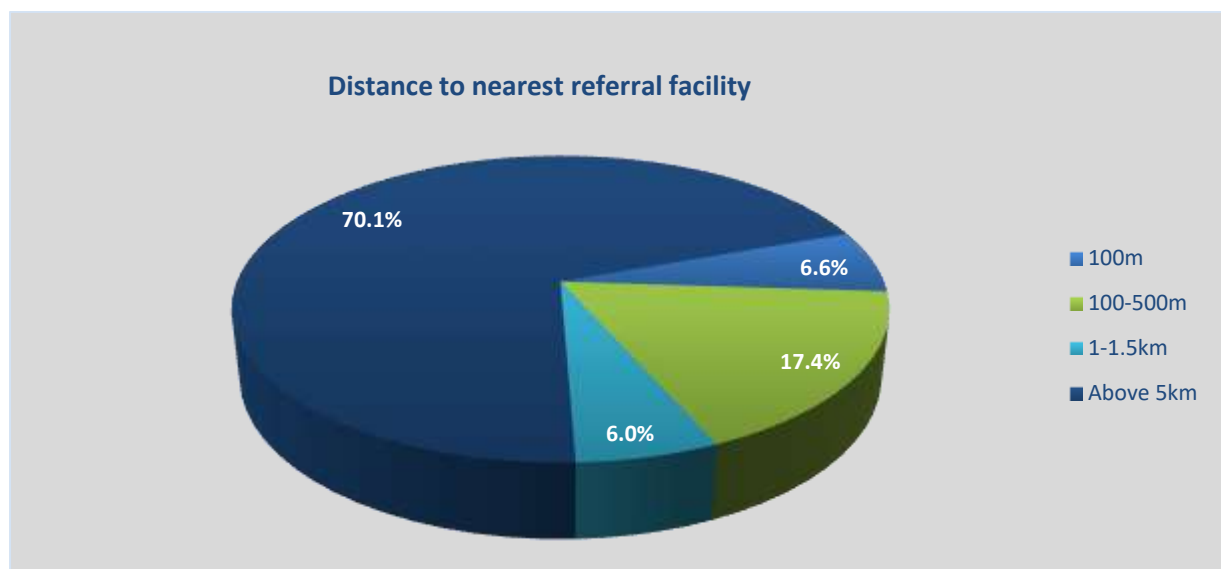


Figure 5-39: Nearest health facility in the RGC

Relatedly, when questioned about the distance travelled to the nearest referral hospital, 70.1% of the respondents indicated travelling over 5km ,17.4% 100-500m ,6.6% 100m and 6% 1-1.5km (Table 5-33).

Table 5-33: Distance to nearest referral facility

Distance to nearest referral facility	Percentage (Frequency)
100m	6.6% (11)
100-500m	17.4% (29)
1-1.5km	6% (10)
Above 5km	70.1% (117)
Total	100% (167)

5.4.11.2 MOST COMMON DISEASES

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. In Uganda, malaria is highly endemic with 90-95% of the population exposed to high transmission.

According to HMIS in 2018/2019, malaria accounted for 24.4% of the inpatient diagnosis’s among children less than five years of age. While in adults, malaria remained the highest among the causes of morbidity accounting for 22.4% of inpatient diagnosis. Tetanus remained the one killer in the financial year accounting for 21% of deaths in children and adults respectively. Other leading causes of death were pneumonia, abortions, diarrhea acute, septicemia, severe malnutrition and tuberculosis. Monthly data obtained from Malongo HC III (Appendix 10) indicates that malaria was the most common illness among patients in the sub county followed by diarrhea and urinal track infections (UTIs) as shown in Table 5-34 below.

Table 5-34: Commonly treated illness at Malongo HC III

Diseases		Oct-21		Nov-21		Dec-21		Feb-22		Mar-21	
		Male (M)	Female (F)	M	F	M	F	M	F	M	F
		210	468	226	701	286	579	296	538	377	974
EPO1. Malaria	EPO1a. Suspected fever	57	105	63	195	102	245	115	242	218	488
	EPO1b. Malaria Total	57	125	96	195	102	245	115	242	218	488
	EPO1c. Malaria confirmed (B/s and RDT positive)	57	125	96	195	102	245	115	242	0	0
	EPO1d. Malaria cases treated	17	22	3	1	0	2	0	1	0	0
CDO1. Diarrhoea-Acute		22	0	1	18	14	17	17	12	0	0

CD03. Urethral discharges	1	210	468	8	6	6	10	3	20	26
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(source: Malongo HC III health records, 2021-2022)

According to the Mayuge District Health Officer, the most common diseases at Malongo HC III are Malaria, Intestinal worms (diarrhea), UTIs, Anemia, Mal-nutrition. Typhoid and Bilharzia are registered as suspected cases with no confirmatory test at the HC. For the last 10 Bilharzia cases referred to Mayuge HC IV, 4 cases were confirmed as positive. In Comparison, from the field survey, malaria (42.9%) and Respiratory Tract Infection (RTI) 36.5% were the main diseases reported (Table 5-35).

Table 5-35: Common diseases in Bukizibu-Bumwena RGC

Most common diseases	Percentage (Frequency)
Malaria	42.9% (161)
RTI	36.5% (137)
Cholera	6.1% (23)
Dysentery	3.2% (12)
Intestine infections	0.8% (3)
Ulcers	3.7% (14)
Skin disease	4.3% (16)
Others	2.4% (9)
Total	100% (375)

5.4.11.3 STATE OF THE HEALTH FACILITIES AROUND THE PROJECT AREA

The nearest health facility to the project area is Malongo H/C III, which serves a population of about 130,000 people. The most common illnesses treated at this facility are measles, malaria, bilharzia, and typhoid. The facility has no emergency unit, 1 ambulance donated by the area MP, 10 beds assigned for emergency cases, no blood transfusion services, and no theatre. The services provided by this facility are; VCT, HIV/AIDS testing and treatment, antenatal and maternity services, reproductive health education, first aid training, and blood group testing. The health facility has 19 staff, and the main contact is **Buyinza Joab +2567732140447**.

5.4.11.4 WATER IN HEALTH CARE FACILITIES

Nationally, 33% of health facilities in Uganda have basic water supply (WHO Global Baseline Report, 2019). According to UNICEF/JMP, 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 Mayuge district, there are 55 health facilities (37 Gov't; 8 PNFP; 10 PFP).

However, within the RGC, only one health facility (Namoni HC II) has access to piped water (2 PSPs) connected to an on-site motorized borehole. There are 2 RWHTs with capacity of 7,000 liters located in 2 health facilities as shown in Table 5-36 below.

Table 5-36: Water in Health Facilities in Bukizibu – Bumwena RGC area

Facility	Location	Ownership	Type of borehole used / accessed	Piped Water	PSPs	Rainwater Harvest Tanks (RWHTs)	No. of tanks	Capacity
Bwondha HC II	Bwondha parish	MoH/ Gov't	Dep borehole	No	0	0	0	0
Malongo HC III	Malongo parish	MoH/Gov't	Dep borehole	No	0	1	1	5,000
Namoni HC II	Namoni parish	MoH/ Gov't	Motorized borehole	No	2	1	1	2,000
Total – 3 HCs					2	2	2	7,000

(Source: HC Management, March 2022)

Implications: The project will provide improved supply of safe and clean water to the 2 health facilities namely Malongo HC III and Namoni HC II. It has been proposed that a Yard Tap (YT), PSP can serve the health facilities better. The proposed Bukizibu-Bumwena RGC water supply system will reduce the queus at the boreholes near the health facility and ensure consistent supply water to the tanks beyond rainy seasons.

Additional water storage tanks (>10,000 liters) can potentially be useful for each facility. It is anticipated that the piped water will make a positive impact to the health service delivery, hence contributing to achievement of health sector targets under NDP III 2020/21- 2024/25, as well as ‘SDG 3 - Ensure healthy lives and promote well-being for all at all ages. By emphasis, 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” (WHO, 2017).

5.4.12 EDUCATION SERVICES

5.4.12.1 EDUCATIONAL LEVEL AND ACCESS TO EDUCATION SERVICES

During the study, information about the level of education achieved and the highest grade completed was collected. 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. Results from baseline data regarding the education level of respondents in the project area of influence indicate that most respondents had attained primary education (66.5%), (17.7%) ordinary level and (12.2%) had never gone to school (Figure 5-40). It is imperative to consider this low level of literacy in the project area as it can affect the project implementation especially in terms of communication. Therefore, the way information is presented for informative and/or discussion

purposes should be geared towards more visual/oral means rather than written communications for better understanding by the project affected communities.

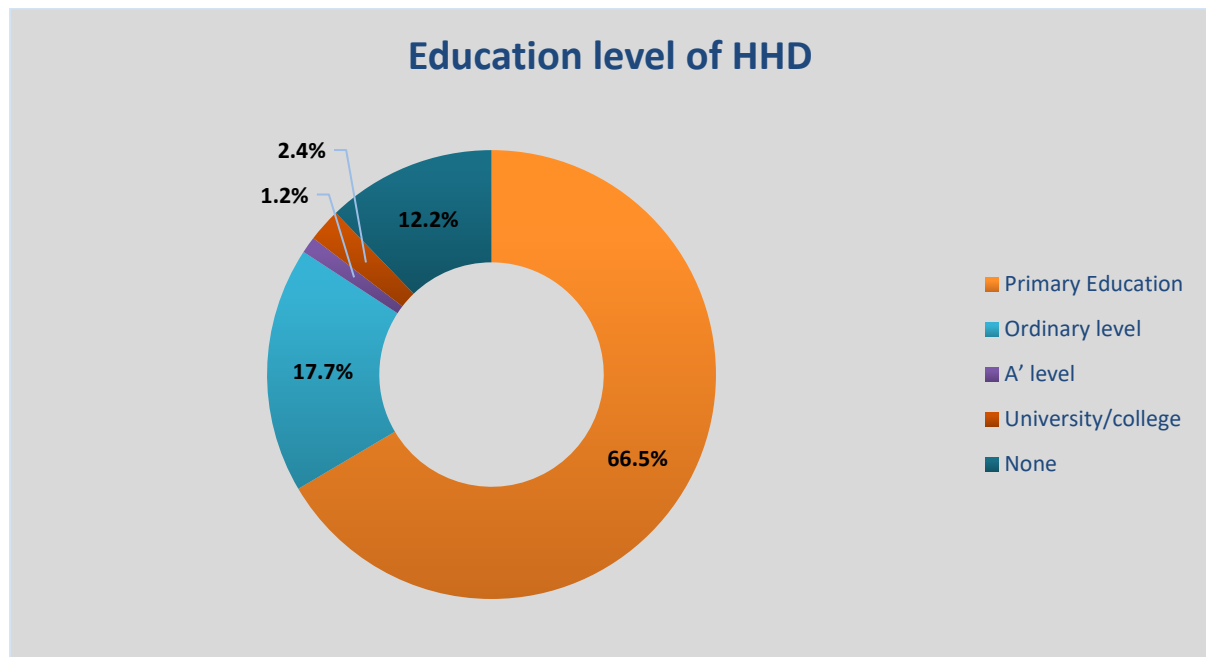


Figure 5-40: Education level of HHD

5.4.12.2 DISTANCE TO THE NEAREST PRIMARY SCHOOL

Regarding access to education services, field data shows that most households were able to access primary school that were within walking distance of 1-1.5km (43.9%), 100-500m (40.8%) and 100m (10.2%) Only (5.1%) of the respondents indicated travelling over 5km to access primary schools from their principal places of residence (Figure 5-41).

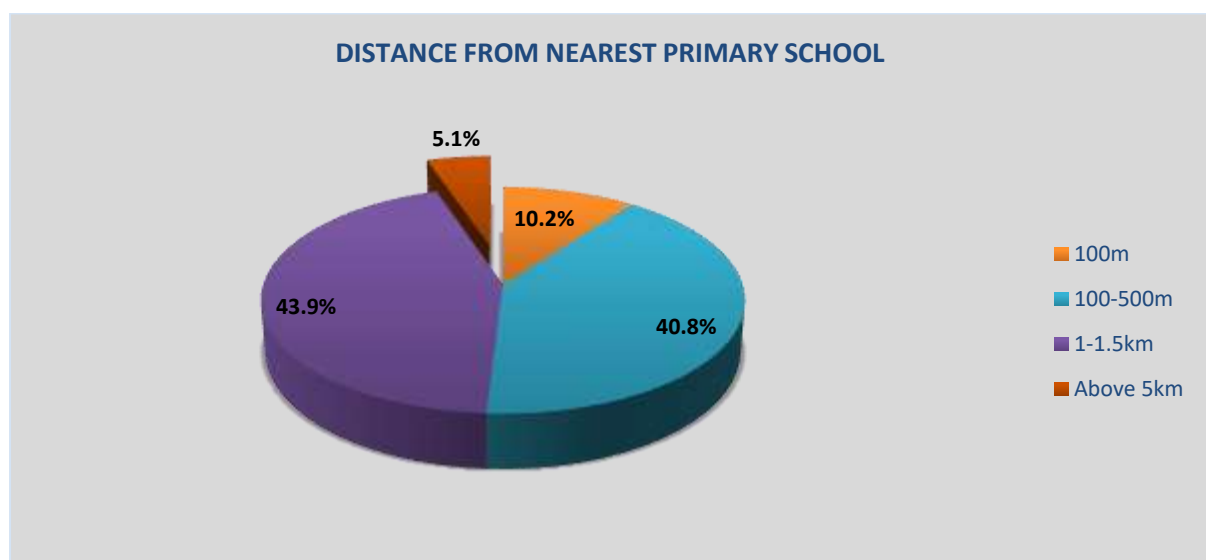


Figure 5-41: Distance to the nearest primary school

Regarding secondary schools, most respondents indicated that they have to travel over 5km (45.9%), (35.61%) 1.5-5km, 100m-500m (16.4%) to access secondary schools. However, some respondents lived in close proximity with the school travelled for 100meters (2.1%), as shown in the Table 5-37 below.

Table 5-37: Distance to the nearest secondary school

Distance to the nearest secondary school	Percentage (Frequency)
100m	2.1% (3)
100-500m	16.4% (24)
1-1.5km	35.6% (52)
Above 5km	45.9% (67)
Total	100% (146)

5.4.12.3 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 (UNICEF, 2020). It is notable that water in schools has direct impact on education outcomes in primary, secondary, and tertiary levels (MOES, 2020).

In all the schools within Bukizibu-Bumwena RGC, the major water source are deep boreholes, and 2 functional RWHTs in two schools (Table 5-38). In summary, the access to safe water in the RGC schools is as follows:

- Water storage: Water is mainly collected using plastic jerrycans and stored in plastic drums.
- Capacity of RWHTs: The total water tank capacity in the 2 schools is 2,000 liters serving a school population of 442 learners.
- Average distance to water source: The average distance to a water source (deep borehole) for schools in RGC is less than 100 meters.

Effects of Water Scarcity on Education outcomes: The inadequate water availability is affecting education outcomes. During stakeholder consultations with school managements in Bukizibu Bumwena RGC, it was revealed that water scarcity contributes to high rate of school dropout, absenteeism and performance among learners and teachers. Accordingly, water scarcity is negatively affecting teacher and learner performance. There are no adequate WASH facilities for the teacher and learners. It's affecting school feeding for teaching staff and learners (no water to prepare porridge).

Table 5-38: Water facilities for schools within RGC

No	Name of School in Bumwena RGC	Ownership	School Popn		Major Source of water	Average Distance to Source in meters	No. of RWHTs	Capacity in Liters
			Male	Female				
1	Bukagabo	Gov't	213	201	Deep Borehole	<150m	0	
2	Bukatabira	Gov't	696	686	Deep Borehole	<150m	0	
3	Bukizibu	Gov't	578	552	Deep Borehole	<150m	0	
4	Buluuta Parents	Gov't	313	346	Deep Borehole	<150m	0	

5	Buluuta SDA	Gov't	286	326	Deep Borehole	<150m	0	
6	Kabuuka	Gov't	171	172	Deep Borehole	<150m	0	
7	Kitovu	Gov't	482	441	Deep Borehole	<150m	0	
8	Malongo	Gov't	352	367	Deep Borehole	<150m	0	
9	Nakigo	Gov't	428	415	Deep Borehole	<150m	0	
10	Namoni	Gov't	331	316	Deep Borehole	<150m		
11	Nango	Govt	616	641	Deep Borehole	<150m	0	
12	St. Barbra Namadhi	Govt	372	368	Deep borehole	<150m	0	
13	Malongo S.S.	Govt	446	245	Motorized borehole	<150m	0	
14	Hands of Love Community S.S	Private	110	80	Deep borehole	<150m	1	1,000
15	Malongo Ark Peas High School	Private	315	187	Deep borehole	<150m	0	
16	Kaswabuli S.S	Private	105	45	Deep borehole	<150m	1	1,000
	Elite High Sch – Bwondha	Private	111	22				
	Buluuta Adventist S. S	Private	73	36				
	Overall, School Population in all schools in RGC		5,998	5446	41.6%		2	2,000
	School Going Age Population in Malongo Sub County		25,405	26,653				

(Source: Mayuge District Education Department, February 2022 – Appendix 11 – School enrollment in Malongo Sub County/ Schools Management, May 2022).

Implications: The water scarcity in schools will reduce. The project will likely benefit 41.6% (21,646 out of 52,058) school going population of boys and girls in pre-primary, primary and secondary schools within Bumwena parish. The feasible water connection to schools could be a Public Stand Post (PSP) PSP and/or Yard Tap (YT) as defined in the Detailed Design Report for Bukizibu - Bumwena RGC system (SGI-Uganda/MWE, 2019). The potential benefits of PSP and/or YT will as well trickle down to neighbouring households within relatively distant schools. The increase in availability of reliable sources of safe and clean water to school will contribute to better school education outcomes especially Enrolment rate, attendance rate, completion rate, teacher performance. The access and utilization of piped water will contribute to reduction in absenteeism, lower the dropout rate especially for girls partly attributed to lack of sanitary and menstrual health facilities. In this regard, the project will contribute to achievement of Education targets under NDP III 2020/21- 2024/25, as well as to SDG 4 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'.

5.4.13 SANITATION AND HYGIENE

5.4.13.1 DISPOSAL OF FECAL WASTE

Sanitation Coverage – In the project area, 77.7% of the population have access to a sanitation facility.

Open Defecation: Two in every 10 people in the project area have no access to any form of sanitation facility and are therefore practicing open defecation. Survey findings indicated that 92.2% (respondents had ever witnessed / observed conditions that depict open defecation in open grounds, river line, grass, bushes, and crop fields; while 7.8 % had not. in was Survey findings indicated that 22.3% of the households don't have access to.

Type of sanitation facility: Regarding disposal of fecal waste, the vast majority (97%) revealed using Pit latrines, 2.4% use VIP latrines and 0.6% flush toilets as shown in the Table 5-39 below.

Table 5-39: Type of toilet facility used by HH

Type of toilet facility used by HH	Frequency
Flush toilet	0.6% (1)
VIP latrine	2.4% (4)
Pit Latrine	97% (161)
Total	100% (166)

5.4.13.2 SHARING OF SANITARY FACILITIES

When questioned on the issues of sharing toilets, 77.8% indicated that they don't while 22.2% indicated that they do (Table 5-40). Those who share sanitary facilities cited the challenge of keeping shared toilets clean which exposes them to the risk of disease and infections.

Table 5-40: Sharing of sanitation facilities

Sharing of sanitation facilities	Frequency
No	77.8% (126)
Yes	22.2% (36)
Total	100% (162)

5.4.13.3 HAND WASHING

In the project area, almost 5 in every 10 people have access to a hand washing facility. Awareness on handwashing practice is also good amongst the surveyed population with 75.8% of the respondents being able to mention at least 3 critical times for hand washing. This should be promoted further.

Table 5-41: Access to hand washing facility

Access to hand washing facility	Frequency
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No	24.2% (39)
Yes	75.8% (122)
Total	100% (161)

5.4.13.4 DISPOSAL OF GENERATE SOLID WASTE

On disposal of solid waste, 58.5% of the respondents indicated that solid waste was disposed of in Dug-pits ,29.5% used it as farm manure,7.1% disposed of their waste at a communal dump site, 3.1% had their garbage Collected by Town Authority or Private Company while 1.8% dumped their waste indiscriminately by the road side (Table 5-42).

Table 5-42: Solid waste disposal

Solid waste disposal	Frequency
Dug-pit	58.5% (131)
Farm as manure	29.5% (66)
Collected by Town Authority or Private Company	3.1% (7)
Communal Dump	7.1% (16)
Thrown at Road side	1.8% (4)
Total	100% (224)

5.4.13.5 COST OF WASTE COLLECTION

Related to waste collection is the important aspect of cost. Survey respondents were questioned on how much they pay for waste collection. 60.2% initiated not paying ,16.4% paying <Ugx 1000,13.3% < Ugx. 5000 and 10.2% Ugx. 1000 per interval of collection (Figure 5-42).

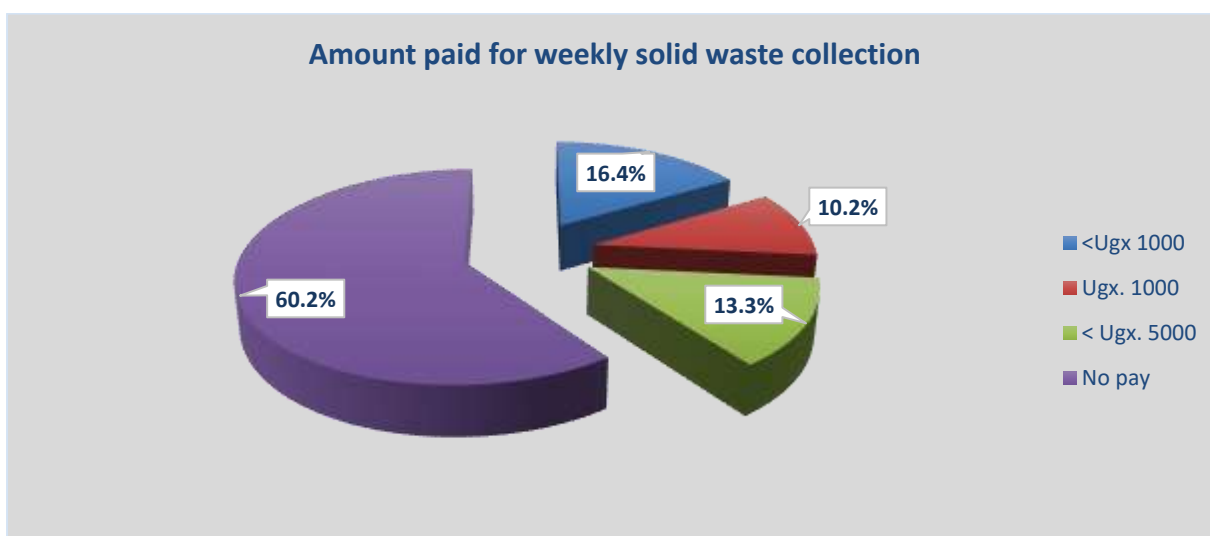


Figure 5-42: Amount paid for weekly solid waste collection

5.4.13.6 PERCEPTION ABOUT SOLID WASTE FEE

Most of the respondents 71.9% revealed that the solid waste collection fee is unaffordable while 28.1% indicated that it is relatively affordable (Table 5-43).

Table 5-43: Affordability of solid waste collection

Is the solid waste collection fee affordable	Frequency
No	71.9% (105)
Yes	28.1% (41)
Total	100% (146)

5.4.14 ENERGY SOURCES

According to the NDPIII 2020/21 – 2024/25, exploitation of the energy from wood, which is consumed in the form of charcoal or firewood is not sustainable because it heavily relies on non-renewable energy, which is both costly, untimely, limited and has serious environmental effects. The socio-economic baseline study also collected information on fuel used by the households in the project area of influence. The distribution of households by type of fuel used for lighting and cooking is presented in Table 5-44 below. A considerable number were found to be using off-grid energy sources such as solar (69.7%) for lighting and this points to the proliferation of renewable energy sources in rural areas. Firewood (69.4%) was the most highly used source of energy for cooking. Only a few 9.7% are connected grid power and use it lighting.

Table 5-44: Major energy sources for cooking

Energy sources for cooking	Percentage (Frequency)
Firewood	69.4% (145)
Gas	1% (2)
Charcoal	28.7% (60)
Solar	0.5% (1)
Other	0.5% (1)
Total	100% (209)
Energy sources for lighting	
Firewood	1.6% (3)
Gas	0.5% (1)
Solar	69.7% (129)
Kerosene	16.2% (30)
Biogas	0.5% (1)

Electricity	9.7% (18)
Other	1.6% (3)
Total	100% (185)

5.4.15 PREVALENCE OF GBV IN THE PROJECT AREA

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 crises. According to the UDHS 2016, 64% of females of ages 15-49 having 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 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 based on 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 must be made by the contractor through Action plans and codes of conduct to mitigate against GBV.

5.4.15.1 COMMON REPORTED CASES

The information collected from the project area for the period Between November 2021 – April 2022 by the Malongo Sub County Uganda Police crime unit indicates that there 142 reported cases of sexual assault ,70 cases related to child abuse and 123 cases of common assault. Field consultation with Mayuge police also indicated that there are several forms of GBV shown in the Figure 5-43 below.

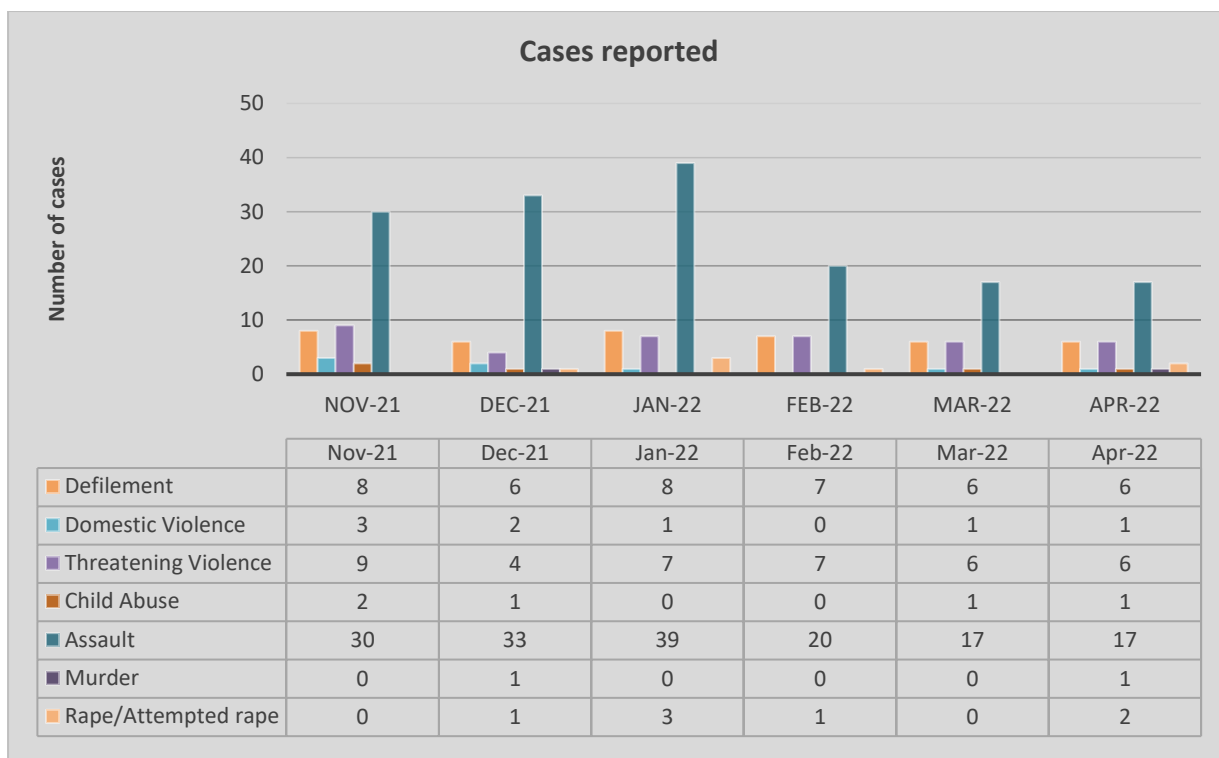


Figure 5-43: Cases Reported

Source: Malong SC Police, May 2022

5.4.15.2 VICTIMS OF DOMESTIC VIOLENCE IN THE AREA

The study revealed that majority of victims of GBV were girls (39.5%) and Married women (38.5%). Approximately 12.3% indicated that children are also victims of GBV as indicated in table 5-45.

Table 5-45: GBV victims

GBV victims	Percentage (Frequency)
Girls	39.5% (122)
Married women	38.5% (119)
Boys	6.1% (19)
Men	3.2% (10)
Children	12.3% (38)
Don't know	0.3% (1)
Total	100% (309)

*Multiple responses allowed

5.4.15.3 COMMON ABUSES RESPONDENTS ARE AWARE OF

When asked about the common types of abuses 38.1% cited battering/beatings, 29.6% verbal insults and abuses, 4.9% Not economically supporting family, 3.9% Threatening violence against spouse or children 3.6% burning, 3.6% unwanted touches and 3.6% marrying of young girls as shown in the Figure 5-44 below.

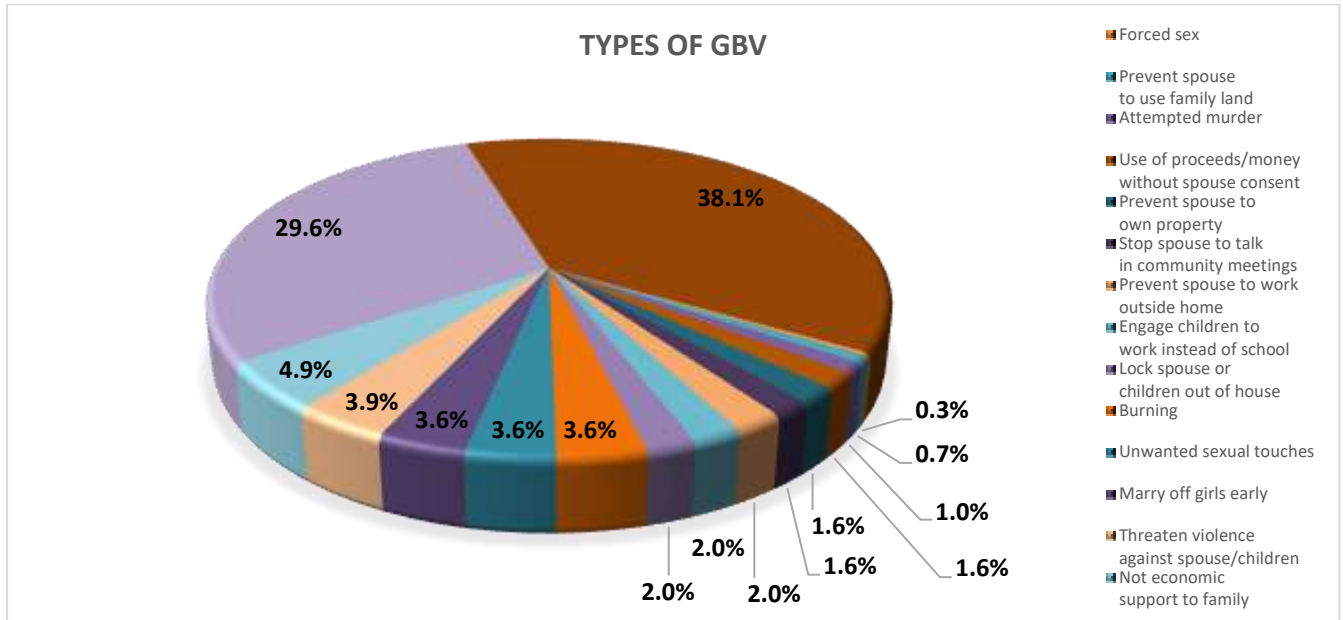


Figure 5-44: Common types of GBV in Bukizibu-Bumwena RGC

*Multiple response

Regarding perpetrators of GBV, Males and female spouses were recorded as the main committers of GBV followed by other relatives 12.1% and strangers (9.3%) as shown in Table 5-46 below.

Table 5-46: Perpetrators of the abuses

GBV perpetrators	Frequency
Male spouse	52.4% (130)
Female spouse	21.4% (53)
Other relative	12.1% (30)
Clan elder	1.2% (3)
Community leader	1.2% (3)
Stranger	9.3% (23)
Employer/boss	0.4% (1)
Male teacher	0.4% (1)
Community member	0.4% (1)

GBV perpetrators	Frequency
Police man/soldier	0.8% (2)
Other	0.4% (1)
Total	100% (248)

5.4.16 HIV/AIDS PREVALENCE

According to the Uganda HIV/AIDS country progress report July 2016-june 2017, 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 2018). Furthermore, the Mayuge DDP 2021-2022-2024/2025 the HIV/AIDS prevalence rate of 5.2%.

5.4.16.1 FACTORS LIKELY TO CONTRIBUTE TO THE SPREAD OF HIV/AIDS IN THIS AREA

When questioned on factor that contribute to the spread of HIV/AIDS, respondents indicated lack of information 21.1%, poverty 17.5%, peer pressure 19.6% and alcohol/drug abuse 13.7%. Numerous factors likely to contribute to the spread of HIV/AIDS are presented in the Table 5-47 below.

Table 5-47: HIV spread factors

HIV spread factors	Percentage (Frequency)
Poverty	17.5% (83)
Lack of information	21.1% (100)
Peer pressure	19.6% (93)
Alcohol/drug abuse	13.7% (68)
Parental neglect	5.3% (25)
No antenatal care service	3.6% (17)
No HIV service providers	2.7% (13)
GBV	3.6% (17)
Prostitution	9.3% (44)

HIV spread factors	Percentage (Frequency)
Early marriage	3.6% (17)
Don't know	0.2% (1)
Total	100% (475)

5.4.16.2 STRATEGIES FOR CONTROLLING HIV/AIDS

When asked 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 5-48 below.

Table 5-48: HIV control/avoidance

HIV control/avoidance	Percentage (Frequency)
Sensitization activities	23.5% (96)
Prevention of GBV	8.8% (36)
Bylaws against prostitution	13.2% (54)
Promotion of ABC	10.5% (43)
Bylaws against drug/alcohol abuse	9% (37)
Improve antenatal care services	7.6% (31)
Engage HIV service providers	5.6% (23)
Bylaws against early marriage	5.9% (24)
Gender empowerment	7.6% (31)
Testing & counselling	8.3% (34)
Total	100% (409)

Multiple responses allowed

Relatedly, survey results also indicate that respondents received information from various sources such as radio (30.8%), health facilities (13.7%), new papers 7.7% religious leaders 7% and community outreaches conducted by village health teams among others (Table 5-49).

Table 5-49: HIV information sources

HIV information sources	Percentage (Frequency)
Television	4.5% (18)
Radio	30.8% (124)

HIV information sources	Percentage (Frequency)
Newspapers	7.7% (31)
Billboards	1.2% (5)
Posters/brochures	4% (16)
Community outreaches	7% (28)
Drama performances	3.2% (13)
Health facilities	13.7% (55)
NGO/CBO/CSO	2.2% (9)
Religious leaders	7% (28)
Traditional leaders	3% (12)
Local leaders/Political leaders	6% (24)
Family members	5.5% (22)
Friends/peers	4.2% (17)
Total	100% (402)

*Multiple response

5.4.17 PROJECT IMPACTS

Regarding impacts of constructing the water supply system, field results indicate that 40.5% of the respondents envisage improvement in the quality of life, 20.5% provide electricity accessibility, 18.2% increase job opportunity (Table 5-50).

Table 5-50: Project impacts

Project impacts	Frequency
Will improve quality of life	40.5% (75)
Will provide electricity accessibility	20.5% (38)
Will improve agricultural productivity	16.2% (30)
Will Increase job opportunity	18.9% (35)
Will boost business in trading area	3.8% (7)
Total	100% (185)

5.5 HEALTH, SAFETY AND SECURITY BASELINE

5.5.1 SECURITY ISSUES AROUND THE PROJECT AREA

The project area is served by Malongo Police Station, located in Malongo Sub County. According to the station in-charge, assaults and domestic violence are the most common crimes (Figure 5-43 above). The police station does not have any transport facilities and communication equipment, except for personal phones. The number of officers is not enough but the OC station can ask for back-up when needed. According to the crime report from November 2021 to April 2022, the recorded cases were as follows; 156 assaults, 78 thefts, 8 domestic violence, 39 threatening violence, 8 simple robberies, 2 murders, 7 rapes/attempted rapes, 15 criminal trespasses, 5 child abuse, 41 defilement, 9 abductions and 10 RTAs (**Appendix 7**).

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5.5.2 FIRE EMERGENCY READINESS

Malongo police station does not have a fire engine, water tanker, trained fire officers and they also do not offer fire safety training. The nearest fire station is Iganga, which is more than 60 km away. From the reviewed records, zero fire calls were recorded for a period between November 2021 to April 2022.

5.5.3 TRAFFIC SAFETY SITUATION

Recorded traffic accidents (RTAs) are rare according to the OC station. But from the records obtained between November 2021 to April 2022, there were 10 RTAs. The roads are marram, narrow, and have potholes. The most common means of transport is by use of motorcycles. There are about 10 vehicles that use the roads, 3 sugarcane trucks, 3 sand trucks, and about 4 small vehicles. The number of motorcycles is about 100 per day.

6 STAKEHOLDER ENGAGEMENT

6.1 OVERVIEW

Stakeholder engagement is an ongoing process that extends throughout the lifespan of the Project and encompasses a range of approaches and activities, from information sharing and consultation, to participation, negotiation, and partnership. This section 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 Kidera RGC, Buyende District to interested and affected persons (I&APs). In order to successfully engage with different groups of stakeholders, thorough analysis and prioritizing should be carried out in order to identify the most appropriate methods and strategies to be employed. Stakeholder engagement is most effective when initiated at an early stage of the project development process and should be under taken throughout the project cycle. Stakeholder engagement is an integral part of early project decisions and the assessment, management and monitoring of the project's environmental and social risks and impacts.

Stakeholder engagement forms an integral and mandatory part of the Environmental and Social Impact Assessment (ESIA) process. As such, the interaction with the communities should be meaningful, adequate, timely, and proportionate to improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Specifically, on this project, stakeholder engagement entailed an interactive process where input of key stakeholders such as project affected communities, district technical officials, political leaders, government institutions, other interested parties and key implementing partners was sought and incorporated in the planning process as early as possible. Information disclosed included details of the project, nature, location, duration, the project benefits, and adverse impacts, as well as the proposed enhancement and mitigation measures.

The stakeholder engagement mechanisms employed during this study included information sharing meetings with the stakeholders, focus group discussions and key informant interviews. The information was disclosed in relevant local languages and in a manner that is accessible and culturally appropriate. Meetings were also held with disadvantaged and vulnerable groups affected by the project such as, women, PWDs, youth, elderly, among others. During the meetings with key stakeholders, key issues discussed included; likely environmental and social risks and impacts, Grievance Redress Mechanism, the importance, composition, roles, and levels of Grievance Redress Committees and during project implementation among others. This chapter describes the public information and consultation process that was implemented as part of the ESIA. The engagement process was designed to meet both Ugandan legal requirements for stakeholder engagement and international requirements for engagement as outlined in the World Bank Safeguards Policy (OP 4.01 Environmental Assessment) by provision of sufficient and useful information on an on-going basis to interested and affected persons (I&APs) to allow them to participate in the project and offer comments is a cornerstone of this Environmental Assessment process.

6.2 OBJECTIVES OF STAKEHOLDER ENGAGEMENT

The objectives of engaging stakeholders during the ESIA study were:

- a. To introduce the proposed Water Supply and Sanitation system for Bukizibu-Bumwena RGC.
- b. To inform the stakeholders about the ESIA and the proposed project strategies to mitigate potential impacts,
- c. Share project information with key stakeholders,
- d. To raise awareness, obtain baseline information,
- e. Obtain stakeholder views, and concerns regarding the proposed project and potential impacts,
- f. Integrate stakeholder views and recommendations in the proposed measures to minimise and/or mitigate negative impacts and enhance positive impacts.

In order to achieve the above objectives, the ESIA team undertook a highly participatory and consultative approach at the national and local level that included participants from Mayuge District Local Government as well as lower administrative units at Sub- County, Parish, and village level.

6.2.1 PRINCIPLES OF STAKEHOLDER ENGAGEMENTS

According to O.P 4.10, stakeholder consultation should be inclusive (of all groups and genders of stakeholders) meaningful, and a two-way dialogue of informing and listening to participants and providing responses to issues raised. Cognizant of that, Stakeholder consultations were conducted at all the various stages of project planning including scoping, during detailed field studies and are expected to continue throughout the implementation phase.

- a. **Stakeholder's appreciation:** During stakeholder engagement with the different groups, the project was welcomed, and stakeholders were looking forward to the water project and the associated benefits like enhanced access to safe water and improved sanitation and hygiene.
- b. **Stakeholders' concerns:** Stakeholders including government officials, political leaders, affected communities, and other stakeholders expressed several concerns on the negative impacts of the project such as; delays in implementation of project works, poor quality works, fear of loss of property such as crops especially along the water transmission mains/lines, delays in addressing grievances that may be reported, how the grievance committees will work, issues of sexual and gender based violence, increase in cases of HIV/AIDS, and other concerns.
- c. **Involvement:** Stakeholders especially at District level requested that the contractor involves the District Technical Teams during implementations period.

6.2.2 TARGET STAKEHOLDER GROUPS

Target groups for the ESIA stakeholder engagement included the following:

- e. At Ministries, Agencies and national agencies, the following stakeholders were consulted:
 - Uganda National Roads Authority,
 - Ministry of Gender Labour and Social Development,
 - Ministry of Water and Environment (Directorate of Water Resources Management (DWRM) and Wetlands Department;
- f. At District/ Sub County local government authorities, technical and political officials, Political and Technical District Officials of Mayuge DLG and Malongo Sub County LG were consulted.

- g. Project-affected communities and households from the 4 project villages ensuring representation of all gender.
- h. other interested parties.

Over 153 stakeholders (102 females and 51 males) were consulted regarding the project. The details of the stakeholders engaged including their gender are included in **Error! Reference source not found.** and **Error! Reference source not found.** under Section **Error! Reference source not found.** above.

6.2.3 ISSUES AND CONCERNS

Early, informed, and prior consultation meetings were carried out first with district technical and political teams together with respective sub-county officials and this were conducted in from February to May 2022. These meetings were held at the respective local government chambers organised by both the consultant and the respective entity leadership; gave an overview of the project, explained the ESIA process together with likely potential and negative impacts. Interactive discussions were held; participants shared experiences of similar projects, provided their views, fears, expectations regarding the Solar-powered Water Supply and Sanitation project. A summary of the key findings from the consultation process right from the scoping to the detailed ESIA phase are presented in Table 6-1 below.

Table 6-1:Key Issues Raised

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
Mayuge District officials on 5 th February 2022 at Mayuge District headquarters boardroom	Mayuge District passed environmental and natural resource ordinances in 2012. The ordinances should be reviewed when conducting the Environment and Social Impact Assessment.	The ESIA reviewed the ordinances in order to align minimization and/or mitigation of project impacts on the environment.
	There are other development projects planned in the proposed location for the piped water scheme. For instance, the National Oil Palm project in Malongo Subcounty which also intends to supply piped water to communities. The client/consultant should understand other planned projects proposed in the area.	The ESIA reviewed and documented the likely impacts of other proposed projects in the project area and recorded it as part of the cumulative impact.
	Part of the proposed project parish (Bumwena) is a forest reserve. It is proposed that the proposed project be extended to neighbouring areas such as Bukatabira, to cover the area that could have been served in the forest reserve.	The project will be limited to Bukizibu and Bumwena villages but will not cover the area covered by the forest reserve.

