Republic of Uganda

Ministry of Water and Environment

INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE SOLAR POWERED PIPED WATER SUPPLY SYSTEM AND SANITATION FACILITY IN KITENGA RURAL GROWTH CENTRE, KALIRO DISTRICT - EASTERN UGANDA

DRAFT ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT

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March 2023

DOCUMENT CONTROL

Name of Unit: Environmental Services				
Project Number: JBN/ES/MWE/22/ESIA-001				
Document Title: Environmental and Social Impact Statement for the solar powered piped water supply system and sanitation facilities in Kitenga Rural Growth Centre, Kaliro District.				
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ACRONYMS

AES	Audio Encounter Surveys
ART	Anti-Retrieval Treatment
CAO	Chief Administrative Officer
CDO	Community Development Officer
DLO	District Labor Officer
EHS	Environment Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FDG	Focus Group Discussions
GBV	Gender Based Violence
GIIP	Good Industry and International Practices
GoU	Government of Uganda
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HC	Health Centre
HIV/AIDS	Human Immuno Virus/Acquired Immuno Deficieny Syndrome
ILO	International Labour Organization
IRR	Internal Rate of Return
IUCN	International Union for the Conservation of Nature
IWMDP	Integrated Water Management and Development Project
KII	Key Informant Interview
MBGL	meters below ground level
MoGLSD	Ministry of Gender, Labour and Social Development
MoWE	Ministry of Water and Environment
MoH	Ministry of Health
NEMA	National Environment Management Authority
NUWS	Northern Umbrella of Water and Sanitation
NGOs	Non-Government Organization
OHS	Occupational Health and Safety

OPM	Office of the Prime Minister, Government of Uganda
PAD	Project Appraisal Document
PCR	Physical Cultural Resources
PLA	Participatory Learning & Action
RAP	Resettlement Action Plan
RGC	Rural Growth Centre
RWC	Refugee Welfare Council
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
SEP	Stakeholder Engagement Plan
SHS	Second Hand Smoke
TC	Trading Centre
ToR	Terms of Reference
TSS	Total Suspended Solids
UBOS	Uganda Bureau of Statistics
UNCCD	United Nations Convention to Combat Desertification
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commission for Refugees
UWSS	Urban Water Supply and Sanitation
UTM	Universal Transverse Mercator
VECs	Valued Environmental Components
VESs	Visual Encounter Surveys
WASH	Water, Sanitation and Hygiene
WCS	Wildlife Conservation Society
WHO	World Health Organization
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

BACKGROUND

The Government of Uganda (GoU) through the Ministry of Water and Environment (MoWE), with financing from the World Bank, is implementing 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 by improving access to clean water, improved sanitation and hygiene in small towns and rural growth centers.

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

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

Kitenga Rural Growth Centre (RGC) is one of the selected project site for WSSS due to the low levels of safe water (14%) and sanitation (33%) coverage compared to other locations in the Kaliro District. The RGC is to be supported with a large solar powered piped Water Supply System and two improved sanitation facilities.

PROJECT COVERAGE AND LOCATION

Kitenga RGC project will cover 16 villages; namely; Bukamba A, Bukamba B, Buvulunguti Centre, Kasuleta A, Kasuleta B, Lwamba Beeda, Kibuye B, Nabusira A, Nabusira B, Nakibungulya A, Nakibungulya B, Buvulumguti West, Buvulunguti East in Bukamba Parish and Kanabi, Kisu A, Kitenga villages Nangala Parish of Bukamba Subcounty, Kaliro District, Eastern Uganda.

Bukamba Sub County is located approximately 35 Km by road from Kaliro District headquarters along the Kaliro-Nawaikoike-Buvuluguti road, and approximately 55 Km North of Iganga Town. The sub county is bordered by Kagulu and Nawaikoke Sub-Counties to the West and South, Pallisa District to the East and Lake Kyoga to the North.

PROJECT DESCRIPTION

The WSS project proposed for Kitenga RGC will abstract 862.69 m^3/day of water from Lake Nakuwa – a satellite of Lake Kyoga in Nabusira Village at GPS coordinates 126843.83 m N, 550367.45 m E. Raw water from the lake will then be transmitted through a 500 m transmission main to a 1,223 m^3/day capacity Water Treatment Plant (WTP) at coordinates 125930.51 m N

549167.88 m E within Nabusira village and then treated by aeration, coagulation, flocculation, sedimentation, and filtration before transmission for 3.5 Km to a 346 m^3 capacity reservoir in

Lwamba Trading Centre at GPS coordinates 128092.83 m N, 546100.29 m E. At the water reservoir, treated water will be pumped to a 10 m high tank to allow gravitational flow to a distribution network of 24.252 Km in the 16 villages located in Bukamba and Nangala parishes within Bukamba Sub County. The project will establish a water field office at Bukamba Sub County headquarters (GPS coordinates 126656.08 m N 545304.40 m E) to administer the operation of the water system and a waterborne toilet at Lugonyola Lnading site at GPS Coordinates 549661.43 m E, 125849.49 m N in Bukamba Parish for public use.

The system is designed to provide a total of 3,002 service connections by the ultimate year 2040. However, implementation will be phased to allow a gradual project expansion to the ultimate year. In the initial year of the project, 411 service connections are planned, 377 of which will be household level connections, 2-yard tap stands and 32 stand pipes.

Kitenga RGC will also be supported with two public improved 6 stance sanitation facilities (water borne toilets) in Bukamba Sub County. The sanitation facilities will be gender disaggregated and will comprise of 4No. Single Stances, 1No. Urinal, 2No. disabled people equipped stances, shower facility and complete hand washing facilities.

RATIONALE FOR THE ESIA STUDY

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

ESIA OBJECTIVES

The purpose of this ESIA Study, therefore was to ensure that the proposed project activities comply with the existing environmental protection laws, regulations and standards in Uganda, as well as with the World Bank’s Operation Policies and Practices; and will not have a lasting adverse impact on the country’s population and their livelihood, the natural environment or assets of particular cultural heritage value. The specific objectives of the ESIA were to: (i) provide a description of the environmental and social baseline settings of the project areas; (ii) investigate the likely impacts of the proposed project on the biophysical and social- economic environment and propose appropriate mitigation measures to avert or reduce such impacts; (iii)promote environmental sustainability through identifying and implementing appropriate mitigation measures in the proposed project; (iv) involve and engage stakeholders including communities in the project area in the decision- making process and make them part of the project; and (v)

facilitate informed decision making by the Ministry of Water and Environment (Project Proponent), National Environment Management Authority and other Lead agencies and to set terms and conditions for sustainable implementation of the project.

ESIA METHODOLOGY

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

STAKEHOLDER ENGAGEMENT

Effective and meaningful stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. Consultations were organised at target sites, villages, parish, sub county, and district levels and at relevant ministries, departments, and authorities of government. The meetings engaged farmers, fishermen, women, men, youth, lake/wetland user groups, transporters local leaders and administration, technical officers. Over 258 stakeholders were engaged, 164 of whom were males, and 84 females.