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
	<p>The district political and technical officials should be involved in all the phases of the project. Roles and responsibilities should be allocated for district authorities to allow participation in the project. The same is recommended for lower local governments and communities to improve project ownership.</p>	<p>The ESIA conducted a comprehensive stakeholder consultation and will develop a Stakeholder Engagement Plan (SEP) as well as ESMPs. A project communication strategy will be proposed in the project ESMP</p>
	<p>The proposed project should define the magnitude and extent of compensation on the project, if any.</p>	<p>The project RAP will incorporate the requirement</p>
<p>District Health Inspector on 4th may 2022</p>	<p>Malongo subcounty is the biggest in the district with Bumwena parish having 43 villages and served by 2 Health Centres (Malongo HCIII and Namulii HCII). Malongo HCIII experiences major water challenges after the breakdown of the supplementary borehole. The maternity ward only consumes the 1000litres and 10,000litres water tanks in a day for 130 deliveries attended to. The supply of water should consider the health centre.</p>	<p>The request would be forwarded to the design engineer for consideration.</p>
<p>MoGLSD on 17th May 2022</p>	<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. 	<p>The project RAP will incorporate the requirement</p>
	<p>The necessary Permits and approvals should be obtained from the respective agencies and authorities.</p> <ul style="list-style-type: none"> ▪ 	<p>The necessary permits and approvals will be highlighted in the ESIA study.</p>
	<p>Design considerations:</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. 	<p>The number of users will be used to inform the size of septic tank and design life of the sanitation facilities.</p>

	<p>Health and welfare:</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. <p>Health and safety considerations:</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. 	<p>The ESIA will highlight all the possible risks and impacts related to health, safety and welfare of workers and propose appropriate mitigation measures.</p>
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| | <ul style="list-style-type: none">▪ 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) | |
|--|--|--|

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
	<p>Pollution and environment management:</p> <ul style="list-style-type: none"> ▪ Water treatment plan should guard against waste contamination of the environment, facility pollution to underground waters. ▪ 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. 	<p>The ESIA will highlight risks and impacts related to water and environmental pollution as a result of water treatment processes and propose appropriate mitigation measures including water source protection, and restoration of degraded vegetation.</p>
	<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. 	<p>The designs of the proposed sanitation facilities are inclusive.</p> <p>Grievance Redress Committees will be formed at the village, sub county, and district level to address and resolve grievances that may arise during the project.</p>
	<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. 	<p>Appropriate employment procedures will be followed as highlighted in the Employment Act</p>
<p>Malongo sub county official on 18th February 2022</p>	<p>The project should engage community leaders (LCI) for recruitment for available jobs during the construction phase to improve project ownership</p>	<p>Available jobs on the project (skilled and unskilled) will be communicated through the local councils to community members</p>
	<p>Will there be compensation for land take on the project?</p>	<p>Resettlement Action Plan has been undertaken, and sites requiring compensation have</p>

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
for Bukizibu Bumwena RGC		been assessed based on govenemrnt standards
	There should be a sustainable operations and maintenance strategy to maintain the project in good working order	An assessment of capacity needs in operations and maintenance of the water systems and sanitation facilities will be conducted by MWE before project implementation
	How much will a jerry can of water cost?	The pricing of water on the project will be Ugx 50 per 20l jerrycairn. This was computed in project feasibility report, based on the ability of a HH to spend only 5% of their annual income on access to safe and clean water.
	More community engagement meetings are required to improve project ownership	Continued community engagement on the project to be recommended in the ESIA.
	Train the locals to provide technical services on the project	An assessment of capacity needs in operations and maintenance of the water systems and sanitation facilities will be conducted in the ESIA.
Meeting with communities in Bukizibu and Bumwena villages on 4 th May 2022	Residents requested to be considered for job opportunities especially during the construction phase of the project in order to better their Standards of Living.	Available employment opportunities for both skilled and non skilled labor would be duly advertised and the locals would be given priority for the jobs which they qualify to do.
	The parish chief informed the meeting that Bukizibu is a busy town with population congestion and people staying in slums. The issue of sanitation in the area is a major challenge as many retail owners do not have latrines hence share the with households which affects hygiene.	The project planned to construct public sanitation facilities to increase access to improved sanitation; and would also conduct sanitation and hygiene promotion campaigns to effect behavirola change.

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
	The community also said that the busy towns of Bumwena and Bukizibu have no sanitation facilities therefore, instead of constructing one 6 stance toilet in one area, the toilet should be divided into two so as they can be constructed in the two towns.	The proposal to have a public sanitation facility for Bukizibu and Bumwena would be forwarded to the Ministry for consideration.
	There was concern of women and children having to move long distance of about 3km in search for the nearest borehole and the conflict there in among women having to wait for their turn to fetch. The Implementation of tap water will benefit many households.	The proposed water supply and sanitation systems would increase access to safe water in nearby locations and will reduce walking distances as well as queuing time at the collection points.
	The communities also expressed concern about the high prevalence of malaria and requested that water and more medical supplies be supplied to Malongo HCIII for better services.	The Request to include the health centre in the list of beneficiaries would be forwarded to the design engineer for consideration.
	<p>Commonly asked questions;</p> <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? 	<p>The project is expected to start in 2023, the water would be paid for at a rate that will be generated based on the operation and maintenance costs of the system.</p> <p>Locals will be prioritized for employment based on their qualifications.</p> <p>Land that will be permanently acquired will be compensated for and crops that will be destroyed during pipe laying will be paid for.</p>
	For every catchment area identified for source water protection, the catchment management organization/ committee should be engaged.	Appropriate water source protection measures would be proposed in the ESIA.
	What are the possible solutions for water contamination given the proximity of latrines and open defecation around the water sources?	Appropriate measures to mitigate contamination of the

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
MWE (with DWRM, Wetlands Department and Environmental Affairs) on 8 th June 2022		water sources would be proposed in the ESIA
	Develop Water Source Protection Plans and ensure that they are implemented during the commencement period of the project such that the implementation activity takes place alongside the project so as everything is finalized at the same time and this will reduce on the man power required.	Water source protection plans were going to be developed for the project.
	Ensure to develop sanitation/ solid waste management plans and clearly indicate the dumping to prevent issues of leachates and salts flowing to water sources and pollution of the environment due to improper solid waste handling.	The ESIA would highlight measures for proper solid waste management
	In cases where there are floods and likelihood of ground water contaminations emanating from improper sanitation and open defecation, ecosan toilets should be provided.	Protection of the environment and ground water from pollution would be considered during the design and technology choice of the sanitation facility.
	The developer should not negate their responsibility of managing the entire ecosystem. They must work closely with the catchment management committee to ensure the catchments or the wetland are effectively managed and conserved without causing more harm.	The ESIA report would emphasise the need for collaboration and partnership with the catchment management committees as one of the mitigation measures.
	The developer should consider motorizing other neighbouring hand pumps in the project area.	This proposal would be forwarded to the design engineer for consideration.
	The ministry has a policy of up to 3% of the project budget of any water intake/ source project to be used for the implementation, preparation of the source water protection and the developer should note this in the BOQs.	The ESIA REPORT would emphasise this policy position as a mitigation measure.

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
UNRA – Head of Design (Roads and Bridges) on	The project design team should provide definite crossing points especially at town junctions called service ducts	The crossing points would be clearly recorded in the ESIA report.
	There is lack of consultations with UNRA as decisions are made to cross roads without notification and inputs to UNRA	MWE will consult UNRA about road crossings before the project construction phase
	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	The ESIA report would emphasize the need for the MWE to work with UNRA and share information on the master plan for road networks
	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	MWE would work together with UNRA on the issue of location of utilities in the road reserves.
	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	UNRA's Regulations on utilisation of road reserves would be followed during implementation of the project.
	In case there is need of implementing water works with crossing points on UNRA proposed road constructions, consultations should be made to harmonise works and prevent cutting of pipes during the initial road works.	MWE would consult UNRA on road crossings of water pipes to avoid cutting of the roads to during implementation of the project.
	The design team should submit their typical road crossings and typical valves so as they can be synchronised with UNRA's class of concrete and to know the size of ducts required especially in big towns.	MWE would share the typical drawings for the road crossings and valves with UNRA to synchronize with UNRA's class of concrete and also know the right size of ducts to be provided.

Stakeholder /Date/ Venue	Views and concerns	Response/Clarification
	Liaise with UNRA to ensure that future road constructions especially bridges / right of way are not in proximity with water abstraction points so as not to contaminate the water sources during road upgrades	MWE would liaise with UNRA on and share information on location of abstraction points.
	Swamp crossings of water pipes by hankers should not block the incoming water flow on roads to avoid flooding of debris and water on the roads.	The design of the water supply system would ensure that swamp crossings of water pipes would not interfere with flow of water

6.3 GRIEVANCE REDRESS MECHANISM

6.3.1 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 community grievance redress shall consist of grievance 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.

6.3.2 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. The 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.

6.3.3 LIKELY SOURCES OF GRIEVANCES

Considering the nature and extent of works, grievances are likely to arise from the following: 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 Behavior 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
- Failure of the contractor to provide necessary information, protective gear and appropriate supervision

6.3.3.1 MEMBERSHIP AND COMPOSITION OF GRIEVANCE MANAGEMENT COMMITTEES

GMCS AT VILLAGE OR PARISH LEVELS 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

- a) Chairperson,
- b) Vice Chairperson,
- c) Secretary,
- d) 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.

6.3.3.2 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.

6.3.3.3 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.

6.3.3.4 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.

6.3.4 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.

6.3.4.1 WORKERS' COUNCIL

The workers' council shall be constituted based on directly elected representatives based on 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.

6.3.4.2 SITE DISCIPLINARY COMMITTEE

During the construction phase, several 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.

6.3.4.3 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) Environment officer for the contractor
- f) Environment officer for the consultant

6.3.4.4 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 9

6.3.4.5 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

ProjectSupport Team shall lead the rollout the capacity building framework and trainings to ensure the committees perform to the expectations of the stakeholders.

6.4 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:

- f. To ensure that all the recommendations in the approved ESIA report are adhered to by the relevant lead agencies/institutions;
- g. 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;
- h. To ensure that the proposed environmental and social corrective/offset measures are implemented throughout the project implementation phases;
- i. To evaluate the effectiveness of environmental and social mitigation/offset measures; and
- j. 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.

6.5 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.

7 ANALYSIS OF ALTERNATIVES

The project alternatives presented in this report are based on analysis of the project feasibility studies, designs and ESIA studies findings. The proposed project involves establishment of a Solar-powered Water Supply and Sanitation system under Bukyizibu-Bumwena RGC to enhance water supply within the seven beneficiary villages of Bukizibu A, B, & C and Bumwena A, B, C & D all in Bumwena Parish, Malongo Sub County in Mayuge District. The alternatives analysis investigates aspects of project components siting and design, water source options, water treatment and sanitation systems and the No Project Option as follows:

- a. The No-Action alternative (Zero alternative).
- b. Water source alternatives.
- c. Sanitation Systems alternatives
- d. Technology alternatives

For any alternative to be considered feasible such an alternative must meet the project objectives of the development proposal without presenting significantly high associated environmental and social impacts.

7.1 SITING AND DESIGN ALTERNATIVES

7.1.1 WATER SOURCE ALTERNATIVES

7.1.1.1 SURFACE WATER FROM LAKE VICTORIA

Lake Victoria which is approximately 1km from Bukizibu-Bumwena RGC was considered during the feasibility studies as one of the water sources. The lake provides adequate water supply to meet the projected demand of approximately 450 m³/day. This option if considered will guarantee constant supply with limited occurrences of water volume fluctuations emanating from source related causes. However, this option involves incurring of high initial capital investment costs to establish a water-intake, transmission, and water treatment infrastructure. Additionally, the subsequent continuous water treatment requirement enhance the operating costs in the longrun owing to the need to purify (treat) the poor-quality raw water from the lake. This water source option was dropped and hence it was not further assessed due to the prohibitive exorbitant costs involved both in the shortrun and longrun dimensions.



Figure 7-1: Figure 7 1: Figure 8 1: The distance between Lake Victoria and the RGC components

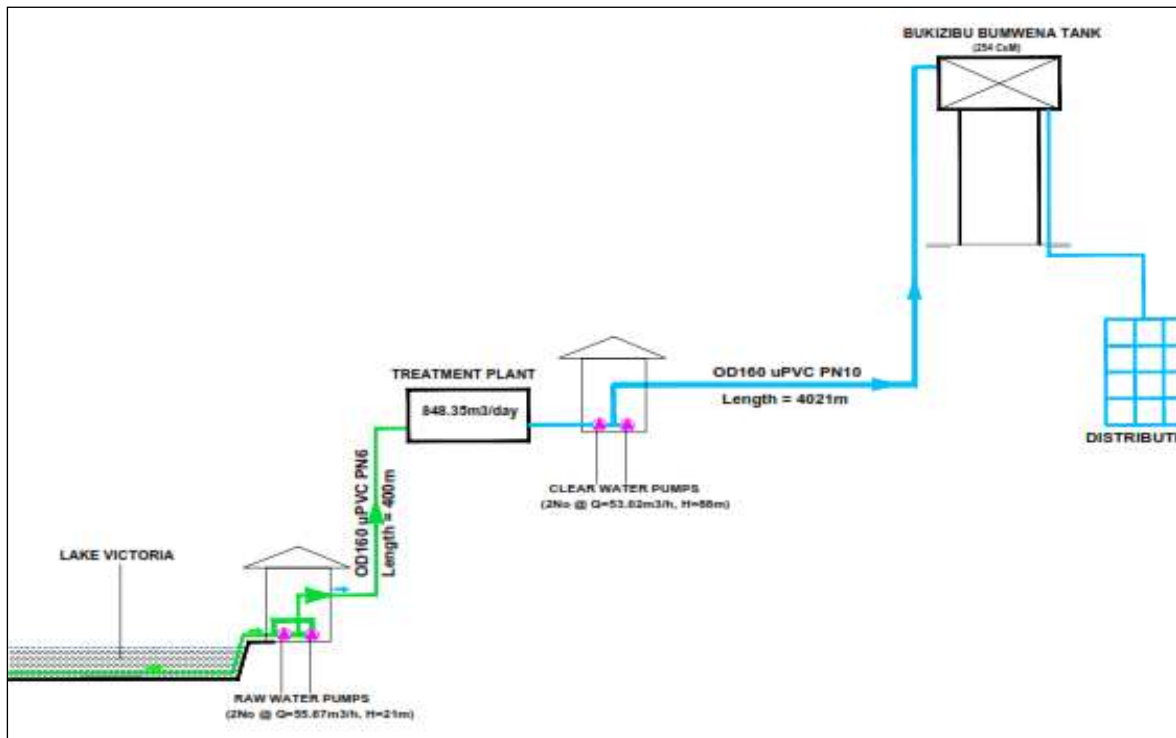


Figure 7-2: Surface water source option Schematics (Source: Feasibility Report)

7.1.1.2 GROUND WATER SOURCE OPTION

Two boreholes were proposed by the project feasibility report to supply the daily demand of projected 848.35m³/day by 2040. In the interim (for the first phase) one borehole has been considered to supply the existing water demand of approximately 450 m³/day. The borehole can yield approximately

432m³/day according to the feasibility report. This option is considered feasible and less capital intensive both in the short and long runs owing to less water treatment requirements (good water quality) as well as minimal additional infrastructure components as shown in Figure 7-3 below compared to Figure 7-2 (Surface water Schematic flow diagram).

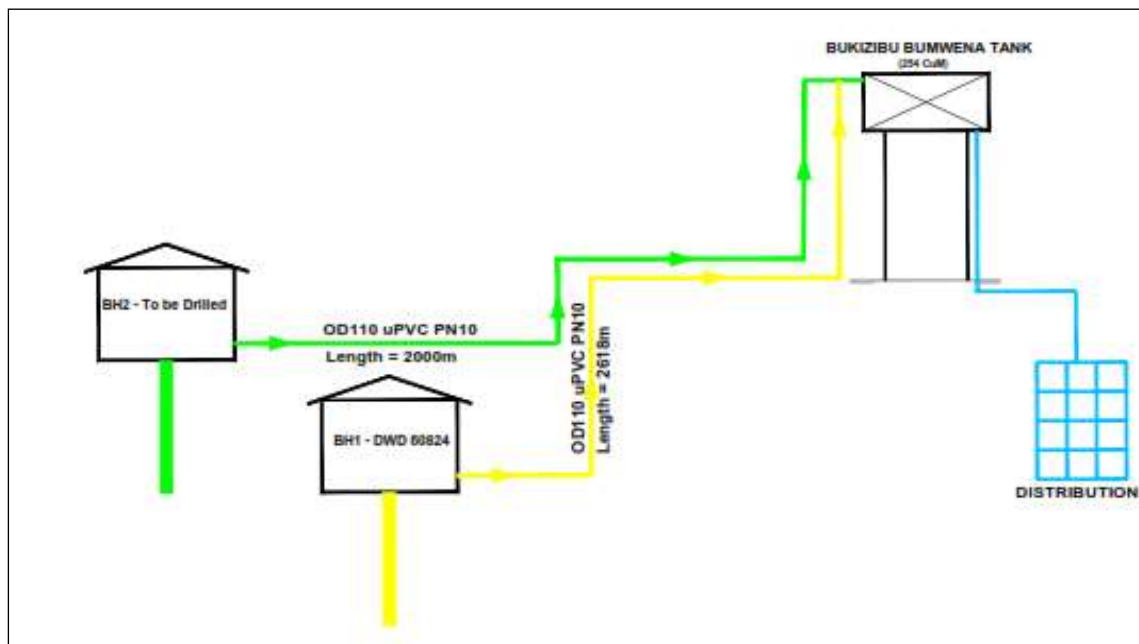


Figure 7-3:Ground Water Option Schematics (Source: Feasibility Report)

7.1.1.3 SELECTED WATER SOURCE

The maximum day water demand for the entire system as per was indicated in the feasibility study report as 848m³/day. The water source for the piped water system is ground water in the form of production wells. Currently, one borehole of 27m³/hr yield (DWD 60824) is already drilled. Due to the limited funds to adequately develop the available water resources to supply the entire project area, the system was down sized to a maximum day demand of 397m³/day which can be met by the available water resource (27m³/hr BH). This demand serves the entire Bukizibu Villages (A, B &C) and a fraction of Bumwena (Bumwena B Village).

7.1.2 WATER TRANSMISSION SYSTEM

Considering the two boreholes for both Phase 1&2, the water transmission and distribution system can be expanded to cover more adjacent villages in Malongo Subcounty. This option would ensure bigger coverage of water supply thus enhancing access to cleaner and safer water by a larger community in Malongo Sub County. Additionally, transmission and distribution coverage enhancement would improve revenues from water sales proceeds for the project proponent (MoWE) thus enabling sustainable water supply and further expansion to other areas. According to the project feasibility report, the two boreholes would be served by one reservoir tank of approximately 436m³ capacity (See Figure 45).

This option is feasible both in short and long runs considering the associated minimal initial capital investment since no extra reservoir tanks are require. Additionally, the economic, social, and public health benefits such enhanced water access and improve hygiene and sanitation, sustainable water supply by MoWE from increased proceeds from water supply collections.

7.2 TECHNOLOGY SELECTION ALTERNATIVES

7.2.1 WATER TREATMENT PROCESS TECHNOLOGY

The choice of water treatment method used is dependent on several factors such as the raw water quality, available budget, final use of the water among others. 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.

7.2.1.1 DISINFECTION

Overtime, Chlorine has been the preferred as the most effective disinfectant to purify water for domestic and industrial use, but more recently other chemicals such as chlorine dioxide, chloramines, and ozone have been adopted for use to purify water and have proven more effective. Non-chemical methods of disinfection such as heat and radiation (e.g., ultraviolet light (UV)) can also be used for water treatment below provides an analysis of the key options that could be employed in the project. Give the raw water quality (turbidity and suspended solids) UV is not a viable option for effective water disinfection. Thus, UV has not been analyzed for this project.

As indicated in Table 36, ozone, the most efficient disinfectant, is not persistent, thus cannot effectively treat water for domestic consumption. It is also difficult to attain the requisite limit thresholds for the formation of bromate during the process of ozonation, thus most water treatment processes do not opt for ozone for water purification activities. Chlorine and chloramines are more effective in secondary disinfection comparee to chlorine dioxide (Less persistent chemical). Thus, chlorine dioxide may not be suitable for the project given the extent of piping systems involved in this project. Lastly, though the combined residues from chloramines lasts longer than chlorine residues, chloramines are not as effective as other germicidal agents.

In general, chlorine stands out as the most effective option of all the assessed water disinfection options and the most used in Uganda and US (according to EPA, 2011, approximately 80% of water treatment plants employ free chlorine for water treatment).

Table 7-1: 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	<p>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</p> <p>Trihalomethanes, Haloacetic acids, Haloacetonitriles, Haloketones, and Haloaldehydes; Trihalomethanes are regulated in Europe; Both Trihalomethanes and Haloacetic Acids are regulated in the US.</p>	<p>Nearly no halogenated organic by-products formed; negligible reaction with organic matter, except halogen transfer to nitrogen amines; some halogenated organic byproducts formed with trace of chlorine or chlorine in excess; Ammonia is formed if used in excess, thus nitrite formed from bacterial oxidation of ammonia.</p>	<p>Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated organic byproducts formed with excess of chlorine used or chlorine formed in-situ.</p>	<p>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.</p>

7.2.2 ALTERNATIVE SANITATION SYSTEMS

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.

7.2.3 ALTERNATIVE TYPES OF SANITATION FACILITIES

There are many types of sanitation facilities used in Uganda (**Figure 7-4**), each with numerous variations. High income residents in medium or high-income group housing may be served by off-site sanitation but the majority rely on onsite sanitation technologies.

Generally:

- On-site options will be most appropriate in areas of low-density housing (typically less than 40 housing units per hectare), relatively low water consumption, and ground conditions that allow the absorption of wastewater without harm to an aquifer
- Off-site options will be most appropriate where housing density is high (>40 houses per hectare), there is a reliable water supply on or close to the plot and sufficient fall is available to transport solids through the sewer without pumping.
- On-site disposal of black water via soak pits, with off-site disposal of sullage water may be possible, even for relatively high-density areas and relatively high-water consumption, if ground conditions allow that and there is no problem of contaminating water supplies.
- Hybrid systems may be appropriate in medium- to high-density areas with a flat topography, particularly where the water table is high.

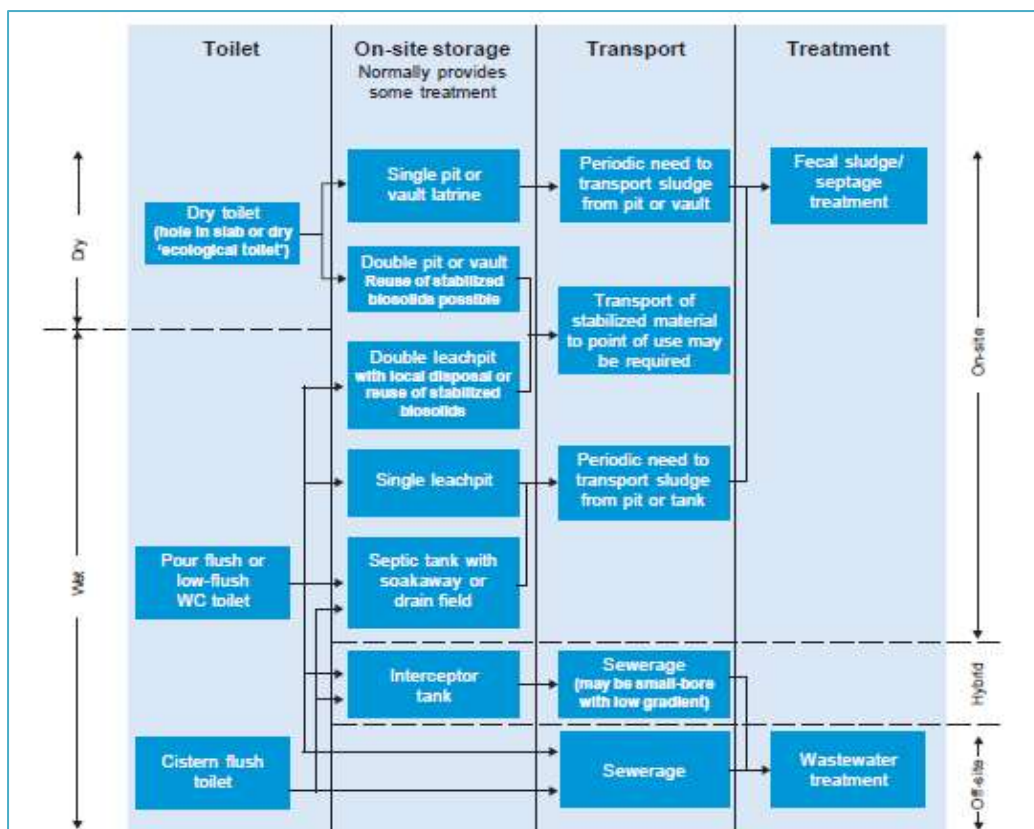


Figure 7-4: Categorization of sanitation facilities

To determine the public sanitation facilities option for Bukizibu-Bumwena RGC, several factors were considered. These are presented in Table 7-1 below.

Table 7-1: Factors for selection of public sanitation technology options

Factor	Description
Institutional Factors	<ul style="list-style-type: none"> ▪ These factors are related to the effective O&M arrangements that could be put in place given the financial and human resources available
Physical Factors	<ul style="list-style-type: none"> ▪ Insufficient space to store faecal waste – this is more likely to be a problem for vaults that are normally raised above floor level than for pits and tanks which can be located below floor level. ▪ Insufficient space to allow absorption of waste water into the ground – this is mainly a problem for cistern flush toilets discharging to septic tanks followed by soak aways. ▪ Another factor to be considered is that seepage from soak pits and soak a way sited close to buildings can cause damp problems in buildings and result in structural damage although damp proof can be used. ▪ Ground conditions include the soil type. The soil type affects the operation of soak aways due to the infiltration capacity of the soil
Environmental Factors	<p>These factors are concerned with the source of water, for instance:</p> <ul style="list-style-type: none"> ▪ Where the community is dependent on boreholes for their drinking water, the possibility of ground water contamination must be considered as this is a potential problem mainly for on-site technologies. ▪ A minimum distance of 10m should be allowed between a soak pit and a shallow well, but this standard will almost be impossible to achieve in most urban settings. ▪ Where the groundwater table is more than 1.5m below the bottom of the pit, the most likely contamination route will be along the side of the well. This suggests that, if off-site technologies are not feasible, the focus then should be on blocking the potential contamination route along the side of the well for instance by using a puddle clay layer
Socio-economic Factors	<p>These factors include the level of water supply service (i.e. house connections are feasible with a sewerage system) and the population/ housing density (i.e. onsite systems are more appropriate for less densely populated rural areas).</p> <p>The total quantity of wastewater produced will depend on water consumption, which in turn will depend on the location of the water source and the length of time for which water is available each day. When per capita consumption is relatively low (<30l/c/d) then, depending on ground conditions and population density, it should be possible to deal with all the waste water on-site.</p> <p>When per capita consumption is higher, on-site disposal of black water is still possible, but sullage water will need to be disposed of off-site. Off-site disposal of all waste water will be required if black water and sullage water flows are combined on-site to produce sewage</p>
Cultural Factors	<p>Cultural factors are related to the cultural norms and practices of the community especially about, anal cleansing, faecal disposal and the general hygiene practises. Sanitation systems, even when they are properly designed, may not be appropriate</p>

Factor	Description
	<p>when social and cultural factors affecting sanitation and hygienic practices of the community members are not considered.</p> <ul style="list-style-type: none"> • For instance, technologies involving re-use of excreta are unfeasible in communities where sight or handling of waste is culturally and socially unacceptable. • In the same way, dry technologies are inappropriate for communities which prefer water for toilet hygiene. • In communities that require a high level of privacy, the design of communal facilities should provide for these requirements.
Financial Factors	The financial factors include the operation and maintenance costs together with the capital costs of the proposed technology option. The costs of the land too where the facility would be located have to be considered.

7.2.4 SANITATION FACILITY ALTERNATIVE

Table 7-2 below shows the different sanitation facility alternatives and how the project arrived at the appropriate technology for Bukizibu-Bumwena RGC.

Table 7-2: Factors considered in assessing sanitation facility options

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
Simple Pit Latrine (Unlined)	Small land requirement (<1.5m ²) – possible on most plots	Low pathogen and BOD reduction.	Does not need water for operation.	Easily understood; residents are familiar with technology.	Relatively low capital cost.	Positive +7 Negative – 5 Total=2
	Relatively simple construction so some or all can be built by the householder	Flies and odours are usually noticeable.	Suitable for a household not public or institutional use		Emptying costs may be significant compared to capital costs.	
	Can accept common degradable and non-degradable anal cleansing materials.	Sludge requires secondary treatment and/or appropriate discharge. Can contribute to pollution of surface water and ground water sources.				
VIP Latrine (Lined)	Can accept common degradable and non-degradable anal cleansing materials	Effective control of flies (if kept dark) and odours	Relatively simple construction so some or all can be built by the householder	Generally, easily understood – many residents familiar with this solution	Low capital cost (though higher than for simple pit latrines)	Positive +8 Negative – 4 Total=4
	Small land requirement (<1.5m ²) – possible on most plots.	Low pathogen and BOD reduction.	Does not need water for operation		Emptying costs may be significant compared to capital costs.	
		Sludge requires secondary treatment and/or appropriate discharge. Can contribute to pollution of surface water and ground water sources.	Suitable for a household not public or institutional use			
Twin-Pit VIP (Lined)	Can accept common degradable and non-degradable anal cleansing materials	Effective control of flies (if kept dark) and odours	Longer life than single VIP (if maintained, indefinite) i.e., reduced reinvestment costs.	Generally, easily understood – many residents familiar with this solution	Low capital cost (though higher than for simple pit latrines)	Positive +9 Negative – 5 Total=4
	Small land requirement – possible on most plots.	Sludge requires secondary treatment and/or appropriate discharge.	Relatively simple construction so some		Higher capital costs than single pit latrines	

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
			or all can be built by the householder			
		Can contribute to pollution of surface water and ground water sources.	Suitable for a household not public or institutional		Emptying costs may be significant compared to capital costs.	
		Low pathogen and BOD reduction.	Does not need water for operation			
Latrine with Vault	Small land requirement – possible on most plots.	Potential for use of stored faecal material as soil conditioner.	Longer life than single VIP (if maintained, indefinite) i.e., reduced reinvestment costs.	Generally, easily understood – many residents familiar with this solution.	Low capital cost (cheaper than double VIP but more expensive than simple pit latrines).	Positive +11 Negative – 5 Total=6
	Can accept common degradable anal cleansing materials	Does not need water for operation.	Suitable for public or institutional use		Emptying costs may be significant compared to capital costs.	
		Effective control of flies (if kept dark) and odours (better than VIP because of the addition of soil, ash and/or leaves).	Relatively simple construction so some or all can be built by the householder.		Higher capital costs than single pit latrines.	
		Significant reduction of pathogen				
		Sludge requires secondary treatment and/or appropriate discharge.				
		Can contribute to pollution of surface water and ground water sources.				
Requires constant source of cover material (soil, ash, leaves, etc.).						
Eco-San (Dehydrating Type)	Small land requirement – possible on most plots.	Good for poor soils, high groundwater, or rocky ground.	Longer life than single VIP (if maintained, indefinite) i.e., reduced reinvestment costs.	Requires acceptance by users Requires education	Low capital cost (cheaper than double VIP but usually more)	Positive +8 Negative – 6 Total=2

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
	Significant reduction of pathogen.	Effective control of flies (if kept dark) and odours (better than VIP).	Emptying can be made manually with simple precautions (low or no operation cost).	Use requires practice and/or skills	expensive than simple pit latrines).	
		Urine and treated faeces can be recycled for agricultural purposes if desired		Careful slab washing required if faeces to remain dry.		
		Urine may cause odour problems		Moslems and others who use water for anal cleansing may find dehydrating eco-sans more complicated to use		
		Requires a constant source of ash, sand, or lime.				
Double-Pit Pour Flush with Cesspit*		Use of stored material as soil conditioner	Because of the alternating pit design, their life is virtually unlimited. i.e., reduced reinvestment costs.		Low cost (though higher than for simple pit latrines).	Positive +8 Negative -3 Total=5
		Moderate reduction in pathogens	Relatively simple construction so some or all can be built by the householder			
		No flies or odour problems	Suitable for public or institutional use			
		Even if limited, a constant source of water must be available.				
		Requires construction of a pit – which may be difficult in areas of hard ground or high groundwater.				
Can contribute to pollution of surface water and ground water sources.						
Full Flush Toilet + Septic Tank + Soak Pit	Septic tank can be built and repaired with locally available materials.	No odour problems if used correctly.	Cheaper than sewerage for medium to low population density.	Widely used in Uganda	Longest life span with emptying and proper disposal of wastewater	Positive +10 Negative -5

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
	Can be modified to be used by PWDs	Eliminates flies and possible sources of sanitation illnesses when well utilised	Long service life	Widely acceptable as a standard improved sanitation facility world wide	High capital and operating cost compared to other on-site sanitation options.	Total=5
	Requires enough area on plot for drainage field or soak pit and hence will not be suitable for high density settlements.	Regular de-sludging required and seepage needs to be handled and treated safely. Sludge requires treatment	Suitable for public or institutional use			
		Requires construction of a septic tank – which may be difficult in areas of hard ground or high groundwater	Requires a constant and important source of water (usually piped water supply).			

Based on the factors used to assess the technological options for the proposed public use sanitation facilities, the Full Flush Toilet + Septic Tank + Soak Pit scored the highest (+5 points) and will be adopted on the project.

When the sanitation facilities fill up, they must be emptied and faecal sludge disposed of. This sludge is to be disposed safely and according to the Ministry of Water and Environment (National faecal sludge assessment for small towns, 2013), it was proposed that faecal sludge treatment plants be constructed to serve a cluster of towns across the country. Bukizibu-Bumwena RGC is in Malongo sub-county and is placed in cluster 11 which consists of Busembatia, Namutumba, Kaliro, Bugiri, Idudi, Namungalwe. The fecal sludge from Bukizibu Bumwena would be transported to the waste stabilization ponds in Iganga constructed in 2008 for treatment. The public toilet can only be properly maintained when the users are paying a fee set by the local authorities. This will be in the form of; a monthly fee being charged to the residents within the locality of the public toilet who would wish to use it, while the non-residents paying and fee for every time, they use the toilet or, a standard user fee is charged for using the toilet at any one time.

7.3 THE “NO PROJECT” ALTERNATIVE PROJECT JUSTIFICATION

The “No Project Option” refers to not implementing the proposed project at all. This alternative would imply that the current status quo would continue. It is important to note that the ‘No Project’ Alternative is the baseline against which all other alternatives and the development proposal will be assessed. When considering the Zero alternative the impacts (both positive and negative) associated with any specific alternative or the development proposal would not occur and in effect the impacts of the Zero Alternative are therefore inadvertently assessed by assessing the other alternatives. In addition to the direct implications of retaining the status quo there are certain other indirect impacts, which may occur should the Zero alternative be followed.

7.3.1 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 agricultural land to the construction of water source facilities, water transmission trenches, and storage reservoirs would be avoided;
- iv. Temporary inconveniences emanating from construction activities within urban areas such as temporary road closure for pipeline crossings, would be avoided; and
- v. The health risks associated with handling of harmful water treatment chemicals would be avoided.

7.4 PROJECT OPTION

This option refers to implementing the proposed project activities under Bukizibu-Bumwena RGC Sola-powered Water Supply and Sanitation Project. The following benefits accrue to implementation of the proposed project option.

7.4.1 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. Cleaner and more conducive environment for activities in the RGC such as sports, markets, public places, etc.;
- viii. 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;
- ix. Increased revenue to the local authority and the country in general through the collection of taxes.

7.4.2 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. Greater school attendance by the girl children since they are more comfortable with cleaner and safer toilets. This leads to increased gender awareness and improvement;
- iii. Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc. especially for Bukizibu and Bumwena trading centres.
- 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.

7.4.3 CONCLUSION

Mayuge District is one of the fastest growing districts in Eastern Uganda in terms of increasing resident population and economic activities, thus, the urgent need of a sustainable water supply system and sanitation facilities. Currently, there is no piped water supply system within Bukizibu and Bumwena trading centres and rest of the viillages in Malongo Sub County and the residents depend on the lake and hand dug wells and sometimes the run off that collects under road culverts for their everyday water needs. Additionally, Bukizibu Bumwena Centres currently have no central sewerage facilities. The population in the centres is mainly served by pit latrines as there is no public toilet within any of the trading centres. And as regards solid waste management, there is a designated solid waste dump site in Bukizibu located within the town centre itself where waste is collected at household level and dumped at this site indiscriminately. As for Bumwena centre, the locals collect and dump their rubbish in the nearby swamp. Therefore, the sanitation systems in the project area are unreliable, in a sorry

state and sub-standard. 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.

In light of this, the “No Project” option will undoubtedly have local, national and regional negative implications such as continuing trends of water-related diseases, no direct or indirect employment opportunities associated with the project, and continuing degradation of the environment and water resources due to unplanned disposal of faecal sludge and other waste streams.

Under the project option, this situation will be addressed by the Ministry of Water and Environment implementing the Bukizibu Bumwena Water Supply and Sanitation system. This will lead to enhanced access to clean water supply, and sanitation facilities reduced expenditure on public health related cases, enhance economic production and improved livelihoods and standards of living among the beneficiary population among others.

In general, the minor benefits of the No-Project option are far outweighed by the benefits to be attained on implementing the Bukizibu-Bumwena RGC Solar-powered water supply and sanitation project.

8 IMPACTS ANALYSIS, ENHANCEMENT AND MITIGATION MEASURES

8.1 OVERVIEW

Key potential environmental and social impacts of the Bukizibu-Bumwena RGC Solar-powered water supply and sanitation project for each stage of the project cycle are assessed in this chapter and an Environmental and Social Management and Monitoring Plan (ESMMP) provided. Analysis and prediction of possible positive and negative impacts of project implementation activities are presented. Most of the socio-environmental impacts triggered by the proposed project activities will be direct in nature and mostly resulting from land acquisition, construction, and operation activities. Impact analysis has involved determination of nature of impact, its magnitude, extent, reversibility, duration, and likelihood of occurrence of potential impacts. For the proposed Bukizibu-Bumwena RGC Solar-Powered Water Supply and Sanitating Project, potential positive and negative impacts were identified both for the construction phase and operation phases.

8.1.1 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 impact results from the aggregated effect of more than one project occurring at the same time, or the aggregated effect of sequential projects. 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.

8.1.2 IMPACT 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.**. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study.

Table 8-1: Criteria for rating impact 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

8.1.3 INTENSITY OF IMPACT

Impact Intensity 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 intensity 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.

Table 8-2: 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

8.1.4 IMPACT EVALUATION AND DETERMINATION OF SIGNIFICANCE

The impact significance 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 magnitude 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 8-3: 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
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
	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.

8.1.5 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 of VECs, spatial and temporal boundaries of assessment, in consultation with stakeholders. 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.

8.2 PRE-CONSTRUCTION PHASE POSITIVE IMPACTS

Preconstruction positive impacts are quite limited and will mainly accrue to few local residents hired by survey teams and design consultants.

8.2.1 SHORT-TERM EMPLOYMENT

Limited employment opportunities shall be realised by residents. These will work as guides for the survey teams and further for the design team. The likelihood of this impact occurring is ranked as possible while level of impact is taken to be low hence an impact of **Minor** Significance

Enhancement

- Involve LC 1 village leaders in identifying casual and semi-skilled workers (Offer Identification / registration forms). However, the contractor has jurisdictions over recruitment process and eligibility requirements.
- Non-skilled jobs, such as trenching, site clearance, laying of pipes, fencing shall be reserved for residents along the transmission and distribution networks, and at the project borehole and reservoir sites.

8.3 PRE-CONSTRUCTION PHASE NEGATIVE IMPACTS

8.3.1 RISK OF INCREASED SPREAD OF COMMUNICABLE DISEASES

Close interaction of workers amongst themselves and with the communities such as in restaurants, residences, places of worship and health facilities, markets during the feasibility studies and other project preparation works could facilitate spread of communicable diseases such as Hepatitis B and Influenza. Sexual relations involving workers and community members will present a risk of spread of HIV and other sexually transmitted diseases. The sensitivity of the project location is High. The intensity of the impact is **Very Low** since:

- The project will be phased,
- Employ few technical persons (5 persons) during the pre-construction phase with minimum interaction with communities, and
- Expected to employ local labor for casual and non-skilled work.

Therefore, the overall impact significance ranked as **major**.

		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) The contractor should implement a workers' code of conduct to regulate interreaction of project workers with the communities,
- b) Workers should and sign and adhere to the code of conduct.
- c) Sensitize workers on risks of spread of communicable diseases.

8.3.2 SOCIAL ANXIETY

Information disclosure on impending implementation works of Bukizibu-Bumwena RGC Solar-powered Water Supply and Sanitation Project will create high levels of anxiety among project host communities especially households within the four beneficiary villages in Bumwena Parish, Malongo Sub County. Unsubstantiated information on possible land take for project implement activities especially along the transmission lines, reservoir tank site, water source among others, hence coming with displacement and compensation fears and excitement. Such false information on possible property appropriation and compensation would not only confuse residents but could lead to poor decisions. Some community members may resort to selling off their properties in fear of losing out on compensation.

Furthermore, the pre-construction phase is often characterized by misinformation, speculation, and manipulation of host communities by unscrupulous individuals. Impersonation by individuals claiming to be acting on behalf of MoWE or the contractor and soliciting for money for self-gratification will be common in return for whatever favors including renting material source areas, compensation benefits relating to land take and acquisition among others.

The sensitivity of the host community to social anxiety, speculation and manipulation is low since the project footprint is already known (Section 5.4.8) and potential project affected persons identified through the Resettlement Action Plan and sensitization indicating project land requirements has been done through the ESIA and RAP processes. The intensity of the impact is also **low**. Overall impact significance is hence **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:

- As part of the RAP, a comprehensive impact survey is being conducted by experienced valuers in association with the district land board and local leaders. The results of the RAP will indicate all affected crops within the water transmission corridor/way leave, the respective owners and the replacement costs, PAPs should be given financial literacy on how to use their compensation packages, and LGs should be involved in mobilization and sensitizing PAPs.

8.4 CONSTRUCTION PHASE POSITIVE IMPACTS

The construction phase under Bukizibu-Bumwena RGC water supply system and sanitation facilities is characterized by establishment on different project components sites. Construction phase impacts are quite visible though others could be masked and difficult to mitigate

8.4.1 CREATION OF EMPLOYMENT OPPORTUNITIES FOR THE LOCAL PEOPLE

Temporary job opportunities shall be available during the construction phase of the project. 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. This shall be an important positive impact to the community because unemployment has been cited as one of the most pressing problems in Uganda today with the youth unemployment increasing from 13.3 per cent in 2013 to 18.6 per cent in 2015.

Enhancement measures

- Contractor(s) will be required to employ to the extent possible local labour (specially to enhance benefits to the local youth) without compromising on the quality of their contractual outputs. This will enhance ownership of the piped water system at the lowest level while providing the necessary awareness on sanitation management in Bukizibu-Bumwena RGC.
- Available work opportunities should be disclosed to the wider public in the Bumwena Parish and Malongo Sub County at large.
- Give priority to qualified/eligible persons in the project parish during the recruitment process.
- Publicizing available project work opportunities in public areas such as administrative centres (such as sub-counties, town councils and trading centres) and such messages be aired in local the local dialect of the respective areas. However, should be strictly to persons those above 18 years of age.
- Deliberate effort be made to ensure that about 30% of women get opportunities to work in the project during its construction phase.
- Contractor should evaluate worker performance.
- Workers' grievance redress mechanism be established with involvement of District Labour Office.
- Give preference to getting service from the local inputs (food, basic materials, etc).
- The Contractor should create enabling environment for food vendors to provide their services to the construction crew through construction of temporary shelters near the Contractor's workers' camp.
- Issue codes of conduct and training to avoid GBV, documentation of workers and issue of work contracts for fair pay and employer accountability
-

8.4.2 CREATION OF MARKET FOR CONSTRUCTION MATERIALS

The Project will require construction materials, some of which will be sourced locally from Bukizibu-Bumwena RGC and other neighbouring towns where the project is going to be implemented and some internationally. These include cement, sand, coarse aggregates, pump sets, steel pipes, valves, and chemicals.

Impact enhancement measures

- Give priority to local suppliers with requisite capacity to supply construction materials to the project during implementation

- Earth materials procurement contracts should be reviewed by competent legal practitioners under the overall supervision of MoWE/RE to avoid taking advantage of landowners where borrow pits and rock quarries are located.
- Site restoration should be undertaken in line with procedures as specified by National guidelines.
- All contracts for material source areas shall be witnessed by Local Council chairpersons in consultation with the District Environment and Community Development offices.
- Periodic monitoring to be specified in the ESMP shall be undertaken to ensure environmental and social integrity of local material source areas.
- The contractor should source all available required major materials including construction materials, fuel, and oil among others from authorized local suppliers/manufacturers to ensure that taxes accruing to such transactions are not evaded.
- All the transactions involving purchase of supplies to the project activities should be well-documented.