ASSESSMENT OF PROJECT ALTERNATIVES

The alternatives analysis looks into aspects of project components siting and design, water source options, water treatment and sanitation systems and the No Project Option as follows:

a) Project or No Project Alternatives; based on the expected benefits coupled with the poor water supply in the area, a Project Alternative was selected to improve water and sanitation services in the Kitenga RGC.
b) Site Location and Design Alternatives; The option of a suitable and sustainable water source was based on the project water requirement for the ultimate year (2040) at a maximum day demand of 1,164.68 m^3/day and the quality of the water. Ground water and surface water options were considered. Surface water option was preferred as it meet the water quantity and quality parameter compared to ground water.
c) Routing Alternatives; the assessment based on the likely impacts on settlements, livelihoods, and sensitive ecological sites. The principle to minimize resettlement and destruction of the sensitive ecological sites. Hence the routing shall follow the existing road reserves.

d) Technology Alternatives; the key options included use of solar, hydro-power and generator. Based on the initial costs as well as operation and maintenance, the solar powered system as the main power source augmented with hydro-power electricity connection was selected.

e) Operation and Maintenance (O&M) procedures for the proposed systems; the options included outsourcing to a private service provider, transferring to National Water and Sewerage Corporation or transfer to the Water Umbrella Authorities. The best option was based on the availability, proximity to existing water services, as well as cost requirements. The optimal alternative was to transfer to the Umbrella Authorities for operation and maintenance.

POLICY, LEGAL AND REGULATORY FRAMEWORK

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

Policy Framework and Plans

Vision Uganda 2040

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

The National Environment Management Policy 1994,

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

The National Water Policy 1999,

The Uganda National Land Policy 2013,

National Sanitation Policy for Uganda 1997,

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,

The National HIV/AIDS Policy 2004,

National Policy on Disability 2006,

The Uganda National Culture Policy 2006, and

National Climate Change Policy 2012.

Legal Framework

The Constitution of the Republic of Uganda 1995,

The National Environment Act 2019,

Water Act Cap 152,

Local Governments Act Cap 243,

The Employment Act 2006,

The Occupational Safety and Health Act 2006,

The Land Acquisition Act 1965,

The Public Health Act Cap 281,

The Historical Monuments Act 1968,

Traffic and Road Safety Act Cap. 361

The Roads Act, 2019,

The Workers' Compensation Act Cap. 225,

Children Act Cap 59,

Domestic Violence Act 2010,

Mining Act, Cap. 148 2003,

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.

During IWMDP Project Preparation, an ESMF and RPF were prepared that are guiding the preparation of this ESIA. The IWMDP project was prepared and approved under the World Bank Safeguards Operational Policies (OP) hence, its implementation is guided following policies; OP/BP 4.01: Environmental Assessment, 4.04: Natural Habitats, 4.11: Physical Cultural Resources

and 4.12: Involuntary Resettlement and World Bank Policy on Access to Information (2015) are triggered.

The World Bank EHS Guidelines shall also apply during project iplementation .i.e; EHS Guidelines - Water and Sanitation, EHS Guidelines - Air Emissions and ambient air quality, EHS Guidelines - Waste Management, EHS Guidelines - Hazardous Materials Management, and EHS Guidelines - Construction and decommissioning.

INSTITUTIONAL FRAMEWORK

The relevant institutions include the Ministry of Water and Environment, Ministry of Gender, Labour and Social Development, Uganda Police Force, National Environmental Management Authority (NEMA), Ministry of Lands Housing and Urban Development and the District Local Administration Structures.

DESCRIPTION OF THE PROJECT AREAS

This is summarized under the themes as follows:

Physical Environment Baseline

Topography: The lowest and highest points in the project area are 1020 to about 1090m asl with a mean elevation of 1055m asl, which renders most parts of the project area flat as they form lakeshore and wetland landscapes.

Geology and soils: The terrestrial project area of Kitenga RGC is composed of reddish-brown sandy loams and loams on laterite; Greyish and yellowish-brown sands, while Peat or peaty sands and clays and of papyrus residues and river alluvium can be found around the Lake.

Air quality, noise, and Vibration: Air quality, noise and vibration measurements were undertaken at two representative sites; namely Kitege A village for rural and Lwamba Trading Centre for peri-urban settings, for sensitive receptors in the project area. All average values of gases (Nitrogen dioxide, Carbon monoxide, Sulphur Dioxide and Volatile Organic Compounds) and particulate matter (PM2.5 & PM10) were in conformity with World Health Organisation Air Quality Standards. Correspondingly, baseline noise levels recorded at the two sites were within the maximum permissible noise limits as prescribed in the First Schedule of National Noise Standards and Control Regulations, 2003. Vibration results averaged between 0.75 mm/s in Kitenga A village and 0.41mm/s at Lwamba Trading Centre, both below the adopted standards (12,5mm/s) for vibrations associated with construction activities.

Water Quality: Results of a water quality assessment from a sample collected from Lake Nakuwa at a site proposed for the project intake indicate that all physical chemical water parameters were within national baseline values for lake water quality monitoring except for E. coli. Biological water treatment will be required for appropriate disinfection to meet acceptable limits for drinking water.

Biological Environment Baseline

The main land uses within the project area are: Monoculture (sugarcane), subsistence in form of shifting agriculture, settlement in form of homesteads, trading centre infrastructures, agro-pastoral farmland, and fishing. Therefore, the entire project sites, (namely; at the intake, the WTP,

reservoir, and along the transmission and distribution routes, at the sites allocated for the field water offices and public toilet) manifested low species diversity. The highest number of species were recorded were Fabaceae (16), followed by Poaceae (*Graminae*) 15, Asteraceae (*Compositeae*) 9, *Cyeraceae* and *Malvaceae* 6 each, and *Moraceae* 5, the rest registered 4 or less. Out of the one hundred seven (107) plant species encountered in all study sites, only two (2) species were listed under the IUCN Red list of Uganda of 2018. These were: *Milicia excelsa* (Mvule) in *Moraceae,* globally listed Near-threatened and nationally as (EN A2acd,) and *Khaya anthotheca* (*Meliaceae*), globally, VU and nationally as (EN A2acd). The ESIA recommends areas with the Mvule and Khaya trees be avoided in routing the project infrastructure. However, *Milicia excelsa* (Mvule) widespread in most localities in Busoga region and is over-exploited by the communities much as there are reportedly initiatives of ongoing replanting of these tree species. Due to the degraded landscapes, there were limited habitats for fauna in the project area. For instance, only thirteen (13) species of butterflies (classified into eleven (11) genera and Six (6) families), two species of dragonflies (represented by two families, family *Coenagrionidae* and family *Libellulidae*) and eight (8) amphibian species (one toad and seven species frogs seven species were recorded at the water Intake, three species along the distribution and supply pipeline alignments and none at the WTP and reservoir infrastructure sites) were encountered in the project area. All the species encountered are categorized as least concern according to 2020 IUCN Red List of threatened species.

Socio-economic Baseline

Project coverage: Kitenga RGC will cover 16 villages in Bukamba and Nangala Parishes of Bukamba Sub County, Kaliro District. The project will cover 47 percent (16 out of 34) core beneficiary villages that make up Bukamba Sub County. By distribution, 86.7 percent (13 out of 15) villages in Bukamba parish; 33.3% (3 out of 9) in Nangala parish.

Population demographics: The core beneficiary villages have a total population of 11,351 people in 2,221 households and an average household size of 5.1. The most populated is Lwamba- Beeda Trading Centre with 310 Households (HH), followed by Kibuye B (297 HHs), Kanabi (204 HHs) and Kiisa A (275 HHs) villages. Most (87.4%) of the household heads in the project area were males.

Settlement, housing and land use: Settlement patterns have a bearing on water distribution. The major human settlement patterns in Kitenga were dispersed or dotted settlements with dwelling located far apart and often within a village landscape, and linear settlements along roads as observed in Trading centres. Type of housing units also indicates poverty levels within an area with semi-permanent housing indicating high poverty levels.

Income: Subsistence crop farming is the primary source of income for the project-affected households (75.8%), followed by fishing (5.9%), retail training (5.4%) and service provision (1.6%). Other economic activities (8.6%) carried out include charcoal burning, retail trading, hawking, transport business mechanical work and carpentry. On average (35%), households earn between Ugshs. 503,000-1,403,000, however, the biggest population (39.5%) earn less than Ugshs. 503,000 and a quarter of the households (25.3) earn more than Ugshs. 1,403,000 per annum.

Access to water: The main sources of safe water for households (83.9%) in Kitenga are boreholes. Majority (40.7%) and (41.2%) of the people live within 100 – 500 m and 1-1.5 Km from water

source. A few people (3.8%) travel over 5 km to access the nearest water source. At household level, water is mainly a responsibility of adult females (39.6%), followed by boy children (26.4%), adult male (24.3%) and girl children (9.7%). Currently, most households (52.2%) do not pay for water, however a considerable number of households (47.6%) pay either user fees at boreholes (32.2%) on a monthly/biweekly basis or vendors to supply water (67.8%) daily. Majority of households (98.6%) would pay for an improved access to water, with most (78.5%) willing to spend between 100-500 Uganda shillings. The most preferred connections (51.1%) were yard tap stands, public stand pipe (25.3%) and house connections (23.7%). Preferred payment schedules daily (64.9%), monthly (27.7%) and whenever collected (6.4%) and bi-weekly (1.1%).

Sanitation: There is no public sanitation facility nor a designated solid waste management facility in Kitenga RGC. Most households use pit latrines (98.1%) while others used VIP latrine (1.3%) and Ecosan (0.3%), respectively. Most people admitted to have ever observed evidence of open defecation in/near open-source water points (74.4%); and/or in open ground, grass, bushes, crop/grazing fields (46%).

Common water related illness: The major water related illnesses in Bukamba Sub County included flu and cough, malaria, diarrhoea, intestinal worms, gastrointestinal disorders, pneumonia, and typhoid (HMIS2, 2021). The people in Kitenga indicated that Malaria (44.4%) and Respiratory tract infections RTI (36.1%) are the most common diseases afflicting the households in the project area. Other diseases that affecting households are ulcers, skin diseases and dysentery.

Gender Based Violence (GBV): Many (33.2%) and (30.4%) indicated verbal abuses/insults and battering/beating respectively as the most common forms of violence. Females are the main victims of gender-based violence with 37.9% and 39.5% of them being married women and girls respectively. The main GBV offenders are male (51.9%) and female spouses (22.8%) respectively. Others are relatives (12.8%), and strangers (5.8%). GBV cases are normally referred to the LC/community leaders (44.9%), police (28.6%), religious leaders (17.9%) clan leader (3.4%) and Sub- County/probation officer/CDO (1%).

HIV/AIDS: People in Kitenga indicated that HIV prevalence in the community was low (49.9%) to very low (23.1%); however, 20.4% thought that it is high, while 1.1% were not certain of the prevalence rates. The reasons that trigger HIV/AIDS spread were noted to include, lack of information (21.8%) poverty (19.2%) that exposes mainly women to sexual exploitation by men, peer pressure (12.5%), substance abuse especially alcoholism 12.5% and use of drug 5%, prostitution 8.3% and parental neglect 5.6%. As such the project should have a robust HIV/AIDS management plan to guide the sensitization and VCT activities geared towards prevention and spread of HIV/AIDS.

PROJECT IMPACTS

These are:

Positive Impacts

Improved / Increased Access to Safe and Clean Water at community level: The proposed piped water supply system will supply 862.69 m^3 of safe affordable (Ugx 50 per 20 litres) water to a population of 11,351 people from 2,221 households in 16 villages of Bukamba and Nangala

Parishes in Bukamba Sub County–Kaliro District. The water supply will cover a 24.5 Km distribution network. By design, the project proposes 3,002 No. service connections by the ultimate year 2040. In the initial year, 411 service connections are planned, 377 of which will be household level connections, 2-yard tap stands and 32 stand pipes.

Improved community sanitation and Hygiene: According to baseline information, access to sanitation facilities stands at 40% in Bukamba Sub County. In Kitenga RGC, 98.1% of the people use pit latrines for faecal waste management, however, 69.2% admitted sharing the facilities with neighbours and 74.4% had witnessed evidence of open defecation in / near open-source water points (Lake Kyoga, rivers, wetland, ponds) and 46% in open ground / grass / fields / bushes. Therefore, the proposed facilities will contribute to increased access to improved sanitation and reduce the rate of open defecation in the RGC if coupled with behavioural change campaigns.

Source of short-term employment opportunities for local communities: The project will create direct and indirect employment to local people. These will be involved in construction works for laying pipes, water towers, sumps, pump stations, among others. Indirect employment opportunities will involve supply of materials such as sand, stones and food stuffs, and petty business such as food kiosks. The income earned will enhance access to basic needs among the local communities. The impact magnitude has been assessed as Low due to availability and willingness of community members to work on the project.

Improved access to safe and clean water at public institution: Improved access to safe water will directly influence better public health conditions and security. In this regard, the project will in addition, impact on health facilities, schools, landing sites and markets in Kitenga RGC. Available baseline information further indicates that there are mainly boreholes and rainwater harvesting tanks at some public institutions used by both institutions and the neighbouring communities. The boreholes and rain water harvesting tanks tend to dry up during the dry seasons as such, this intervention will be an added source to address the water shortage issue.

Contribute to reduction in water borne diseases: The proposed water supply and sanitation project will contribute towards reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery, and diarrhoea. The people will have access to safe water; the people will have access to improved sanitation facilities. The project will have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced. Improved water supply and sanitation will promote good health and reduce health care costs thus making overall national savings for investment in other developmental activities.