8.4.3 SKILLS DEVELOPMENT AMONG LOCAL RESIDENTS

Approximately 35 workers will be deployed on the project majority of which will be Ugandans and project area locals. This has the potential to employ residents in different aspects of project construction works. Several beneficiaries will be youths with different levels of formal education and training including artisans and technicians. Engagement of various categories of people will encourage skills transfer from the experienced civil construction workforce to residents with a multiplier effect for the local construction industry.

Impact Enhancement measures

- The terms of agreement as per the contracts given to the construction works contractor and should emphasize knowledge transfer and the project developer (MWE) should monitor and ensure that the objectives are met.
- MWE should sensitize residents in the RGC, especially youths on non-monetary benefits accruing to employment on construction project including skills development.
- Design employment contracts that guarantee employees progressive placements to facilitate skills development

8.4.4 RENTAL INCOME

Property owners in Bukizibu and Bumwena Trading Centres and surrounding areas in Malongo Sub County may earn rental incomes from their rental units that could be rented by the contractor's workers. This is a positive but short-term and reversible benefit ceasing with project completion.

Impact Enhancement Measures

- Contractors must sign contracts with all service providers who shall be paid in a timely manner.
- Any complaints regarding contractor's failure to pay his service providers shall be received through the community grievance redress system and resolved. s

8.5 CONSTRUCTION PHASE NEGATIVE IMPACTS

8.5.1 LOSS OF LAND AND DISPLACEMENT OF ECONOMIC ACTIVITIES

The project mostly traverses farmland under cultivation along with settled and built-up areas. The project developer, MoWE, intends to mostly use road reserves of the existing public roads which are government land for the transmission and distribution lines. However, the water source site, and storage reservoir sites shall be located on private land, whose owners will be engaged by MoWE and local leaders in the process of land acquisition in accordance with the Land Act and World Bank Environmental and Social safeguard policies as well as relevant national laws. According to the RAP (2022), the project will require a permanent land take and an easement corridor of an estimate of 6.79 acres (from a total of approximately 376 PAPs (**Table 8-4**)). Given the current land use/cover of the key project sites, this will be converted as construction of project facilities occurs on the respective sites. The clearing of corridor, movement of equipment and contractor staff and laying of pipes may lead to spot destruction of crop gardens and farm lands.

Table 8-4: Project Land Takes

Impact	Land Affected in Acres
Permanent Land Affected (Water Source Sites, Reservoir Sites, Access Roads, and Sanitation Facility Sites)	0.68
Permanent Land Restriction (Easement for Transmission and Distribution Pipes)	6.11

In general, the loss of land will be direct, permanent, and irreversible but non-cumulative. This will be limited to proposed sites and a long-term impact. The intensity will be low since the project foot print requires small pieces of land per component, per locality and the water pipelines will mainly lie in the road reserve except the areas where access to the source and reservoir sites is required. The sensitivity has been assessed as medium because there is no physical displacement of human settlement, physical cultural resources and/or significant economic displacement. Therefore, 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 water transmission line routes should be as much as possible restricted within the road reserves.
- Where land take is envisaged, compensation should be adequate and timely done. All land acquired for establishment of the water sources, reservoir tanks and any other activity either by

the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies.

- Sensitize the community early enough about the project so that those affected by the project will have time to relocate their businesses to secure settings. Prior to the construction phase, farmers shall be sensitized at least 6 months in advance such that cultivation within the project sites/ components' footprint is stopped or reduced. The aspects of the sensitization shall include but not limited to the project components, the Grievance Redress Mechanism including the right to complain and the right to appeal
- As part of the RAP, a comprehensive impact survey is being conducted by experienced valuers in association with the district land board and local leaders. The results of the RAP will indicate all affected crops within the water transmission corridor/way leave, the respective owners, and the replacement costs.
- PAPs should be given financial literacy on how to use their compensation packages.
- LGs should be involved in mobilisation and sensitizing PAPs.

8.5.2 VEGETATION CLEARANCE

Project implementation works could result in damage to trees such as uprooting especially the small trees, breaking of branches, and peeling of the barks which can lead to their death.

The vegetation survey enumerated a total number of ninety-three (93) individual species, from thirty-two (32) families along the transmission lines and other project component sites. These were mainly herbs or grasses, trees/shrubs, and liana species. ***Out of the ninety-three (93) plant species encountered in all study sites, only one (Milicia excelsa) is listed under the IUCN Red List of Uganda, 2018. Therefore, the species is of great conservation concern in the country and in the region, but bearing in mind the impact and effect of deforestation and forest degradation on the ecosystem. Milicia excelsa (Mvule) in Moraceae, globally listed as Near-threatened and nationally as (EN A2acd.). The tree species were sighted along the distribution line to the landing site but a linear structure like water transmission may not affect the existence the tree.***

The sensitivity of the project area to loss of vegetation is low due to low species diversity and only one species of conservation concern in the project area. The intensity of the impact is also low since the project vegetation clearance will only be limited to identified project sites; aminly at the water source (located in a substistence farm), the reservoir (located on a sugarcane monocrop field), water office and saniation facilities sites (located on built area) and the transmission and distribution lines (along community access roads). The overall significance of the risk 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

The following measures recommended for mitigating impacts on roadside trees.

- a) All trees within the earmarked areas for the transmission lines and other project components shall be marked for protection and recorded before construction activities begin in any given section.
- b) All local councils shall be sensitized on the importance of the trees within the project area and are assured that they will be protected during project implementation works.
- c) In addition to protecting the existing trees, more will be planted within the project area especially adjacent to project component facilities such as the water source, sanitary facilities and the reservoir tank as part of MoWE's project area greening program. At least 5 trees of a specific type shall be planted at the major project installations to replace a similar one that shall be cut during the project.
- d) Contractor should get permit for tree cutting in case they fall within the project foot prints.



Figure 8-1: Trees, crops and other vegetation adjacent to the drilled borehole

8.5.3 POTENTIAL LOSS OF HABITAT FOR FAUNA

Implementation of activities of the proposed project activities will involve earthworks and vegetation clearance.

Fauna Species such as butterflies, birds, dragonflies, mammals, amphibians, among others listed in Section 5.3.2 are mobile, deriving most of their nutritional and some non-nutritional resources from plants. Some trees and shrubs especially along the earmarked transmission line and other project component facilities will be lost as detailed above. For Herpetofauna, some of the trees in and around the project components sites will be felled leading to loss of some of their hiding and basking grounds such as for the lizards. Some herpetofauna especially lizards may be killed or injured as a result of earth works or indiscriminate killing due to negative attitude towards them. There could be loss of nesting or roosting grounds for the birds established after this ESIA study as a result of felling the trees in different project sites. As the contractor clears the sites for establishment (construction civil works) of different project components, hiding and feeding places for small mammals are likely to be lost.

There is always temptation for people to kill small mammals especially rats when seen during construction activities.

The likelihood of loss of fauna especially for small mammals, herpetofauna and birds is ranked as Low since the project sites are already disturbed by agriculture. The intensity is also ranked low since the project components will require small footprints (Table 8-4). The overall impact significance is therefore ranked 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

- Awareness creation amongst the workforce on biodiversity conservation
- To minimize death during site clearance, attempts to scare the herpetofauna from the sites should be done. Also, clearance should be step by step and not the entire site at once; Amphibians and reptiles are shy groups of animals and are always eager to escape if given chance; Every effort should be made to save and release any amphibian and reptiles encountered during site clearance and during construction into the environment outside the construction site. The animals should be released into a similar habitat/area immediately outside the construction footprint but under no circumstance to an area further away;
- If trees are to be removed, ensure that no bird is breeding from there. If birds are breeding from the trees, tree removal should be done outside the breeding season;
- Clearance during construction should be done cautiously and carefully as to give time and chance to small mammals to escape from their hiding places;
- Avoid unnecessary killing of small mammals like rodents that may hide in construction materials deposited at the sites.

8.5.4 POTENTIAL INTRODUCTION OF INVASIVE PLANT SPECIES

Invasive plant species have the potential to colonize rapidly with detrimental effects on diversity and prevalence of indigenous species. Invasive species recorded within the project area include *Parthenium hysterophorus*, *Oryza barthii*, *Lantana camara*, *Mimosa podica*, and *Mimosa pigra*. Besides the problems dodder may cause to crops, it represents an important and fascinating part of natural communities where it contributes to the ecological equilibrium like any other species. It is noted that, invasive species propagation is still a fascinating science as such, they tend ramify an ecosystem and sometimes outcompete native species. Although several methods can be applied to control the infestation, these are not always successful and lead to loss of the harvest.



Figure 8-2: Invasive lantana camara plant species in the project area

During project implementation works especially for establishment of transmission trenches and other civil works, mechanical and manual equipment does disperse seeds of these plants as they clear vegetation and undertake excavation works. Seed dispersal will also be associated with haulage raw materials such as sand and gravel to the different project sites. The probability of this impact occurring is unlikely since invasive plant species are prevalent in the biggest part of the project area implying, they have already established.

The sensitivity of the project area to invasion by invasive species is low since the area is already has such species. The intensity of the impact is low since the project activities will require few equipment that may disperse the species and will be limited to project foot prints. The 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) Transfer of spoil/overburden material across vegetation zones shall be avoided during the project implementation works. The Environment team shall identify suitable sites for overburden material dumping in the project area.
- b) Equipment shall be clean before they are moved between different areas of the project.

8.5.5 SOIL EROSION AND SEDIMENTATION

The construction phase will involve use of machinery and excavations to clear the site, strip the soil of vegetation and establishment of transmission trenches; soil disturbance is bound to happen. The main factors that will affect soil erosion and sedimentation of surface water resources are level of vegetation clearance, terrain, erodibility of soils, and proximity of different project sites to surface water resources and community feeder roads drainage channels. The project area has some sections of gentle sloping and relatively flat terrains with sandy soils mixed with clay, silt and gravel and characteristic and/or susceptible to erosion incidences. However, the site size to be affected by proposed project activities is small with low potential for mass erosion incidences and silt transportation.

The sensitivity of the project area to erosion and sedimentation of water resources is low since the site is generally covered by vegetation and the closest water resource is L. Victoria located approximately 1km from the site of the project borehole. The intensity of the impact is low since the project activities will be limited to project foot prints. The 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

Mitigations

- The different project components sites should be cordoned off during the project implementation phases.
- The Contractor should put in place measures to aim at minimum soil disturbance and soil erosion. These measures will include clearing the project sites of excavated materials or protect excavated sections from storm water, avoid excavation through flood plains, creating proper channels for wastewater and solid waste disposal, develop emergency measures and procedures for protection of soils;
- If possible, site clearance should be undertaken during the dry season, with watering down of surfaces to avoid dust nuisance;
- Excavation and disturbance should be limited to the proposed sites for project implementation works;
- The Contractor shall attend to storm water drainage on construction site, to prevent flooding;
- Excavations resulting from the removal of these items should be backfilled with suitable fill. Construction areas designated to receive fill are typically scarified to depths ranging from 0.5m to 1.0m, moisture-conditioned, and uniformly compacted.
- Re-vegetate exposed areas of the site, so as to mitigate erosion of soil by storm-water run-off

- Stock pile of materials should also be prevented from exposure to erosion through among others the use of silt fences etc.

8.5.6 RISK OF INCREASING THE SPREAD OF HIV-AIDS AND OTHER VENEREAL DISEASES

According to Third District Development Plan (DDPIII) 2021/2022-2024/2025 of Mayuge District, HIV alone contributes greatly to the total disease burden in the district with a prevalence rate of 5.8%. This is attributed to factors that include the district’s strategic location at crossroads of boarder districts, widow inheritance, polygamy, poverty and prostitution which is rampant in Mayuge Town council 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 communities. The concentration of workers in the villages, immigration of people from different regions as well as occasional payment in wages may lead to behavioral 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 disturb the social order and even lay the ground for escalation of HIV/AIDS cases whose impacts are likely to be prolonged in prevalence. The sensitivity is High as these poor communities would struggle to cope with the challenges of being HIV positive. The impact intensity is however low due to th low number of workers (about 40, with priority hiring of non and semi-skilled labour from project villages) 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

- 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.
- Provide information, education and communication about HIV/AIDS prevention, treatment and care. .
- Provide an on-site clinic to provide Voluntary Counselling and Testing (VCT) services to construction crew and provision of Anti-Retroviral (ARVs) for vulnerable community members
- 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

- Ensure safety of women and girls in provision of VCT services.

8.5.7 RISK OF SEXUAL EXPLOITATION AND ABUSE (SEA) 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 Bukizibu and Bumwena Trading Centres which provides a facilitates this practice to be propagated by the workers. The Intensity of the impact is expected to be Low because 35-40 workers on average are expected to be involved in the works, most of which are casual workers to be recruited locally. The sensitivity is however high 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 Community Development Officers on ongoing sensitization of workers on responsibilities 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.

8.5.8 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 mostly affect women and girls, and may also affected men and boys. This may be experienced 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. The information collected from the project area for the period of 2022 by the Uganda Police crime indicates that there 142 reported cases of sexual assault ,70 cases related to child abuse and 123 cases of common assault. Field consultation with Malongo SC police post also indicated that there are several forms of GBV shown in the Table 8-5 below

Table 8-5: Criminal cases at Malongo Sub County Police Post

Cases reported	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22
Defilement	8	6	8	7	6	6
Domestic Violence	3	2	1	0	1	1
Threatening Violence	9	4	7	7	6	6
Child Abuse	2	1	0	0	1	1
Assault	30	33	39	20	17	17
Murder	0	1	0	0	0	1
Rape/Attempted rape	0	1	3	1	0	2

Source: Malongo SC Police Post

Therefore, since these communities already experience gender-based violence the sensitivity is high. However, the impact intensity is ranked as low because of the low number of workers who would be exposed to incomes that can encourage irresponsible behaviour. The overall significance is ranked as **Moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Inten sity	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

Mitigation Measures

- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project.
- Effective and on-going community engagement and consultation, particularly with women and girls; review of specific project components that are known to heighten GBV risk at the community level, such as, compensation schemes; employment schemes for women; delivery of water supplies; etc.
- Specific plan for mitigating these known risks, such as, sensitization around gender equitable approaches to compensation and employment; water services; etc
- Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.
- 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.
- MoWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities.
- Report and follow up with Uganda Police on all matters of criminal including sexual offences.
- 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.
- 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 are able to attend to their domestic duties.
- Both men and women be considered to get jobs at the site with atleast 30% of key workers being females
- Include maternity and paternity leave provisions in workers’ contracts.
- Provision of gender disaggregated bathing, changing, sanitation facilities.

Residual impact significance: **Minor**.

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

According to the World Health Organization (2020), Violence against Children (VAC) is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm, that results in actual or potential harm to the child’s health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labour, sexual gratification, or

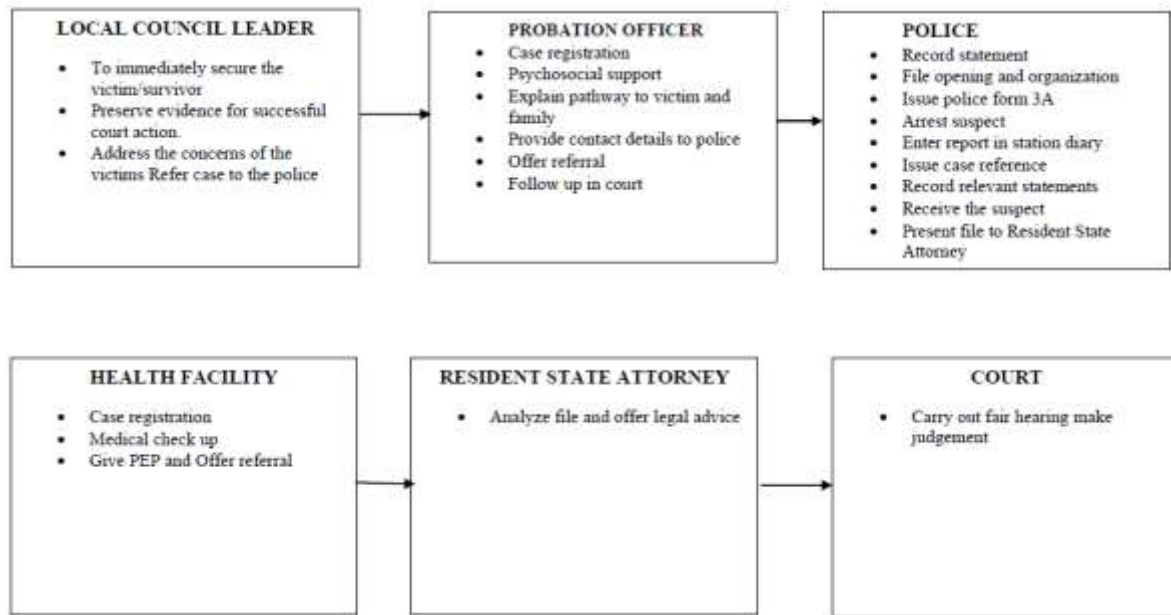
some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography. The Children Act of Uganda 2016 prohibits contractors from “employing children 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 challenge of child labour is can easily be trigger since it currently has a prevalence rate of (27%). Given the trend, it is possible for the contractor to abuse children through hiring them to supply 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 sensitivity is therefore high as abused children can drop out of school, face challenges of early motherhood as well as associated psychological torture. The intensity is however Low due to the low number of workers who would be exposed to incomes that can encourage irresponsible behaviour. 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 a Children Protection Plan that will ensures minors are protected against negative impacts associated by the Project.

CHILD SEXUAL VIOLENCE REFERRAL PATHWAY THEMATIC



Recommended MoLSGD -Child abuse referral pathway

- All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior
- The contractor should among other things clearly stipulate Code of conduct that includes:
 - a. Adherence to Child protection regulations
 - b. Zero tolerance to Gender Based Violence,
 - c. Zero tolerance sexual harassment,
 - d. Strict adherence to rules prohibiting Child Labour,
 - e. Zero tolerance to elopement and
 - f. Zero use of vulgar language during the execution of MWE project activities
 - g. Formation and supporting Child Protection Committees within the communities on the landing site to increase involvement of the community member and leaders in child protection.
- Ensuring that contractor’s workers are well sensitized on the need to protect children
- Contractor shall be restrained from employing children
- Sensitize the community about the rights of children
- Engage security agencies like Police and Local Councils to vet workers so that employees with criminal records are not employed
- Establish and train existing structures like, Para-social workers and child protection committees on issues related to child protection
- Continuous monitoring of VAC by CDOs, LCs, Police to ensure no child labor cases
- Involving local CSOs in the prevention, reporting and management of VAC cases.

8.5.10 RISK OF NON-PAYMENT OF WORKERS, SUPPLIERS AND SUBCONTRACTORS

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.

Typically, local sub-contractors and suppliers operate with limited capital. Delays and failure to pay them for supplies to the project can affect their financial status and even survival in business. In addition, the expected benefits to the local economy would not be realized but rather the project would affect the local economy negatively if workers, suppliers and subcontractors are not paid. 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

- All workers must sign contracts;
- Include clauses for equal pay for equal work;
- Institute Workers Grievance Committees to handle grievances including those related to labour issues;
- Involve the District Labour Officers in project supervision to offer guidance on management of labour issues;
- The provision of ‘pay when paid clause’ should be introduced in the contractor and supplier/sub-contractor contract
- The workers should understand the terms or clauses of payment in the project
- The payment matter should be followed up constantly with the contractor
- Setting an established time frame for payment.
- The effect of delayed payments on the project progress must be understood by all the contractor and the workers involved in the project.
- 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**.

8.5.11 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. The impact sensitivity is High while the intensity low 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 should always provide of appropriate PPE to all workers and enforcement of their usage.
- The contractor will ensure that the Project is implemented in total adherence to the Employment Act 2006.
- The workers should receive requisite training especially on the operation of the machinery and equipment
- There should be adequate warning and directional signs.
- Ensuring that the Contractor prepares a code of conduct for staff is followed to prevent accidents.
- The contractor should 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
- The contractor should cordon off unsafe areas and provide safe crossing points across trenches
- The contractor should provide an onsite clinic to provide first aid services to the staff.
- The contractor should record of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate.
- Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements.
- The Contractor to repair any damage done to private property.

8.5.12 IMPACTS RELATING TO CONSTRUCTION MATERIALS EXTRACTION AND TRANSPORT

Construction activities of different project components will require sand, bricks, and stones for masonry works. If not available from local sources, these materials must be extracted by creating borrow pits which can affect the landscape and aesthetics of the areas if the pits are not properly decommissioned. 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. The transportation and use of heavy equipment and trucks is required during construction. Trucks will transport raw materials and heavy equipment. This has the potential to directly impact traffic flow along the community feeder access roads especially within the trading centres of Bukizibu and Bumwena among others.

Overall, the sensitivity of materials extraction and use is ranked as Medium and the impact intensity is rated as low due to the low quantities of materials required for such low-scale construction activities which may not even require opening of new material sites but rather to source materials from existing sources such as sourcing bricks from different areas in Malongo Sub County and surrounding areas. Additionally, common haulage routes may be used that will create additional traffic and increasing the risk of traffic accidents. The overall impact significance is therefore 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 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- This is to be mitigated through contractors sourcing and purchasing construction materials such as sand, bricks, and stone aggregates from existing suppliers/relevant licensed sources i.e., extraction and processing of such materials (as applicable) in the project area and surrounding areas where the project works are to be implemented without them getting to be involved in the extraction and statutory process. The Contractors shall undertake due diligence to procure construction materials from sites that do not have encumbrances. The sources should 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
- Adequate and appropriate road signs should be erected to warn road users of the construction activities. For example, reduced speed near the construction site access road.
- Trucks transporting raw materials such as stones and sand should be adequately covered with tarpaulin or other appropriate material to prevent any escaping into the air and along the roadway.
- Heavy equipment should be transported early morning (12 am – 5 am) with proper pilotage.
- The use of flagmen should be employed to regulate when trucks have access to the construction site.
- 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 Kaliro DEO;
- Restoration of materials source sites be approved by both the Supervising Engineer and the District Environment Officer of Kaliro 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.

8.5.13 ERECTION OF TEMPORARY MATERIAL STORAGE SITES

Secondary facilities associated with construction will include materials stockpile areas, temporary site stores and sanitary facilities. Stock piling construction materials near work sites is a normal practice during construction. Contractor’s stockpile and store assorted materials at or near construction sites to ensure uninterrupted access to supplies. The material needs are low because of the intensity of project activities (relatively minimal construction civil works). The impact sensitivity of the area is rated very low and the overall 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

- Cover materials with tarpaulin
- Hoard the construction site to avoid materials from being washed to areas outside the site
- Plan for demand for the materials to avoid large stockpiles onsite.

8.5.14 NUISANCE OF CONSTRUCTION WASTE

Solid waste will be generated at the site during the construction phases. The waste will largely consist of typical construction waste (timber, metal, broken bricks, cement, paper, kitchen waste, waste concrete, etc.). It is anticipated that once the construction phase commences, workers will be recruited which calls for need for construction/establishment of sanitation facilities such as mobile toilets and other ablution facilities which should be commensurate with the size of the workforce, thus generating waste associated to these facilities.

Other site clearance activities will include vegetation clearance on site. Much of this waste can be recycled or reused though avenues to implement these management options are rarely explored. Typically, excavated material is considered unlikely to cause adverse impacts and can be used as fill, which is considered a useful reuse of the material.

Hazardous chemicals from construction sites may encounter storm water and pollute ground or surface water sources.

The sensitivity of the area to construction waste nuisance is Medium and the impact Intensity is ranked medium as the volumes of generated construction waste could be relatively minimal given the nature and magnitude of the proposed project activities. Large volumes of waste if not properly collected, stockpiled, and disposed of can be a nuisance especially in busier trading centres for establishment of sanitary facilities. Therefore, 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

Impact Mitigation strategies

- The contractor should prepare a waste management plan prior to commencement of work, including appropriate waste segregation and storage areas, collection & disposal schedule;
- The Contractor's workforce should be prohibited from burning of waste on site or in waste containers;
- The Contractor should ensure that construction wastes is sorted and separated at the point of generation to encourage the recycling of reusable wastes to reduce the waste volumes for disposal;
- The contractor in liaison with local Authorities should facilitate proper handling and disposal of construction waste from the sites. All such waste must be disposed to the approved waste dumping sites;
- The contractor should ensure that good construction practices and site/waste management measures should be observed to ensure that all solid waste, fuels, and solvents are stored in banded areas.;
- The Contractor should ensure that excavated materials or other construction materials are not stockpiled or deposited near or on-stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the watercourse itself.
- The Contractor should install signage/labels indicating nature of the stored waste materials on waste storage containers or facilities. Waste storage areas shall be sheltered, paved, and banded for oil containment;
- The Contractor should ensure that traffic management is ensured during transport of the waste. Flag persons will be required. All vehicles transporting excavated materials should be cleaned before leaving the construction site to ensure no earth, mud, debris, and the like is deposited by them on the community feeder roads.

Chemical Waste: Chemical waste that is produced should be handled in accordance with the National Environment (Waste) Management Regulations, 2020. The contractor should ensure that containers used for the storage of chemical waste are:

- Be clearly labelled and used solely for the storage of chemical waste.
- Be enclosed on at least 3 sides.

- Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest.
- Have adequate ventilation.
- Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and
- Be arranged so that incompatible materials are adequately separated.

Disposal of chemical waste should:

- Be via a NEMA licensed waste collector; and
- Be at a facility licensed to receive chemical waste.

Concrete wastewater: The mitigation for the concrete washout is to construct sedimentation tanks or pits to collect and retain all the concrete washout water. After the tank has been used to wash down the chutes of ready mixed trucks and the wash water has evaporated or has been vacuumed off, the remaining hardened solids can be broken up and removed from the pit and disposed as fill material. Concrete wash water is highly alkaline (pH of 10-13). Therefore, pH correction will be required.

Management of waste associated with sanitation facilities

- The contractor should use mobile toilets at the construction site.
- Provision of water and soap at the sanitary facilities at all time
- Provide separate sanitary facilities for the different gender and clearly label them
- Ensure that the pit latrines (if used) and mobile toilets are always kept clean
- The contractor will prepare a decommissioning plan in the CESMP including that for sanitary facilities, with appropriate procedural actions to dismantle, disinfect, fill the pits, level the grounds and plant trees.

8.5.15 AIR QUALITY IMPACTS

Construction fleet, generator, and construction equipment emit fumes, particulates, and other gaseous pollutants with detrimental impacts on the environment and humans. Inhalation of these emissions is associated with public health implications especially to site workers and communities adjacent to the access roads the different project component sites.

Additionally, dust coming from work sites and transportation of construction materials, fumes from paints and oils, exhaust fumes from automobile engines and generators could affected health of workers especially machine operators, repair technicians, flag persons and construction crew at work site with respiratory illnesses. Suspended particulate matter (dust) is expected to be the main pollutant associated with the earthwork activities and material handling especially during the dry season. Exposed murram community feeder road surfaces during the dry season can generate loads of dust that will add to the air pollution loading. The extent of impact is dependent on several factors such as speed of wind, degree of exposure among others.

The main potential impacts of dust are:

- visual impacts,
- coating/soiling of merchandise and property, and
- Coating of vegetation.

- Respiratory diseases

Dust is the major air quality problem from construction sites. Dust is a problem for a variety of reasons. If not suppressed, dust can taint goods in shops such as clothes, sugar, salt, and grain flour and this is likely to be a major grievance amongst the business community. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. The impact of dust nuisance will be confined within the project boundary and restricted to the construction phase. Dust will inevitably occur at and inside the construction corridor and will also be generated alongside the haul routes. The sensitive receptors include schools as well as businesses (shops) along the feeder roads and in the towns especially shops selling clothes and other items that can be affected by dust and in turn lose sale value.

It is assumed that dust nuisance will mainly become topical in very dry periods and wherever clearance, earthworks, material transport or construction takes place at the site. In addition, dust generation can adversely affect the health and safety of construction workers at the site. Overall, the impact of dust pollution during construction is rate as likely to occur with a medium impact magnitude especially to the receptors within 200-300 m and low for receptors located more than 500m from the haulage routes and project site.

Exhaust fumes from construction fleet and equipment such as generators and excavation or levelling equipment may temporarily affect local ambient air quality around the site and along materials transport routes. The concentration of air pollutants will be highest at the immediate construction site and generally decrease with increasing distance from the source. The presence of heavy-duty trucks in the construction fleet affects strongly contribute to particulate matter and NOx emissions. Since the quantity of construction materials required is minimal, the construction fleet is expected to be a few trucks a day.

Poor air quality also impedes vision and could cause occupational and community accidents. The sensitivity of project is High since all the project are is mainly traversed by murrum roads, and there are no other sources of pollution such as industries in the area. The intensity is low due to the magnitude of project works (the minimal number of trucks and equipment to be used on the project) resulting in a overall significance is therefore 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 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- Maintain construction machinery in good working order.

- Ensure appropriate manufacturer silencers and baffles are fitted for the specific project machinery.
- Enforce vehicle speed restrictions.
- Switch off all machinery when not in use; and
- Ensure that all project equipment is serviced on a regular basis and,
- Maintain all machinery and equipment in good working order to ensure minimum emissions including carbon monoxide, NOX, SOX and suspended particulate matter.
- Hoarding of sites and use of dust screens.
- Dust suppression measures (water sprinkling) on roads and soil/overburden stockpiles should be implemented where appropriate;
- Cover and/or maintain appropriate freeboard on trucks hauling any loose material such as sand, cement and bricks that could produce dust during haulage process;
- Re-vegetate rehabilitated disturbed areas as soon as possible after clearing with native trees and lawn grass.
- Vehicle speed restrictions (50 kph for main road; 20 kph for trading centre) should always be adhered to, to prevent dust generation and dust settlement (Speed limits to 20km/hr along project area access roads and raw material haulage routes.); and
- The contractor should consider nuisance dust monitoring along access routes.
- Provide appropriate PPEs (dust masks) to construction workers to mitigate exposure to dust nuisance.

8.5.16 TRAFFIC SAFETY RISKS

Occupational accidents could arise from use of project vehicles such as haulage trucks and construction equipment with drivers, operator, and site workforce at risk. Additionally, the proposed project will make four main community access road crossings within the project area (see Section 3.3.5.3 above) and the baseline information (section 5.5.3) indicates that road accidents are rare 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 of the project area and introduction of construction activities not common in the project location, the impact on traffic will be easily noticeable thus high sensitivity. The intensity of the impact is however, low therefore **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

Impact mitigation

- The contractor shall be required to prepare a site construction traffic management plan, prior to commencement of project works implementation.
- Conduct regular training to cover risk related to traffic and moving equipment and their mitigations.
- A risk assessment will be conducted to identify traffic related hazards.
- The workers operating construction equipment will be provided with appropriate safety gear.
- A fully stocked first aid kit shall be procured and kept onsite to cater for emergency injuries before the injured person can be transported for extensive medical attention.
- A well trained first aider and emergency contacts shall be available at the construction site.
- Installation of traffic signs, barriers, and deployment of flag persons along the junctions and crossing points especially within trading centres, near schools, markets among other busy areas.
- Maintenance of project vehicles and equipment.
- Implement emergency preparedness and response plan for 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 together 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).

8.5.17 NOISE AND VIBRATION IMPACTS

Noise will be one of the undesirable consequences of the construction phase arising from construction equipment and haulage fleet, works and workers. Machinery which are often used in power generation, steel cutting, borehole drilling, compacting soil and concrete generate noise. Such noise can cause disturbance to community activities. Noise and vibrations will mainly result from use of heavy construction equipment including excavators, graders and dump trucks during site preparation and construction activities. Though the level of discomfort caused by noise depends on the sensitivity of the receptor, the most reported impacts of increased noise levels are interference in oral communication and disturbance to sleep or resting time, office work and disruption of school learning activities.

Noise generated by construction equipment, haulage fleet and a construction workforce will affect the health of communities neighbouring the construction site during the implementation phase. As the noise levels from the equipment exceed 85 dB(A) which is the level from which hearing impairment is likely to occur. Prolonged exposure to high noise levels presents health risks that includes tinnitus, stress, lack of sleep, reduce productivity, interferes with communication and concentration among community members and could contribute to accidents and injuries. None the less and new and high sources of the noise will be disruptive to members of the community particularly schools, business entities and office facilities. The disruption and health risk due to exposure to noise to the community are likely to occur though it may cause low discomfort due to the few equipment and magnitude of works that require machinery on the project and the impact level. However, the impact intensity is low. The significance of this risk is considered 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 contractor should provide noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 85 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area.
- The Contractor should ensure that regular maintenance of all project equipment and haulage fleet.
- The Contractor should limit hours of continuous exposure to noise and vibrations particularly workers who operate handheld compactors and vibrators.
- The Contractor should undertake a health surveillance, treat, and reassign workers that have shown signs of health impacts due to noise.
- The Contractor should restrict working hours from 7 am to 6 pm minimize community interruptions and inconveniences late at night.
- The Contractor should provide of noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 85 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area.
- The Contractor should limit hours of continuous exposure to noise and vibrations particularly workers who operate handheld compactors and vibrators.
- The Contractor should undertake a health surveillance, treat, and reassign workers that have shown signs of health impacts due to noise.

Ground vibration from project implementation activities is a cause of concern to the community. This will emanate from movement of trucks, excavation works, usage of equipment (compactors,

generators, etc.), etc. The most sensitive ones to ground vibrations are the semi-permanent and aged structures that can develop cracks if exposed to vibrations. Issues with construction-generated vibrations will depend on these types of activities occurring close to vibration-sensitive locations. 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.

Peak Particle Velocity (PPV) is the most accepted criteria to assess the damage potential of structures due to blast vibrations. Due to absence of Uganda standards for vibrations, the ground vibrations standards are adopted from Ireland.

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 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. 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 impact magnitude for vibrations is low and the sensitivity is low to medium. The impact of vibrations is likely to be significant for semi-permanent and aged structures that are located less than 10 meters from the project sites.

The sensitivity of the area to vibration is high due to settlement, schools and health centres in the project area, however, the project intensity is rate very low resulting in minor 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 strategies

- The Contractor should usure construction workers should be briefed and made aware of the sensitive nature of workplaces they are operating in and advised to limit verbal noise or other forms of noise. For example, metallic objects or tools can be passed on to colleagues rather than dropping or throwing them with loud bangs.

- The Contractor should ensure that Haulage trucks drivers and equipment operators to switch off vehicle engines while offloading materials and when not in use.
- Contractor will be careful when selecting equipment to avoid use of old or damaged machinery with high level of noise emissions that would have a negative impact in the environment.
- The Contractor should institute and enforce vehicle speed restrictions especially for material haulage trucks.
- The Contractor should maintain plant machinery and haulage fleet in good working order through routine maintenance.
- The Contractor should restrict working hours from 7 am to 6 pm.; for any works into the night hours (as it may become necessary to redeem time), permission should be sought from NEMA, and local authorities and neighbours informed accordingly. Such works should majorly be tasks which don't generate a lot of noise.
- The Contractor should install silencers to heavy duty equipment such as the generator, compactors among others to reduce on the generated noise levels.
- The Contractor should provide earplugs or earmuffs to workers working in noisy conditions.

8.5.18 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 impact intensity is high even if MoWE procures a qualified contractor who is aware of OHS measures but workers do 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

- a. The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the MoWE;
- b. The Contractor shall provide safety guidelines to all operations prior to start of work;
- c. 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;
- d. 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;
- e. 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.

Residual impact significance: **Minor**

8.6 OPERATIONAL PHASE POSITIVE IMPACTS

8.6.1 PERMANENT EMPLOYMENT OPPORTUNITIES TO THE LOCAL PEOPLE

In addition to the temporary job opportunities that shall be available during the construction phase of the project, operation phase, will create employment of permanent workers to work in the the water office, mainly at the treatment plant laboratory, operation and maintenance, security service and billing. This shall be an important positive impact to the community because unemployment has been cited as one of the most pressing problems in Uganda today with the youth unemployment increasing from 13.3 per cent in 2013 to 18.6 per cent in 2015.

Table 8-6: Permanent roles during operation phase

Position	Staff Required
	(No.)
Manager	1
Accounts Officer	1
Secretary	1
Plumbers / Technicians	3
Meter Readers	4
Intake Attendants / Guard	6
Total	16
DED	

Enhancement measure

- Contractor(s) will be required to employ to the extent possible local labour (specially to enhance benefits to the local youth) without compromising on the quality of their contractual outputs. This will enhance ownership of the sewer system at the lowest level while providing the necessary awareness on sanitation management in project area.
- Available work opportunities be disclosed to the wider public in the project areas;
- Give priority to qualified/eligible areas local during the recruitment process;
- Publicizing available project work opportunities in public areas such as administrative centres (such as sub-counties, town councils and trading centres) and such messages be aired in local the local dialect of the respective areas. However, should availed strictly to persons those above 18 years of age;
- Deliberate effort be made to ensure that about 30% of women get opportunities to work in the project during its construction phase;
- Contractor should evaluate worker performance;
- Worker grievance redress mechanism be established with involvement of District Labour Officers.

8.6.2 INCREASED QUALITY WATER SUPPLY.

According to Ministry of Water and Environment (MWE), feasibility report 2019 Mayuge, Bukizibu RGC will have a newly designed water supply system. This development scenario will consist of the following aspects

- a) Siting and Drilling of 1No. New production well of capacity 26.02m³/hr.
- b) Construction of 2No. new borehole pumping houses
- c) Installation of 2No. submersible pumps
- d) Construction of transmission mains from the boreholes to the reservoir

- e) Construction of a new Storage Reservoir.
- f) Construction of a distribution network for the project area.
- g) Making New Consumer Connections.

In the design, the system will be sized basing on the maximum day water demand of 848.35m³/day in the year 2040. With the intention to serve about **12,195** residents by 2025, therefore the construction of the water supply system will go a long way in improving water supply in this area. Water supply is essential for human health and survival, for food security and the empowerment of women as well as the education of girls, for reduction in productivity losses due to morbidity and malnutrition, for the management and protection of natural resources. Although the crucial importance has been widely recognized, the right to safe water remains a promise unfulfilled for the world's poorest citizens. The lack of access to safe drinking water impedes economic development, thwarts progress towards gender equality and puts the health in danger. The project will ease the current water deficit in the project area and the environs consequently promoting the economic growth; the community will get access to quality clean water for drinking and domestic use. This will minimize cases of waterborne diseases resulting to a healthy community; reduce drudgery associated with water collection and result in gender balance.

Enhancement measure

- Ensure that the poor and other vulnerable groups can continue to safely satisfy their basic water needs.
- Ensure adequate water supply for addressing the basic needs of the beneficiary communities
- Develop alternative supply options to palliate for service breakdowns.
- Involve the population (men and women) in the management of new and improved services to ensure their sustainability.
- Implement water fees/tariffs to maintain a good quality and constant service level.
- Establish quality control for water supply and storage facilities.
- Provide information and education on monitoring and maintaining water supply systems, particularly for ensuring water quality preservation.
- Establish a formal consultation mechanism with local authorities to discuss issues disturbing inhabitants and to find solutions satisfying all parties.
- Plan wastewater management as part of the program.

8.6.3 TRANSFORMATION OF BUKIZIBU AND BUMWENA RGC INTO AN IMPROVED SEMI-URBAN CENTRE

The new water supply and Bukizibu-Bumwena RGC will attract new business ventures and subsequently more human population in search for urban centres with access to improved social services such as consistent safe water supply, thus transforming Bukizibu-Bumwena RGC the two trading centres and development of the adjacent rural dwellings with possibilities of socioeconomic transformation of the project area and beyond. In particular, Bukizibu-Bumwena RGC water supply system and improved public sanitation will contribute to the following:

- a) Transform the 7 beneficiary villages and two trading centres of Bukizibu and Bumwena as well as neighbouring villages into better living areas.
- b) Strengthen social service infrastructures (health, educational and local administration facilities) through improved sanitation, hygiene (public health) and access to water.

- c) Appreciated value of property.
- d) Boost local trade, leisure, and hospitality sub sector.

Enhancement measures

- Improve physical planning of the small trading centres proliferating in the project area and neighbouring area.
- Secure funding for sewage systems to handle expected demand for faecal sludge management facility closer to the RGC.

8.6.4 GENERATION OF INCOME.

This project is scheduled to be implemented under the umbrella scheme and in this sense, the system will generate income monthly bills of end-user connections. However, these revenues are mostly used for the water system maintenance works, there is a VAT component to it that is remitted to government forming a local revenue source. Additionally, enhanced water supply due to project implementation will attract the business community to undertake different investments/businesses that would otherwise be impossible without piped water. Income will be generated through tax remittances such as Value Added Tax (VAT), With Holding Tax (WHT), Pay as You Earn (PAYE), Local Taxes among others. etc.

Enhancement measure

- The water distribution network connections should target SMEs.
- The Central Government through URA should ensure that project facilities operator makes timely submissions and routinely update their tax bases.

8.6.5 IMPROVED HYGIENE, SANITATION AND PUBLIC HEALTH CONDITIONS

Generally, enhanced access to safe and clean water under Bukizibu-Bumwena RGC will directly improve the public health conditions in the project area, adjacent areas and beyond due to the reduction in the prevalence of water-borne diseases and illnesses such as typhoid, diarrhoea, dysentery, bilharzia, gastronomic disorders, malaria, among others.

According to socioeconomic baseline (Sections 5.4.7 & 5.4.8), only one health facility (Namoni HC II) in the RGC has access to piped water (2 PSPs) connected to an on-site motorized borehole, the rest rely on rainwater harvesting and surface water sources through vendors and fetching in jerrycans. All the school in the RGC have no connections to piped water and source their water from drilled boreholes.

Sanitation and hygiene in households, trading centres such as Bukizibu and Bumwena as well as other social amenities such as schools, health centres (e.g., Malongo HCIII, etc.) is dependent on reliable access to clean water. Improved sanitation and hygiene within the communities directly impacts on reduction of public health related illnesses, enhanced productivity, improved livelihood and standards of living.

Enhancement measures

- Provide piped water connections to government health facilities (institutional connection) to all social amenities such health centres and schools in Malongo Subcounty and surrounding areas.
- Adjust eligibility criteria for water connections by including appropriate conditionalities such as having a functional sanitation facility, hand washing facility, rubbish pit / gunny bags for waste

collection, community sanitation conditions (zero open defecation), among others. This will enable local leaders and potential water users to mobilize and prepare themselves before connection. It should be noted in many parts of Uganda, the water utility managing units such as Umbrellas have often verified some of the above hygiene and sanitation conditions before establishing household connections. At the same time, given the rural nature of communities, verifying WASH conditions before any connection if done will enhance public health and safety.

- Provide water tanks to health facilities to enable them store enough water.

8.7 OPERATION PHASE NEGATIVE IMPACTS

8.7.1 DEPLETION OF GROUNDWATER RESOURCES

The motorized abstraction of groundwater has the potential to deplete the groundwater resources if the abstraction rate exceeds the aquifer recharge rates. To alleviate this, test pumping of the two proposed boreholes for Bukizibu-Bumwena RGC will be conducted after drilling for a duration of not less than 72 hours to estimate the safe well (borehole) yields. Additionally, pumping should not exceed the recommended number of hours in a day the boreholes are designed to pump water for. The recharge of the aquifer which depend on the rainfall regime of the area among others factors and the infiltration of part of the same can be affected by human activities that impact the amount of rainfall received in the area and the amount of infiltration.

The sensitivity of the receptors is high as unregulated abstraction can lead to change in the hydrology of the area while the impact intensity is low since surface water exists in the area i.e., Lake Victoria. 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

- MoWE ensure that the ground water resources are not depleted, the abstraction rate should not exceed the rates determined during the test pumping exercise.
- The water levels should continuously be monitored to ascertain any impact on the water level – with guidance from DWDRM.
- Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction.
- The developer should apply and acquire the abstraction permits to ensure adherence to agreed rates of abstraction and other permit conditions on one side and guide the DWDRM while issuing abstraction permits in the vicinity, to other competing users.

8.7.2 SOLID WASTE GENERATION

During the operation of the project, solid waste will be generated from the activities of the water office as well as activities of maintaining the water transmission and distribution lines. The wastes that will be generated include food remains, polythene bags, plastic bottles, papers, containers for treatment chemicals such as chlorine, wrappings for spare parts, etc. Wrappings/cylinders for treatment chemicals can be hazardous to humans and the environment if not safely disposed.