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

Ensure environmental sustainability: The skill for managing water supply and sanitation would result in building social capital which could be extended to better manage the local environment and water resources. The project would include environmental awareness which could be

deployed to manage the environment better. This impact will be enhanced through training of local communities on aspects of environmental and social management.

Promotion of gender equality and empowerment of women and the girl child: The proposed project would free women and girls of the burden of having to spend a lot of their time collecting and carrying water almost daily often from sources distant from their houses. This reduction in burden would allow women and girls time for other activities including involvement in economic ventures that could contribute to reducing poverty and furthering their education (thus increasing school enrolment).

Contribute to local economy growth in the area: The GoU would invest heavily in the construction phase of the proposed project which would involve use of locally available materials. The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water.

Human capacity building and creation of jobs: Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair, and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled labourers. During construction, about 100-150 people will be employed and about 10-20 people will get jobs during operation phase. More employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services.

Additional source of revenue to the government: This water supply and sanitation project will generate revenue to the districts and the 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.

Skills and technology transfer: Skills and technology transfer is foreseen to take place in all phases of the project, though most importantly at the construction phase. It is anticipated that construction works will be contracted to a reputable Ugandan firm which will employ and train local labour. This will avail an opportunity for skills and knowledge transfer into Kaliro 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.

Negative Impacts and Risks

CONSTRUCTION PHASE

Impacts on land use/cover: The project components, namely; WTP, transmission, water reservoir and distribution, mostly traverses farmland under cultivation along settled and built-up areas. The project infrastructure is planned to a large extent, to mostly use road reserves of the existing public roads for its water transmission and distribution lines. However, the water source and WTP sites as well as the reservoir sites shall be located on private land, whose owners will be engaged by MoWE in the process of land acquisition as per the laws governing land acquisition. These impacts and their management have all been detailed in project RAP report.

Degradation of the landscape and breeding grounds vectors: Sourcing earth construction works materials such as murram and gravel will impact on the landscape through borrow pits and stock-piles of such excavations if not satisfactorily managed and restored can pose considerable visual intrusion and degrade the landscape. Construction materials (stone-based products, murram and related fill materials) subsoil will be sourced preferably from relevant licensed sources i.e. extraction and processing of such materials (as applicable) be in accordance with the provisions in such licences and the need to ensure proper restoration.

Loss of vegetation cover: Vegetation clearance and removal will take place at the water source site, water treatment plant, transmission mains, reservoir sites and distribution. According to the project baseline studies on vegetation, the entire project footprint has been modified by a combination of anthropogenic factors such as cropping/farming grazing and seasonal fires amongst others, hence the areas do not have any pristine natural vegetation. However, given the project land requirements are smaller rather compared and largely linear and based on limited land-take, this impact is gauges as of low impact magnitude. In addition, only two tree species of conservation concern were identified within the project foot print and the study suggests that, the design leaves their locations outside the project.

Loss of fauna and their habitats: During project implementation, vegetation clearance, excavation and landscaping are expected to compromise some habitats. The animal groups such as mammals, birds, amphibians, and vertebrates were studied and none were of conservation concern status. This is because the land scape is largely modified area through anthropogenic needs. Based on these, the impact magnitude of the project on fauna is rated as low with its overall impact significance is Moderate.

Disturbance and degradation of wetland ecosystems: The project is likely to affect the wetland at the proposed location of the project intake, raw water transmission pipeline and the WTP. Project works within the wetland will involve removal of wetland vegetation, excavation, installation of project infrastructure and redesigning of topography to suit the proposed project structures. The Developer will obtain a wetland user permit from NEMA before constructing the intake and raw water transmission line within the protection zone of the Lake Nakuwa, a satellite of Lake Kyoga and effort will be made to then follow the conditions keenly in the Wetland User Permit to issue by NEMA.

Generation of solid waste: The proposed project will likely generate waste based on its various activities and the waste can comprise food remains (kitchen based), polythene bags, plastic bottles, plastic offcuts from the HDPE and uPVC pipes papers, wrappings for components to be installed, excavated soil and left overs of construction materials (timber, aggregates, sand, bricks/blocks, steel bar cuttings, glasses, and cement). Such waste needs to be handled reasonably and must not remain in the road reserves or along the water trenches. Inappropriate disposal of waste or spoil could have medium or long-term environmental and public health impact. The likelihood of the impact to occur is Likely given that the project intake, raw water transmission and water treatment plant are in/next to a wetland. The impact magnitude is assigned Low rating resulting in a moderate impact significance.

Noise and vibrations impact: Noise and vibration will occur both on and off site. This will emanate from movement of trucks, excavation works, usage of equipment (compactors and generators). Exposure of communities, workers and fauna to high noise and vibration levels can be a health concern. According to baseline noise level recorded in Kitenga RGC, average noise levels ranged from 47.3dBA in Kitege A village a residential area near the location of intake, WTP and water transmission line to 54.5dBA in Lwamba trading centre, a mixed residential and urban area, the main location for the reservoir tank, and distribution lines. The baseline noise levels measured were within the maximum permissible noise limits for mixed residential areas. The noise levels emanated mainly from people talking and motor cyclists.

Vibrations: The effects of vibration vary and depend on the magnitude of the vibration source, the ground conditions between the source and receiver, presence of rocks or other large structures in the area. Due to absence of Uganda standards for vibrations, the ground vibrations standards are adopted from Ireland. Baseline information on structures in Kitenga RGC indicates that most of the houses are semi-permanent. The baseline vibration measurements in Kitenga RGC averaged at 0.75 mm/s in Kitega A village and 0.41mm/s in Lwamba Trading Centre.

Air pollution: Baseline Ambient air quality measurements indicate that the environment around the project area has pollution levels which are lower based on-air quality measurements which averaged below the recommended limit prescribed in the World Health Organisation Air Quality Guidelines (WHO AQG), 2021 for Particulate Matter (PM2.5, PM10), CO, NO2, and SO2. The project location is generally rural with motorcycles as the main mechanism of transport on community roads. The occurrence of the impact is therefore Low and moderate in overall terms. Traffic safety: The proposed project will cut across several roads within the project area and the baseline information indicates that there are few road accidents in the project area. Those that occur mainly involve motorcycles. Children were also noted to ride bicycles to fetch water along community roads. Motorcycle and bicycle riders therefore need to be notified about works at possible road crossings and the presence of construction trucks within the project area. Due to the rural nature and introduction of construction activities not common in the project location, the impact on traffic will be easily noticeable. The occurrence of the impact is therefore Low and moderate in nature.

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.

Risk of spread of HIV-AIDS and other STDs and STIs: According to Kaliro District Local Government Five Year District Development Plan 2015/16-2019/20, HIV contributes to the total disease burden in the district with a prevalence rate of 6.7%. This is attributed to factors that include the districts' strategic location at cross roads of boarder district and some practices such as widow inheritance, polygamy, poverty, and prostitution which is rampant in Kaliro and the fishing villages. This is to be mitigated by the project through sensitization of 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 amongst other measures.

Risk of Gender Based Violence and Family / Marriage Breakdown: GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. This impact refers to gender-based violence at the community level that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. These communities already experience gender-based violence and therefore the impact is likely to occur. The project has to develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project such as effective and on-going community engagement and consultation, review of specific project components that are known to heighten GBV risk at the community level, for instance; compensation schemes; employment schemes for women; delivery of water supplies among others.

Risks of violation of children rights by contractor and labour force on site: The Children Act of Uganda 2016 prohibits contractors from "employing children in a manner that is economically exploitative, hazardous, and detrimental to the child's education, harmful to the child's health or physical, mental, spiritual, moral, or social development. The contractor should among other things clearly stipulate Code of conduct that includes strict adherence to rules prohibiting Child Labour as in national laws and ILO on matters out-lawing child labor in the project establishment.

Non-Payment of workers, suppliers, and sub-contractors: Delay in payment or the non-payment of suppliers and subcontractors of a contractor is a usual occurrence in projects, and poses a grave risk to project which negatively impacts on the effectiveness of the contractor and as such affect project delivery schedule and it creates mistrust between the parties impacted. It is therefore essential, that contractors ensure they are paid on time so that they do not unnecessarily 'renege' on their contractual obligations with suppliers of good and services to the project. All workers must sign contracts as part of engagement in the project and the contract include clauses for equal pay for equal work.

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 contactor will ensure that the Project is implemented by total adherence to the Employment Act 2006.

Potential destruction of Physical Cultural Resources: There are currently no known archaeological sites within the immediate vicinity of the proposed project area. However, the proposed transmission line from Kikoba village is near a graveyard. PCRs like graveyards and older-trees may be damaged during site clearance, laying of the transmission mains. Given the excavation works involved in the laying of the transmission and distribution system, the possibility that some cultural features being encountered along the alignment cannot be ruled out. The impact Magnitude is low given that the grave yard at the proposed reservoir site is most likely not to be affected since it is located outside the project foot print. A 'chance find' procedure has been prepared to guide actions when there is accidental encounter with physical cultural resources during excavations or civil works.

OPERATION AND MAINTENANCE PHASE

Impact of water abstraction on the Lake water levels: The project will abstract 862.69 m^3 of raw water from Lake Nakuwa, a satellite of L. Kyoga per day, compared to change in storage for L. Kyoga of 10 m^3/s. Water abstraction for the project represents only 0.12% of the total storage, which is negligible. Overall Lake storage, is gauged as minor significant.

Loss of livelihoods sources: areas where project infrastructure will traverse will likely take up space utilized for livelihoods especially roadside or along the right of way. This will disrupt businesses affecting income at households' levels. These concerns are addressed under the RAP especially under comprehensive livelihood restoration schedule.

Potential water uses conflicts: Information generated from the project feasibility report indicate that the project will only abstract 0.12% of the total Lake storage, which is negligible. Baseline information indicates that there were no notable water users (single consumption above 1000 m^3 per day) of the water from the Lake in the project area; except community water collection (using jerrycans) for domestic use and watering of animals and fishing with canoes. It is noted that, though they are currently not potential enormous water users, in future, some of the current low-grade users could increase their water demands thereby causing heightened conflicts over availability and usage. The area has potential to for irrigation, which could become a potential high demand for the water. This impact magnitude is low due to the planned development and implementation of the project source protection plans as long-term strategies for impact management.

Potential risks on project intake infrastructure: L. Kyoga is swampy and characterized by floating islands. The islands pose a risk to the intake structure and can affect the water quality and project infrastructure. For instance, a comparison between 2012 and 2018 and 2022 google imagery indicates floating islands in 2022 compared to the years before. However, the project design has proposed a strong intake structure with precast reinforced concrete rings to accommodate the raw water pumps incurred on a steel columns walkway from the shore to the intake point and a raw water pumping main fixed to the walkway. An electrical switchgear for the pumps will be housed in a weather proof and burglar proof console at the deck.

Pollution of Lake Nakuwa from WTP works: The project WTP will be located approximately 500 m from the intake (from Lake Kyoga). Water treatment sludge generated from treatment of raw water will most likely be allowed to flow back into the Lake. Surface water treatment for potable supplies typically involves coagulation, flocculation, sedimentation, and filtration processes for removing colloidal as well as suspended solids from raw water. The impact magnitude is low since the amount to be released will be low, however; the impact may be larger in the long-term resulting a medium impact Magnitude. The overall impact significance is Moderate.

Water and soil pollution in the project small towns: Baseline information indicates there are no wastewater management facilities such as septic tanks, wastewater stabilisation ponds or lagoons in Kitenga RGC. The most common sanitation facilities are pit latrine both at homestead and institutional level while wastewater from washing and other tasks are poured on open ground. The closest wastewater stabilisation ponds are in Iganga town, 55 Km from Kitenga RGC.

Impact of solid waste nuisance resulting from the project: During the operation of the project, solid waste will be generated from the activities of the water office, WTP and activities of maintaining the water transmission and distribution lines. The wastes that will be generated include food remains, polythene bags, plastic bottles, papers, wrappings for spare parts, and offcuts from plastic pipes among others. Baseline information indicate that there is no designated hazardous and non-hazardous. A Waste management plan for the operation phase of the project shall be developed and implemented and it will guide on aspects sustainable waste management.

Risk of Pollution from poor Mismanagement of sanitation facilities: The project will support construction of two waterborne toilets at public places to serve the residents of Lwamba and Kitenga trading centres. Baseline information indicates that the area has no sewerage system. Therefore, the waterborne public toilets will have septic tank systems. The septic tanks shall be emptied and treated at a site (waste treatment plant) gazetted by NEMA such as the waste stabilization ponds at Iganga town, 55 Km from the project area. Therefore, the collection, transportation and disposal of sewage must be done correctly to minimise or and avoid health risks to communities. The impact is likely to occur since there are no sewerage system in the project area. The impact is long term and continuous although low volumes of waste are expected from sanitation facilities per time interval (emptying may take 6 months) resulting in medium impact magnitude. The overall impact significance is Moderate.

Increased cost per unit/reduced affordability of water: At baseline, majority of the respondents (98.6%) indicated a willingness to pay for piped safe water, with 86.5% willing to pay Ugx.50 per20l jerry can and above. In fact, most (51.1%) preferring yard taps while 23.7 percent requested for household connection. Nonetheless, the amount charged may hinder affordability and utilization, hence increased substitutability. The impact may Possibly occur. The impact magnitude may be Medium since most people in the community did not previously pay for access to water, however they indicated a willingness to pay for improved access to clean water. The overall impact significance is Moderate.