The sensitivity of receptors is assessed as 'low' given that the solid waste will be generated at already established sites with waste disposal facilities from the construction phase while the impact intensity is assigned 'medium' rating since the impact of solid wastes, though localized, temporary, and largely reversible, can be enormous in magnitude and cumulative in effect. This ultimately results 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

- Develop and implement a waste management plan for the operation phase of the project.
- Waste collection bins should be provided at strategic positions at the water offices, water source sites 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 or local authorities.
- Engage waste handlers including the nearest Town Council;
- Re-usable wastes be sold or given away to interested parties; hazardous/toxic wastes (e.g., chlorine and alum containers be returned to supplier or given to a NEMA approved waste handler.
- Sensitization of communities and workers on proper waste management
- Ensure proper solid waste management practices at the construction sites including sorting at the point of generation

8.7.3 LAND POLLUTION, WASTE AND DRAINAGE PROBLEMS

Improved water supply is associated with an increase in the volumes 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 and 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.

This is a direct negative impact, long-term and local in extent. The sensitivity of the project area to the impact is high if water users are not educated on techniques for safely disposing of wastewater or sullage from their households especially in informal settlements. The intensity of the impact is low, and sensitivity of the receptor is rated medium 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

- Sensitize households to construct proper septic tank systems;
- MoWE through the Umbrella Scheme should provide toll free numbers where they can be reached for customer support and emergency notifications.

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

8.7.4 INCREASED COST PER UNIT / REDUCED AFFORDABILITY

The cost per unit is likely to be higher than the prevailing level of water affordability. Currently, majority of the households pay about Ugx 100 per jerry can of water. The new piped water is likely to increase the charge per jerry can/per unit. This will hinder affordability and utilization, hence increased substitutability.

The sensitivity of the receptors is low since household can access alternative sources (deep boreholes, rivers, no matter the distance), while the impact intensity is considered to be medium given that the project developer put into consideration the economic situation of the project area when developing the project and ultimately when setting water prices for the project beneficiaries. 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

- Alternative water sources such as the boreholes should continue to be maintained by the water user committees.
- MoWE should support the District Local Government to continue funding construction / rehabilitation of alternative water sources such as shallow wells, boreholes, etc.
- MoWE through its water supply schemes should put into consideration the project area's economic profile and vulnerability when setting affordable water prices.

8.7.5 LOSS OF LIVELIHOOD BY WATER VENDORS

Water vendors supplying water especially in trading centres of Bukizibu and Bumwena and surrounding areas earn a living from these activities due to long distances to traditional water sources. They often carry 20-litre jerry cans on motorcycles, bicycles, wheel barrows, any other bulk carriers. They sell jerry cans of 20 litre capacity each UGX 500 or more based on prevailing circumstances (low in the rainy season and high in the dry season). The vendors are likely to have their livelihoods undermined following project implementation. By introduction of piped potable water supply, water vendors will lose their source of income within the project area as water will be accessible at homesteads and at nearby public posts.

This impact is rated as possible and the impact significance rated as medium since the vendors can put their effort and investments into other sources of income, while the impact intensity is low given that the water vendors can extend their services to areas not covered by the project. 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

- MoWE through the Umbrella scheme should sensitize existing water vendors in the area about adapting to the new developments in the area. This would eliminate their negative attitude towards the proposed project and result in total project support.
- The Community Development Officer (CDO) should mobilise the local people (including water vendors) and sensitise them about the opportunities that the proposed project would bring in the area and how they can take advantage of piped water in the area to create jobs (such as washing bays) and spur development in the area.
- Vendors would be encouraged to become scheme or kiosk operators; vendors would be encouraged to tender for public water points.
- Vendors should be encouraged to be involved in project implementation activities as part of the labourforce.

8.7.6 OCCUPATIONAL HEALTH AND SAFETY RISKS

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

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

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

		Sensitivity			
		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 primary measure to mitigate OHS impacts is prevention which entails identification of risks and instituting pro-active measures to avoid them. In part this can be achieved by following national guidelines. For unavoidable risks, personal protective equipment (PPE) should be provided to workers.
- Orient all staff on safe work practices and guidelines and ensure that they adhere to them.
- Training staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences.
- Regular safety drills to constantly follow on various possible incidences.
- Use signage to warn staff and/ or visitors that are not involved in laboratory work of dangerous places.
- Develop evacuation procedures to handle emergency situations.
- Provide adequate OHS protective gear for all laboratory staff.

8.7.6.1 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 Town council 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 intensity 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 sensitivity of the population in the RGC is high 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.

8.8 CUMMULATIVE IMPACTS

Although the scope of this report only covers the proposed development of the solar powered piped water supply system and sanitation facilities in Bukizibu-Bumwean Rural Growth Centre, Mayuge District, there may be other projects in the project area that may have impacts on the environment and socio-economic being of the people in the RGC. For instance, the implementation of the Makutu Rear earth Mineral and/or oil palm development projects within Mayuge District. Additionally, there are sugar factories (for instance Mayuge Sugary Factory) and commercial fishing activities within a 20 Km radius of the project area. These projects may be implemented concurrently and therefore will trigger cumulative impacts.

These projects may be implemented concurrently and therefore will trigger cumulative impacts. Furthermore, extraction of materials for construction phases of piped water system in similar sources with other projects may have an impact on the available resources and increase pressure on assess, while influx of migrant workers in search improved access to services such as piped water from these projects may result in an increase in population within Bukizibu-Bumwena RGC. Other cumulative impacts may result from the development of the piped water system in the area. The key cumulative impacts and risks associated with the project are summarized below:

- The proposed water Supply and sanitation project will contribute towards reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhea. 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. This positive cumulative impact will be enhanced if the following are done:
 - a. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water;
 - b. Ensuring that operations and maintenance are properly done to avoid issues of water contamination; and
 - c. Ensuring that water is affordable and available all the time.

The improved health conditions will significantly result in a reduction in health costs and time for collecting water which translate into substantial savings for rural households.

- 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.

- Skills and technology transfer are also 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 Mayuge community. 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. With the development of the piped water systems, it is also anticipated that some people will adopt waterborne toilets as a sanitation option supported by the project.
- The project will create permanent employment positions, namely; 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 prioritized during recruitment.
- This water supply and sanitation project will generate long-term revenue to the districts and the sub country in general. This will be in form of VAT on water supply and other taxes associated with extension such as expanded and improved business opportunities in the project areas. This will be enhanced by putting in place an efficient mechanism for revenue collection.
- Community health risks especially the spread of HIV/AIDS require concerted efforts. Interactions of workers at the sites with communities within the project area can increase risk of HIV/AIDS. The contractor must maximize the use of local workers as opposed to moving workers from other areas to minimize new interactions that can increase the risk of spread of HIV/AIDS. In addition, the contractors provide their own healthcare services by recruiting qualified health practitioners to operate site clinics. This will mitigate the risk of the contractors constraining the meagre social services within the project areas.
- However, as noted under negative impacts, the project will supply water to about seven small and unplanned towns in Bukizibu-Bumwena RGC, within Malongo Sub County; the main ones being Bukizibu TC, and Bumwena TC. 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 behavioral change campaigns to maximize benefits from the projects and deter cumulative negative impacts of the same.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

9.1 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 Bukizibu-Bumwena 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 Mayuge and Malongo 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 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.

9.1.1 APPROVAL OF THE ESMP ACTIVITIES

Implementation of ESMP activities will be approved by MoWE 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.

9.1.2 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. The ESMP for Bukizibu-Bumwena RGC Solar-powered Water Supply and Sanitation Project has been prepared and included in Table 9-1 below.

Table 9-1: 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	<ul style="list-style-type: none"> Recruit locals for construction jobs according to their skills. 	<ul style="list-style-type: none"> Contractor 	Embedded in contractor's fees
	<ul style="list-style-type: none"> Promote labor-intensive construction methods to create more jobs. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Adhere to the local labour laws of 30% women in employment and remuneration of workers above the minimum wage. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Ringfence some jobs such as cleaning and cooking specifically for local women. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Encourage qualified females to apply for jobs. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Gender sensitive facilities such as bathrooms, toilets and breastfeeding spaces to be provided to create a conducive working environment. 	<ul style="list-style-type: none"> Contractor 	5,000,000
NEGATIVE IMPACTS – CONSTRUCTION PHASE			
Land use/cover change	<ul style="list-style-type: none"> Restrict water transmission and distribution lines to road reserves. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Compensate for land as per Ugandan laws on Land Acquisition and in line with World Bank's OP 4.12. 	<ul style="list-style-type: none"> MWE 	
	<ul style="list-style-type: none"> Movement of vehicles and equipment must follow designated pathways or agreed upon access roads. 	<ul style="list-style-type: none"> Contractor 	-
Land acquisition and resettlement	<ul style="list-style-type: none"> Implement the RAP in line with Ugandan laws and the World Bank's ESS5 	<ul style="list-style-type: none"> 	
	<ul style="list-style-type: none"> Engage local communities to provide land voluntarily especially for the distribution lines 	<ul style="list-style-type: none"> MWE 	Covered in RAP implementation budget
	<ul style="list-style-type: none"> Select land requiring minimal or no relocation at all 	<ul style="list-style-type: none"> MWE 	
	<ul style="list-style-type: none"> Use road reserves for pipe works 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Provide a fair and prompt compensation to the affected people 	<ul style="list-style-type: none"> MWE 	
	<ul style="list-style-type: none"> Determine the extent of property lost or destroyed and provide fair and prompt compensation to the effected people. 	<ul style="list-style-type: none"> MWE 	Covered in RAP implementation budget
Deterioration of landscape and visual quality	<ul style="list-style-type: none"> Obtain murram and subsoil from a NEMA/DLG licensed source. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> Install berms and drainage channels to control surface water run-off during earthworks. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Restore of borrow pits and revegetate with native species. 	<ul style="list-style-type: none"> Contractor 	

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> • Close monitoring of impact on natural resources with enforcement of contract or legislative options. 	<ul style="list-style-type: none"> • DLG/ MWE 	10,000,000
Soil Erosion	<ul style="list-style-type: none"> • Limit vegetation clearance to localities required for development. 	<ul style="list-style-type: none"> • Contractor 	-
	<ul style="list-style-type: none"> • Hoard off construction sites and instate soil barriers before excavations to intercept any eroded material and any soil material. 	<ul style="list-style-type: none"> • Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> • Remove topsoil prior to carrying out excavations and stockpile separately so that it is used last in backfilling of the excavated areas. 	<ul style="list-style-type: none"> • Contractor 	
	<ul style="list-style-type: none"> • Backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation. 	<ul style="list-style-type: none"> • Contractor 	
	<ul style="list-style-type: none"> • Remove excess excavated soil material which will not be used for construction works in a timely manner and deposit at an approved site 	<ul style="list-style-type: none"> • Contractor 	
<ul style="list-style-type: none"> • Ensure proper landscaping and vegetation restoration is carried out using native species to further reduce the possibility of soil erosion. 	<ul style="list-style-type: none"> • Contractor 		
Loss of Vegetation and degradation of Habitat	<ul style="list-style-type: none"> • Limit vegetation clearance to localities required for development. 	<ul style="list-style-type: none"> • Contractor 	-
	<ul style="list-style-type: none"> • Avoid and minimize cutting of trees at all project sites. 	<ul style="list-style-type: none"> • Contractor 	-
	<ul style="list-style-type: none"> • Movement of vehicles and equipment must follow designated pathways or agreed upon access roads. 	<ul style="list-style-type: none"> • Contractor 	-
	<ul style="list-style-type: none"> • Remove and destroy any encountered invasive species 	<ul style="list-style-type: none"> • Contractor 	-
	<ul style="list-style-type: none"> • Sensitize all project workers to minimize damage to vegetation and fauna. 	<ul style="list-style-type: none"> • Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> • Use existing road corridors for construction and operational access wherever possible. 	<ul style="list-style-type: none"> • Contractor 	-
Disturbance and degradation of wetland ecosystems	<ul style="list-style-type: none"> • Where the alignment requires the suspension points for the water pipes to be located in the swamp and in areas which cannot be easily accessed, build temporary access to wetland areas not easily accessible from existing roads or causeways, that will be removed after. 	<ul style="list-style-type: none"> • Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> • Obtain wetland user permits from NEMA before constructing across or along wetlands and follow all guidelines given. 	<ul style="list-style-type: none"> • MWE 	150,000

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> All project workers should be sensitized to minimize damage to flora and fauna. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> MWE 	-
Generation of waste	<ul style="list-style-type: none"> The Contractor shall develop and implement a Waste Management Plan 	<ul style="list-style-type: none"> Contractor 	15,000,000
	<ul style="list-style-type: none"> 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. Other forms of waste which are inert must be collected by NEMA gazetted waste handlers and taken to a NEMA gazetted waste disposal facilities for disposal. 	<ul style="list-style-type: none"> Contractor 	10,000,000
	<ul style="list-style-type: none"> All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated district landfills for disposal. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> All plastic waste generated during construction, such as mineral water bottles, polyethene bags, jerrycans and cups shall be collected and taken for recycling in plastic collectors in Mayuge for onward transmission to plastic recyclers. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Human excreta shall be managed using a mobile toilet and then disposed at the waste stabilization ponds at Mayuge Hospital. 	<ul style="list-style-type: none"> Contractor 	10,000,000
	<ul style="list-style-type: none"> The contractor will work with Mayuge 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 maintained at all times. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
Noise and Vibrations	<ul style="list-style-type: none"> Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> Periodic medical hearing checks should be performed on workers exposed to high noise levels. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Sites must be hoarded to curb noise impacts to neighbouring communities. 	<ul style="list-style-type: none"> Contractor 	

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> Works should be undertaken during day time i.e. from 8am to 6pm. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Works near schools or health centres should be done in periods like weekends in order for noise and vibrations not to interfere with learning environment. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Weekly monitoring of noise levels at active sites should be carried out by the contractor. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
Air Pollution	<ul style="list-style-type: none"> Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h on the highway and 40 km/h off the highway. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> Workers will be provided with PPE and the use of PPE shall be enforced. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> All surfaced roads shall be subject to road cleaning and un-surfaced roads to dust suppression, the methodology and frequency of which shall be included in the Contractor's Traffic Management Plan. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Stockpiles of friable material will be grassed in order to prevent wind erosion. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO2 and NO2 are minimised. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
Reduced Traffic Safety	<ul style="list-style-type: none"> The Contractor shall develop and implement a traffic management plan to be approved by the supervision engineer 	<ul style="list-style-type: none"> Contractor 	11,000,000
	<ul style="list-style-type: none"> All road closures shall be separately notified and agreed with the subcounty administration. 	<ul style="list-style-type: none"> Contractor/ Subcounty Council 	-
	<ul style="list-style-type: none"> Vehicular access to and from hospitals, police stations, and other public institutions shall be maintained through the use of steel road plates over open trenches. Pedestrian access to schools, health facilities, and other premises frequently accessed by the public will be maintained with the use of walking boards. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> To minimize interference with traffic, half of the road shall be closed to enable vehicles 	<ul style="list-style-type: none"> Contractor 	-

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	use one half as the other half is being excavated and installed with pipe work.		
	<ul style="list-style-type: none"> Road safety and site safety training should be done involving construction workers, police and local community. 	<ul style="list-style-type: none"> Contractor/ Police/ LC 	-
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> All drivers to be employed by the Contractor shall be qualified, skilled with valid driving permits. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm). 	<ul style="list-style-type: none"> Contractor 	-
Risk of misinformation due to failure to engage stakeholders	<ul style="list-style-type: none"> Prepare a comprehensive Stakeholder Engagement Plan (SEP); 	<ul style="list-style-type: none"> Contractor 	5,000,000
	<ul style="list-style-type: none"> Community liaison activities; 	<ul style="list-style-type: none"> MWE 	20,000,000
	<ul style="list-style-type: none"> Undertake radio talk shows to communicate progress of the project to local stakeholders. 	<ul style="list-style-type: none"> MWE 	3,000,000
Risk of violence against children (VAC)	<ul style="list-style-type: none"> Develop a strict employment code of conduct to protect the girl child. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Sensitize employees on dangers of molestation of children, especially the girl child. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Sensitize the Contractor against child labour and implement the child labour act; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Demand birth certificate or any identify that clearly shows the age of a job applicant; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Issue each worker with an applicant letter with well spelt out terms of engagement. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Monitoring school attendance 	<ul style="list-style-type: none"> Contractor/ DLG 	-
	<ul style="list-style-type: none"> Sensitization in schools 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Reporting mechanisms in place such as a whistleblowing system. 	<ul style="list-style-type: none"> Contractor 	-

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
Risk of Sexual and Gender Based Violence (SGBV) - e.g. physical assault, Sexual abuse, and sexual harassment	<ul style="list-style-type: none"> The Contractor should have a sexual harassment policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> MWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities; 	<ul style="list-style-type: none"> MWE 	-
	<ul style="list-style-type: none"> Put SGBV reporting mechanisms in place; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Community sensitization among men and women. 	<ul style="list-style-type: none"> Contractor 	-
HIV/AIDS risks	<ul style="list-style-type: none"> Sensitize workers on proper social behaviour and conduct about community norms, HIV/AIDS and other sexually transmitted diseases. HIV/AIDS policies should be developed at the workplace. Free HIV/AIDS testing, counselling and condom distribution be encouraged for both workers, sex workers and local community. The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Social bonds are not readily controlled, and the permanence of HIV/AIDS transmission makes this impact of social bonding both negative and positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual exploitation can also occur. It is therefore important to tackle the issue of social bonding with firmness and fairness, forbidding powerful relationships, which lead to exploitation of mostly women and children, while encouraging relationships that may lead to permanent situations. 	<ul style="list-style-type: none"> Contractor/ DLG 	-
Risk of not engaging stakeholders in project monitoring	<ul style="list-style-type: none"> Bring onboard the relevant stakeholders including Mayuge DLG to participate in routine project monitoring. 	<ul style="list-style-type: none"> MWE 	-
Decommissioning of auxiliary facilities	<ul style="list-style-type: none"> Demolish all auxiliary facilities 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Remove all obsolete equipment, vehicles, trucks, and machinery shall be removed from sites 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Backfilling all openings with overburden soil 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Planting fast-growing trees and grasses to stabilize the excavated areas 	<ul style="list-style-type: none"> Contractor 	-

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> Fencing off the re-vegetated areas is recommended until the reinstated vegetation has reached maturity 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Clean-up of the site and safe disposal of any construction waste. 	<ul style="list-style-type: none"> Contractor 	-
NEGATIVE IMPACTS AND RISKS – OPERATION PHASE			
Depletion of Groundwater Resources	<ul style="list-style-type: none"> The water levels should continuously be monitored to ascertain any impact on the water level. 	<ul style="list-style-type: none"> EUWS 	-
	<ul style="list-style-type: none"> Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction. 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
	<ul style="list-style-type: none"> The developer should apply /acquire the abstraction permits which will facilitate adherence to agreed rates of abstraction on one side and guide the DWRM while issuing abstraction permits in the vicinity, to other competing users 	<ul style="list-style-type: none"> MWE 	450,000
Solid Waste Generation	<ul style="list-style-type: none"> A Waste management plan for the operation phase of the project will be developed and implemented. 	<ul style="list-style-type: none"> EUWS 	-
	<ul style="list-style-type: none"> Waste collection bins will be provided at strategic positions at the water 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
	<ul style="list-style-type: none"> offices, water source sites 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 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
	<ul style="list-style-type: none"> The water supply system operator will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
Risk of Pollution from mismanagement of sanitation facilities	<ul style="list-style-type: none"> A Periodic maintenance regime including emptying and desludging will be put in place and implemented to prevent sewage over flows 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
	<ul style="list-style-type: none"> Use of manifest system to ensure that the wastes are disposed of at a site (waste treatment plant) gazetted by NEMA 	<ul style="list-style-type: none"> EUWS 	-
	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> EUWS 	-

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
Loss of livelihood for water vendors	<ul style="list-style-type: none"> Provide paid employment to water vendors who will lose their livelihood 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
NEGATIVE IMPACTS AND RISKS – PHASE CROSSCUTTING			
Occupational Health and Safety Risks	<ul style="list-style-type: none"> The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the developer. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Contractor shall provide safety guidelines to all operations prior to start of work. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> 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. To ensure occupational health and safety on construction sites, the Contractor shall be obliged to comply with all applicable Ugandan construction Health and Safety Standards as required by the Occupational Safety and Health Act of 2006. These include provisions of the Factories Act, Labour Unions Act and Workman's Compensation Act. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Regular drills will be constantly 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. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Personnel on duty shall always wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Contractor shall establish emergency entrances, exits and amenities. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> The Contractor shall ensure access to first aid kits. 	<ul style="list-style-type: none"> Contractor 	3,000,000
	<ul style="list-style-type: none"> The Contractor shall ensure safe working heights through provision of work platforms, scaffolds, and adequate supervision by 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	ensuring regular inspection of formwork, false work and temporary supports before loading or pouring concrete.		
	<ul style="list-style-type: none"> The Contractor shall secure site boundaries with fences or hoardings as appropriate. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Developer through the Construction Supervisor will continually monitor Contractors' compliance with Health and Safety measures. 	<ul style="list-style-type: none"> MWE 	Within supervision consultant's bid budget
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Contractor 	-

9.2 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

9.2.1 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.

9.2.2 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.

9.2.3 MONITORING ACTIVITIES AND PROCESSES

9.2.3.1 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.

9.2.3.2 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.

9.2.3.3 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.

9.2.3.4 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".

9.2.3.5 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 labour 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.

9.2.3.5.1 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.

9.2.3.5.2 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; • 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 	Social Safeguards officer / GRM	MWE (who can then report to bank)	As soon as becomes known (Tracking is done continuously / daily)
<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 	GBV Service provider (e.g. CBO, NGO)	Contractor & MWE	Monthly

<ul style="list-style-type: none"> • Summary data on perpetrators (location, relation to victims and/or survivors), date of occurrences 			
<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 the 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

9.2.4 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.

9.2.5 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.

9.2.6 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.

9.2.7 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.

9.2.8 OPERATION PHASE MONITORING

9.2.8.1 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) 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 to produce 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 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.

9.2.8.2 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 9-2) are as follows:

Table 9-2: 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
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

Characteristic	Unit	US-201: 2008 Requirement	WHO 2011 Requirement
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 9-3** below:

Table 9-3: 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:

- Quality of water harnessed including effects on the water from climatic, human and industrial activities;
- Type of treatment for drinking worthiness;
- Volume of water processed;
- Risks of contamination;
- Background of public water supply network;
- Population served; and
- Capabilities of the analytical facility (both in terms of capacity and in terms of analytical performance).

9.2.8.3 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.

9.3 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 Eastern Umbrella of Water and Sanitation, 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 regional and district level RWSRC-2 Mbale and Mayuge DLG offices will be responsible for the day-to-day monitoring of the ESMP in their areas of jurisdiction.

At the National level, two institutions i.e. the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSHS) 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 DOSHS is to issue permits and periodically inspect the project site. DOSHS 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 town councils 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.

The Project will be implemented by MoWE through its regional entities (WMZs, WSDFs) in close collaboration with Mayuge District local governments and their partners (e.g. private sector operators). To facilitate integration within the sector, MoU/MoUs outlining joint responsibilities will be signed between the MWE, respective district local governments and entities responsible for specific activities (e.g. districts)

Table 9-4: 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 Environment- MoWE	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 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).

	<i>MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.</i>
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><i>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.</i></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><i>On this project, DWRM will be responsible for issuing a ground water abstraction permit for the project as well as approval and monitoring the implementation of source protection plan.</i></p>
Private Sector Involvement	
Supervising Consultant	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
Contractor	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, 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	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,

	<p>develop and formulate national policies on all taxes, fees, levies, rates for Local Governments.</p> <p>Mayuge 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 (Malongo Police Post/ Mayuge District Police)	The project will be implemented in Bumwena Parish, Malongo Sub County, Mayuge District. The police post at Malongo Sub County will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Mayuge 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.
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9.4 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

9.4.1 PURPOSE OF MONITORING

A monitoring program is aimed at ensuring that proposed mitigation and enhancement measures are implemented to generate intended results, otherwise the measures need to be modified, ceased, or replaced when inappropriate. Furthermore, monitoring allows assessing compliance with National Environmental/Social standards as well as with the World Bank Operational Safeguards Policies relevant to the project.

On the other hand, environmental and social monitoring provides feedback about the actual environmental and social impacts of the project. Monitoring results help assess the success of mitigation measures in protecting the environment and safeguarding the social well-being of project-affected parties.

They are also used to ensure compliance with environmental and social standards, and to facilitate any needed project design or operational changes. A monitoring program, backed up by powers to ensure corrective action when the monitoring results show it necessary, is a proven way to ensure effective implementation of mitigation measures. By tracking the project's actual impacts, monitoring reduces the environmental and social risks associated with the project and allows for project modifications to be made where required.

9.4.2 SCOPE OF ENVIRONMENTAL AND SOCIAL MONITORING

Environmental and social monitoring covers the following:

- Disclosure of information and public sensitization
- Protection of flora and fauna
- Noise
- Air emissions
- Soil quality and management
- Transport and traffic
- Waste management
- Water management
- Cultural heritage
- General site management and occupational health and safety
- Gender based violence
- Child protection
- Land acquisition
- Contractors obligations

Environmental monitoring will be undertaken at different levels as described below

- i. **Surveillance:** Undertaken by the Supervision Engineer on behalf of MoWE.
- ii. **Quarterly Monitoring:** Joint by all relevant stakeholders at various levels.
- iii. **Audit activities:** To be done by a NEMA registered Environmental Auditor.

- iv. **Spot checks:** By Supervising Engineer, MoWE, Contractor, District Leadership, NEMA.

9.4.3 MONITORING ACTIVITIES AND PROCESSES

9.4.3.1 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.

9.4.3.2 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.

9.4.3.3 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 (MoWE) and World Bank to raise any environmental issues arising from the joint inspection and as a reaction to the contractor's presentation.

9.4.3.4 RECORDKEEPING

MoWE 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".

9.4.3.5 MONTHLY ENVIRONMENTAL AND SOCIAL REPORT

Either a standalone Monthly Environment Report 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. 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:

- h) Progress in implementing the CESMP and the standalone management plans;
- i) Status of key approvals and documentation for the project;
- j) Compliance with legal obligations and specifications;
- k) Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management;

- l) Summary of any complaints by the community and actions taken/to be taken; and
- m) Key environmental activities for the next month.

9.4.4 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.

9.4.5 APPROVAL OF THE ESMP ACTIVITIES

Implementation of ESMP activities will be approved by MoWE 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.

9.4.6 ENFORCEMENT OF COMPLIANCE AND ENVIRONMENTAL COMPLIANCE AUDIT

MoWE 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. MoWE shall submit the environmental compliance audit report to NEMA and undertake mitigation measures to address and rectify any non-compliance detected.

Table 9-5: Environmental and Social Monitoring Plan

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimates (UGX)
Positive Impacts – Construction Phase								
Employment opportunity	Percentage of local construction laborer's	Quarterly	Project site	Percentage of local people employed in the project	Employment Records, inquiries, and observation	50% of Casual workers 30% Women	MoWE, LC-1 Contractor	Proj. Sup. Contract
Negative Impacts - Pre-construction Phase								
Air Quality	Dust (PM ₁₀)	Once before commencement	Project site	ppm	Micro-dust Pro	National Stds	MoWE/ ESIA Consultant	ESIA Contract
Noise Baseline	Noise level	Once before commencement	Project site	dBA	Noise Level Meter	National Stds	MoWE/ ESIA Consultant	ESIA Contract
Water Quality	Turbidity, TSS, Oil, PH	Once before commencement	Project site/ wetland	ppm	Mobile Lab	National Stds	MoWE/ ESIA Consultant	ESIA Contract
Land acquisition/ displacement of land uses	PAPs	Before commencement & continuous throughout implementation	BH areas & along TL	No. of PAPs Compensated Land consent agreements	RAP Implementation Report/ Grievance Log	100% compensation	MoWE/ RAP Consultant	Proj. Sup. RAP Budget
Negative Impacts - Construction Phase								

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimates (UGX)
Land acquisition/ displacement of land uses	PAPs	Before commencement & continuous throughout implementation	BH areas & along TL	No. of PAPs Compensated Land consent agreements	RAP Implementation Report/ Grievance Log	100% compensation	MWE/ RAP Consultant	Proj. Sup. RAP Budget
Land use/ cover change	Area cleared; Species type	Monthly	Along the TL and DL	Ha No. species	Progress Reports	Restricted to TL & DL Restored	MWE Contractor	15,000,000 Contract
Erosion	Siltation Turbidity	Once per month (daily inspection to be made to detect and remedy soil deposition during works in wetland area).	Wetland	TSS	Sample & lab test	National Stds Baseline	MoWE Consultant Contractor	10,000,000 Contract 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	MoWE DLG Contractor	5,000,000 MWE Budget Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimates (UGX)
Water Quality	All	Monthly	BHs, Wetland	All	Lab. Analysis	National Stds	MoWE Contractor	50,000,000 Contract
Air Quality	Dust (PM ₁₀)	Once per months (daily inspection to be made to detect and remedy excessive dust generation).	Project site	ppm	Micro-dust Pro	National Stds	Contractor MoWE / Sup. Consultant	Contract 10,000,000
Noise pollution	Noise level	Once a week	Project site	dBA	Noise Level Meter	National Stds		10,000,000
Safety and health risks	Number and type of PPE. Health and sanitation facilities in site No of near misses, incidences/accidents recorded. No. of toolbox talks conducted Incident investigation	Daily by contractor, weekly by Consultant and Quarterly by MWE.	Project site	Number of safety measures provided	Incidents/Acc. Log, injuries and inspection	0	MoWE Consultant Contractor	20,000,000 Contract Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimates (UGX)
	<p>Number of incidents involving company and contract vehicles including delivery trucks.</p> <p>Number of trespassers</p> <p>Number and types of Incidents, Injuries and Near Misses.</p> <p>Conformance to Facility Standards (Planned maintenance, structural integrity, heavy and light vehicle standards, condition of roads, condition of bunds, alarm systems).</p>							
GBV 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	MoWE Consultant Contractor	40,000,000 Contract Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimates (UGX)
GRM for workers and communities	Grievance Committees	Monthly	Project site	No. Reported Cases and resolved	Grievance Log	0	MWE Consultant Contractor	5,000,000
								10,000,000
Negative Impacts - Operation stage								
Water Quality & Quantity	All	Monthly	BHs	All	Lab. Analysis Hydrogeological analysis	National Stds	MoWE	50,000,000
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	MoWE DLG	10,000,000 MWE Budget
Total monitoring costs								220,000,000 (Equivalent to 59,460 USD)

9.5 DECOMMISSIONING

The Bukizibu-Bumwena RGC Water Supply and Sanitation Project has been planned to operate up to 2040 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 now 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 MANAGEMENT PLANS

10.1 CONTRACTOR MANAGEMENT PLANS

The Contractor will be required to prepare some stand alone safeguards management plans. These are highlighted below:

10.1.1 HUMAN RESOURCE MANAGEMENT PLAN

The Contractor is expected to have a clear plan for recruitment, managing, and discharging 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 locality and this should be done through local areas councils from where those seeking employment should get letters of recommendations.

10.1.2 WASTE MANAGEMENT PLAN

This Waste Management Plan (WMP) will be prepared to address waste management aspects associated with the Bukizibu-Bumwena RGC project activities in line with legal and regulatory requirements. The Contractor, all subcontractors, and project management team 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 risks such as soil and water pollution, outbreak of diseases such as cholera, diarrhea, dysentery due to poor disposal of human excreta and poor hygiene. The Contractor shall undertake measures to respond to all generated categories of wastes. 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.

10.1.3 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT 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 OSH 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 especially in the busy trading centres of Bukizibu and Bumwena.

10.1.4 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 geographical scope is the Project Area of Influence. The risks and potential project impacts to community health and safety can emerge from

both within and outside the 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. 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.

10.1.5 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 of the commissioning. This stakeholder engagement plan will adopt an inclusive perspective. As such, the contractor will provide details of engagements during the project lifecycle. The Contractor's SEP will inform on-going stakeholder engagement through the various stages of construction, decommissioning and the defects liability period.

10.1.6 EMERGENCY PREPAREDNESS AND 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. The ERP will manage emergency events during the stages of construction for example: earthworks, traffic management, casting, relocation of utilities and many more. 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 including the subcontractors' workers have the skills to report emergency incidents. The contractor shall keep records of all incident reports, investigation, and analysis and counter measures taken.

10.1.7 SECURITY MANAGEMENT PLAN

The purpose of the Security Management Plan is to assure a safe and secure project environment for staff, visitors/tourists, 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 under the project. The Plan will specifically deal with:

- Security issues in the project i.e. being safe from attacks from thugs and ill motivated persons.
- Being prepared for insecurity incidents; and
- Decisively responding to and managing them insecurity circumstances and incidents.

10.1.8 HIV/AIDS AND STIS MANAGEMENT PLAN

The Contractor in pursuit of his commitment to health and safety (specifically HIV/AIDS and STIs Management) will prepare a plan that sets out how the contractors will organize trainings, conduct

awareness and education on the use of infection control measure in the workplace. The Contractor is expected to provide condoms 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.

10.1.9 GENDER AND SOCIAL EQUITY MANAGEMENT PLAN

A gender and social equity management plan is a set of actions, which spell out a strategic view aimed at achieving gender equality in a work environment. In a bid to achieve this in a work environment, the contractor should have such a plan to guide the assignment of roles for both men and women equally, creating gender awareness amongst all categories of stakeholders, ensuring women's participation and local communities during project implementation process to achieve the intended gender and social outcomes. The plan should also include activities to sensitize the workers and communities against gender-based violence in all its forms (including sexual gender-based violence). These aspects shall be reported on a monthly basis.

10.1.10 CHILD PROTECTION MANAGEMENT PLAN

The contractors should be cognizant of the importance of child protection issues and their responsibility to always uphold the rights of children. 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 all the potential perpetrators of child related abuse.

10.1.11 PLAN FOR ACQUISITION AND MANAGEMENT OF ANCILLARY SITES

Pursuant to set standards and guidelines for construction, a contractor is supposed to have ancillary sites such as dump sites for depositing of solid waste and borrow pits for extraction of raw material. And as such a contractor should have a strategy in place to manage these sites, carry out environmental impact assessments for each in accordance with national environmental laws, standards, and international best practices to ensure the social and environmental safeguards are upheld. This can only be achieved through having robust ancillary sites acquisition and management plan which serves as a guiding and management tool for auxiliary sites.

10.1.12 CAPACITY BUILDING PLAN

Building capacity for service delivery entails support to formal and informal local governance structures including communities. The construction activities of the proposed Bukizibu-Bumwena RGC Solar-powered Water Supply and Sanitation Project will require capacity building during the construction/establishment and post-establishment phases and as such it is imperative that that contractor, MoWE have a clear strategy detailing the capacity and needs and the gaps that need to be filled for project sustainability.

10.1.13 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 stands. Given the nature and sensitivity 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.

10.1.14 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:

- a) Workers must be vigilant to any relics found during excavation;
- b) In case of a discovery during the excavation, workers must immediately report the findings to the Foreman;
- c) The Foreman must stop the work immediately and communicate the findings to the Supervisor;
- d) The Supervisor then communicates the findings to the Contractor Manager;
- e) The Contractor Manager then notifies MWE Safeguards Team;
- f) 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;
- g) 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;
- h) 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;
- i) 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;
- j) 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
- k) All chance finds will be recorded in the chance find form.

The project activities will then continue after the following have taken place:

- i. 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;
- ii. 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
- iii. 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 if, a PCR is encountered, the following can be contacted:

Ministry of Tourism, Wildlife and Antiquities Rwenzori Towers 2 nd Floor, Plot 6 Nakasero Road. KAMPALA, UGANDA. P. O. Box 4241 Kampala Phone: +256 414 561 700 Email: info@tourism.go.ug	The Uganda Museum Plot 5-7 Kira Road, P. O Box 365, KAMPALA-UGANDA (+256) 414 232707. www.mtti.go.ug .
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10.1.15 DECOMMISSIONING PLAN

At the end of the project implementation activities, the Contractor shall ensure restoration of the disturbed natural sites through environmental rehabilitation, backfilling and restoring topsoils, (re-) introduction of genetic species (e.g., natural re-grassing) like those destroyed in order to re-establish the natural local ecology. The decommission phase will focus on any of the following as applicable:

- a. The parking yards
- b. Material stockpile areas
- c. Makeshift roads within the site premises
- d. Immediate surroundings of the construction site whose vegetation will be cleared during construction.

Specifically, the process of rehabilitating and restoring the site shall follow the following sequential approach:

- a. All facility structures shall be demolished; the rubble/debris shall be used for fill purposes or taken to an approved disposal site.
- b. All obsolete equipment, vehicles, trucks, and machinery shall be removed from sites.
- c. Makeshift access roads shall be closed, scarified, and revegetated
- d. Backfilling all openings with soil and leftover overburden.
- e. Planting fast-growing trees and grasses to stabilize excavated areas with native species.
- f. Fencing off the re-vegetated areas should be provided until the reinstated vegetation has reached maturity

Joint site inspections will be conducted to ensure site restoration before handover of the project facilities in order to assess the progress of restoration activities. They will constitute the Contractor, MoWE, Mayuge District Environment Officers, CDO and Engineer.

10.2 OPERATION PHASE MONITORING AND MANAGEMENT PLANS

10.2.1 WATER SAFETY PLAN

MoWE 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:

- d) System assessment to determine whether the drinking-water supply chain (up to the point of consumption) can deliver water of a quality that meets health-based targets.
- e) Identifying control measures in a drinking water system that will collectively control identified risks and ensure that the health-based targets are met; and
- f) 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:

- f) Measures to protect the source of drinking water from risks of pollution;
- g) Measures to ensure all installations intended to produce 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;
- h) 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;
- i) 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
- j) A verification plan to ensure that individual components of a drinking-water system, and system 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.

10.2.1.1 WATER QUALITY MONITORING PLAN

MoWE 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 are as follows:

Table 10-1: 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
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

Characteristic	Unit	US-201: 2008 Requirement	WHO 2011 Requirement
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 9-3 below.

Table 10-2: 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:

- h) Quality of water harnessed including effects on the water from climatic, human and industrial activities;
- i) Type of treatment for drinking worthiness;
- j) Volume of water processed;
- k) Risks of contamination;
- l) Background of public water supply network;
- m) Population served; and
- n) Capabilities of the analytical facility (both in terms of capacity and in terms of analytical performance).

10.2.2 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.

10.2.2.1 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.

- (i) Storage and equipment rooms be equipped with doors, opening outward to the outdoors complete with panic hardware;
- (ii) Viewing window into chlorine storage and equipment rooms for operator security;
- (iii) Visual and audible emergency alarms at the chlorine room entrance;
- (iv) Exhaust fans with a typical rating to air changeover every minute;
- (v) A chlorine gas leak detector to generate alarms and attendant ammonia bottle to help locate a leak;
- (vi) A drench shower located where it is easily accessible in case of emergency, with single turn (butterfly valve) water tap;
- (vii) An emergency kit to repair leaking containers.

For systems that use gas chlorination:

- (i) Install alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected;
- (ii) Install containment and scrubber systems to capture and neutralize chlorine should a leak occur;
- (iii) Use corrosion-resistant piping, valves, metering equipment, and any other equipment meeting gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease;
- (iv) Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

10.2.2.2 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:

- i. Prepare and approve standard operating procedures for its storage and handling;
- ii. Never store chlorine gas and ammonia in the same building or area;
- iii. Keep chlorine isolated and in different rooms from the chemicals that it reacts with;
- iv. 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;
- v. 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;
- vi. Containers should be stored and used above ground level and always in a vertical position;
- vii. Chlorine gas containers should be stored in marked areas shielded from external heat sources;
- viii. 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;
- ix. Empty cylinders should be clearly marked and segregated from unused cylinders.

10.2.2.3 STAKEHOLDER ENGAGEMENT PLAN

The Stakeholder Engagement Plan (SEP) is an instrument for mapping and prioritizing stakeholders across levels and regions; and for guiding planned consultations and disclosure of relevant project information to/with identified stakeholders.

- i. **Stakeholder categorization:** Three (3) categories of stakeholder to be mapped out (across three levels at the national, regional and community) as follows.
- ii. **Primary level stakeholders** considered to have high influence and power in respect to the project, project area and potential impacts and project implementation. These require regular engagements and consultations throughout the project life. These include the beneficiary communities, Malongo Sub County Local Government, and Mayuge District Local Government.
- iii. **Secondary level stakeholder** considered to have either high influence but low power or high power but low influence. These will require to be initially consulted and regularly kept informed. These will require to be initially consulted and regularly kept informed. These include political leaders in area
- iv. **Tertiary stakeholders** considered to have low power and low influence. These include neighbouring sub counties and town councils.

Information needs: The following information should be made available to all stakeholders, who are likely to be affected by positive and adverse environmental or social impacts from the project:

- Purpose, nature, objectives, and scale of the project.
- Schedule and duration of proposed project activities.
- Potential project risks and impacts extracted from the ESIA.
- Proposed mitigation plans.
- Available grievance mechanisms.
- Envisaged consultation process, if any, and opportunities and ways in which the public can participate (via the SEP) and
- Time and venue of any planned public meetings.
- Benefits of project
- Possible risks and their consequences (non-technical) for public interest e.g. threats to water catchments production wells, contamination; threats to water infrastructural e.g. vandalism.

Disclosure mechanisms: Several strategies can used to enhance public information disclosure and stakeholder consultations including:

- i. Scheduled public hearings at community level (village and parish) for initial disclosure, disclosure of draft reports and final reports including their implementation
- ii. Dedicated and select meetings with institutional stakeholders at the central regional, district and sub-county levels at different project phases
- iii. Dedicated meetings with select social groups like livelihoods groupings and vulnerable social groups including women, youth, PWDs and local leaders.
- iv. Project Background Information Document (PBID) summaries will be prepared, translated, and shared alongside other strategies described herein

- v. Non-Technical Summaries (NTS) of the ESIA will also be developed for public disclosure through print media and info-shops for the regulators, funder, and project proponent.

11 COMMITMENT, RECOMMENDATIONS AND CONCLUSION

11.1 COMMITMENTS

- i. The Contractor shall implement the mitigation measures stipulated in the ESMMP. The same shall be extended or included in any contract entered with any sub-contractors;
- ii. The Contractor together with the District Environment Officers, officials from NEMA, MoWE and other relevant Government agencies and departments shall carry out monitoring to ensure that the recommended mitigation measures in addition to ESIA conditions of approval and other relevant ESHS requirements are complied with;
- iii. Annual EHS audits of the proposed Bukizibu-Bumwena RGC Solar-Powered Water Supply and Sanitation Project will be carried according to the NEMA conditions of approval;
- iv. Proper waste management facilities and emergency preparedness/response measures shall be put in place;
- v. The Contractor should comply with the environmental and social management and monitoring plan of the project.
- vi. Commitments should also imply prompt actions by the Contractor in event of any relevant issues which may arise during the project
- vii. In order to attain the commitments made in ESIA report and other ESHS aspects of the WSSP under Bukizibu-Bumwena RGC, the Contractor should hire one full time Environmental and Social Officer, one Health and Safety Office, an Environmental and Social Manager, and Environmental Social Health and Safety Manager.
- viii. MoWE should also hire one Environmental Safeguard Specialist, One Social Development Specialist, and one Graduate Environmentalist, one graduate sociologist and one health and Safety graduate.
- ix. This ESMP will be disclosed in the communities around the project area and discussed with the members of the Grievance Redress Committees who are tasked to register and report local grievances and concerns.
- x. Contractor should commit to compel all subcontractors to follow and implement this ESMP, commitments, and measures outlined in the Contractor ESMP (C-ESMP) prepared inline the OPRC.

11.2 RECOMMENDATIONS

Based on the results of the ESIA, the ESIA team recommends the approval of the proposed project and its components for implementation on condition that the recommended mitigating measures are implemented, and as any other stakeholders may recommend in the course of review of this report or following audit.

11.3 CONCLUSION

The proposed implementation of the Bukizibu Bumwena Solar-powered WSSS Project will not only have positive impacts like improved access to clean and safer water, creation of employment opportunities, skills transfer, creation of market for local goods and services, enhanced sanitation, hygiene and public health among the urban communities and rural dwellers; local and national economy benefits within the project area (4 villages in Bumwena Parish in Malongo Subcounty, Mayuge District) but also, the WSSP upon completion will spur the country's economic development through enhancement of sectoral growth for sectors like tourism, agriculture, health, industry and

trade within and beyond the project area at large especially facilitated by access to quality and adequate water supply.


The above notwithstanding, project implementation works under Bukizibu-Bumwena RGC will trigger negative effects such land uptake, loss of vegetation, loss of livelihoods among the water vendors, impact on water source depletion, waste generation, dust nuisance, noise, occupational health and safety amongst others. Also, important to note is that, the water transmission and distribution pipe network will be within the existing access roads reserves to ensure minimal land uptake, loss of property such as crop gardens among others thus minimal need for compensation and resettlement activities. Consequently, the anticipated impacts on vegetation and faunal species will be minimal.

From the assessment, it is established that most of the anticipated negative impacts will be of reversible nature, short-term and can be mitigated through implementation of an Environmental and Social Management and Monitoring Plans proposed by this study whose implementation will rest largely with the Contractor under the supervision of MoWE, will have an overall monitoring responsibility.

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APPENDIX 1: APPROVAL OF TERMS OF REFERENCE FROM NEMA



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

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

NEMA House
Plot 17, 19 & 21, Jinja Road.
P.O.Box 22255, Kampala, UGANDA.
Tel: 256-414-251064, 251065, 251068
342758, 342759, 342717
Fax: 256-414-257521 / 232680
Email: info@nema.go.ug
Website: www.nema.go.ug

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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.

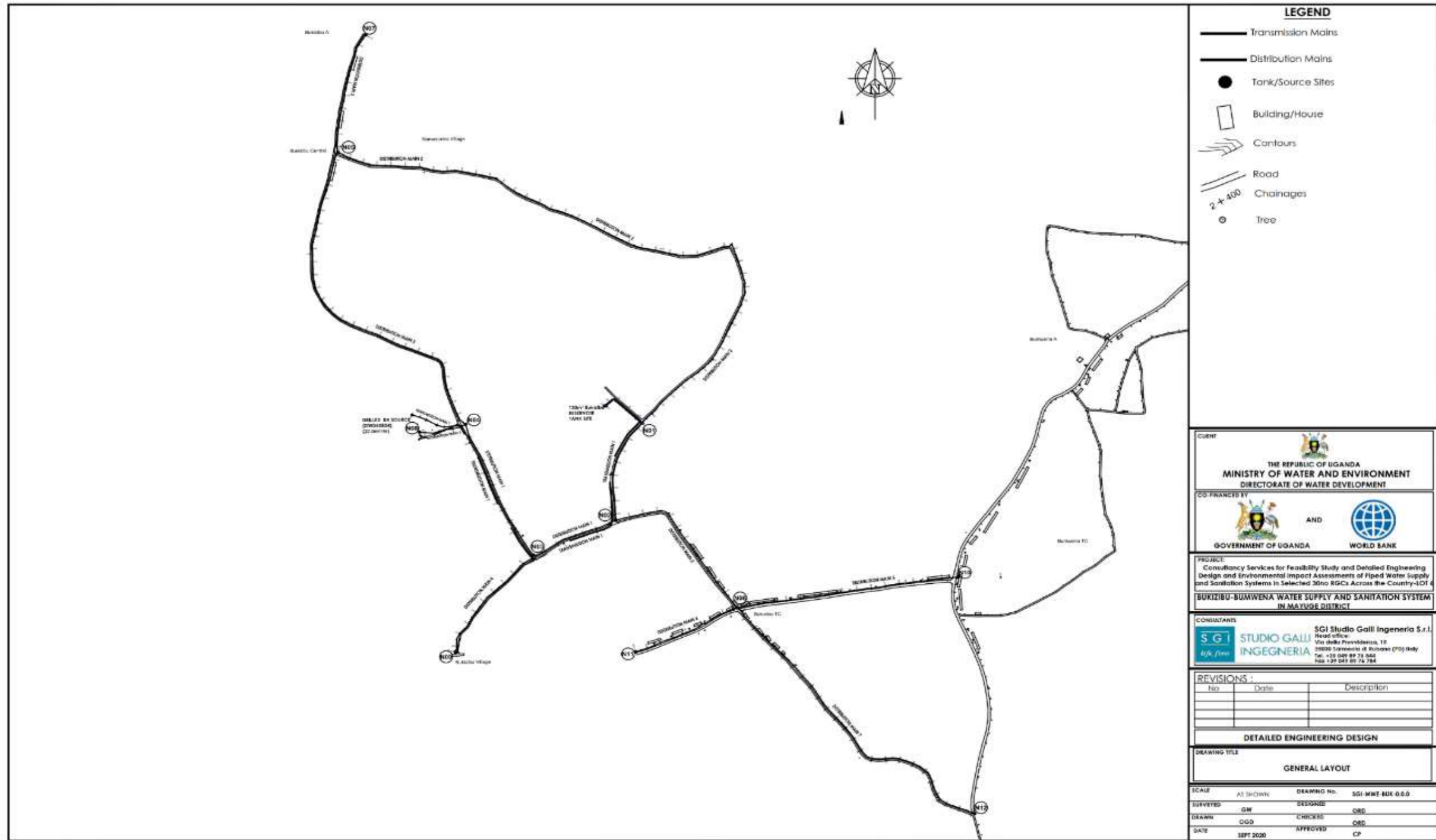
This is therefore, to recommend that you proceed with carrying out the ESIA studies for the proposed solar powered piped water supply systems and sanitation facilities. We look forward to the receipt of comprehensive copies of the ESIA reports, for our further action.

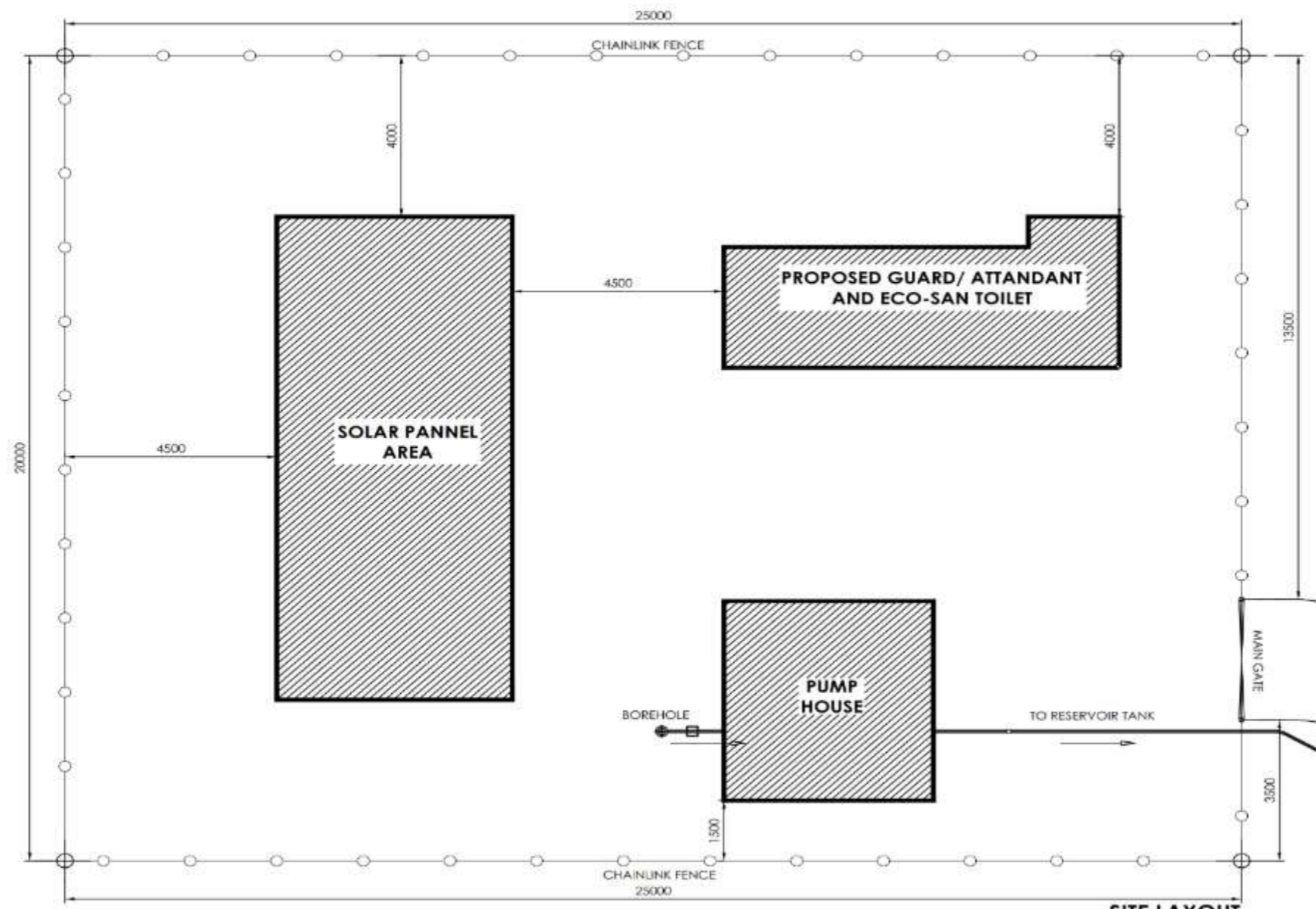


Monica Angom
FOR: EXECUTIVE DIRECTOR

APPENDIX 2: DRAWINGS

Overall project design





SITE LAYOUT
Scale 1:125

NOTES

- All dimensions are in mm unless stated otherwise.
- All levels are in metres above sea level.
- Structural details are not included.
- All structural concrete is Class 25/10.
- All mass concrete is Class 15/10.

CLIENT

THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT

CO-FINANCED BY

GOVERNMENT OF UGANDA AND WORLD BANK

PROJECT

Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4 BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

CONSULTANTS

SGI STUDIO GALLI INGEGNERIA S.r.l.
Via della Repubblica, 18
10030 Sarmone di Buzano (PD) Italy
Tel. +39 0429 76 644
Fax +39 0429 76 734

REVISIONS

No	Date	Description

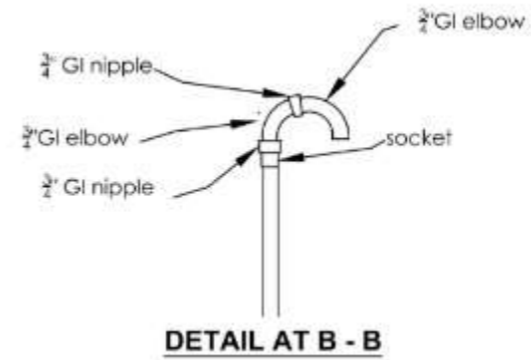
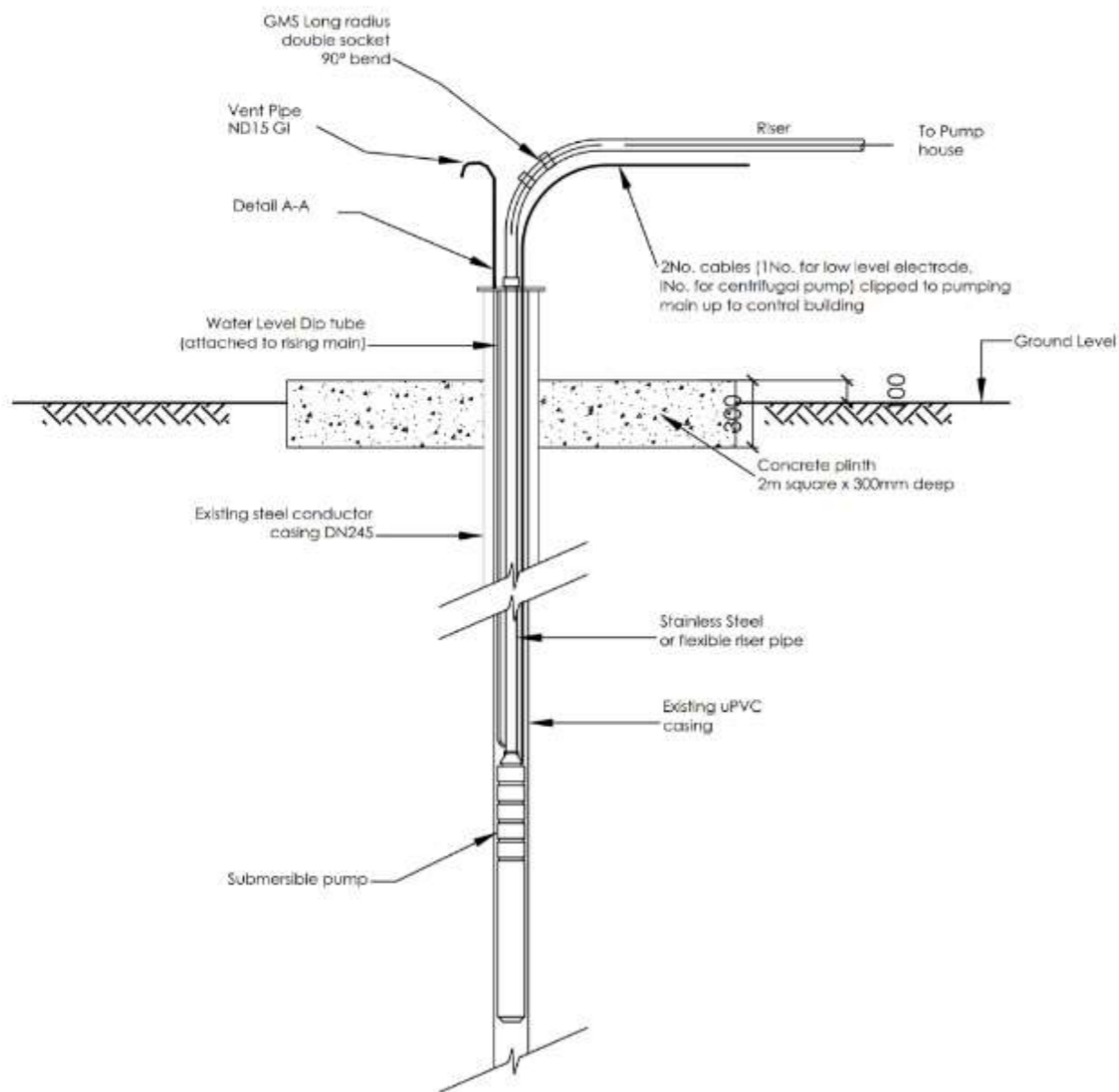
DETAILED ENGINEERING DESIGN

DRAWING TITLE

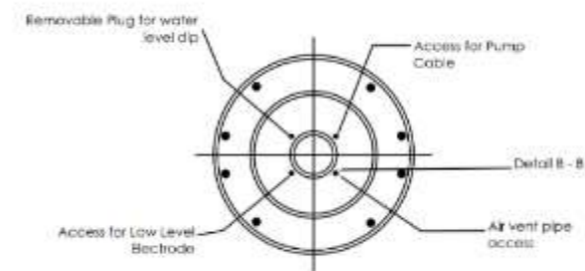
TYPICAL BOREHOLE PUMP HOUSE SITE LAYOUT

SCALE AS SHOWN **DRAWING No.** SG-MWE-SUR-1.0.0

DESIGNED BY	DESIGNED	DESIGNED
OW	OW	OW
CHECKED BY	CHECKED	CHECKED
EXD	EXD	EXD
DATE	APPROVED	APPROVED
SEP 2021	CP	CP



DETAIL AT B - B



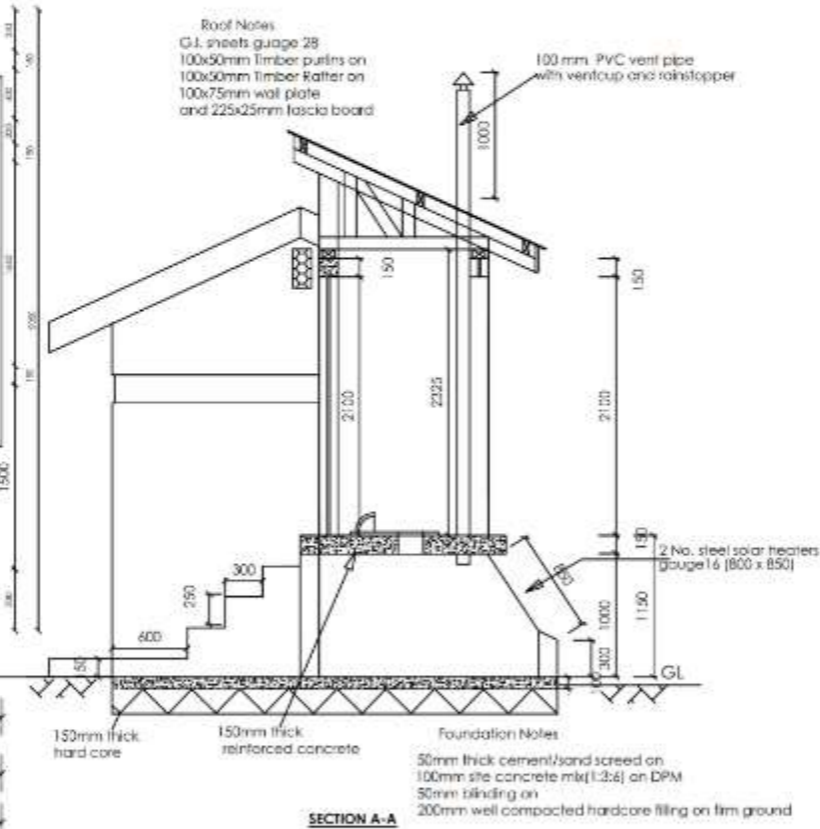
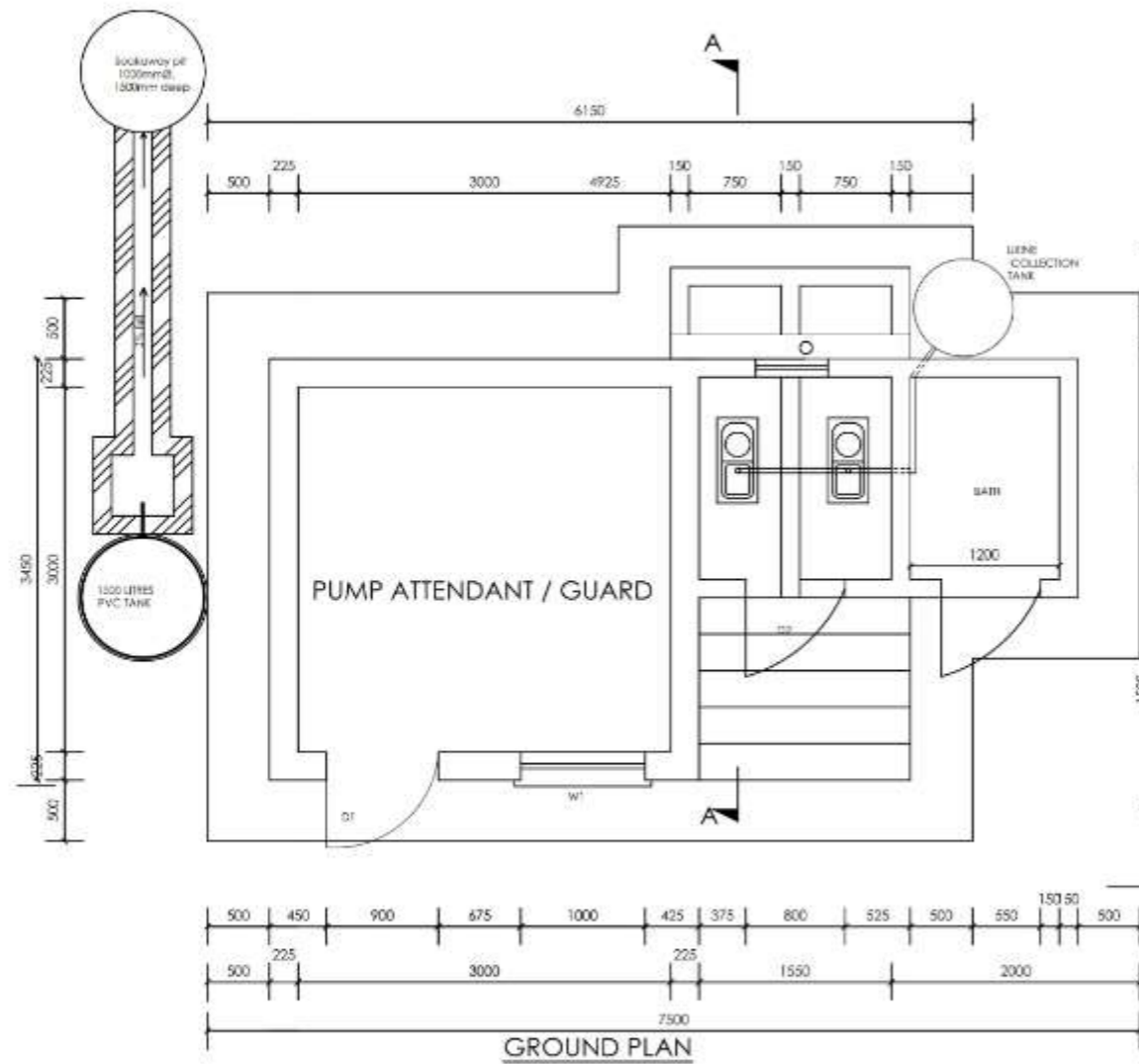
DETAIL AT A-A

Scale: 1:20

NOTES

1. All dimensions are in mm unless stated otherwise.
2. All levels are in metres above sea level.
3. Structural details are not included.
4. All structural concrete is Class 25/10.
5. All mass concrete is Class 15/10.

 THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT																
CO-FINANCED BY  AND  GOVERNMENT OF UGANDA WORLD BANK																
PROJECT: Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4 BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT																
CONSULTANTS:  SGI Studio Galli Ingegneria S.r.l. <small>Head Office: Via della Provvidenza, 12 38100 Cortina (TS) Italy Tel. +39 0461 71.644 Fax. +39 0461 71.764</small>																
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">REVISIONS :</th> </tr> <tr> <th>No</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		REVISIONS :			No	Date	Description									
REVISIONS :																
No	Date	Description														
DETAILED ENGINEERING DESIGN																
DRAWING TITLE TYPICAL BOREHOLE PUMP HOUSE RISER MAINS																
SCALE:	DATE: 1/01/2020															
SURVEYED: GW	DESIGNED: DBO															
DRAWN: CGD	CHECKED: DBO															
DATE: 1/01/2020	APPROVED: CP															



- NOTES**
1. All dimensions are in mm unless stated otherwise.
 2. All levels are in metres above sea level.
 3. Structural details are not included.
 4. All structural concrete is Class 25/10.
 5. All mass concrete is Class 15/10.

CLIENT

THE REPUBLIC OF UGANDA
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GOVERNMENT OF UGANDA AND WORLD BANK

PROJECT

Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country LOT 4

BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

CONSULTANTS

SGI STUDIO GALLI INGEGNERIA S.r.l.
 WORK OFFICE:
 Via della Provincetorale, 15
 33000 Sarnano di R. Umbria (PG) Italy
 Tel. +39 0742 83 76 848
 Fax +39 0742 83 76 844

REVISIONS:

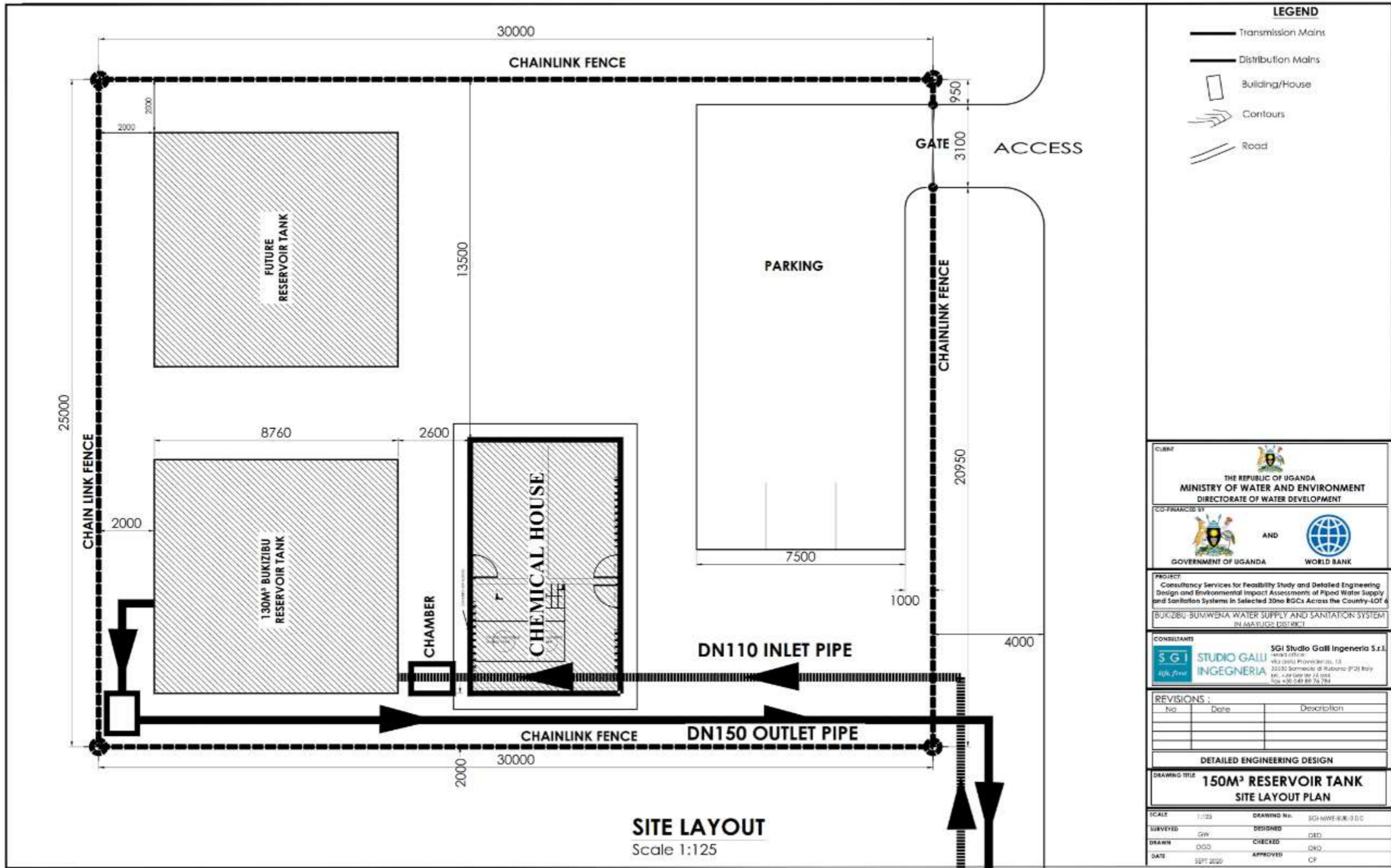
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

PUMP ATTENDANT / GUARD + ECOSAN PLAN AND SECTION

SCALE	N/S	DRAWING No.	SGI RWSE-BUK-1.1.A
SURVEYED	GW	DESIGNED	CRD
DRAWN	OGD	CHECKED	CRD
DATE	SEPT 2020	APPROVED	CP



SITE LAYOUT
Scale 1:125

LEGEND

- Transmission Mains
- Distribution Mains
- ▭ Building/House
- ↗ Contours
- ≡ Road

CURT

THE REPUBLIC OF UGANDA
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DIRECTORATE OF WATER DEVELOPMENT

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PROJECT

Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 6

BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MATAJJO DISTRICT

CONSULTANTS

S G I STUDIO GALL INGEGNERIA SGI Studio Gall Ingegneria S.r.l.
Via S. Maria Piovana 10/11, 13
35030 Sarmeola (PD) Italy
Tel. +39 049 97 24 1000
Fax +39 049 89 74 784

REVISIONS:

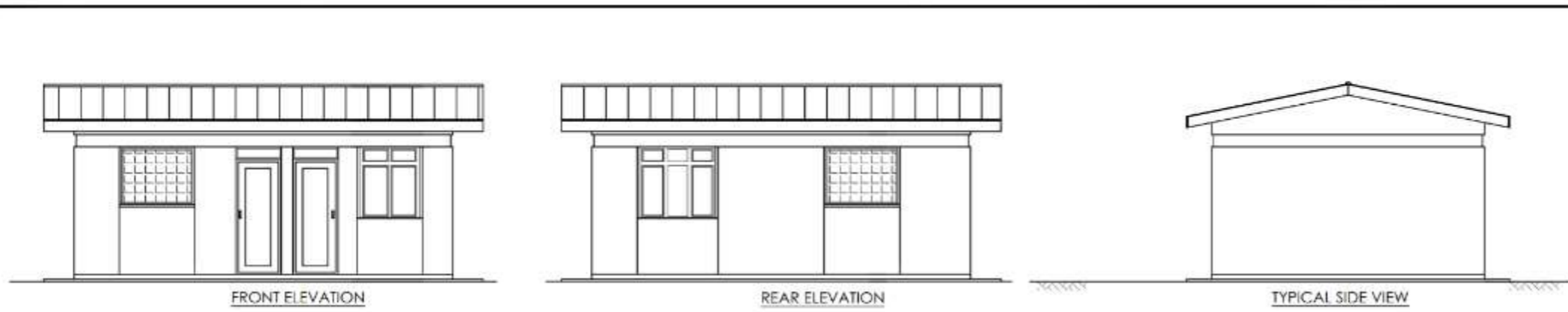
No	Date	Description

DETAILED ENGINEERING DESIGN

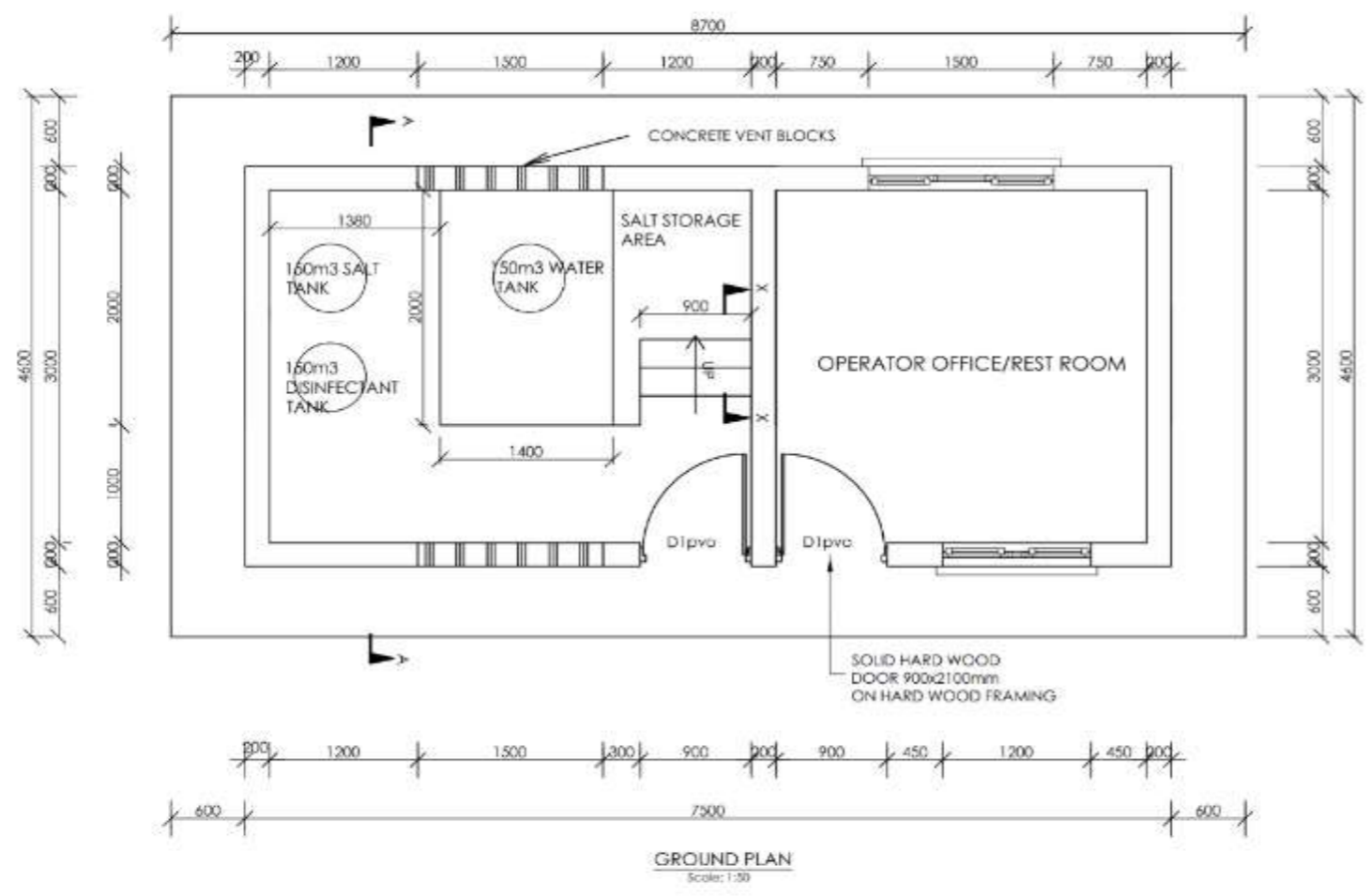
DRAWING TITLE

150M³ RESERVOIR TANK
SITE LAYOUT PLAN

SCALE	1:125	DRAWING No.	SGI-NWE-0013 D.C.
SURVEYED	GW	DESIGNED	DED
DRAWN	DDO	CHECKED	DDO
DATE	SEPT 2020	APPROVED	CP



- NOTES**
1. All dimensions are in mm unless stated otherwise.
 2. All levels are in metres above sea level.
 3. Structural details are not included.
 4. All structural concrete is Class 25/10.
 5. All mass concrete is Class 15/10.



CURT

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MINISTRY OF WATER AND ENVIRONMENT
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PROJECT:
 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no BGCs Across the Country-LOT 4

BUKIZIBU-SUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

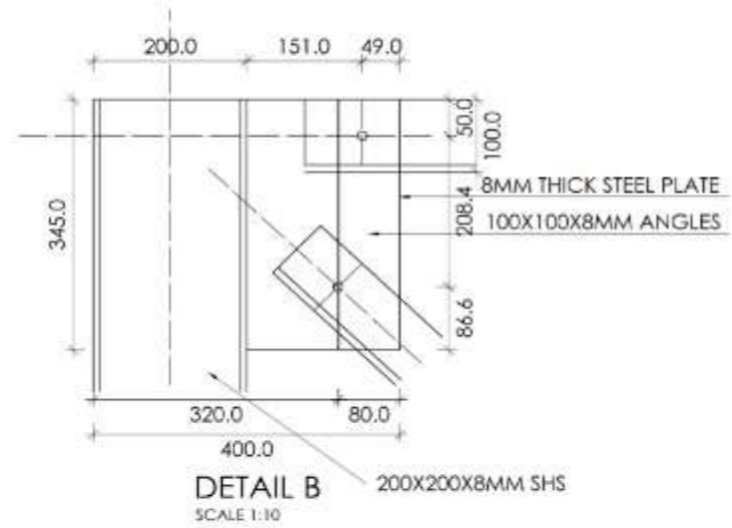
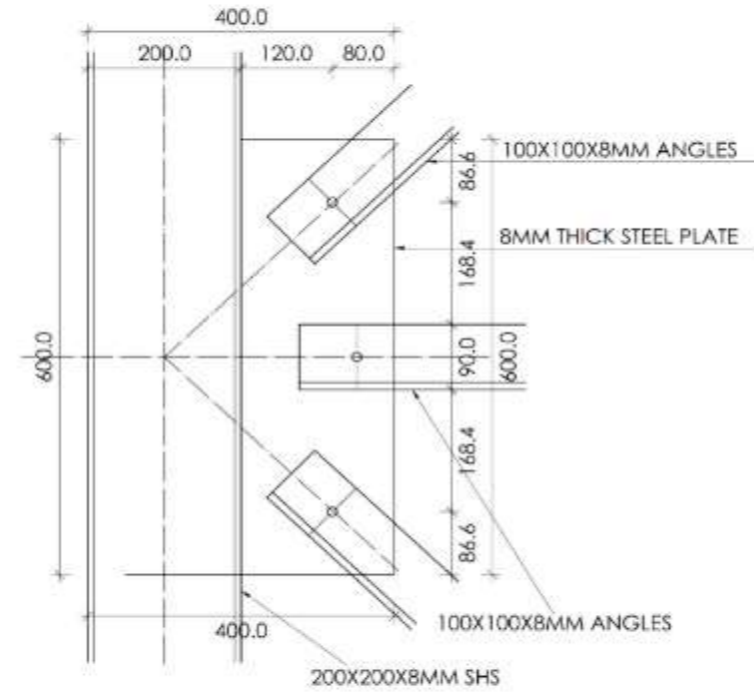
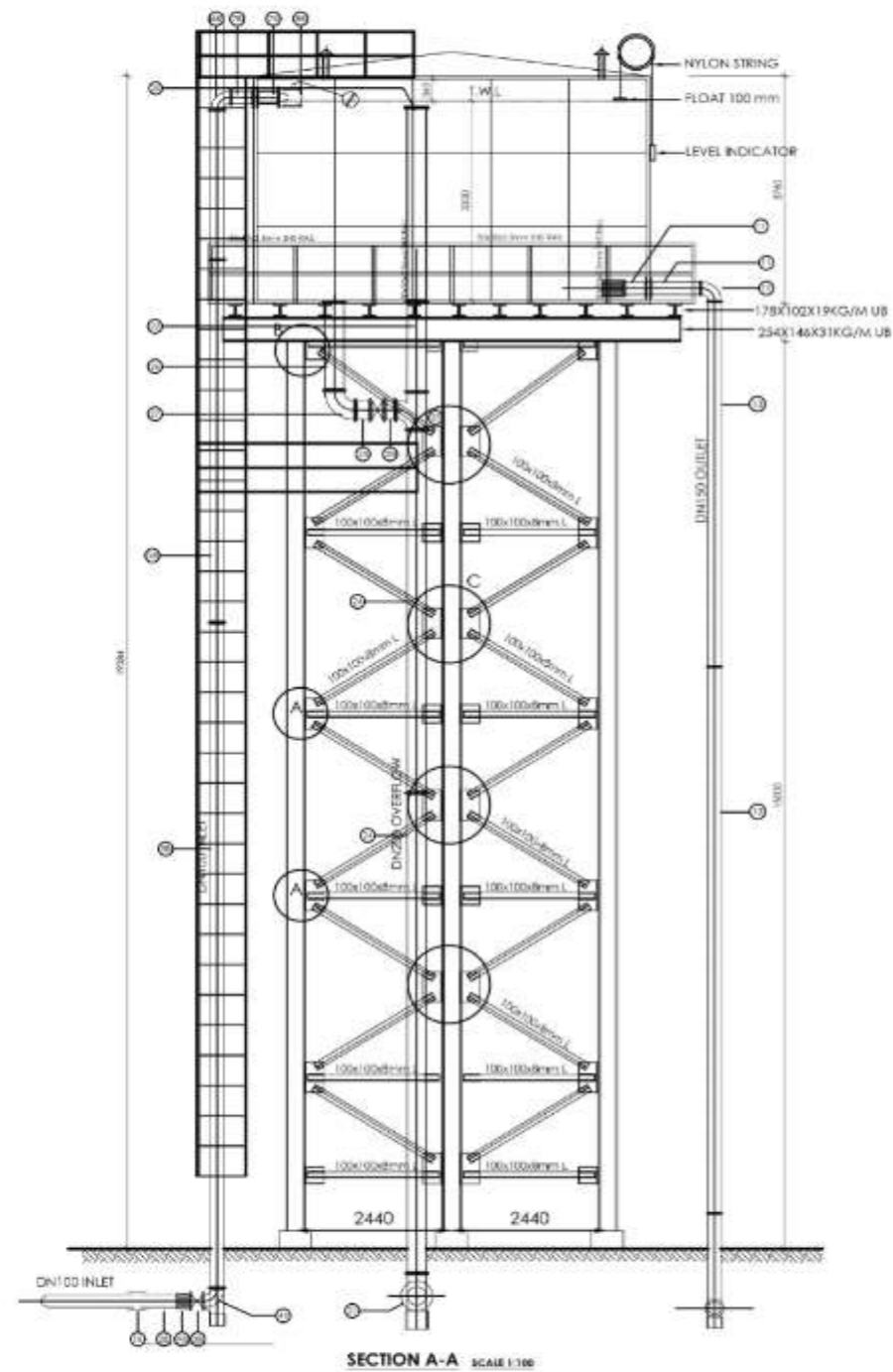
CONSULTANTS:
SGI STUDIO GALL INGEGNERIA S.r.l.
 Via 0841 Provenzano, 10
 20030 Sarnano di Rubano (PD) Italy
 Tel. +39 049 69 75 144
 Fax +39 049 69 75 704

REVISIONS :		
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
CHEMICAL HOUSE
PLAN AND ELEVATIONS

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-BUE-01.0
SURVEYED	GW	DESIGNED	OSD
DRAWN	OGD	CHECKED	OSD
DATE	SEP 2020	APPROVED	CP

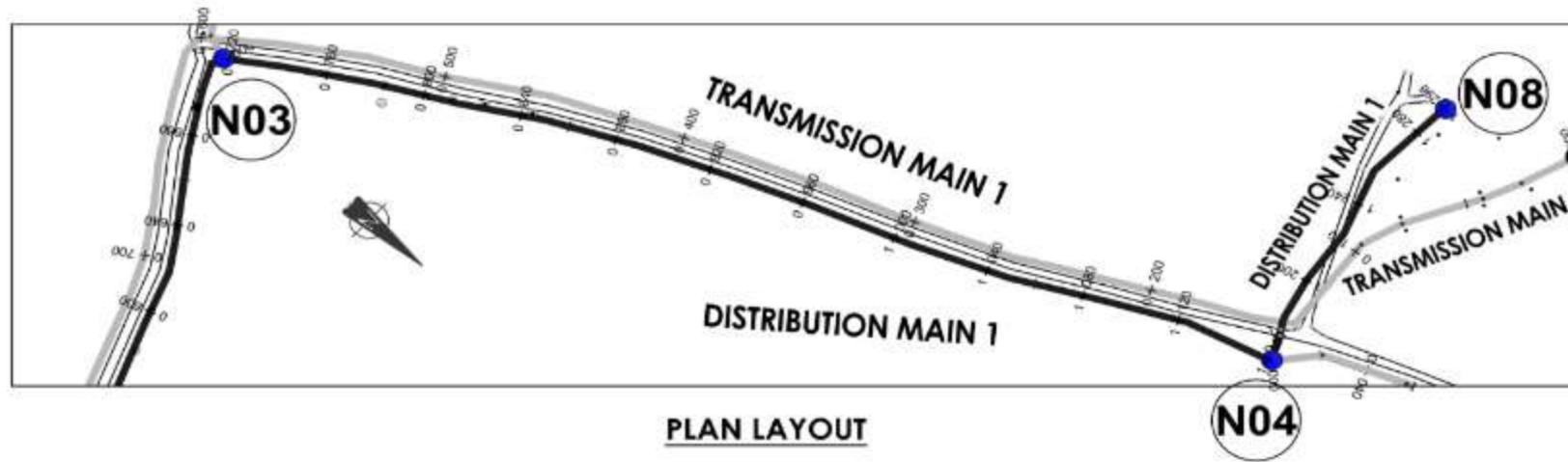


NOTES

PIPE FITTING SCHEDULE

1. 1No. DN100 Coupling.
2. 1No. DN100 Pipe not exceeding 2.0m.
3. 1No. DN100 All Flanged Gate Valve.
4. 1No. DN100 All Flanged Duck foot 90° bend.
5. 3No. DN100 Double Flanged Pipe not exceeding 6.0m.
6. 1No. DN100 All Flanged 90° bend.
7. 2No. DN100 Double Flanged Pipe not exceeding 0.6m.
8. 1No. DN100 Flanged Ball Float Valve.
9. 1No. DN100 Flanged Adaptor, Max type or similar.
10. 1No. DN150 Flanged Outlet Pipe Strainer.
11. 2No. DN150 Double Flanged Pipe not exceeding 0.6m.
12. 1No. DN150 All Flanged 90° bend.
13. 2No. DN150 Double Flanged Pipe not exceeding 6.0m.
14. 1No. DN150 Double Flanged Pipe not exceeding 2.0m.
15. 1No. DN150 All Flanged Duck foot 90° bend.
16. 1No. DN150 Flanged Gate Valve.
17. 1No. DN150 Flanged Adaptor, Max type or similar.
18. 1No. DN150 Double Flanged Pipe not exceeding 2.0m.
19. 1No. DN150 Coupling.
20. 1No. DN200 Flanged Ball Mouth.
21. 1No. DN200 Double Flanged Pipe not exceeding 2.8m.
22. 1No. DN200 Double Flanged Pipe not exceeding 2.0m.
23. 1No. DN200/50 All Flanged Tee.
24. 2No. DN200 Double Flanged Pipe not exceeding 6.0m.
25. 1No. DN200 All Flanged Duck foot 90° bend.
26. 1No. DN50 All Flanged Pipe with puddle flange n.e 2.0m.
27. 1No. DN50 All Flanged 90° bend.
28. 1No. DN50 Double Flanged Pipe not exceeding 0.4m.
29. 1No. DN50 Flanged Gate Valve.
30. 1No. DN50 Flanged Adaptor, Max type or similar.