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 magnitude of the impact is expected to be low because 5-7 workers on average per site are expected to be involved in the operation of the system, some of whom may be recruited locally. 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)

Recommendations

The study recommends that the project should proceed but with the following recommendations;

a. Putting in place a robust Project Coordination Unit staffed with matching expertise who are to take charge of the oversight role of environmental and social safeguards compliance considering the provisions in the ESMP, RAP and supportive safeguards tools that have been prepared as part of this project requirements.
b. Construct the proposed water project along the road reserves of the existing public roads as proposed by the Developer to avoid delays, impacts and negotiations associated with land acquisitions with private landlords.
c. Detailed design for the water transmission and distribution lines shall be undertaken in close consultation with UNRA/Kaliro District so as to take care of the new road designs which UNRA/Kaliro District Engineering Department may be planning to implement in the project area.
d. Conduct and implement pre and post construction phase mitigation measures by coordinating with local authorities and involving the district and sub-county officials.

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

a. Ensure employment opportunities for the local people.
b. Ensure health and safety for both workers and the public.
c. Institute a programme where all communities affected by the water and sanitation project have access to adequate and clean water.
d. Control negative impact on biodiversity and wetlands.
e. Ensure all livelihoods lost are restored through a transparent and adequate compensation procedure and livelihood restoration plan.
f. Mainstream HIV/AIDS prevention in contractors SEAP.
g. The Contractor should develop a Construction specific ESMP after developing the final designs. This should constitute the monitoring checklist to be used by the Supervising Consult and MoWE.

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

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

1 INTRODUCTION

1.1 BACKGROUND

The Government of Uganda through the Ministry of Water and Environment (MoWE) received a credit facility 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.

IWMDP comprised of four components, namely: 1) Small-town and Rural Water Supply and Sanitation; 2) Urban Water Supply and Sanitation; 3) Water resources planning and management and; 4) Institutional strengthening.

However, the proposed project is under component 1: Small-town and Rural Water Supply and Sanitation i.e., sub component 1.1 which aimed at supporting small towns and Rural Growth Centres (RGCs) to improve the sustainable provision of water supply and sanitation services.

The support targets 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, Kyenjojo in Western Uganda.

This ESIA Study is particularly for the Kitenga RGC implementation of a solar powered piped water supply system and sanitation facilities located in Kaliro District, Bukamba Sub County as part of the strategy to improve access to clean water, improved sanitation, and hygiene in the mushrooming small towns in the RGC.

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 centres known as small towns and RGCs and these establishments are experiencing rapid population growth rate[1]. The rapid population growth stresses the water and sanitation services existing in these locations. Consequentially, over seven million Ugandans in small towns and RGCs lack access to safe water and 28 million do not have access to improved sanitation facilities (UNICEF, 2018[2]).

Furthermore, due to disparities in access to safe water in Uganda, urban people living in poverty pay as much as 22% of their income to access water from water vendors (Water.org, 2022[3]).

1 Uganda rural population for 2020 was 34,326,791, a **2.51%** increase from 2019. Uganda rural population for 2019 was 33,485,073, a 2.81% increase from 2018. Uganda rural population for 2018 was 32,570,632, a 3.01% increase from 2017 (Source: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).

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

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

Spending such a high percentage of earnings on water reduces overall household income, limiting opportunities to build savings and break the cycle of poverty.

Sanitation coverage poses another significant challenge. The United Nations Joint Monitoring Program (WHO, 2021[4]) reports that only 28% of the urban and 17% of the rural populations had access to basic sanitation facilities by 2020 (UNICEF, 2018[5]). Sewerage coverage is less than 7% in large towns and negligible in small towns (WHO, 2021). The low sanitation coverage indicates unimproved on-site sanitation conditions from unlined public and household toilets and inadequate wastewater treatment and faecal sludge management. This has potentially caused severe water pollution and related environmental and public health issues.

1.3 SAFE WATER AND SANITATION SITUATION IN KALIRO

According to Water Atlas 2022, the access rates in Kaliro vary from 14 % in Bukamba Sub-County to 95 % in Kisinda Sub-County. Kaliro has 596 domestic water points which serve a total of 176,923 people 168,292 in rural areas. About 28 water points have been non-functional for over 5 years and are considered abandoned. Kaliro has 2 piped schemes.

In Kaliro District, 49% of the total population has access to safe water with 41% access in urban areas (MoWE, 2022). The statistics are much lower in Bukamba Sub County – the location of the proposed project in Kaliro District. Safe water coverage stands at 14 percent of the total sub county population (MoWE, 2022). Similarly, access to improved sanitation in the district is very low (33%) with most of the population in the district mainly using pit latrines and 15.4 percent of the population practicing open defecation (Kaliro DLG, 2022).

According to the National Development Plan III[6,] by 2025 Government of Uganda (GoU) targets to attain 85% of its safe water coverage in rural areas while it envisages to attain 100% sanitation (improved toilets) as well as 50% improved hygiene especially hand washing in line with the Plan overall goal which is ***"to Increase household incomes and improve quality of life of Ugandans".***

To contribute to improved water supply and sanitation in Kaliro District, a water and sanitation infrastructure project has been proposed for Kitenga RGC in Bukamba Sub County.

1.4 RATIONALE OF ESIA

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

The proposed water supply system and sanitation facility falls under Schedule 5 Section 4 (a) "Surface water abstraction for urban use of more than 1000 m^3/day", and Schedule 4 section 9

4 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).
5 https://www.unicef.org/media/97281/file/WASH%20affordability%20case%20study-Uganda.pdf (Accessed online on 25th March 2022)
6 Third National Development Plan (NDPIII) 2020/21–2024/25, National Planning Authority-KAMPALA

(d) “Construction of public sanitary facilities” of the NEA, respectively. Schedule 4 and 5 of the NEA requires mandatory ESIA to be undertaken before project implementation.

Furthermore, the World Bank classified IWMDP as Category B. This ESIA study is conducted in pursuant of both national E&S requirement and the World-Bank Operational Safeguards policies Environmental Assessment (OP/BP/GP 4.01). This is in consideration of the nature of impacts of associated with the project.

The Environmental and Social Impact Statement (ESIA Report) of Kitenga RGC WSSS will be submitted to the National Environment Management Authority (NEMA) for its review and approval before commencement of project implementation.

1.5 OBJECTIVES

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

1.5.1 SPECIFIC OBJECTIVES

Primarily, the ESIA objectives included:

a. Describe the Policy, Legal and Regulatory Frameworks
b. Provide a description of the environmental and social baseline settings of the project areas;
c. 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;
d. Analysis of proposed alternatives identified during the feasibility study;
e. Conduct evidence based and participatory consultations with project stakeholder groups, including potentially affected persons, ensuring their views and comments are documented and taken into consideration.
f. Determine, analyse, and evaluate potential (positive and negative) environmental and social impacts (direct, indirect, and cumulative impacts) likely to result from the proposed Kitenga Centre RGC Piped Water supply and Sanitations Systems (WSSS) project implementation activities.
g. Identify feasible and cost-effective mitigation measures for the impacts identified.
h. Prepare an Environmental and Social Management Plan (ESMP) and other relevant management plans to guide environmental and social management of the project during implementation;
i. 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

j. Propose recommendations to ensure overall environmental and social sustainability of the project.

1.6 THE ESIA STUDY PROCESS

ESIA for the Kitenga RGC Solar Powered WSS project 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).