<p>THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT</p>													
<p>GOVERNMENT OF UGANDA</p>	<p>WORLD BANK</p>												
<p>PROJECT: Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RDCs Across the Country-LOT 6 SUKIZIBU-BUMWENYA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT</p>													
<p>CONSULTANT: SGI Studio Galli Ingegneria S.r.l. Head Office: Via della Provvidenza, 15 85020 Sarmacola di Bulturno (PG) Italy Tel. +39 049 88 75 844 Fax +39 049 88 75 754</p>													
<p>REVISIONS:</p> <table border="1"> <thead> <tr> <th>No</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		No	Date	Description									
No	Date	Description											
<p>DETAILED ENGINEERING DESIGN</p>													
<p>DRAWING TITLE 130M³ RESERVOIR TANK SECTION A-A AND STRUCTURAL DETAILS</p>													
SCALE	As shown	DRAWING No.	SGI-MWD-BUE-02.0										
SURVEYED	GW	DESIGNED	CRD										
DRAWN	OCG	CHECKED	CRD										
DATE	SEP 2020	APPROVED	CP										



DRILLED BH SOURCE (DWD60824) (27.0m³/hr)

PLAN LAYOUT

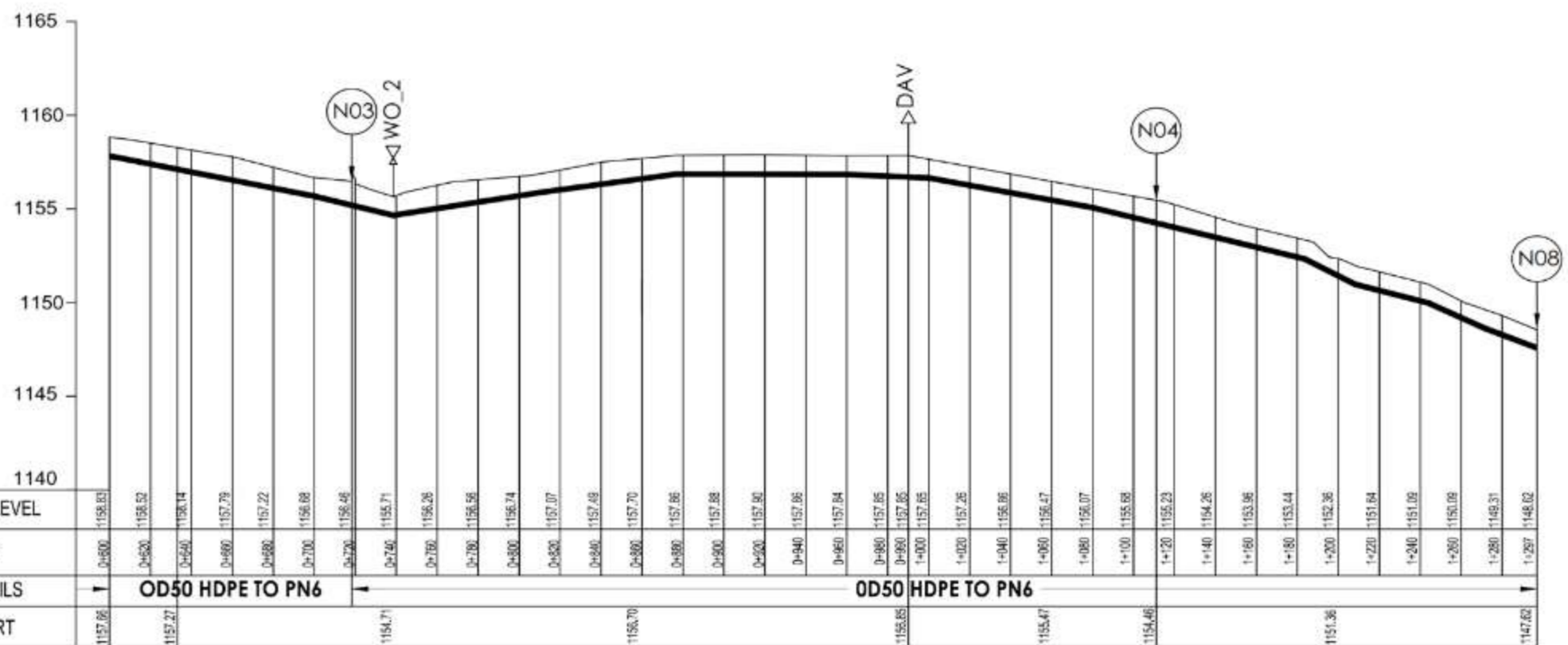
NOTES

- All dimensions are in millimetres unless stated otherwise.
- All levels are in metres above sea level.
- For Site location see Dwg. SGI-MWE-BUK-0.0.0
- For Standard details see sheets as follows

Level Indicator	Sd 220
Outfall Chamber	Sd 116
Marker Post	Sd 117
Thrust Blocks	Sd 118
Pipe bedding	Sd 121
- All valves, hydrants and washout locations are identified by marker post in positions.

LEGEND

- Transmission Mains
- Distribution Mains
- Building/House
- Contours
- Road
- Tree
- Double Orifice Air Valve
- Type 2 Washout
- Node detail No. 101



LONGITUDINAL PROFILE

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 THE REPUBLIC OF UGANDA
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 DIRECTORATE OF WATER DEVELOPMENT

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PROJECT
 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30th ECDC Across the Country-LOT 4
BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MATUPE DISTRICT

CONSULTANTS
 SGI STUDIO GALLI INGEGNERIA S.r.l.
 Via della Provvidenza, 18
 20133 Bergamo di Bussato (PO) Italy
 Tel. +39 042 89 74 844
 Fax +39 042 89 74 784

REVISIONS		
No	Date	Description

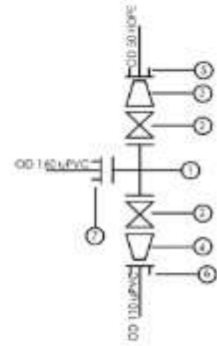
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 DISTRIBUTION MAIN 1
 CR 0+600.00 - CH 1+200.00

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SURVEYED	OG	DRAWN	OGD
DRAWN	OGD	CHECKED	OGD
DATE	SEPT 2021	APPROVED	CP

LEGEND

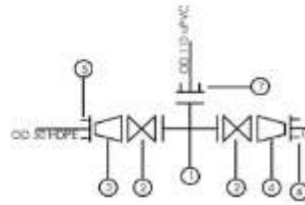
NODE BUK NO1



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	100V100	1	4
2.	O FLANGED GATE VALVE	100	2	4
3.	DI FLANGED TAPER	100/40	1	4
4.	DI FLANGED TAPER	100/100	1	4
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN40XDD50	1	4
6.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDD110	1	4
7.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDD140	1	4

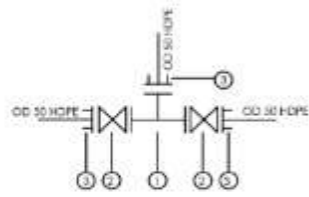
NODE BUK NO2



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	100V100	1	4
2.	O FLANGED GATE VALVE	100	2	4
3.	DI FLANGED TAPER	100/40	1	4
4.	DI FLANGED TAPER	100/100	1	4
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN40XDD50	1	4
6.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN50XDD70	1	4
7.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDD110	1	4

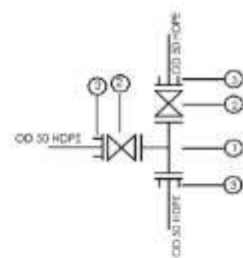
NODE BUK NO3



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	40/40	1	4
2.	O FLANGED GATE VALVE	40	2	4
3.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN40XDD50	3	4

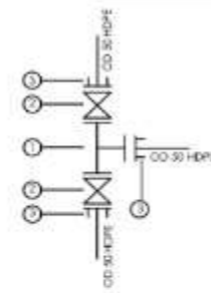
NODE BUK NO4



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	40/40	1	4
2.	O FLANGED GATE VALVE	40	2	4
3.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN40XDD50	3	4

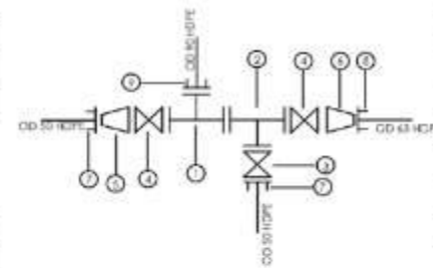
NODE BUK NO5



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	40/40	1	5
2.	O FLANGED GATE VALVE	40	2	5
3.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN40XDD50	3	5

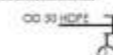
NODE BUK NO6



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	80/80	1	5
2.	DI ALL FLANGED TEE	80/40	1	5
3.	O FLANGED GATE VALVE	40	1	5
4.	O FLANGED GATE VALVE	50	2	5
5.	DI FLANGED TAPER	80/40	1	5
6.	DI FLANGED TAPER	80/50	1	5
7.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN40XDD50	2	4
8.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN50XDD63	1	5
9.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN60XDD70	1	5

NODE BUK NO7, 08, 09, 11, 12



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	40	1	4

NODE BUK N10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	50	1	4

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PROJECT
 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4
BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MUYUGA DISTRICT

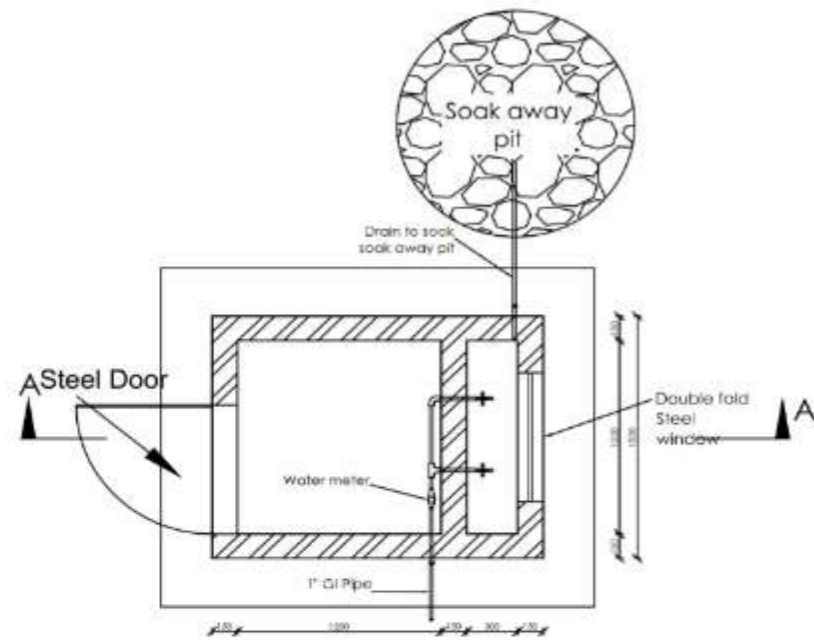
CONSULTANTS
 **STUDIO GALLI INGEGNERIA**
 SGI Studio Galli Ingegneria S.r.l.
 Head Office:
 Via della Provvidenza, 15
 00185 Roma, Italy
 Tel: +39 06 69 74 844
 Fax: +39 06 69 75 154

REVISIONS:

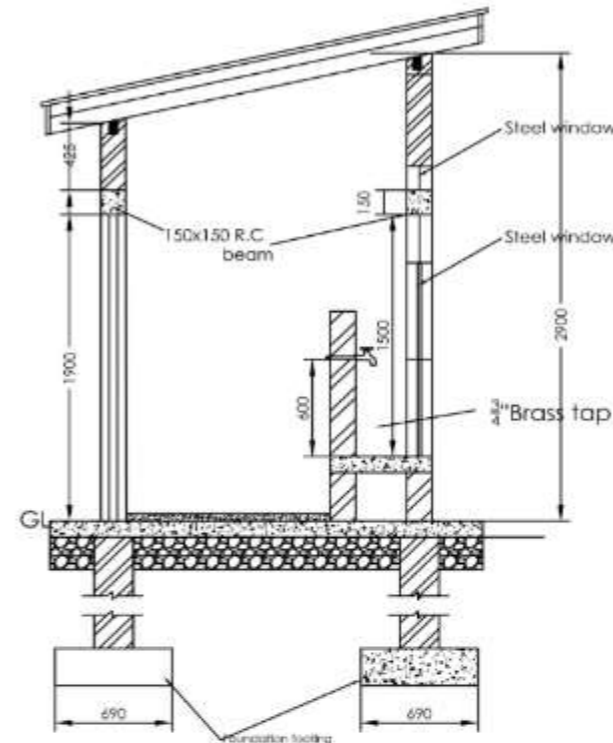
No	Date	Description

DETAILED ENGINEERING DESIGN
 DRAWING TITLE:
PIPE NODE DETAILS

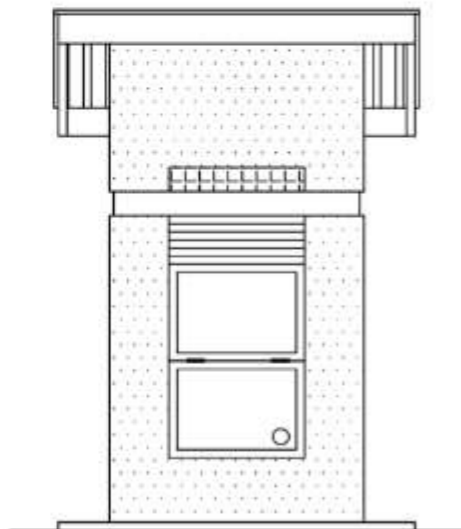
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SURVEYED	SW	DESIGNED	ORD
DRAWN	OGG	CHECKED	ORD
DATE	SEPT 2020	APPROVED	CP



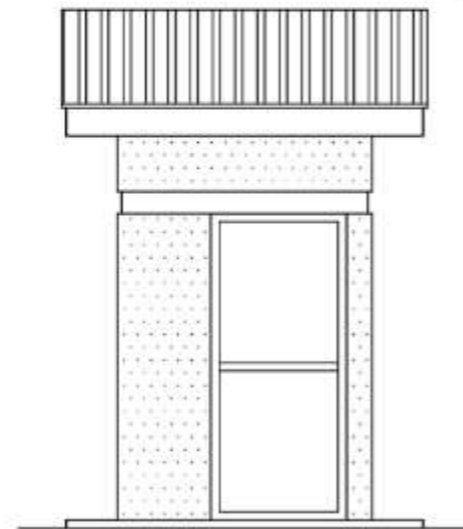
GROUND PLAN



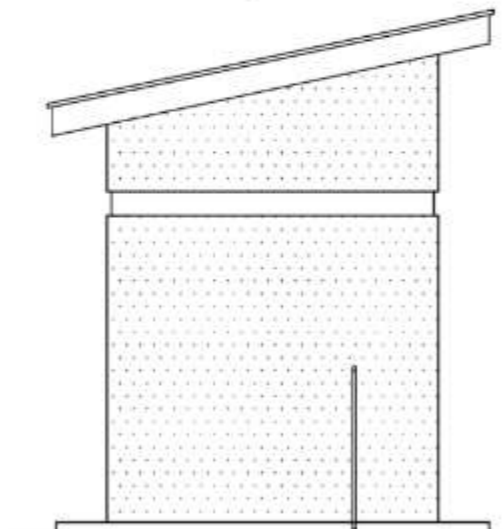
SECTION A-A



FRONT ELEVATION



REAR ELEVATION



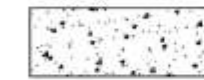
SIDE ELEVATION

NOTES

1. All dimensions are in mm unless stated otherwise.
2. All levels are in metres above sea level.
3. Structural details are not included.
4. All structural concrete is Class 25/10.
5. All mass concrete is Class 15/10.

LEGEND

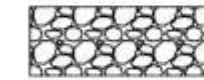
GL: Ground Level



Concrete



Brick walling



Hardcore



Earth

CLIENT

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DIRECTORATE OF WATER DEVELOPMENT

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GOVERNMENT OF UGANDA AND WORLD BANK

PROJECT

Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LCT 4

BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

CONSULTANTS

SGI Studio Galli Ingegneria S.r.l.
Via G. Galilei, 13
33030 Sanmarta di Rubicchio (PD) Italy
Tel. +39 049 88 74 800
Fax +39 049 88 74 184

REVISIONS:

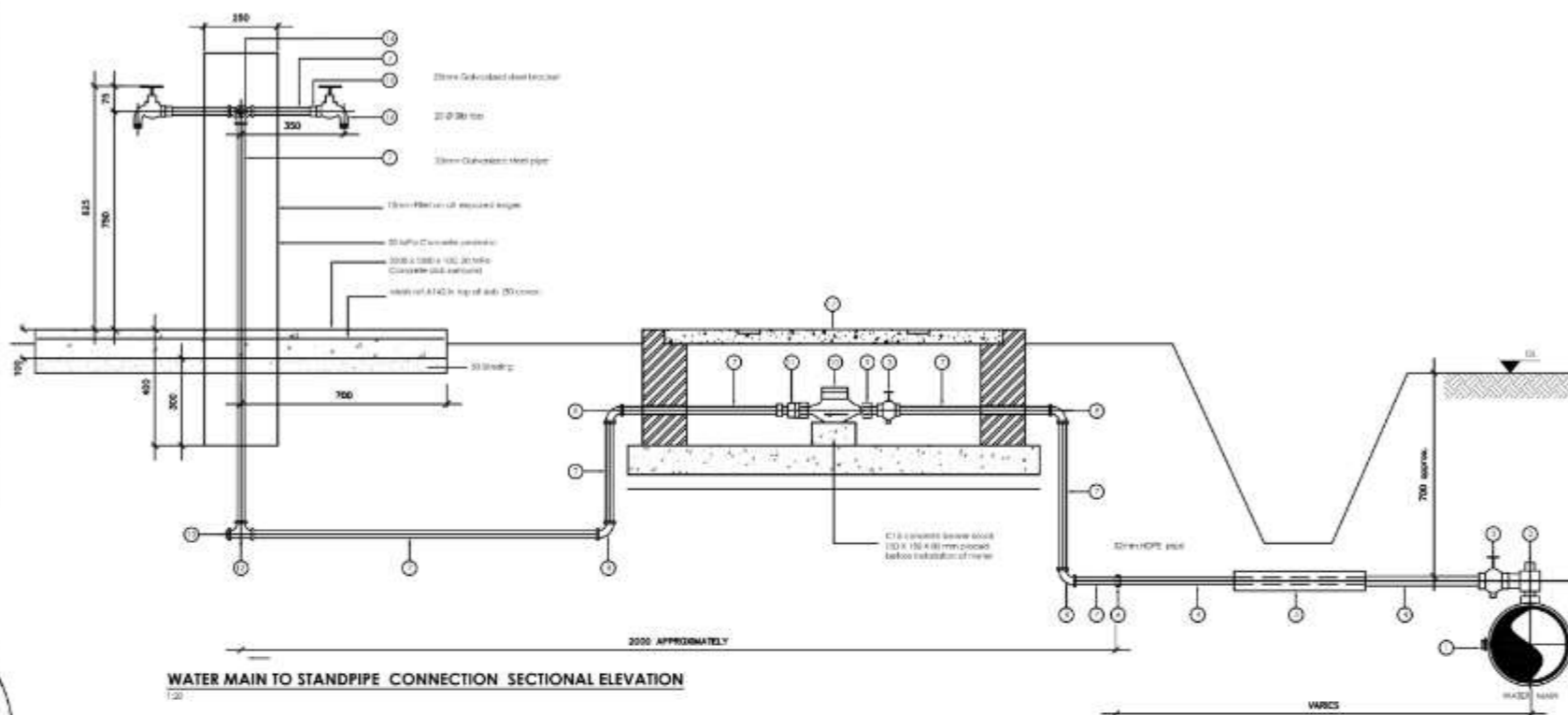
No.	Date	Description

DETAILED ENGINEERING DESIGN

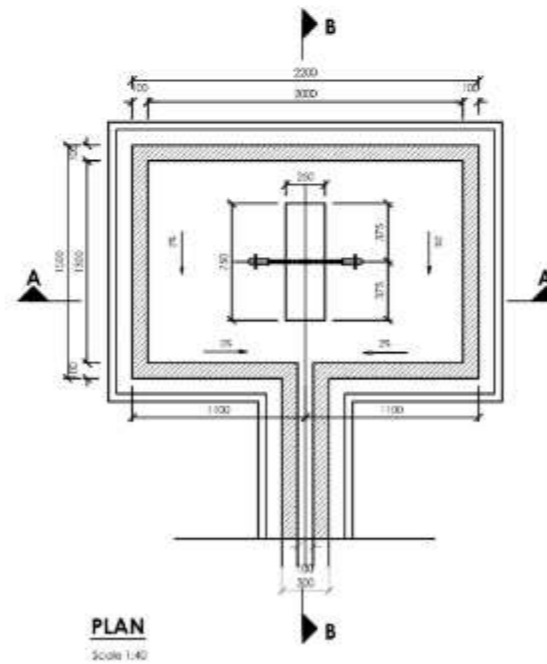
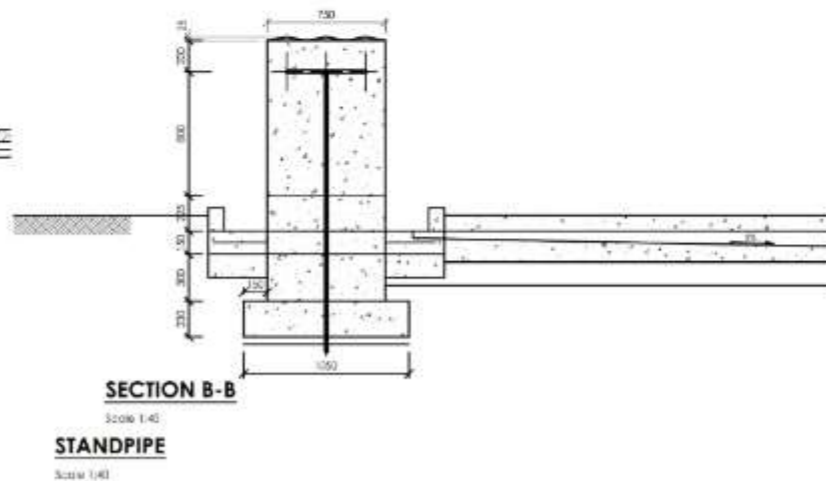
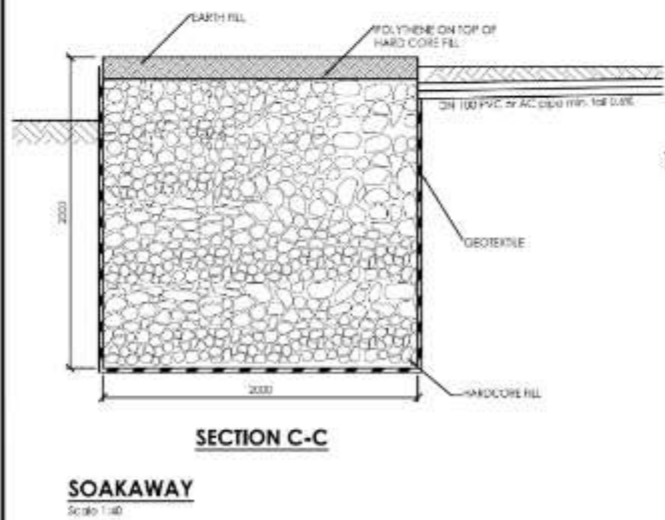
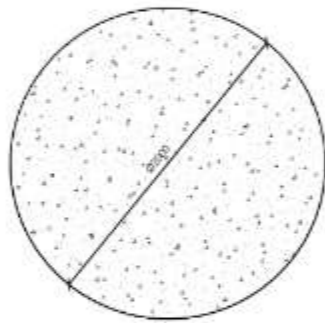
DRAWING TITLE: **TYPICAL WATER KIOSK PLAN, SECTIONS AND ELEVATIONS**

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-BUK-4.0.0
SURVEYED	GW	DESIGNED	CRD
DRAWN	OGD	CHECKED	CRD
DATE	SEPT 2009	APPROVED	CP

SCHEDULE OF PIPE FITTINGS		
ITEM NUMBER	DESCRIPTION	No. REQUIRED PER CONNECTION
1	PVC SADDLE CLAMP	1
2	P.E. OUTLET TYPE SWIVEL FERRULE	1
3	SOFT TAP	2
4	32mm HDPE PIPE PIECE	1
5	1.2m GMS SLEEVE	1
6	32mm Ø HDPE 125mm Ø GMS COUPLER	1
7	32mm Ø GMS PIPE PIECE	13
8	32mm Ø GMS 90° BEND	4
9	WATER-BEADED CONNECTOR	1
10	32mm Ø WATER METER	1
11	32mm Ø ADJUSTING COUPLING	1
12	32mm Ø GMS EQUAL TEE	3
13	32mm Ø PLUG	1
14	32mm Ø GMS TEE	1
15	32MM GALVANIZED STEEL BRACKET	6
16	RED TAPE	2
17	WHITE CHARCOAL	1



- NOTES**
1. All dimensions are in mm unless stated otherwise.
 2. All levels are in metres above sea level.
 3. Structural details are not included.
 4. All structural concrete is Class 25/10.
 5. All mass concrete is Class 15/10.



CLIENT
THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT

CO-FINANCED BY
GOVERNMENT OF UGANDA AND WORLD BANK

PROJECT
Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RDCs Across the Country-LOT 4
BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MATUGE DISTRICT

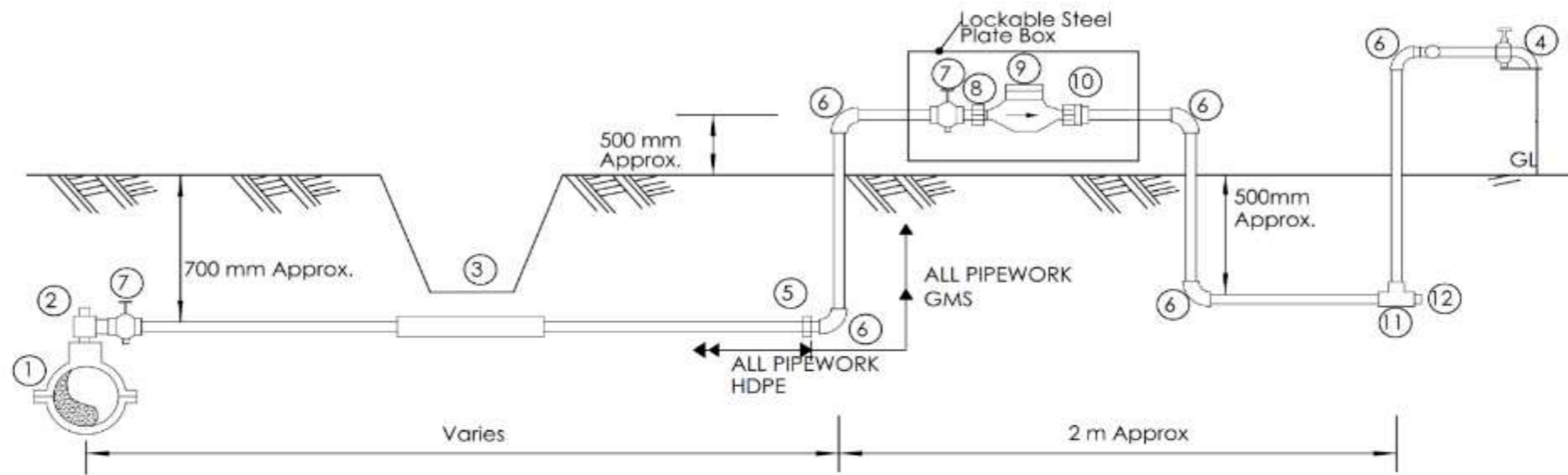
CONSULTANTS
SGI STUDIO GALLI INGEGNERIA S.r.l.
Head office: Via della Provvidenza, 15
20090 Sarnonno di Ruberto (101) Italy
Tel. +39 0345 89 74 544
Fax +39 0345 89 74 786

REVISIONS		
No.	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
TYPICAL STAND POST PLAN AND SECTION

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-SUC-7-0.0
SURVEYED	GW	DESIGNED	DSG
DRAWN	OGD	CHECKED	DSG
DATE	SEPT 2020	APPROVED	CP



- NOTES**
1. All dimensions are in mm unless stated otherwise.
 2. All levels are in metres above sea level.
 3. Structural details are not included.
 4. All structural concrete is Class 25/10.
 5. All mass concrete is Class 15/10.

SCHEDULE OF FITTINGS

ITEM No	DESCRIPTION	No REQUIRED PER CONNECTION
1.	Saddle Clamp	1
2.	HDPE Outlet type swivel ferule	1
3.	1m Length GMS sleeve	1
4.	Brass Tap	1
5.	PE/GMS Adaptor	1
6.	GMS Elbow	5
7.	Brass Gate Valve	2
8.	Male threaded connector	1
9.	Water meter	1
10.	Adjusting coupling	1
11.	GMS equal tee	1
12.	Plug	1

NOTES

1. GMS pipe ends to be screwed with tapered threads to ISO R7 and to be supplied with sealing PTFE tape
2. GMS pipe fittings to be malleable cast iron to BS 143 and BS 1256 with female threaded ends
3. The adjusting coupling shall be made of bronze or brass with a threaded female connection at the outlet end. It shall incorporate sufficient adjustment to permit removal at the meter
4. All PE connections shall be of the compression type
5. Diameter of pipe varies

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 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4
BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

CONSULTANTS
SGI Studio Galli Ingegneria S.r.l.
 Head Office:
 Via della Provvidenza, 13
 30030 Sommacampese di Rubano (PD) Italy
 Tel. +39 0429 82 70 844
 Fax +39 0429 82 70 844

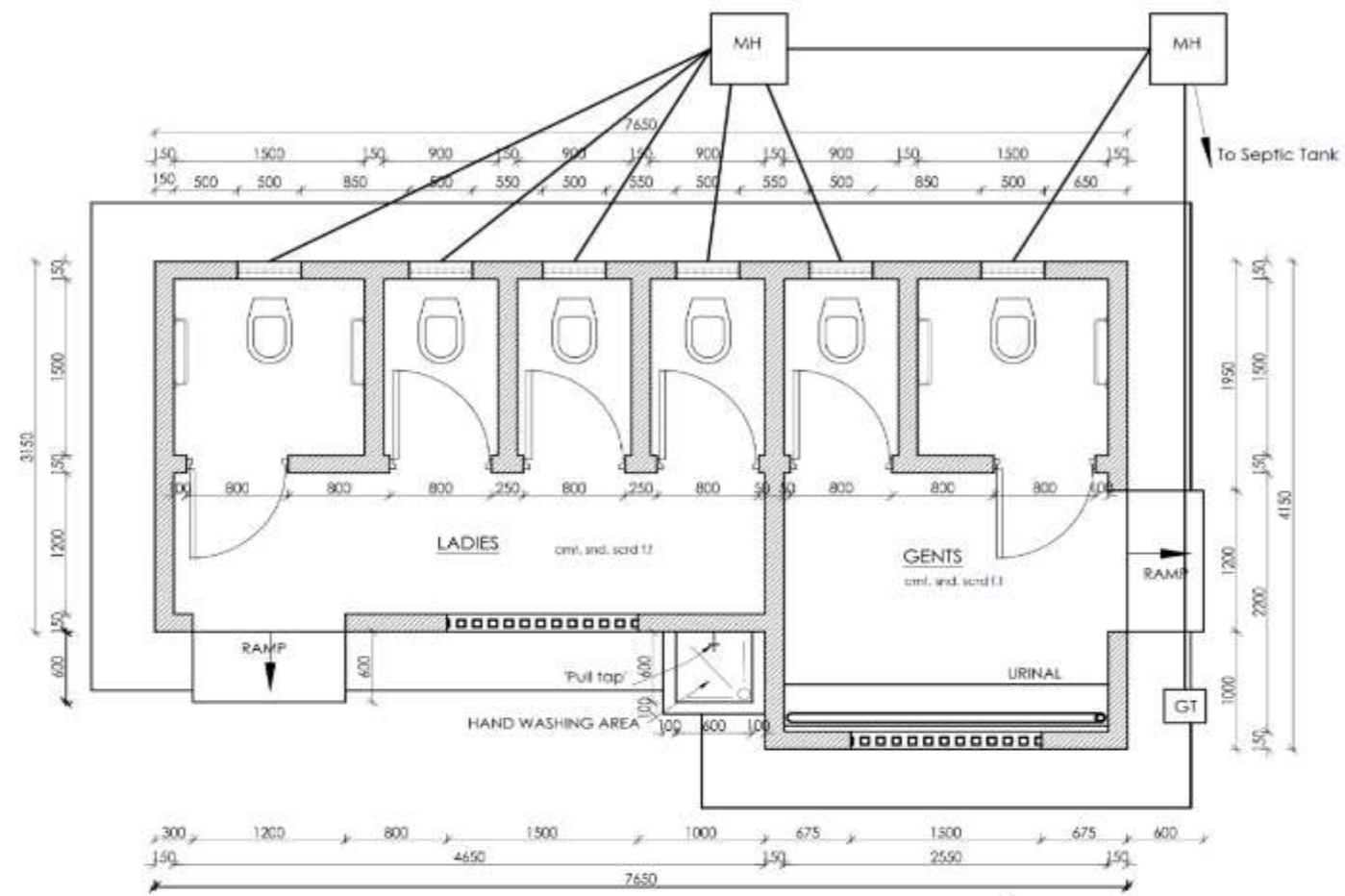
REVISIONS:

No	Date	Description

DETAILED ENGINEERING DESIGN

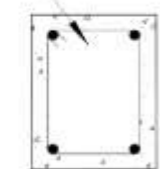
DRAWING TITLE
TYPICAL YARD CONNECTION PLAN AND SECTION

SCALE	AS SHOWN	DRAWN No.	SC4-MATE-BUX-8.0.0
SURVEYED	CW	DESIGNED	DEB
DRAWN	OGD	CHECKED	DEB
DATE	SEPT 2020	APPROVED	CP

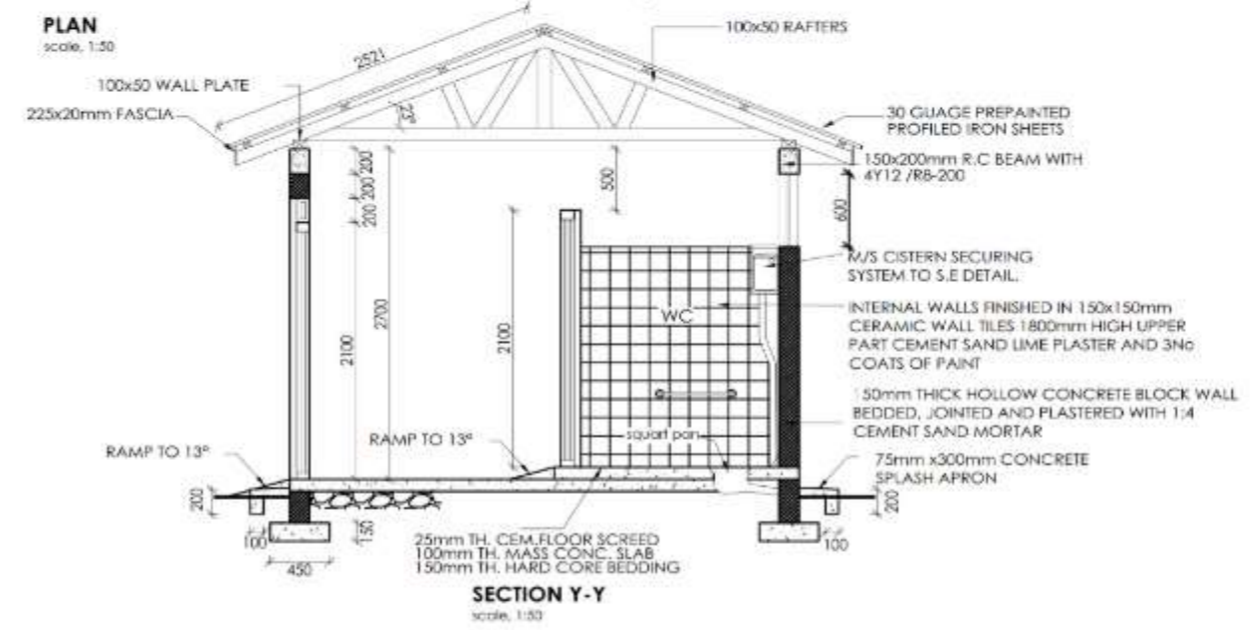


PLAN
scale: 1:50

150 x 200mm R.C RING BEAM WITH 4Y12 /RB-200



RING BEAM DETAIL
scale: 1:10

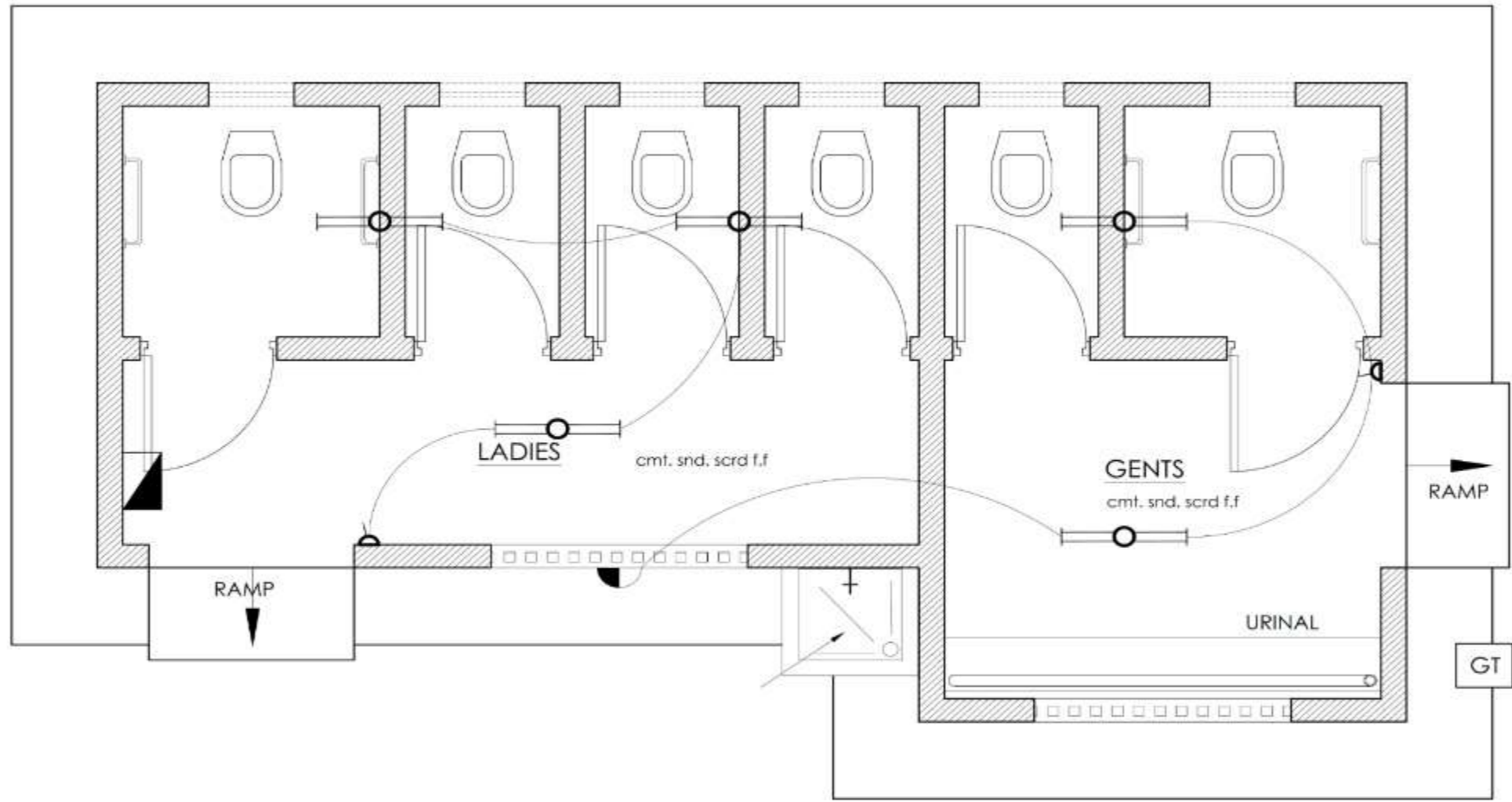


SECTION Y-Y
scale: 1:50

NOTES

1. All dimensions are in mm unless stated otherwise.
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3. Structural details are not included.
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5. All mass concrete is Class 15/10.

<p style="text-align: center;">THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT</p>													
<p>CO-FINANCED BY</p> <p style="text-align: center;">GOVERNMENT OF UGANDA WORLD BANK</p>													
<p>PROJECT: Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4</p> <p>BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT</p>													
<p>CONSULTANTS:</p> <p>SGI Studio Galli Ingegneria S.r.l. Via della Provvidenza, 13 33030 Sarnano (PG) Italy Tel: +39 049 09 75 544 Fax: +39 049 55 75 784</p>													
<p>REVISIONS:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		No	Date	Description									
No	Date	Description											
<p>DETAILED ENGINEERING DESIGN</p>													
<p>DRAWING TITLE</p> <p>PUBLIC TOILET PLAN, SECTION AND RING BEAM DETAIL</p>													
SCALE	HTS DRAWING No. SGI/MWE/BUK/P/0.1												
SURVEYED	OW DESIGNED OBO												
DRAWN	OGD CHECKED OBO												
DATE	SEPT 2020 APPROVED CP												



PUBLIC TOILET PLAN

- NOTES**
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CLIENT
 THE REPUBLIC OF UGANDA
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 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4
BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

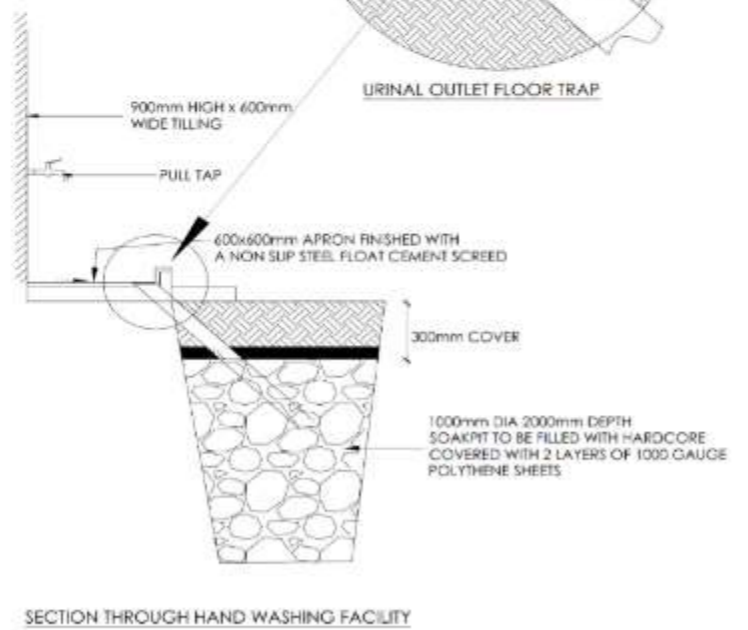
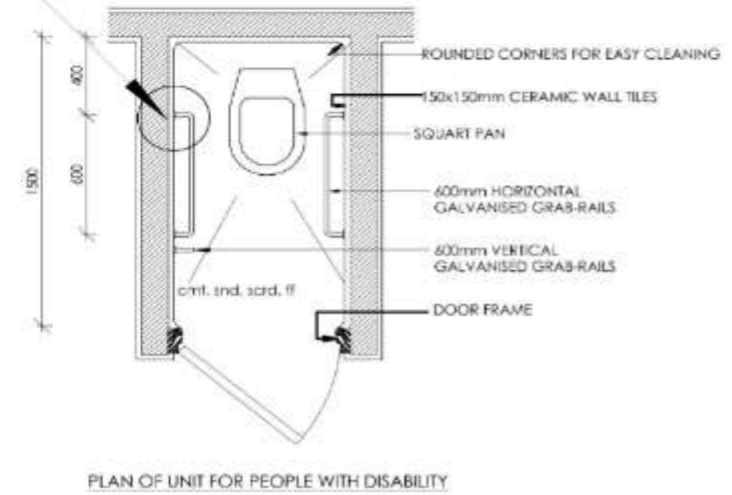
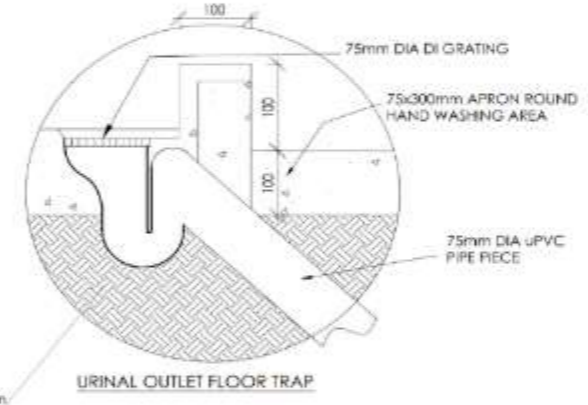
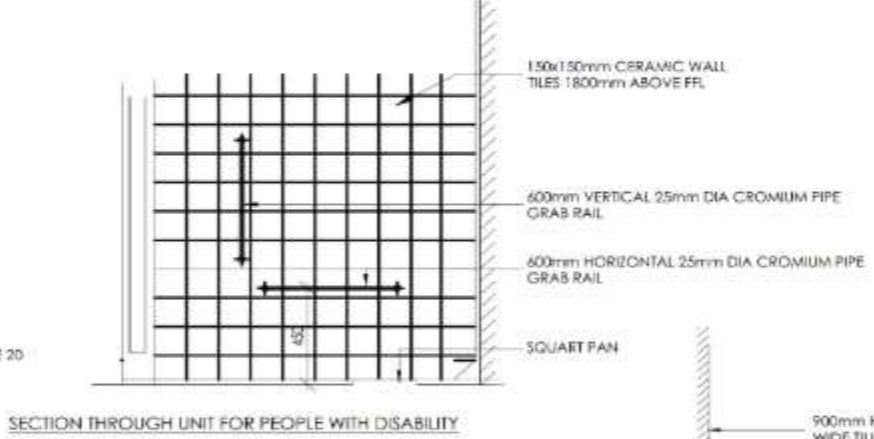
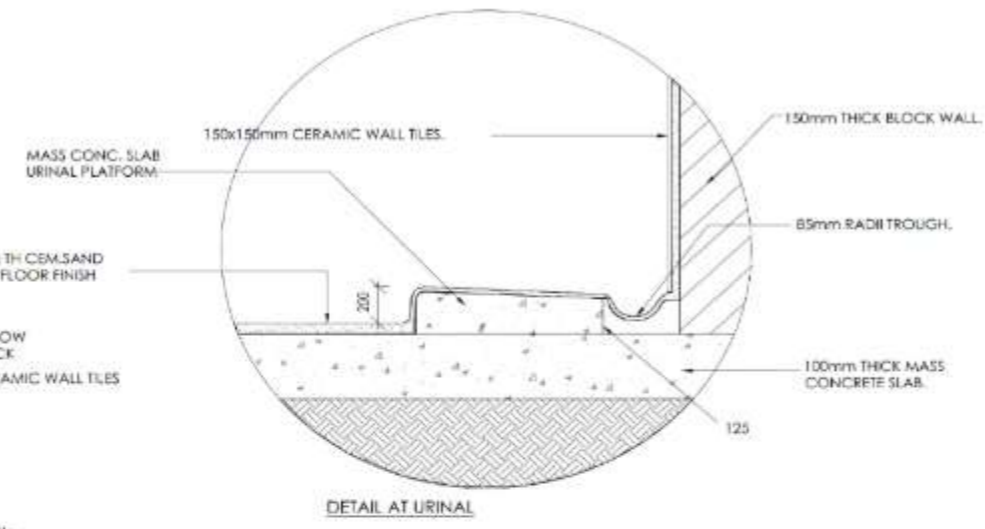
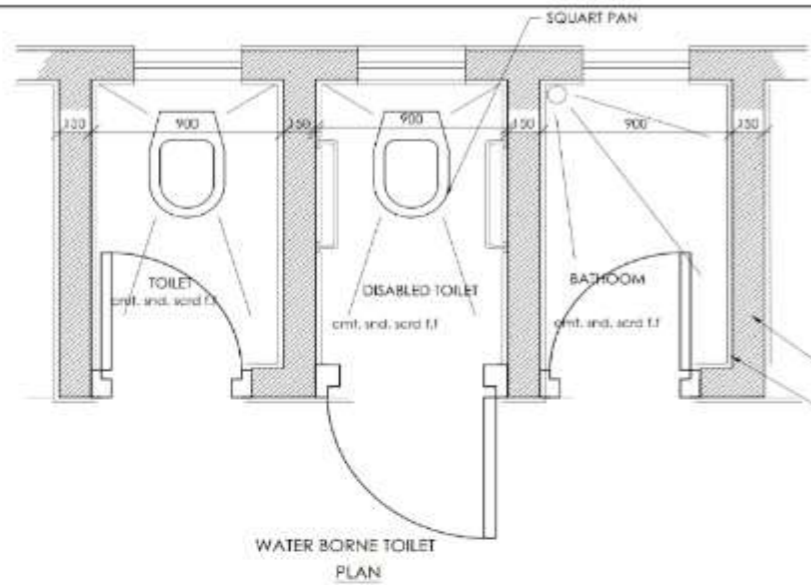
CONSULTANTS
 SGI STUDIO GALLI INGEGNERIA S.r.l.
 Via della Provvidenza, 16
 33030 Sarnonada di B. d'Avorio (PD) Italy
 Tel. +39 049 89 75 884
 Fax +39 049 69 75 784

REVISIONS :		
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
TYPICAL PUBLIC TOILET ELECTRICAL LAYOUT

SCALE	HTS	DRAWING No.	SGH-WMT-BUE-9.0.3
SURVEYED	OW	DESIGNED	CPD
DRAWN	OGG	CHECKED	CPD
DATE	SEP 2020	APPROVED	CP



- NOTES**
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 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4

BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

CONSULTANTS
 SGI STUDIO GALLI INGEGNERIA S.r.l.
 Head office: Via della Provvidenza, 15 25030 Sarnonola di Albano (PD) Italy
 Tel. +39 049 89 76 844 Fax +39 049 89 76 784

REVISIONS :		
No	Date	Description

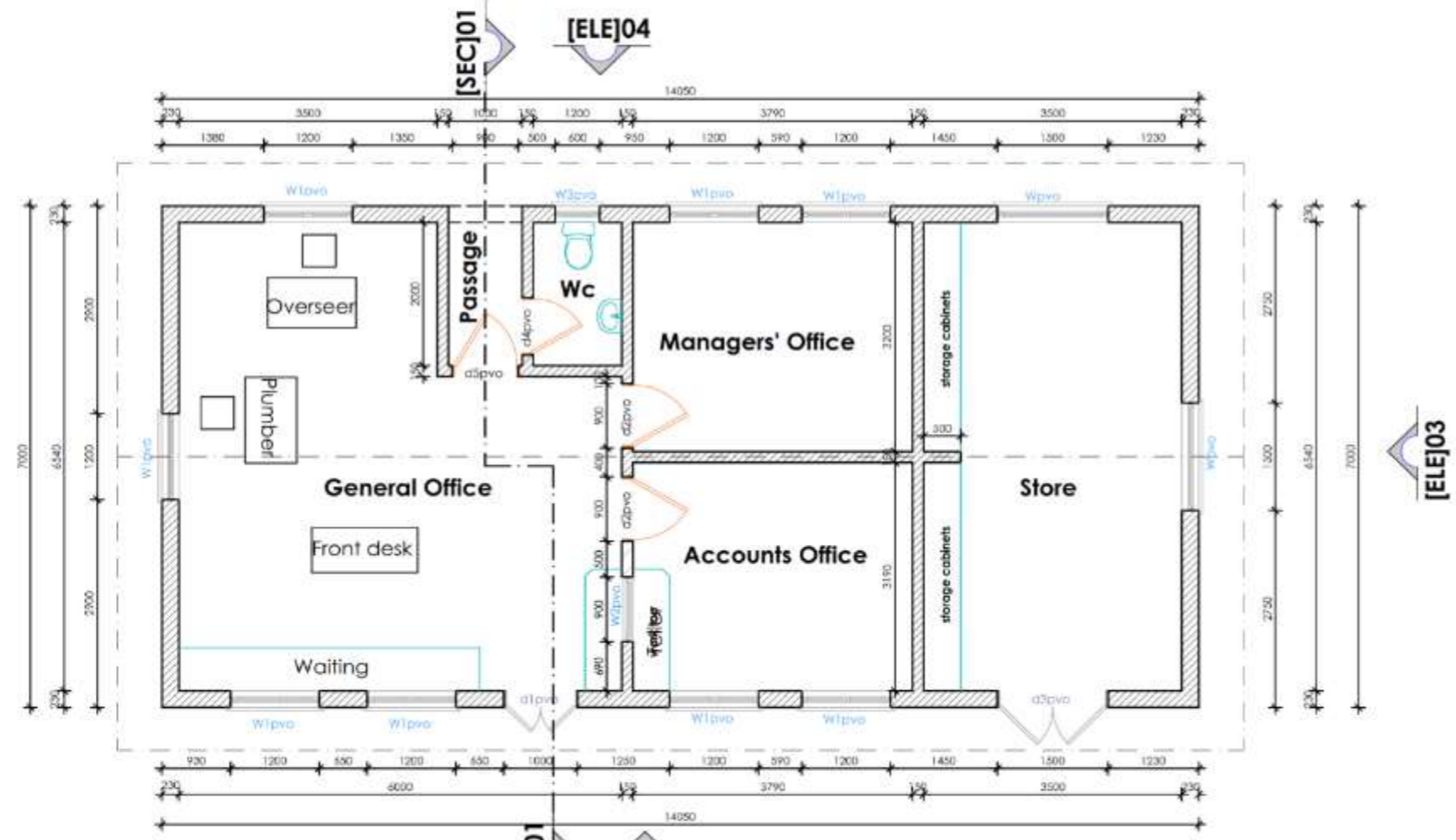
DETAILED ENGINEERING DESIGN

DRAWING TITLE
 TYPICAL PUBLIC TOILET
 CONSTRUCTION DETAIL 1

SCALE	NTS	DRAWING No.	SGI/MWE/BK-9.0.3
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DRAWN	QED	CHECKED	QED
DATE	SEPT 2020	APPROVED	CP



ELEVATION 02 scale 1:75

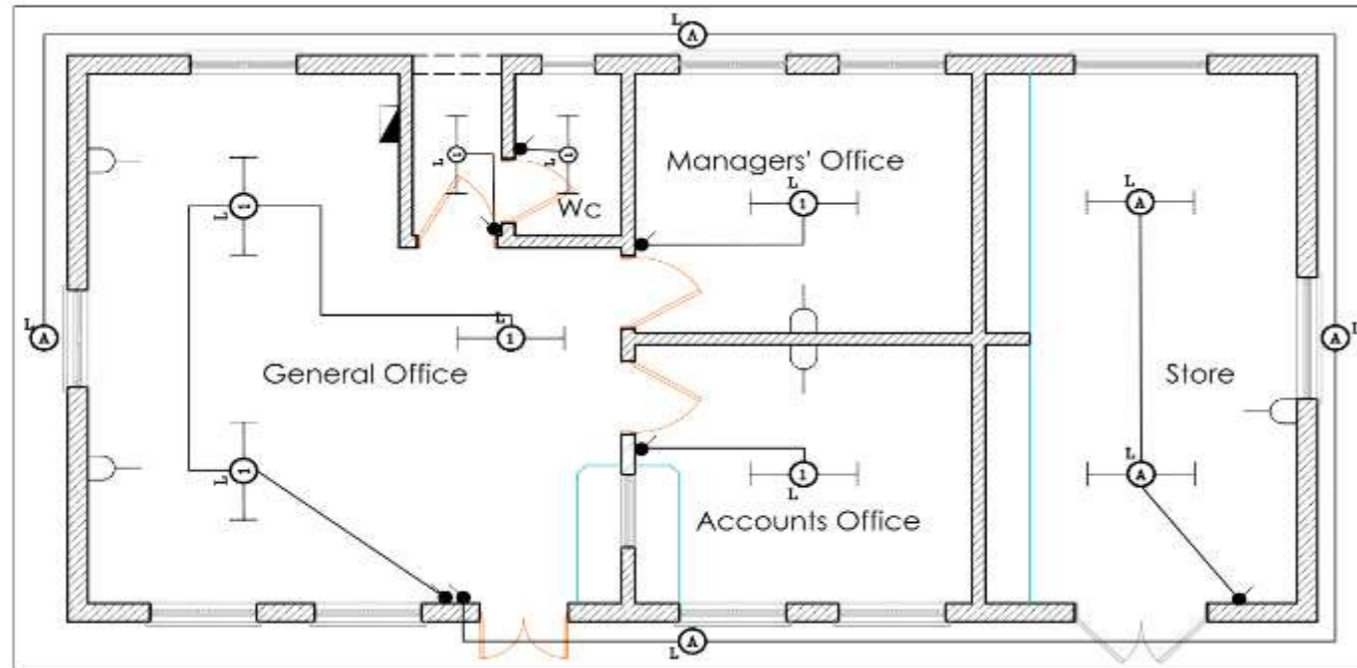


GROUND FLOOR PLAN scale 1:75

NOTES

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3. For Site location see Dwg. SGI-MWE-BUK-0.0.0
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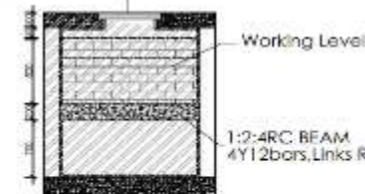
<p>THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT</p>													
<p>CO-FINANCED BY</p> <p>GOVERNMENT OF UGANDA AND WORLD BANK</p>													
<p>PROJECT:</p> <p>Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30th RGAs Across the Country-LOT 4</p> <p>BUKIZIBU-BUMWENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT</p>													
<p>CONSULTANTS:</p> <p>SGI STUDIO GALLI INGEGNERIA S.r.l. Head office: 33030 Sarnonno di Rubano (PD) Italy Tel. +39 049 89 74 644 Fax +39 049 89 78 184</p>													
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No	Date	Description											
<p>DETAILED ENGINEERING DESIGN</p>													
<p>DRAWING TITLE</p> <p>WATER OFFICE FLOOR PLAN AND ELEVATION</p>													
SCALE	AS SHOWN	DRAWING No.	SGI-MWE-BUK-10.0.0										
SURVEYED	GW	DESIGNED	OSD										
DRAWN	OSD	CHECKED	OSD										
DATE	SEPT 2020	APPROVED	CP										



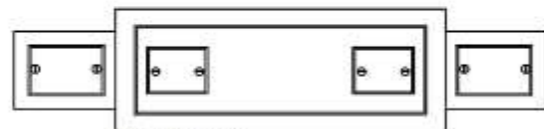
ELECTRICAL INSTALLATION

SYMBOL	DESCRIPTION
	40W Single Fluorescent fitting
	60W Bulk head with energy saving bulb
	3pin, double gang 13A socket outlet
	Distribution Board
	Switch

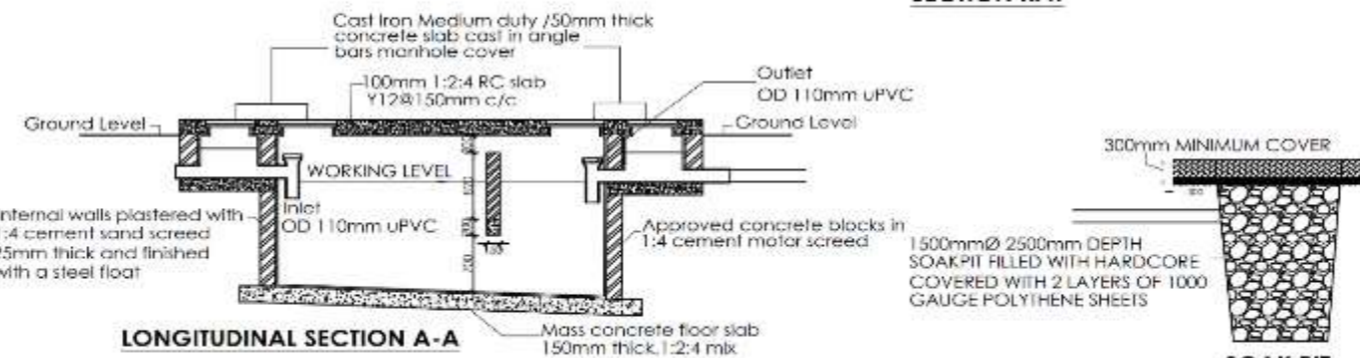
Cast Iron Medium duty /50mm thick concrete slab cast in angle bars manhole cover



SECTION KAT

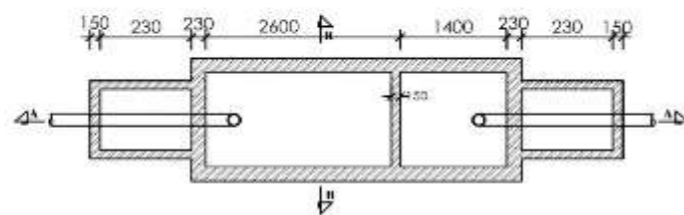


PLAN VIEW



LONGITUDINAL SECTION A-A

SOAK PIT



SEPTIC TANK DETAILS

- NOTES**
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 - For Site location see Dwg. SG-MWE-BUK-0.0.0
 - Structural details are not included.
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CLIENT

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 BUKIZIBU-BUMWIENA WATER SUPPLY AND SANITATION SYSTEM IN MAYUGE DISTRICT

CONSULTANTS

 SGI Studio Galli Ingegneria S.r.l.
 Via della Provvidenza, 15
 30135 Torricella di Montebelluna (TV) Italy
 Tel. +39 0422 89 75 544
 Fax +39 0422 89 75 294

REVISIONS:		
No.	Date	Description


DETAILED ENGINEERING DESIGN

DRAWING TITLE
**WATER OFFICE
 ELECTRICAL DISTRIBUTION LAYOUT**

SCALE	AS SHOWN	DRAWING No.	SG-MWE-BUK-10.10
SURVEYED	GW	DESIGNED	DRD
DRAWN	CGO	CHECKED	DRD
DATE	SEPT 2020	APPROVED	CP

APPENDIX 3: WATER QUALITY RESULTS

a)



Republic of Uganda

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 : Ground Water
 Date received : 11th April 2022
 Analysis Completion data : 14th April 2022

TEST RESULTS

Source Name	Bukizibu GW1 Bore hole	Drinking water standards (IDEAS 12 2018 Maximum permissible for Natural Potable Water)
Village	Bukizibu	
Subcounty	Malongo	
District	Mayuge	
Date Sampled	10-Mar-22	
Lab Identifier code	E51487	
Turbidity	NTU	0.65 / 25
pH	Units	6.54 / 5.5 - 9.5
Electrical Conductivity	µS/cm	585 / 2500
Total Dissolved Solids	mg/L	410 / 1500
Total Hardness as CaCO ₃	mg/L	175 / 600
Fluoride	mg/L	0.19 / 1.5
Sulphates	mg/L	31 / 400
Chlorides	mg/L	43 / 250
Nitrates as N	mg/L	0.28 / 10
Nitrites as N	mg/L	0.0176 / 0.003
Manganese	mg/L	0.0047 / 0.01
Total Iron	mg/L	0.36 / 0.5
<i>E. Coli</i>	CFU/100mls	<1 / <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 11 APR 2022 NWQR

NATIONAL WATER QUALITY
REFERENCE LABORATORY - ENTEBBE

Water Quality Management Department
 Directorate of Water Resources Management
 Water Quality Laboratory Entebbe
 P.O Box 19, Entebbe
 Tel: 041-321342

PRINCIPAL ANALYST
LABORATORIES

★ 14 APR 2022 ★

NATIONAL WATER QUALITY
REFERENCE LABORATORY-ENTEBBE

Sign.....

b)



**NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY-BUGOLOBI.**

P.O. Box 7053, Kampala.
Tel: 0412573480/1144 Fax: 041 233441
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: Royal Techno Industries Ltd
ADDRESS: P.O. BOX 23009, Kampala
TEL: 256-414-220573

Ref No: LS 1094/mv/2018/347
Sampled by: Client
Type of container: plastic
Sample source: Borehole water.

Date Sample received: 3-06-2018

Date of Report: 11-06-2018

Table of analytical results

Parameters	Units	Village: Bukiziba S/c: Malongo District: Mayuge DWD*: 40824	National Standards for Natural portable water
WS Sample Nr	-	K2094/2018/C	
pH	-	6.80	5.5-9.5
Conductivity	µs/cm	339	2500
Turbidity	Ntu	6.0	25
Total dissolved solids	mg/l	254	1500
Total Alkalinity: (as CaCO ₃)	mg/l	170	500
Magnesium : Mg ²⁺	mg/l	34.6	100
Calcium :Ca ²⁺	mg/l	40.0	150
Hardness: total as CaCO ₃	mg/l	61.0	600
Iron:total	mg/l	0.032	0.3
Total suspended solids	mg/l	0	0.0
Chlorides:Cl ⁻	mg/l	30.0	250
Nitrate-N	mg/l	0.0	45
Bi-Carbonates as CaCO ₃	Mg/l	120	500
Colour	PCU	29	50
Sulphates:SO ₄ ²⁻	mg/l	12	400
Fluoride :F ⁻	Mg/l	0.06	1.5

Remarks:

The sample showed satisfactory physio-chemical characteristics of the source, which was commensurate with the National Standards for natural portable water.

ANALYSED BY: Robinah Muhairwa and Arua Kennedy.

AUTHORISED BY: *[Signature]* MANAGER, Central Laboratory Services

APPROVED BY: *[Signature]* SENIOR MANAGER, Water Quality Management Department

NB: The NWSC certificate of analysis by no means constitutes a permit to any person or undertaking to trade in water.



APPENDIX 4: SOCIAL ECONOMIC SAMPLE SIZE DETERMINATION GUIDE

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	100000	384

APPENDIX 5: STAKEHOLDER ENGAGEMENT PARTICIPANT LISTS AND MINUTES OF MEETINGS



ATTENDANCE LIST

Project Name: M.M.D.P. - SRGC - Eastern Uganda

Location: Nayuga District

Date: 04/09/2022

No.	Name	Contact DESIGNATION	Email / CONTACT	Signature
08	Wan Moses Okuni	Health & Safety Specialist	0777185064	
09	Kusinde Sarah	JBN Consultants & Planners - Consultants	0773165589	
10	Murambo Tom P	DWD	0752436278 tomurambo2@gmail.com	
11	Christine Nsungwa	SRGC RWSC-3/MWR	Christynsungwa@gmail.com 074466693	
12				
13				
14				



ATTENDANCE LIST

Project Name: Del MDP - 5 RGCs - Eastern Uganda

Location: Nagye District

Date: 04/02/2022

No.	Name	Contact Designation	Email / CONTACT	Signature
01	KITAVUJJA LEONARD	DCAD Manager	kitavujja@gmail.com	
02	Icsimbula Peter	VICG Eman LCY	0772869076	
03	Cato Namyalu	SEHD / MWE / RUCSD	0775-171504 / cnamyalu@ymail.com	
04	NAGUYO EDWARD	ADHD - EH	0773195530 edwardnaguyo@gmail.com	
05	ARANN THOMAS	SENIOR ENV. OFFICER	0752-851765 arannthomas@gmail.com	
06	BURENYA HARUNA	A/ISO For LDC	0772662265	
07	DHUKUSOKA DAVID	for DCAD	0773880944 daviddhukusoka@gmail.com	

ATTENDANCE LIST

Project Name: SRA's - Eastern Uganda

Location: Matanga Sub-county - Mayuge District

Date: 18/02/2022

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	MUKOSE RONALD	M	DISTRICT COORDINATOR	0787427553	MUKOSE RONALD 1970@gmail.com	[Signature]
2.	KIYANJA JALIRO	M	SAS MASENGO	0704727733	Mkiyanja@gmail.com	[Signature]
3.	Kawungu Abdallah	M	C/O Matanga	0785267060	abdallah.kawungu@gmail.com	[Signature]
4.	ISIKO WILLIAM	M	P/CHIEF	07574452871	Isiko@gmail.com	[Signature]
5.	MUZIENYU FRED	M	C/PERSON	0759910122		[Signature]
6.	NANIGORI HELLEN	F	WOMEN COUNSELLOR	0739376190	NANIGORI HELLEN	[Signature]
7.	BOGERE SIMON	M	PLENEX	0755113242		[Signature]
8.	LUKUNGU STANLEY	M	P/ISH CHIEF	0774531636		[Signature]
9.	WAIBIRI TADEO	M	D. SPEAKER	0758917769	www.tadeoemertatigum.com	[Signature]
10.	MUTESI MOREEN	F		0772620140		[Signature]
11.	NAMUKULA WILBER	M	C/O L.C. II	0774407158		[Signature]
12.	WAMOGA YENYU	M	WORKS & PRODUCTION	0758883342		[Signature]
13.	MUBUNYA PROSPER	F	C/P L.C. II	0776221571		[Signature]

BA BIRAT Zainab Conductor 0703680239 Zainab

ATTENDANCE LIST

Project Name: 5-RCC - Eastern Uganda

Location: Makindu Sub-County - Kakumbe District

Date: 18/02/2022

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	WAISWA DAV	M	LCT	0758154414		
2.	BUTINZA JOAS	M	SCO/Incho	0773 214047	butinzaioas@gmail.com	
3.	MATHENO MOSES	M	HA	0788540445	Mathenomoses@gmail.com	
4.	AIP NANSOBI ANNET	F	OC MAKONRO	075894334		
5.	Hon. Luwacha Habiba UC	UC	V-Chairman/HA	0787238866		
6.	Hon. BABATE ZINA	F	Councillor	0703080239		
7.	HON. MUKUNYA JESSE	M	Councillor	0776760177		
8.	WUODUY ESAN	M	COO	0719350692		
9.						
10.						
11.						
12.						
13.						

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMF		<input type="checkbox"/>	Environmental Audit		
	RPF		<input type="checkbox"/>	RAP		
	ESIA		<input checked="" type="checkbox"/>	Other (specify)		
Date: 04 th / 05 / 2022						
Location: MUKONGO SUBCOUNTY, MAYUGE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES						
Proponent: IWMOP / MINE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/email)	Sign/ initial
	M	F				
KAVUMA CHARLES	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUKIZIBU	member	0788457441	Charles
KIYUNGO MICHEAL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUKIZIBU	IC	0705319122	Kiyungo
HALONGO HALIISA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUKIZIBU		0758304183	Halisa
SAURE ISURUWU	<input checked="" type="checkbox"/>	<input type="checkbox"/>	"	"	-	Isuruwu
MUGABI PATRIKE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	"	"	0757090254	Patric
NAIGAGA ASA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	"	"	-	N.A.
MOYETI MARY	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0777956185	MARY
YONDO JAKOB	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUKIZIBU	A	078369139	Yondo
WEGULO ERIKA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUKIZIBU	A	0788793559	ERIKO
MUKALAZ, WILLIAM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUKIZIBU		-	William

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMF		<input type="checkbox"/>	Environmental Audit		<input type="checkbox"/>
	RPF		<input type="checkbox"/>	RAP		<input type="checkbox"/>
	ESIA		<input checked="" type="checkbox"/>	Other (specify)		
Date: 05/05/2022						
Location: BUMWENA VILAGE, MALONGO SUBCOUNTY, MAMUGE DISTRICT.						
Project name: WATER SUPPLY & SANITATION FACILITIES - BUKIZIBU - BUMWENA R.G.C.						
Proponent: INMOP / MWE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/email)	Sign/ initial
	M	F				
MUSANA DAN	<input checked="" type="checkbox"/>		BUKIZIBU	member	0788235590	FA
IKOBA AWARI	<input checked="" type="checkbox"/>		"	"	-	IA
ZAITUNA MWAMURA		<input checked="" type="checkbox"/>	BUMWENA B		076174130	Z.M
NAMPALA JOSEPH	<input checked="" type="checkbox"/>		BUMWENA B		0703545119	N.J
GABANDI YOWRI	<input checked="" type="checkbox"/>		"	"	078861640	BO
KISAMBYA TUFARI	<input checked="" type="checkbox"/>		BUMWENA B		0750785444	FA
BABITA SCOVIA		<input checked="" type="checkbox"/>	BUMWENA B		-	BS
NYARWANDA DENIS	<input checked="" type="checkbox"/>		BUMWENA B		0757629386	DR

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMF				Environmental Audit	<input type="checkbox"/>
	RPF				RAP	<input type="checkbox"/>
	ESIA		<input checked="" type="checkbox"/>		Other (specify)	
Date: 04/05/2022						
Location: MALANGI SUB-COUNTY MATVELE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES - (BUKIZIBU-BUMWETA R/W)						
Proponent: MWE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/email)	Sign/ initial
	M	F				
NAKISIGE	SCORIA		<input checked="" type="checkbox"/>	BUKIZIBU A	0705319122	SCORIA
Mutenyi	George	<input checked="" type="checkbox"/>		BUKIZIBU A	0784419605	George
Besweke	Musa	<input checked="" type="checkbox"/>		BUKIZIBU A	0783628784	Musa
Mudasi	SOUKALI	<input checked="" type="checkbox"/>		BUKIZIBU	0783558043	SOUKALI
Mutasa	JACKSON	<input checked="" type="checkbox"/>		BUKIZIBU	0779358354	Mutasa
Bogere	Skalifu	<input checked="" type="checkbox"/>		BUKIZIBU A	0759283161	Skalifu
Bshindi	Malidu	<input checked="" type="checkbox"/>		BUKIZIBU C	0771399199	Malidu
AMINA	NANDESIWE		<input checked="" type="checkbox"/>	BUKIZIBU A	0704369488	AMINA
Samanya	ISA	<input checked="" type="checkbox"/>		BUKIZIBU A	0741418855	ISA
TAKWEMAZAYO	RECHEAL		<input checked="" type="checkbox"/>	BUKIZIBU A	-	Recheal

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMF			Environmental Audit		
	RPF			RAP		
	ESIA <input checked="" type="checkbox"/>			Other (specify)		
Date: 4/05/2022						
Location: MALANGO SUB-COUNTY MATUGE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (BUKIZIBU-BUMWENA RGC)						
Proponent: MWE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/email)	Sign/ initial
	M	F				
Mugabi ASWRAF	<input checked="" type="checkbox"/>		BUKIZIBU A		0777843748	
KIAGUNYA FRANCES FRANCES	<input checked="" type="checkbox"/>		BUKIZIBU A		-	KIAGUNYA FRANCES
NAMUSOBYA JAKINE		<input checked="" type="checkbox"/>	BUKIZIBU A		-	NAMUSOBYA
EKUBUYA MAKIMU	<input checked="" type="checkbox"/>		BUKIZIBU A		-	
MBOGO SOON	<input checked="" type="checkbox"/>		BUKIZIBU A		075011521	
NAISWA MICHEAL	<input checked="" type="checkbox"/>		BUKIZIBU A		0784658313	
WAZOMU SUMU	<input checked="" type="checkbox"/>		BUKIZIBU A		0777843748	
NASASA FRED	<input checked="" type="checkbox"/>		BUKIZIBU A		-	NASASA FRED
NAIKOBA ASIA		<input checked="" type="checkbox"/>	BUKIZIBU A		-	

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMF			Environmental Audit		
	RPF			RAP		
	ESIA		✓	Other (specify)		
Date: 11/05/2022						
Location: MALOGO SUB-COUNTY MATUGE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION						
Proponent: MWE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/email)	Sign/ initial
	M	F				
MUSMA METER	✓		Dukuhwa	FARMER	0700-753711	MUSMA
KAGUNYA PETER	✓		Dukuhwa	MANAGER	078126772	PETER
MUSANA JOSEPH	✓		"	FARMER	0761042524	
Lebanga Muhammed	✓		"	FARMER	0789662738	
KASABA MEDIE	✓		"	SABON	0745436657	Medi
✓ TIGAWAZANA TOM	✓		"	FARMER	0756372460	TIGAWAZANA

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMF				Environmental Audit	
	RPF				RAP	
	ESIA		<input checked="" type="checkbox"/>		Other (specify):	
Date: 21 st May 2022						
Location: MALONGO SUB-COUNTY MATUGE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (BUKITUBU - BUKWENDA RGD)						
Proponent: MINE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/email)	Sign/ initial
	M	F				
KASAKUBA MUHAMMAD	<input checked="" type="checkbox"/>		BUKUBU	BUSINESS	0772-387656	KASAKUBA
MAGEME SUDANSONI	<input checked="" type="checkbox"/>		"	FARMER	0752497155	MAGEME
SEGEWA ALOSIOUS	<input checked="" type="checkbox"/>		"	Techman	0705366412	SEGEWA
BADIARDINI MUKUJ	<input checked="" type="checkbox"/>			Butcher	0787254836	BADIARDINI
ISABIRWE MUKEDI MUKISA	<input checked="" type="checkbox"/>		MUKUBU	BUSINESS		ISABIRWE
KASANKU MUKUBU	<input checked="" type="checkbox"/>			FARMER	0758-762876	KASANKU
SAMANYA ISMAIL	<input checked="" type="checkbox"/>		C	FARMER	0783775457	SAMANYA
NAMUKESA MONICA	<input checked="" type="checkbox"/>		C	FARMER	0772957228	NAMUKESA

Minutes

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
<p>Mayuge District officials on 5th February 2022 at Mayuge District headquarters boardroom</p>	<p>Mayuge District passed environmental and natural resource ordinances in 2012. The ordinances should be reviewed when conducting the Environment and Social Impact Assessment.</p>	<p>The ESIA will review the ordinances in order to align minimization and/or mitigation of project impacts on the environment.</p>
	<p>There are other development projects planned in the proposed location for the piped water scheme. For instance, the National Oil Palm project will be among other locations take up Malongo Subcounty. The project similarly proposes provision of piped water to the communities in Malongo subcounty. The client/consultant should understand other planned projects proposed in the area. Such projects have social service projects such as water supply incorporated in the bigger project. This could result in duplication of project efforts in the same location.</p>	<p>The ESIA team will consult the vegetable Oil Development Project under the Ministry of Agriculture, Animal Industry and Fisheries and the proprietors of the Mayuge District Palm Oil Development Project on the proposed social services on the project to avoid duplication of services</p>
	<p>Part of the proposed project parish (Bumwena) is a forest reserve. It is proposed that the proposed project be extended to neighbouring areas such as Bukatabira, to cover the area that could have been served in the forest reserve.</p>	<p>The project design will be limited to Bukizibu and Bumwena villages but will not cover the area covered by the forest reserve.</p>
	<p>The district political and technical officials should be involved in all the phases of the project. Roles and responsibilities should be allocated for district authorities to allow participation in the project. The same is recommended for lower local governments and communities to improve project ownership.</p>	<p>The ESIA will conduct comprehensive stakeholder consultations and will develop a Stakeholder Engagement Plan (SEP) as well as ESMPs. A project communication strategy will be proposed in the project ESMP</p>
	<p>The proposed project should define the magnitude and extent of compensation on the project, if any.</p>	<p>The ESIA will make recommendations based on the proposed RAP planned for the project</p>

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
Local Council Chairperson LCV on 5 th May 2022	There project is welcomed and the District will offer it's full support in order to achieve the intentions of the government.	Noted
	The ministry should continuously engage the District Local Government and Subcounty officials, who will involve the local community through awareness and prepare them for upcpming projects.	Noted
	Mayuge is one of the District with poor water supply and sanitary facility in the Busoga region. Therefore more of the same projects should be implemented in other parts of the district in order to improve water supply among communities...	Noted
District Health Inspector on 4 th may 2022	Malongo subcounty is the biggest in the district with Bumwena parish having 43 villages and served by 2 Health Centre (Malongo HCIII and Namulii HCII. Malongo HCIII offers both OPD and In-Patient services, Maternity (ANC, Delveries, PNC, Family planning, PMCT (HIV), Cancer screening, care of the sick, small and premature babies.)	Noted
	The health centre registered Malaria, Intestinal worms (diarrhoea), UTIs, Anaemia, Mal-nutrition and the most prevailing sickness. Typhoid is registered as suspected case with no confirmatory test. For the last 10 cases investigated on the prevalence of Bilhazia, 4 cases were confirmed as positive.	Noted
	Namuli HCII has water abstracted at the HC premises which is supplied to villages. Malongo HCIII has a seasonal borehole shared with the	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	neighbouring communities. Therefore, water should be supplied to Malongo HCIII.	
	According to the In-charge Malongo HCIII, the health centre experiences major water challenges after the breakdown of the supplementary borehole. The maternity ward only consumes the 1000litres and 10,000litres water tanks in a day for 130 deliveries attended to. The supply of water should consider the Health centre.	Noted
	There's Living water organisation that supports the district with supply water and constructing sanitation facilities. This helped to improve water and sanitation status in the District. However, Malongo Subcounty is considered with poor sanitation facilities. The towns in Bukizibu and Bumwena have no public toilets yet they harbour thousands of people.	Noted
MoGLSD on 17 th May 2022	<p><u>Land acquisition:</u> 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 will incorporate the requirement
	<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. ▪ Site layout plans and architectural designs for solar powered piped water system and all that is entailed therein, should be submitted to 	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	the ministry for approval. Additionally, geotechnical survey/ study reports on bearing ratio to hold the pipes should be submitted	
	Design considerations: <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. 	Noted
	Health and welfare: <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
	Health and safety considerations: <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. 	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<ul style="list-style-type: none"> ▪ 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) 	
	<p>Pollution and environment management:</p> <ul style="list-style-type: none"> ▪ Water treatment plan should guard against waste contamination of the environment, facility pollution to underground waters. ▪ 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
	Community engagement:	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<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. 	
	<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
Malongo sub county official on 18th February 2022 for Bukizibu Bumwena RGC	The project should engage community leaders (LCI) for recruitment for available jobs during the construction phase to improve project ownership	The ESIA will assess available jobs on the project and make recommendations on employment of skilled and unskilled community members
	Will there be compensation for land take on the project?	Compensation will be discussed after undertaking a Resettlement Action Plan for the project
	There should be a sustainable operations and maintenance strategy to maintain the project in good working order	An assessment of capacity needs in operations and maintenance of the water systems and sanitation facilities will be conducted in the ESIA

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	How much will a jerry can of water cost?	The pricing of water on the project is discussed in the project feasibility reports and will be discussed further during the ESIA studies for individual RGCs.
	The proposed sanitation facility should be divided into two. Instead of a 6-stance toilet in one location, three stances should be constructed at Bukizibu centre and another at Bumwena centre	The ESIA will assess the sanitation requirements of Bukizibu and Bumwena trading centers with consultation of sub county and community stakeholders and recommend appropriate location(s) for the proposed sanitation facility.
	More community engagement meetings are required to improve project ownership	Continued community engagement on the project to be recommended in the ESIA.
	Train the locals to provide technical services on the project	An assessment of capacity needs in operations and maintenance of the water systems and sanitation facilities will be conducted in the ESIA.
	The common diseases among the people at the landing site are water borne. With the proposed project, we anticipate a reduction in the occurrence of such diseases.	Noted.
Meeting with communities in Bukizibu village on 4 th May 2022	Residents requested to be considered for job opportunities especially during the construction phase of the project in order to better their Standards of Living.	Noted
	The parish chief informed the meeting that Bukizibu is a busy town with population congestion and people staying in slums. The issue of	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	sanitation in the area is a major challenge as many retail owners do not have latrines hence share the with households which affects hygiene.	
	Some residents were concerned about the quality of water that project will provide, if the chemicals used during treatment won't affect them in the long run.	
	The community also said that the busy towns of Bumwena and Bukizibu have no sanitation facilities therefore, instead of constructing one 6 stance toilet in one area, the toilet should be divided into two so as they can be constructed in the two towns.	
	The community also raised a concern on the scarcity of water in the area especially during the dry season. There is an open ground water source at bukizibu centre where the entire community collects water for domestic uses	
	There was concern of women and children having to move long distance of about 3km in search for the nearest borehole and the conflict there in among women having to wait for their turn to fetch. The Implementation of tap water will benefit many households.	Noted
	The communities also informed the community about the common prevalence of malaria that is rampant. They therefore requested that water and more medical supplies be supplied to Malongo HCIII for better services.	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<p>Commonly asked questions;</p> <p>5. How soon will the water supply process start?</p> <p>6. Is the piped water going to be at a cost or free? If yes how much will be charge per jerrycan?</p> <p>7. Will the community member be considered for job opportunities?</p> <p>8. Are people’s land going to be affected? If yes, will they be compensated?</p>	Noted
UNRA – Head of Design (Roads and Bridges) on	Where there is proposed road crossing, the project design team should provide definite crossing points especially at town junctions called service ducts	Noted
	There is lack of consultations with UNRA as decisions are made to cross roads without notification and inputs to UNRA	Noted
	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
	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

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	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
	In case there is need of implementing water works with crossing points on UNRA proposed road constructions, consultations should be made to harmonise works and prevent cutting of pipes during the initial road works.	Noted
	The design team should submit their typical road crossings and typical valves so as they can be synchronised with UNRA's class of concrete and to know the size of ducts required especially in big towns.	Noted
	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
	Swamp crossings of water pipes by hankers should not block the incoming water flow on roads to avoid flooding of debris and water on the roads.	Noted
Meeting with communities in Bumwena village on 4 th May 2022	The community informed the meeting that there is a lake nearby therefore, government should abstract water from surface water in order to serve the entire Malongo subcounty and other neighbouring parishes.	Noted
	The local leaders welcomed the idea of a supplementary borehole given the high population and every increasing water demands in the two small towns of Bumwena and Bukizibu.	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The community also said that the busy towns of Bumwena and Bukizibu have no sanitation facilities therefore, instead of constructing one 6 stance toilet in one area, the toilet should be divided into two so as they can be constructed in the two towns.	Noted
	Residents requested to be considered for job opportunities especially during the construction phase of the project in order to better their Standards of Living especially through supportin the local economy (restaurants, salons and retail shops etc).	Noted
	In line with construction of sanitation facilities, most residents confirmed that the majority do not have latrines especially in the trading centres and others use latrines from the neighbouring households.	Noted
	A community member informed the meeting that there is conflict among the women at the borehole due to the long queues	Noted
	Men complained that their wives spend a lot of time at the borehole and lake while rumourmongering and making deals with other men which has contributed to domestic violence in most families.	Noted
	They mentioned that there is a fear when the project starts, the community members will be not involved in anyway and informed that some community members can do casual laboring and others are learned degree holders and can apply their skills therein.	Noted
	Develop Water Source Protection Plans and ensure that they are implemented during the commencement period of the project such that	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
MWE (with DWRM, Wetlands Department and Environmental Affairs) on 8 th June 2022	the implementation activity takes place alongside the project so as everything is finalized at the same time and this will reduce on the man power required.	
	The meeting also informed that the component of sanitation facility coverage in the hosting communities is at 30%-20%, an implication on open defecation in the area. Therefore, more sanitary facilities should be considered.	Noted
	For every catchment area identified for source water protection, the catchment management organization/ committee should be engaged.	Noted
	What are the possible solutions for water contamination given the proximity of latrines and open defecation around the water sources?	Noted
	Ensure to develop sanitation/ solid waste management plans and clearly indicate the dumping so as to prevent issues of leachates and salts flowing to water sources and pollution of the environment due to improper solid waste handling.	Noted
	The developer should not negate their responsibility of managing the entire ecosystem. They must work closely with the catchment management committee and wetland committee to ensure the catchments or the wetland are effectively managed and conserved without causing more harm.	Noted
	The developer should obtain wetland user permits prior to installation of the pipes.	Noted

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The developer should consider motorizing other neighbouring hand pumps in the project area.	Noted
	The ministry has a policy of up to 3% of the project budget of any water intake/ source project to be used for the implementation, preparation of the source water protection and the developer should note this in the BOQs.	Noted
	For the cases of floods around boreholes, given the interactions between the surface water and groundwater, monitoring for water quality and water treatment should be done. Therefore, a dosing point should be put at the abstraction points.	Noted

**APPENDIX 6: SUMMARY OF PROJECT LAND REQUIREMENTS AND COMPENSATION
REPORT**

APPENDIX 7: SUMMARY OF CASES REPORTED BETWEEN NOVEMBER 2021 TO APRIL 2022 IN MALONGO SUB COUNTY – MAYUGE DISTRICT

Month	Assault	Theft	Domestic Violence	Threatening	Simple Robbery	Murder	Rape/Attended	Criminal Trespass	Child Abuse	Defilement	Abduction	RTA's
Nov-21	30	9	3	9	2	0	0	0	2	8	0	2
Dec-21	33	10	2	4	0	1	1	3	1	6	1	1
Jan-22	39	15	1	7	1	0	3	2	0	8	2	1
Feb-22	20	10	0	7	1	0	1	4	0	7	3	2
Mar-22	17	16	1	6	3	0	0	2	1	6	1	3
Apr-22	17	18	1	6	1	1	2	4	1	6	2	1
	156	78	8	39	8	2	7	15	5	41	9	10

Source: Malongo Police Posts, November 2021 – April 2022 records

11.4 APPENDIX 8: SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

The interviewer is part of development of LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES team assessing the socio-economic baseline conditions in the project area. The information collected will be used for environmental & social impact assessment (ESIA). Your responses to questions herein will be treated with utmost confidentiality.