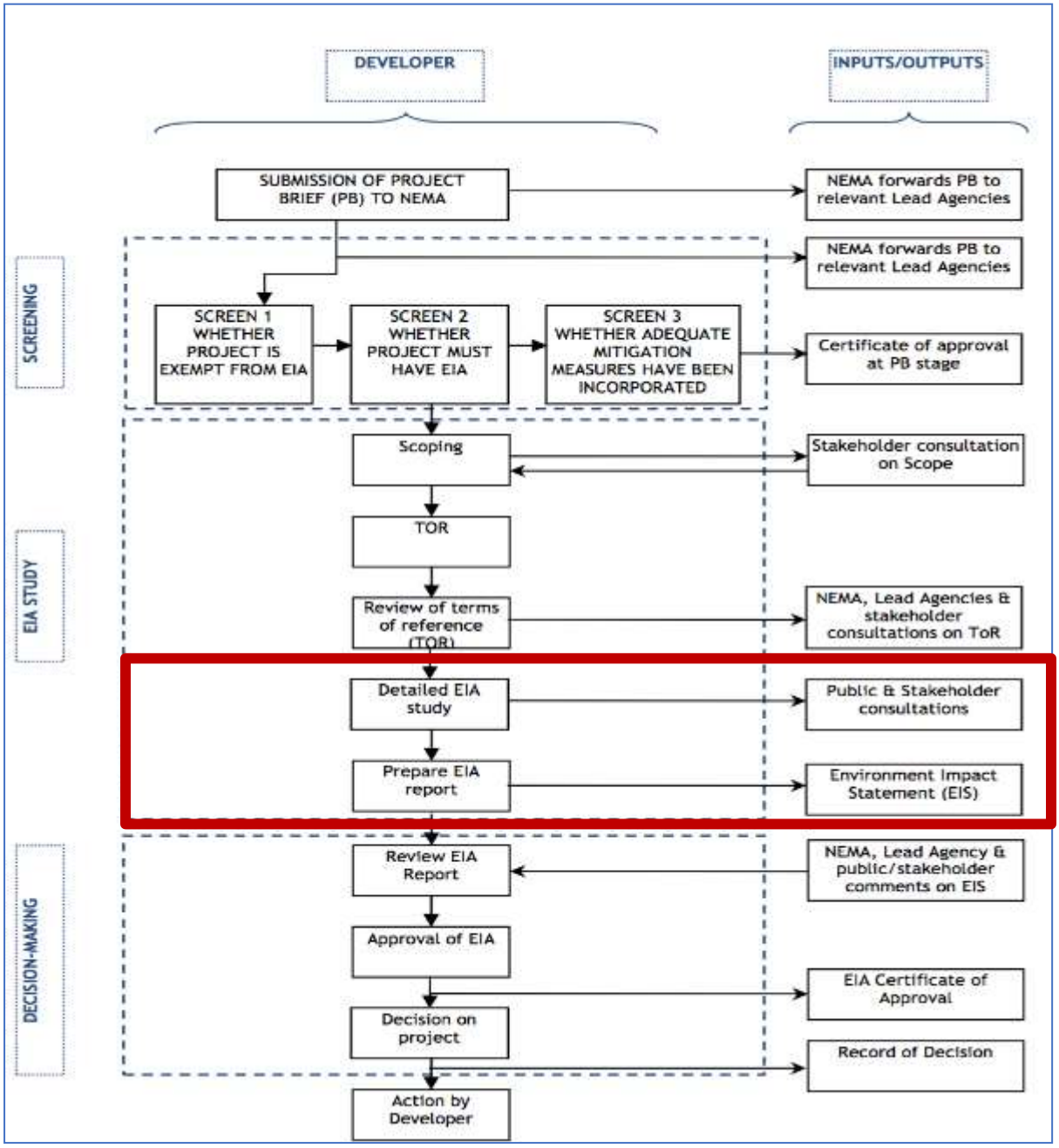


Figure 1-1: ESIA Process in Uganda according to ESIA Reference Manual, NEMA, June 2002

(a) Screening: The proposedKitenga RGC Solar Powered WSS project was screened to preliminarily establish its key potential environmental and social impacts and the level of

environmental and social assessments that would be required. The project falls under Schedule 5 of the National Environmental Act 2019 which require mandatory assessments to be conducted before implementation.

(b) Scoping: This was the first step in the ESIA, and it was determining the scope/extent of work to be undertaken in assessing the likely environmental and social impacts of the proposed project. This process entailed literature review, site reconnaissance visits which was conducted in the project area from (14^{th}- 22^{nd} February 2022), consultative meetings with relevant agencies and stakeholders including project affected persons (PAPs) and with the local leaders to obtain their views and comments on the project and the ESIA studies. This culminated in the preparation of an E&S Scoping Report and Terms of reference, which was submitted to NEMA in keeping with EIA practice and procedures on 7^{th} June 2022 and approved. The NEMA conditions of approval of the terms of reference for this ESIA are presented in ***Table*** 1-1 below and included in ***Annex A*** of this report.

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

No.	Condition	Incorporation in the report
(i)	Provide a comprehensive description of the project components and activities covering the construction and operational phases, associated infrastructure, details of the design and capacity of water supply systems, the methods and chemicals to be used for water treatment, and size of the workforce; and the implications of these on the environment.	Included in Chapter 2 (Project Description) of this report
(ii)	Undertake geotechnical investigations of the proposed project sites to inform the design and construction of the Water Supply Systems and Sanitation Facilities.	Reviewed and required information included in the geology and soils sections (6.1.4 and 0). Geotechnical investigations report Appendix 7
(iii)	Include in the ESIA reports hydrological investigative reports in regards to the potential impacts of the project on underground water resources within the proposed project areas, and mitigation actions to address such impacts.	Included in Section 6.1.2 – Water Resources and Hydrology. Detailed Water resource and hydrology studies included in the project Feasibility Study
(iv)	Provide a detailed description of the waste streams that will be generated from the activities of the piped water supply systems and sanitation facilities, and the measures and equipment that will be put in place to handle such waste.	Included in Section 2.4.1.1.9 (Dirty back wash from the WTP), Section 2.4.1.1.10 (Sludge from the WTP) and 0

No.	Condition	Incorporation in the report
		(Operation of the sanitation facilities)
(v)	Include in the ESIA reports other relevant baseline information that is project site specific, on the soils, water, air quality and noise levels; as well as, clear colored photographs depicting the current status of the project areas and the neighbouring environs.	Included as Chapter 6 (Baseline Conditions)
(vi)	Provide clear colored and well-labelled location maps/images (preferably each covering A-3 size papery and accurate sets of GPS coordinates clearly indicating the site boundaries and locations of the various project components. Ensure that all GPS coordinates are provided in UTM format.	Clear coloured and well-labelled location maps/images have been provided in Chapter 2 (Project Description) and Chapter 6 (Baseline Environmental and Socio-economic)
(vii)	Append to the ESIA report well-labelled copies of the proposed site layout plan (preferably covering A3 or larger paper size) that shows the layout and placement of the different project components.	Included as Annex B of this report
(viii)	Carry out comprehensive consultations with all the relevant key stakeholders of Kaliro District Local Government Authorities, Department of Occupational Safety and Health (Ministry of Gender, Labour and Social Development), local communities in the neighbourhood and the Directorate of Water Resources Management (DWRM) particularly in regards to potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA reports.	Detailed Stakeholder engagement with all the proposed stakeholders engaged has been included in Chapter 7
(ix)	Include in the ESIA report, comprehensive analysis of analysis of alternatives/ options to the selected project location, design and technology among other aspects.	Detailed Alternative analysis has been included as Chapter 3 (Impact Analysis) of this report
(x)	Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified environmental impacts of the proposed project.	Detailed Impact Analysis, including analysis of the project negative impacts with relevant mitigation measures is included as Chapter 8.