1: Interview Details

- 1.1 Interviewer's Name: _____
- 1.2 Date of interview: ____/____/2021
- 1.3 Name of respondent: _____
- 1.4 Phone number of respondent: _____ (Upon permission)

2: General Information of Household

- 2.1 District: _____
- 2.2 Sub-county _____
- 2.3 Parish: _____
- 2.4 Village/zone/LC1 _____
- 2.8 Name of household head: _____
- 2.9 Nationality of the household head: _____
- 2.10 Age of household head
- | | | | |
|------------|--------------------------|-------------------|--------------------------|
| 1. (15-25) | <input type="checkbox"/> | 4. (46-55) | <input type="checkbox"/> |
| 2. (26-35) | <input type="checkbox"/> | 5. (56 and above) | <input type="checkbox"/> |
| 3. (36-45) | <input type="checkbox"/> | | |

2.11 Type of household head

1. Female headed
2. Male headed
3. Child headed below 18 years Male___ Female___

2.12 Marital status of household head

1. Single
2. Married (No. of spouses): ___
3. Divorced/separated
4. Widowed

2.13 Household members living in the homestead

1. 0-4years: _____ persons
2. 5-9 years: _____ persons
3. 10-14 years: _____ persons
4. 15-19 years: _____ persons
5. 20-24: years _____ persons
6. 25-29: years _____ persons
7. 30-34 years _____ persons
8. 35-39 years _____ persons
9. 40-44 years _____ persons
10. 45-49 years _____ person
11. 50-54 years _____ persons
12. 55-59 year _____ persons
13. 60+ years _____ persons

2.14 What is the total number of person in your household: _____ persons?

2.15 Vulnerability of household head:

- | | |
|---|---|
| 1. Physical Impairment <input type="checkbox"/> | 5. Old age <input type="checkbox"/> |
| 2. Hearing Disorder <input type="checkbox"/> | 6. Mental Disorder <input type="checkbox"/> |
| 3. child headed <input type="checkbox"/> | 7. Any other (specify) <input type="checkbox"/> |
| 4. Blindness <input type="checkbox"/> | 8. None of the above <input type="checkbox"/> |

2.16 Does your household have people with disability or chronically ill? YES / NO If YES, How many? _____

2.17 If YES: - Type of disability/illness: (Blind, deaf, lame, dumb, mental) (HIV/AIDS, Asthma, sickle cells, cancer, diabetes, Hypertension)

2.18 Of what Religious Affiliation is your household?

- | | |
|--|--|
| 1. Catholic <input type="checkbox"/> | 4. Pentecostal/born aga <input type="checkbox"/> |
| 2. Protestant <input type="checkbox"/> | 5. SDA <input type="checkbox"/> |
| 3. Islam <input type="checkbox"/> | 6. Others (specify) <input type="checkbox"/> |

2.19 Ethnic group

- | | |
|---|-------------------------------------|
| 1. Basoga <input type="checkbox"/> | 5. Banyole <input type="checkbox"/> |
| 2. Bagwere <input type="checkbox"/> | |
| 3. Bagisu <input type="checkbox"/> | |
| 4. Basamia <input type="checkbox"/> | |
| 6. Itesot <input type="checkbox"/> | |
| 7. Japadhola <input type="checkbox"/> | |
| 8. Other (specify) <input type="checkbox"/> | |

2.20 What is your Homestead size? (acre).....

2.21 What is the nature of your dwelling ?

- | | |
|--|---------------------------------------|
| 1. Brick wall <input type="checkbox"/> | 2. Mud Block <input type="checkbox"/> |
| <input type="checkbox"/> | |
| <input type="checkbox"/> | |
| <input type="checkbox"/> | |

- 3. Mud and wattle
 - 4. Mud Block with plaster
 - 5. Concrete blocks
 - 6. Reeds, Thatch or Sticks
 - 7. Stone
- 2.21 Tenure of homestead
- 1. Customary
 - 2. Freehold
 - 3. Mailo
 - 4. Leasehold

2.22 Assets/property owned by household (Tick multiple answer)

- 1. Land
- 2. House
- 3. Domestic animals
- 4. TV set
- 5. Radio
- 6. Car
- 7. Motorcycle
- 8. Bicycle
- 9. Mobile phone

2.23 Are there any important cultural sites? 1=Yes 2=No

2.24 If yes, list sites: _____

3: Land Use, Land Ownership, and Crops

3.1 In what capacity do you live on this land?

- 1. Landowner
- 2. Tenant (Kibanja)
- 3. Co-owner
- 4. Squatter
- 5. Licensee(renting)
- 6. Encroacher

3.2 How did you own this land?

- 1. Bought
- 2. Inherited from parents
- 3. Renting
- 4. Squatter

3.3 How long have you used this land? _____ months/years Note if season, month, etc.

3.3 Do you use any other land apart from the one you own? 1=Yes 2=No (Household head)

3.4 If Yes, list location (village, parish, or sub-county) _____

Condition of rented land

- 3.5 If land is rented, from whom?
- | | | |
|-------------------------------------|--------------------------|--|
| 1. Relatives/clan members | <input type="checkbox"/> | 3. Land owner living outside |
| 2. Land owner in the same community | <input type="checkbox"/> | 4. Government <input type="checkbox"/> |
| | <input type="checkbox"/> | 5. Others (specify) <input type="checkbox"/> |

3.6 Duration of contract of renting _____ years/months Note if season, month, etc.

3.7 Rent in case of cash/acre UGX _____ per year Note if season, month, etc.

3.8 Rent in other forms of payment (e.g. crops, livestock and animal produce) _____ Describe

4: Livelihood activity

4.1 What is the Primary (main) Livelihood Activity of household head?

- | | | | |
|---|--------------------------|--------------------|--------------------------|
| 1. Farming | <input type="checkbox"/> | 6. Student | <input type="checkbox"/> |
| 2. Formal Employment | <input type="checkbox"/> | 7. Fishing | <input type="checkbox"/> |
| 3. Casual labour | <input type="checkbox"/> | 8. Brickmaking | <input type="checkbox"/> |
| 4. Trading | <input type="checkbox"/> | 9. other (specify) | <input type="checkbox"/> |
| 5. Service provision (salon, transport) | <input type="checkbox"/> | | |

4.2 What is the secondary Livelihood Activity of household head?

- | | | | |
|---|--------------------------|--------------------|--------------------------|
| 1. Farming | <input type="checkbox"/> | 6. Student | <input type="checkbox"/> |
| 2. Formal Employment | <input type="checkbox"/> | 7. Fishing | |
| 3. Casual labour | <input type="checkbox"/> | 8. Brickmaking | |
| 4. Trading <input type="checkbox"/> | | 9. other (specify) | |
| 5. Service provision (salon, transport) | | | |

4.3 If your primary livelihood is farming, specify the crops you grow?

- | | |
|-----------------|--------------------------|
| 1. Bananas crop | <input type="checkbox"/> |
| 2. Other crop | <input type="checkbox"/> |
| | <input type="checkbox"/> |
| | <input type="checkbox"/> |

- 3. Animal rearing
- 4. Tree farming
- 5. None

4.4 In case you grow **other crops** apart from rice, specify the other crops. (Tick Multiple answer)

- | | | |
|-----------------|--------------------------|----------------|
| 1. Beans | <input type="checkbox"/> | 6. Sorghum |
| 2. Maize | <input type="checkbox"/> | 7. Vegetables |
| 3. Irish Potato | <input type="checkbox"/> | 8. Others |
| 4. Sweet potato | <input type="checkbox"/> | (specify)_____ |
| 5. Cassava | <input type="checkbox"/> | |

4.5 In case **you rear animals**, specify (Tick Multiple answer).

- | | | | |
|------------|--------------------------|--------------------------|--------------------------|
| 1. Goat | <input type="checkbox"/> | 5. Sheep | <input type="checkbox"/> |
| 2. Cattle | <input type="checkbox"/> | 6. Rabbits | <input type="checkbox"/> |
| 3. Poultry | <input type="checkbox"/> | 7. Others (specify)_____ | |
| 4. Pigs | <input type="checkbox"/> | | |

4.6 In case of **tree planting**, specify which trees grown (Tick Multiple answer).

- | | | | |
|--------------------------|--------------------------|------------|--------------------------|
| 1. Pine | <input type="checkbox"/> | 4. Guava | <input type="checkbox"/> |
| 2. Eucalyptus | <input type="checkbox"/> | 5. Avocado | <input type="checkbox"/> |
| 3. Grevillea | <input type="checkbox"/> | 6. Orange | <input type="checkbox"/> |
| 7. Others (specify)_____ | | | |

4.7 In case of **fishing**, specify the fishing place: (Tick Multiple answer)

- 1. River
- 2. Inland pond
- 3. Lake (specify)

4.8 Where do you sell your produce?

- | | | | |
|-------------------------|--------------------------|---------------------|--------------------------|
| 1. Local trading center | <input type="checkbox"/> | 4. Cooperative | <input type="checkbox"/> |
| 2. local produce buyer | <input type="checkbox"/> | 5. Market | <input type="checkbox"/> |
| 3. Farm gate | <input type="checkbox"/> | 6. Others (specify) | <input type="checkbox"/> |

5: Income and Expenditure

Income and Expenditure			
	Question	Answer	Remarks
5.1	Average Annual Income	UGX per year	Household head
Source of Income:			
5.2	Farming	UGX per month/season	
5.3	Formal employment	UGX per month	
5.4	Casual labour	UGX per month	
5.5	Trading	UGX per month	
5.6	Service provision	UGX per month	
5.7	Fishery	UGX per month	
5.8	Brick making	UGX per month	
5.9	Others (Specify)	UGX per month	
Expenditure:			
5.10	School fees	UGX per month (usually per term not month)	
5.11	Medical bills	UGX per month	
5.12	Food	UGX per month	
5.13	Transport	UGX per month	
5.14	Clothing	UGX per month	
5.15	Water	UGX per month	
5.16	Energy	UGX per month	
5.17	Rent	UGX per month	
5.18	Others (Specify)	UGX per month	

6: Health

6.1A what is the type of nearest health facility?

- | | | | |
|---------------------------|--------------------------|-------------------------------------|--------------------------|
| 1. Referral Hospital | <input type="checkbox"/> | 6. Maternity Clinic | <input type="checkbox"/> |
| 2. Church run hospital | <input type="checkbox"/> | 7. Community Health Centre | <input type="checkbox"/> |
| 3. privately run Hospital | <input type="checkbox"/> | 8. privately run clinic / Drug shop | <input type="checkbox"/> |
| 4. Health centre III | <input type="checkbox"/> | 9. Other (specify) | <input type="checkbox"/> |
| 5. Health centre II | <input type="checkbox"/> | | |

6.1 What is the distance to nearest health facility?

- | | |
|-------------------|--------------------------|
| 1. 100 meters | <input type="checkbox"/> |
| 2. 100-500 meters | <input type="checkbox"/> |
| 3. 1-1.5km | <input type="checkbox"/> |
| 4. Over 5km | <input type="checkbox"/> |

6.2 What is the distance to health referral facility

- | | |
|-------------------|--------------------------|
| 1. 100 meters | <input type="checkbox"/> |
| 2. 100-500 meters | <input type="checkbox"/> |
| 3. 1-1.5km | <input type="checkbox"/> |
| 4. Over 5km | <input type="checkbox"/> |

6.3 What are the most common diseases that affect the family?

- | | | | |
|----------------------------------|--------------------------|-----------------------------|--------------------------|
| 1. Malaria | <input type="checkbox"/> | 5. Intestine Infection | <input type="checkbox"/> |
| 2. Cough | <input type="checkbox"/> | 6. Ulcers | <input type="checkbox"/> |
| 3. Water related diseases | <input type="checkbox"/> | 7. Skin diseases | <input type="checkbox"/> |
| 4. Sexually transmitted diseases | <input type="checkbox"/> | 8. Other diseases (specify) | <input type="checkbox"/> |

7: Education

7.1 Education level of the household head

- | | | | |
|----------------------|--------------------------|-----------------------|--------------------------|
| 1. Primary Education | <input type="checkbox"/> | 5. University/college | <input type="checkbox"/> |
| 2. Ordinary level | <input type="checkbox"/> | 6. None | <input type="checkbox"/> |
| 3. A' level | <input type="checkbox"/> | 7. Junior | <input type="checkbox"/> |
| 4. Vocational | <input type="checkbox"/> | | |

8.2 Distance to the nearest primary school

- | | | | |
|-------------------|--------------------------|-------------|--------------------------|
| 1. 100 meters | <input type="checkbox"/> | 3. 1-1.5kml | <input type="checkbox"/> |
| 2. 100-500 meters | <input type="checkbox"/> | 4. Over 5km | <input type="checkbox"/> |

8.3 Distance to the nearest Secondary school

- | | | | |
|-------------------|--------------------------|-------------|--------------------------|
| 1. 100 meters | <input type="checkbox"/> | 3. 1-1.5kml | <input type="checkbox"/> |
| 2. 100-500 meters | <input type="checkbox"/> | 4. Over 5km | <input type="checkbox"/> |

8: Water supply and Energy

8.1 Primary (main) water source (Tick appropriate response)

- | | | | |
|-----------------------|--------------------------|-------------------------|--------------------------|
| 1. Communal borehole | <input type="checkbox"/> | 5. Piped water in house | <input type="checkbox"/> |
| 2. Protected spring | <input type="checkbox"/> | 6. Open stand pipes | <input type="checkbox"/> |
| 3. Unprotected spring | <input type="checkbox"/> | 7. Piped water | <input type="checkbox"/> |
| 4. River/lake | <input type="checkbox"/> | 8. Rain water | <input type="checkbox"/> |

8.2 Sufficiency of water source

1. Sufficient throughout the year
2. Insufficient during dry season

8.3 Distance to water sourced

1. 100 meters
2. 100-500meters
3. 1-1.5km
4. Over 5km

8.4 Major Energy sources for cooking:

- | | | | |
|-------------|--------------------------|----------------|--------------------------|
| 1. Firewood | <input type="checkbox"/> | 5. Kerosene | <input type="checkbox"/> |
| 2. Gas | <input type="checkbox"/> | 6. Biogas | <input type="checkbox"/> |
| 3. Charcoal | <input type="checkbox"/> | 7. Electricity | <input type="checkbox"/> |
| 4. Solar | <input type="checkbox"/> | 8. Other | <input type="checkbox"/> |

8.5 Major Energy sources for lighting

- | | | | |
|----------|--------------------------|-------------|--------------------------|
| Firewood | <input type="checkbox"/> | Kerosene | <input type="checkbox"/> |
| Gas | <input type="checkbox"/> | Electricity | <input type="checkbox"/> |
| Charcoal | <input type="checkbox"/> | Other | <input type="checkbox"/> |
| Solar | <input type="checkbox"/> | | |
| Biogas | <input type="checkbox"/> | | |

9 Gender and domestic violence

How would you rate the prevalence of domestic violence in this area?

1. None

2. Very rare
3. Relatively common
4. Rampant
5. Don't know

What are common abuses in this community?

(Multiple response)

1=Battering/beating

2=Burning

3=Verbal abuses/insults

4=Attempted murder

5=Forced sex

6=Unwanted sexual touches

7=Marrying off girls early

8=Threatening violence against spouse or children

9=Use of proceeds/money without spouse consent

10=Preventing spouse from owning property

11=Preventing spouse from using family land

12=Stop spouse from talking/community meetings

12=Preventing spouse from working outside home

13=Engaging children in work instead of school

14=Not economically supporting family

15=Locking spouse or children out of house

16=Other.....

Who are the main victims of domestic violence in the area? **(Multiple responses allowed)**

1. Girls
2. Married women
3. Boys
4. Men
5. Children
6. Maids
7. Other _____
8. Don't know

Who are the perpetrators of the abuses?

(Multiple)

1=Male spouse

2=Female spouse

3=Other relative

4=Clan elder

5=Community leader

6=Stranger

7=Employer/boss

8=Male teacher

9=Community member

10=Police man/soldier

11=Other.....

12=Male teacher

Where are cases of gender and domestic abuses normally reported/referred?

(Multiple)

1=Police

2=LC/community leaders

3=Religious leader

4=Clan leader

5=NGO/CBO

6=Sub-county/probation officer/CDO

7=Courts of law

8=Head-teacher

9=Health worker

10=Media

11=Others

HIV/AIDS

What is the prevalence of HIV/AIDS infection in this area?

1. Very low
2. Low
3. High
4. Very high
5. Don't know

What factors are likely to contribute to the spread of HIV/AIDS in this area?

1. Poverty
2. Lack of information
3. Peer pressure
4. Alcohol abuse
5. Drug abuse
6. Parental neglect
7. No antenatal care service
8. No HIV service providers
9. GBV
10. Prostitution
11. Early marriage
12. Other _____
13. Don't know

How can HIV/AIDS be controlled or reduce avoided? (Allow multiple responses)

1. Sensitization activities
2. Prevention of GBV
3. Bylaws against prostitution
4. Promotion of ABC
5. Bylaws against drug/alcohol abuse
6. Improve antenatal care services
7. Engage HIV service providers
8. Bylaws against early marriage
9. Gender empowerment
10. Testing & counselling
11. Other (specify)_____

What are the sources of information about HIV/AIDS?

(Multiple response)

- 1=Television
- 2=Radio
- 3=Newspapers
- 4=Billboards
- 5=Posters/brochures
- 6=Community outreaches
- 7=Drama performances
- 8=Health facilities
- 9=NGO/CBO/CSO
- 10=Religious leaders
- 11=Traditional leaders
- 12=Local leaders/Political leaders
- 13=Family members
- 14=Friends/peers

15=Others.....

10: Credit:

10.1 Most important form of saving 1=Crops in storage 2=Buy livestock 3=Deposit in bank
4=Save with a local SACCO, 5=Deposit it with a friend/relative/at home, 6=other (specify)

10.2 For answer 3 in Q 9.1 (Deposit in bank), Please specify.

Bank name, location, distance (Answer all)

1. Bank name _____
2. Location _____
3. Distance _____

10.3 Do you have access to credit service 1=Yes 2=No

10.4 If yes, what is the main source of credit service? (Tick multiple answer)

- | | | | |
|----------------------------------|--------------------------|---------------------|--------------------------|
| 1. Commercial banks | <input type="checkbox"/> | 7. Government | <input type="checkbox"/> |
| 2. Micro finance institutions | <input type="checkbox"/> | 8. SACCO | <input type="checkbox"/> |
| 3. Moneylenders | <input type="checkbox"/> | 9. NGO | <input type="checkbox"/> |
| 4. Input supply | <input type="checkbox"/> | 10. Other (specify) | <input type="checkbox"/> |
| 5. Self-help group | <input type="checkbox"/> | 11. Not available | <input type="checkbox"/> |
| 6. Internal (family and friends) | <input type="checkbox"/> | | |

10.5 If yes, main purpose of credit service

- | | | | |
|----------------------------------|--------------------------|---------------------------------|--------------------------|
| 1. Agricultural labor employment | <input type="checkbox"/> | 6. Irrigation equipment | <input type="checkbox"/> |
| 2. Seeds purchase | <input type="checkbox"/> | 7. Livestock rearing | <input type="checkbox"/> |
| 3. Fertilizer | <input type="checkbox"/> | 8. Aquaculture | <input type="checkbox"/> |
| 4. Agro-chemicals | <input type="checkbox"/> | 9. Trading agricultural produce | <input type="checkbox"/> |
| 5. Farm machinery | <input type="checkbox"/> | 10. Other (specify) | <input type="checkbox"/> |

0: Project Awareness and Remark or opinion on the impacts

10.1 Have you been informed about the project in your area? 1=Yes 2=No

10.2 If yes, from whom did you learn about the project?

1. NWSC
2. Local Government (Parish chief,
LCs, District/SC officers
3. News
4. Neighbors/Friends
5. Relatives
6. Others

10.3 What is the project impact? Positive Negative

A) If Positive,

- | | |
|---|--------------------------|
| 1. will improve quality of life | <input type="checkbox"/> |
| 2. will provide electricity accessibility | <input type="checkbox"/> |
| 3. will improve agricultural productivity | <input type="checkbox"/> |
| 4. will Increase job opportunity | <input type="checkbox"/> |
| 5. will boost business in trading area | <input type="checkbox"/> |
| 6. Others | <input type="checkbox"/> |

B) Negative

- | | |
|--|--------------------------|
| 1. will will displace people | <input type="checkbox"/> |
| 2. will lose income/land | <input type="checkbox"/> |
| 3. will invite community split/ conflict | <input type="checkbox"/> |
| 4. Others | <input type="checkbox"/> |

10.5 Are you in favor of the project? 1=Yes 2=No 3=Undecided

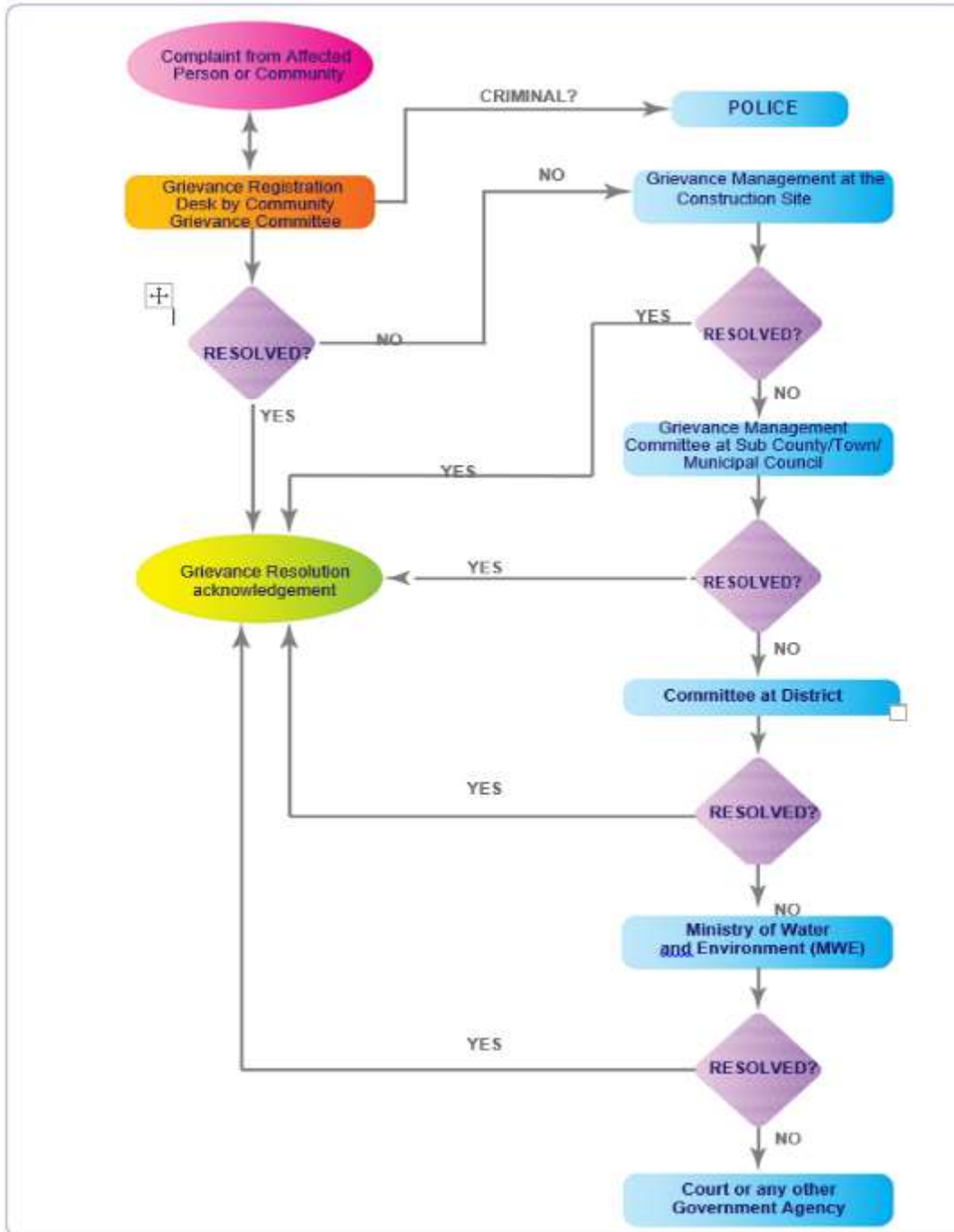
10.6 If yes, are you willing to join or cooperate with project activities? (If they don't understand easily, explain by giving e) 1=Yes 2=No

10.7 Other concerns about project

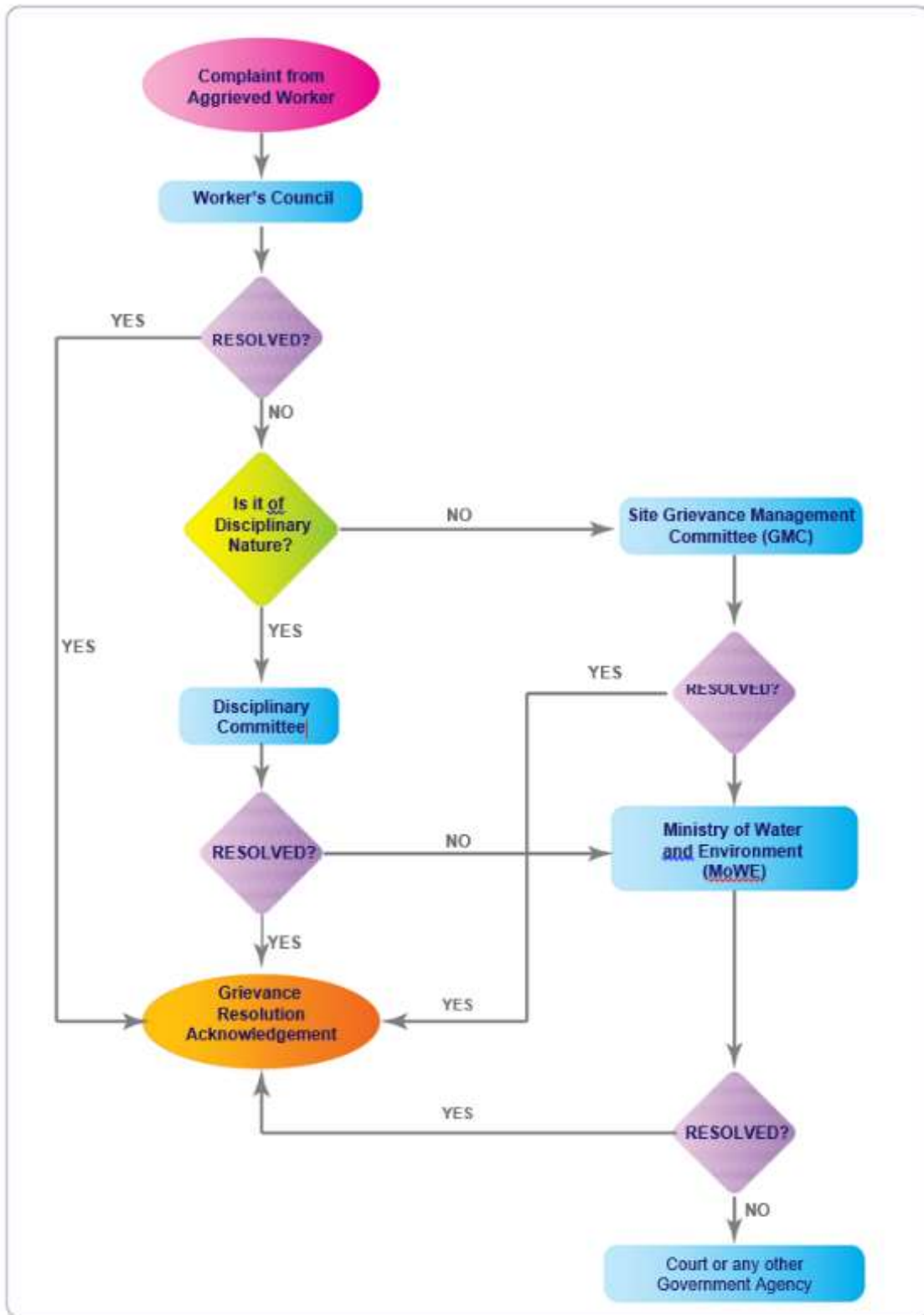
Thank you for your valuable responses

APPENDIX 9: 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)

.....

.....

.....

.....

.....

.....

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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Stakeholder	Action and support is to be provided	Where the case should be Referred?
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 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.

Stakeholder	Action and support is to be provided	Where the case should be Referred?
	<ul style="list-style-type: none"> • 	
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> <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>	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?
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	<p>Form compiled by:</p> <p>Name: -----</p> <p>Signature: -----</p> <p>Position:-----</p> <p>Date:-----</p>	<p>Contact details:</p> <p>Tel:-----Email:-----</p>

APPENDIX 10: DISEASE PREVELANCE AT MALONGO HC III

HEALTH UNIT OUTPATIENT MONTHLY REPORT

Health Unit: MALONGO H/C Level: III Code:

District: MAYUGE HSD: BUYANDA SOUTH

Sub county: MALONGO

MARCH 2022

Diagnosis		0-28 days		29 days-4Yrs		5-9 Yrs		10-19 Yrs		20 Yrs and above	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Epidemic-Prone Diseases											
EPO1. Malaria	EPO1a. Suspected fever	00	00	149	202	64	92	82	209	82	471
	EPO1b. Malaria Total	00	00	76	91	49	59	61	140	32	198
	EPO1c. Malaria confirmed (B/s and RDT positive)	00	00	76	91	49	59	61	140	32	198
EPO5. Dysentery											
CDO1. Diarrhoea-Acute		00	00	18	23	00	01	02	01	00	01
CD03. Urethral discharges						00	01	01	00	01	03

FEB 2022

Diagnosis		0-28 days		29 days-4Yrs		5-9 Yrs		10-19 Yrs		20 Yrs and above	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Epidemic-Prone Diseases											
EPO1.	EPO1a. Suspected fever	00	00	104	98	51	60	63	94	78	286

	EPO1b. Malaria Total	00	00	51	40	19	28	30	69	15	105
	EPO1c. Malaria confirmed (B/s and RDT positive)	00	00	51	40	19	28	30	69	15	105
	EPO1d. Malaria cases treated	00	00	51	40	19	28	30	69	15	105
EPO5. Dysentery		00	00	00	00	00	01	00	00	00	00
CDO1. Diarrhoea- Acute		00	00	16	09	01	03	00	00	00	00
CDO1. Diarrhoea- Persistent		00	00	00	01	00	00	00	00	01	00
CD03. Urethral discharges						00	00	02	00	08	03

DEC 2021

Diagnosis		0-28 days		29 days-4Yrs		5-9 Yrs		10-19 Yrs		20 Yrs and above	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Epidemic-Prone Diseases											
EPO1. Malaria	EPO1a. Suspected fever	00	00	98	129	31	52	33	109	124	289
	EPO1b. Malaria Total	00	00	33	52	09	25	24	55	36	113
	EPO1c. Malaria confirmed (B/s and RDT positive)	00	00	33	52	09	25	24	55	36	113
	EPO1d. Malaria cases treated	00	00	33	52	09	25	24	55	36	113

EPO5. Dysentery	00	00	00	01	00	00	00	01	00	00
CDO1. Diarrhoea-Acute	00	00	12	14	01	00	00	01	01	02
CDO1. Diarrhoea-Persistent	00	00	01	00	00	00	00	00	00	00
CD03. Urethral discharges					00	00	00	02	06	04

NOVEMBER 2021

Diagnosis		0-28 days		29 days-4Yrs		5-9 Yrs		10-19 Yrs		20 Yrs and above	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Epidemic-Prone Diseases											
EPO1. Malaria	EPO1a. Suspected fever	00	00	79	148	19	53	34	110	94	390
	EPO1b. Malaria Total	00	00	21	51	08	24	20	40	14	80
	EPO1c. Malaria confirmed (B/s and RDT positive)	00	00	27	51	08	24	20	40	41	80
	EPO1d. Malaria cases treated	00	00	27	51	08	24	20	40	41	80
EPO5. Dysentery		00	00	01	00	01	00	00	00	01	01
CDO1. Diarrhoea-Acute		00	00	10	13	00	02	02	01	00	02
CDO1. Diarrhoea-Persistent											
CD03. Urethral discharges						00	00	03	00	04	08

OCTOBER 2021

Diagnosis		0-28 days		29 days-4Yrs		5-9 Yrs		10-19 Yrs		20 Yrs and above	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Epidemic-Prone Diseases											
EPO1. Malaria	EPO1a. Suspected fever	00	00	78	102	21	24	28	58	83	284
	EPO1b. Malaria Total	00	00	21	07	14	15	09	26	13	57
	EPO1c. Malaria confirmed (B/s and RDT positive)	00	00	21	27	14	15	09	26	13	57
	EPO1d. Malaria cases treated	00	00	21	27	14	15	09	26	13	57
CDO1. Diarrhoea-Acute		00	00	17	19	00	01	00	00	00	02
CD03. Urethral discharges						00	00	00	00	00	01

APPENDIX 11: SCHOOLS ENROLMENT IN MAYUGE DISTRICT

MAYUGE DISTRICT LOCAL GOVERNMENT AIDED PRIMARY SCHOOLS ENROLMENT AS PER STATISTICAL RETURNS

S/N	School Name	SUB COUNTY	P.1		P.2		P.3		P.4		P.5		P.6		P.7		TOTAL			NO.TRS
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	T			
1	Bukagabo	Malongo	42	45	36	30	34	30	32	24	20	26	32	26	17	20	213	201	414	9
2	Bukatabira	Malongo	126	134	124	122	102	114	120	108	88	84	88	89	48	35	696	686	1382	21
3	Bukizibu	Malongo	159	152	92	66	104	97	98	103	64	56	34	47	27	31	578	552	1130	17
4	Buluuta Parents	Malongo	75	78	65	62	60	65	36	40	33	48	29	41	15	12	313	346	659	11
5	Buluuta SDA	Malongo	51	49	40	43	55	58	43	59	45	46	45	41	7	30	286	326	612	8
6	Kabuuka	Malongo	54	64	44	35	30	19	22	22	10	18	11	14	0	0	171	172	343	8
7	Kitovu	Malongo	107	98	80	72	79	78	72	72	73	65	44	37	27	19	482	441	923	15
8	Malongo	Malongo	86	59	56	63	65	57	42	54	40	51	41	55	22	28	352	367	719	12
9	Nakigo	Malongo	79	76	70	72	71	67	69	66	60	57	39	47	40	30	428	415	843	13
10	Namoni	Malongo	65	60	64	63	50	43	45	42	49	45	33	36	25	27	331	316	647	11
11	Nango	Malongo	134	129	124	119	127	124	89	94	66	81	47	68	29	26	616	641	1257	18
12	St. Barbra Namadhi	Malongo	77	79	74	67	61	64	58	50	41	45	40	43	21	20	372	368	740	11
			1055	1023	869	814	838	816	726	734	548	622	483	544	278	278				

GOVERNMENT AIDED SECONDARY SCHOOLS IN MALONGO SUB COUNTY

S/N	NAME OF SCHOOL	S/C	ENR	NO. TRS
1	Malongo S.S.	Malongo	702	23

PRIVATE SECONDARY SCHOOLS IN MALONGO SUB COUNTY

S/N	NAME OF SCHOOL	S/C	ENR
1	Hands of Love Community S.S	Malongo	190
2	Malongo Ark Peas High School	Malongo	502
3	Kaswabuli S.S	Malongo	150
4	Elite High Sch – Bwondha	Malongo	132
5	Buluuta Adventist S.S	Malongo	109

PRIVATE PRIMARY SCHOOLS IN MAYUGE DIST WITH THEIR

ENROLMENTS

NO	SCHOOLS	SUB-COUNTY	PARISH	P.1		P.2		P.3		P.4		P.5		P.6		P.7		TOTAL	
				M	F	M	F	M	F	M	F	M	F	M	F	M	F		
	ALIMANSI JUNIOR	MALONGO																	
	ALL SAINTS		MALONGO	20	23	26	30	13	21	16	18	15	15						
	ALLIANCE P/S																		
	ALLIED MODAL																		
	BRIGHT KIDS BUKAGABO P/S			17	14	11	10	11	13	17	8	7	10	2	10	10	18	75	83
	BRIGHT STAR P/S																		
	BUBODHE ISLAMAIC																		
	BUGIYA MODERN P/S																		

BUGOMA P/S			34	31	8	2	7	2	4	4	3	3	2	2	2	3	59	43
BUKAGABO CHILDRENS CENTRE			12	22	12	16	22	19	20	22	7	12	12	18	7	6	92	105
BWAGU COMMUNITY																		
BWEMBE ISLAMIC P/S																		
CHILDREN'S CENTRE BUKAGABO																		
CHOICE JUNIOR																		
CONER STONE			18	9	12	16	14	29	14	24	22	17	12	10	16	18	108	123
EBENEZER BWONDHA P/S			7	4	0	0	1	0	3	0	0	0	0	0	0	0	15	4
EDEN VIEW P/S																		
ELGON JUNIOR			30	29	27	34	32	34	29	33	25	28	29	26	21	22	193	212
EXCELL JUNIOR																		
FREEDOM CITY P/S																		
GENESIS C/CARE																		
GOD'S CARE P/S																		
GODS WILL		MALONGO	25	27	20	25	22	23	15	20	10	15	0	0	0	0		
GOLDEN JUNIOR																		
GOOD HOPE P/S BUGOMA			68	79	22	26	20	32	12	24	1	9	3	7			126	177
GOOD SEED P/S																		
GRACE JUNIOR																		
GRACE OF GOD P/S		NAMADHI	27	40	30	35	30	39	35	35	20	37	19	35	15	22		
GREEN LIGHT ACADEMY P/S		NAMONI	30	40	39	23	25	33	22	29	16	19	15	14				
GREEN VALLEY																		
HANDS OF LOVE P/S		NAMADHI	22	20	23	24	19	24	22	32	20	11	20	23	20	20		
HAPPY HOURS NAMUNGOMA P/S																		
HAPPY TIMES																		

HIGH WAY																			
HILL SIDE P/S		MALONGO	10	20	12	15													
HILL VIEW P/S			21	28	21	31	16	31	16	21	22	32	12	24	18	17	126	184	
HIS CHOICE JUNIOR SCH		MALONGO	9	15	10	8	6	10	8	4	4	6	8	4					
HIS GLORY P/S		BUKATABIRA	20	15	15	15	20	17	22	11	16	22	16	10					
HIS MERCIES		MALONGO	38	40	39	45	37	51	36	37	39	34	34	37	52	36	269	276	
HOLINESS JUNIOR SCHOOL			20	15	18	13	20	11	13	12							71	51	
HOPE LEARNING CENTRE			30	27	23	25	33	41	21	23	9	21	8	11	6	14	127	162	
HUDHA ISLAMIC P/S			14	11	24	16	31	17	14	15	19	12	15	17	3	7	120	95	
IMAM HESSEIN																			
ISLAMIC KAFU P/S																			
JAHOVA JUNIOR			12	18	15	9	15	19	20	29	9	19	7	13	7	3	108		
KAFU JUNIOR SCHOOL																			
KASWABULI P/S			59	60	20	19	10	15	16	14	14	19	9	18	5	18	133	163	
KAYANJA PROGRESSIVE P/S																			
KYABAZINGA P/S																			
LAKE VIEW BUYENGO			30	45	15	20	6	7	10	7	4	6	5	0	0	0	85	70	
LAKE VIEW NANGO JUNIOR SCHOOL			16		16	21	12	17	16	21	13	17	14	18	8	10	95	120	
LAKE VIEW P/S NAMONI			20	15	15	20	15	10	4	7	5	4					70	73	
LORD'S WILL P/S																			
LUCKY STAR BWEMBE																			
MALINDI ISLAMIC			3	5	2	4	2	3	-	-	-	-	-	-	-	-	7	12	
MALONGO MODERN		MALONGO	16	17	21	13	15	14	20	16	13	15	8	10					
MANCHESTER NAMUGOWA JUNIOR																			
MARIQUAZ RUQUAYA P/S			34	30	31	31	29	36	29	33	23	24	23	25	8	6	210	175	

MIREMBE N&PS		MALONGO	16	23	15	23	16	18	12	17	11	15	10	9	5	9		
MOON LIGHT P/S																		
MORNING STAR JUNIOR SCHOOL																		
MT. ROSE P/S			22	17	15	17	17	24	20	22	24	19	16	26	19	15	113	140
MUSAANA CHEECA P/S			77	79	30	46	18	15	15	14	10	10	8	9	6	3	164	176
NAKABALE ISLAMIC																		
NAMONI LAKE VIEW P/S		NAMONI	80	79	51	53	64	55	44	46	36	43	32	20	15	20		
NAMUNGOMA JUNIOR SCHOOL																		
NANGO LAKE VIEW		MALONGO	40	25	33	21	15	29	10	20	16	14	9	22	4	22		
NANGO TOWN SHIP P/S		MALONGO	26	24	19	32	21	19	26	28	18	15	20	23	20	20		
NEW HOPE P/S			10	12	6	4											16	16
NEW LIFE P/S																		
NKUTU ISLAMIC P/S																		
NOOR ISLAMIC BULUUTA			15	12	13	7	34	8	9	7	16	14	-	-	-	-	87	48
NOOR ISLAMIC P/S			14	11	13	10	11	7	10	10	12	7	6	6	4	3	70	54
OXFORD P/S																		
PEACE P/S BWEMBE			25	30	20	25	20	40	30	30	35	25	20	20	12	8	100	240
PRICE OF PEACE KAYANJA P/S																		
PRIME JUNIOR P/S			109	143	23	35	28	38	25	38	18	27	20	20	12	11	235	312
PRINCE OF PEACE		MALONGO	26	26	16	20	17	19	19	26	20	27	0	0	0	0	0	0
PRINCE OF PEACE BULABE																		
ROCKFORD JUNIOR SCHOOL		NAMADHI	23	22	26	20	18	21	19	25	15	17	17	11	12	7		
STAR COMMUNITY BASED SCHOOL			17	17	23	19	31	15	20	25	12	15	6	16	10	5	119	112
SKY STANDARD		MALONGO	17	23	20	15	20	21	16	25	15	17	20	27	14	25		
ST. JOHN P/S																		

ST. JOSEPH		BUKATABIRA	21	6	12	8	10	8	8	5									
ST. JUDE P/S			27	14	18	8	30	27	13	24	16	9	11	11	10	5	126	98	
ST. MARY'S			6	10	7	10	8	9	7	4	2	7	3	4	3	9	36	53	
ST. PETER BUYENGO																			
ST.MARY'S BULUUTA																			
STANDARD JUNIOR																			
SUN RISE N & PS		BUKATABIRA	29	26	27	25	10	9	8	11	9	9	8	9	7	9			
TALIBIA P/S		MALONGO	30	25	32	28	35	30	44	33	22	18	15	13	8	6			
TAWHEED P/S																			
TREE OF HOPE P/S																			
TRINITY INFANT SCHOOL KABUUKA			5	4	0	0	0	0	0	0	0	0	0	0	0	0	5	4	
TRINITY NAMONI P/S			16	18	13	15	11	16	13	10	9	10	5	16	-	-	67	85	
VISION NUR & P/S			25	10	29	13	24	21	38	26	16	19	8	11	7	6	147	106	
VISION PREPARATORY NUR & P/S			12	12	10	13	6	21	15	16	6	12	3	6	6	6	58	86	
YESU AKWAGALA P/S		MALONGO	25	23	26	18	22	24	15	17	20	18	18	29	5	9			

ANNEX 12. VALUATION CERTIFICATE.