No.	Condition	Incorporation in the report
(xi)	Refer to all the relevant provisions of the applicable policies, laws, regulations, guidelines and standards the National Environment Act, No. 5 of 2019.	Detailed analysis of the applicable policies, laws, regulations, guidelines and standards is included as Chapter 4.
(xii)	Append to the ESIA reports, authentic copies of land ownership and acquisition documents.	A resettlement Action Plan for the project has been undertaken. Recommendations of which will guide land acquisition on the project.
(xiii)	Consider any other critical environmental aspects/concerns which, may have not been initially foreseen during preparation of the scoping report and TOR, and include an evaluation of such environmental and social concerns in the ESIA reports.	All the environmental aspects relevant to this ESIA have been included in Chapter 6 (Baseline conditions) and further assessed in Chapter 8 (Impact Analysis)
(xiv)	Indicate the estimated cost of the project evidenced by a certificate of valuation of the capital investment of the project, issued by a qualified and registered valuer in accordance with Regulation 18(1) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.	The project cost is included in Section 2.1 as adopted from the project feasibility and design report – MWE will include a certificate of valuation of the capital investment of the project at submission to NEMA
(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.	To be appended at submission of the report to NEMA

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

The study was preceded by internalization of the Terms of Reference and formulation of appropriate data collection tools. It assessed each of the activities of the project covering physical, biological, socio- economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and

indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for adverse negative/adverse effects. Key aspects involved in the ESIA study focused on literature review, field baseline environmental and socio-economic studies which included noise and vibration measurements, air quality, *in situ* and *ex-situ* water quality measurements, biological surveys covering flora and faunal investigations. Other activities involved impact evaluation and preparation of environmental and social management plan (ESMP) alongside the environmental monitoring plan. Details of these process are presented under chapter 5 of this ESIA herein.

(d) 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. On the other hand, the Bank will review the ESIA report and upon clearance through its procedures, it will be disclosed in its external website.

1.7 ESIA REPORT STRUCTURE

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

Chapter	Highlight on section content
Executive Summary	Executive Summary of the project and its activities, ESIA study methods, key findings and impacts as well as proposed mitigation measures.
Chapter 1	Introduction with details of project background, objective, justification, categorization of the Project and ESIA process.
Chapter 2	Project description detailing its location, project parameters and the proposed project activities at different phases.
Chapter 3	Analysis of project alternatives, a comparison of the options and their significance
Chapter 4	Outline of different laws, policies, regulations, institutions and international guidelines and conventions relating to implementation activities of the proposed project as well as ESIA study
Chapter 5	Describes the ESIA study Methodology and Approach
Chapter 6	Has the description of biophysical and socio-economic baseline information of the project areas
Chapter 7	Public consultation and stakeholder engagement processes and the outcomes of such meetings during the study.
Chapter 8	Is the description of the project anticipated environmental and social impacts and their mitigation measures
Chapter 9	The Environmental and Social Management Plan (ESMP) as well as the Environmental and Social Monitoring Plan
Chapter 10	Is dedicated to the Grievance Redress Mechanism (GRM)

2 PROJECT DESCRIPTION

MWE plans to develop a water supply system and sanitation facility project in Kitenga RGC, Bukamba Sub County, Kaliro district. The project will be implemented is part of GoU overall strategy to increase access to clean water and improve sanitation and hygiene in its rural growth centres.

2.1 PROJECT COST ESTIMATES AND PROPONENT

PROJECT COST ESTIMATES

The overall project has a Capital Investment Cost Estimate of USh 7,692,066,814 as indicated in the cost breakdown in ***Table*** 2-1 below and the valuation certificate annexed.

Table 2-1: Breakdown of Project Investment Costs

Description	Capital Investment Costs (Ugx.)
Preliminary and General Items	519,748,341
Intakes / Pump House	448,836,450
Treatment Plant Works	1,770,000,000
Raw Water Transmission Mains	42,582,384
Clear Water Transmission Mains	460,446,174
Storage Reservoir	389,965,000
Distribution Network & Service Connections	1,134,533,402
Water Office	120,000,000
Mechanical and Electrical for Raw Water	175,000,000
Mechanical and Electrical for Clear Water	497,000,000
Solar Items	159,120,000
Sanitation Facility	271,100,000
Sub Total 1	**5,744,341,752**
Allow 10% Contingency	574,434,175
Sub Total 2	**5,750,086,094**
Allow 18% VAT	1,132,011,887
Grand Total	**7,692,066,814**

(Source: Project Estimates - Project Design report)

THE PROJECT PROPONENT:

Name and physical address

The Permanent Secretary

Ministry of Water and Environment,

Directorate of Water Development,

Rural Water Supply Department

Plot 3-7, Kabalega Crescent Road,

P.O. Box 20026, Kampala.

Investment cost

2.2 PROJECT LOCATION AND AREA OF INFLUENCE

LOCATION

The proposed Kitenga RGC water supply system and sanitation facility project will cover Bukamba and Nangala Parishes in Bukamba Subcounty, Kaliro District, Eastern Uganda.

Bukamba Sub County is located approximately 35 Km by road from Kaliro District headquarters along the Kaliro-Nawaikoike-Buvuluguti road. The sub county is bordered by Kagulu and Nawaikoke sub-counties to the West and South, Pallisa District to the East and Lake Kyoga to the North.

The project main components will be located at GPS coordinates indicated in **Table** 2-2 and shown on a map in ***Figure*** 2-1

Figure 2-2 below.

Table 2-2: Location of Main Project Components

No.	Component	UTM, 36N	Village	Parish
1	Intake	126843.83 m N, 550367.45 m E	Nabusira	Bukamba
2	Water Treatment Plant (WTP)	125930.51 m N, 549167.88 m E	Nabusira	Bukamba
3	Reservoir Tank	128092.83 m N, 546100.29 m E	Lwamba	Bukamba
4	Water field office	126656.08 m N, 545304.40 m E	Bukamba	Bukamba
5	Sanitation facility	549661.43 m E, 125849.49 m N	Lugonyola Landing site	Bukamba

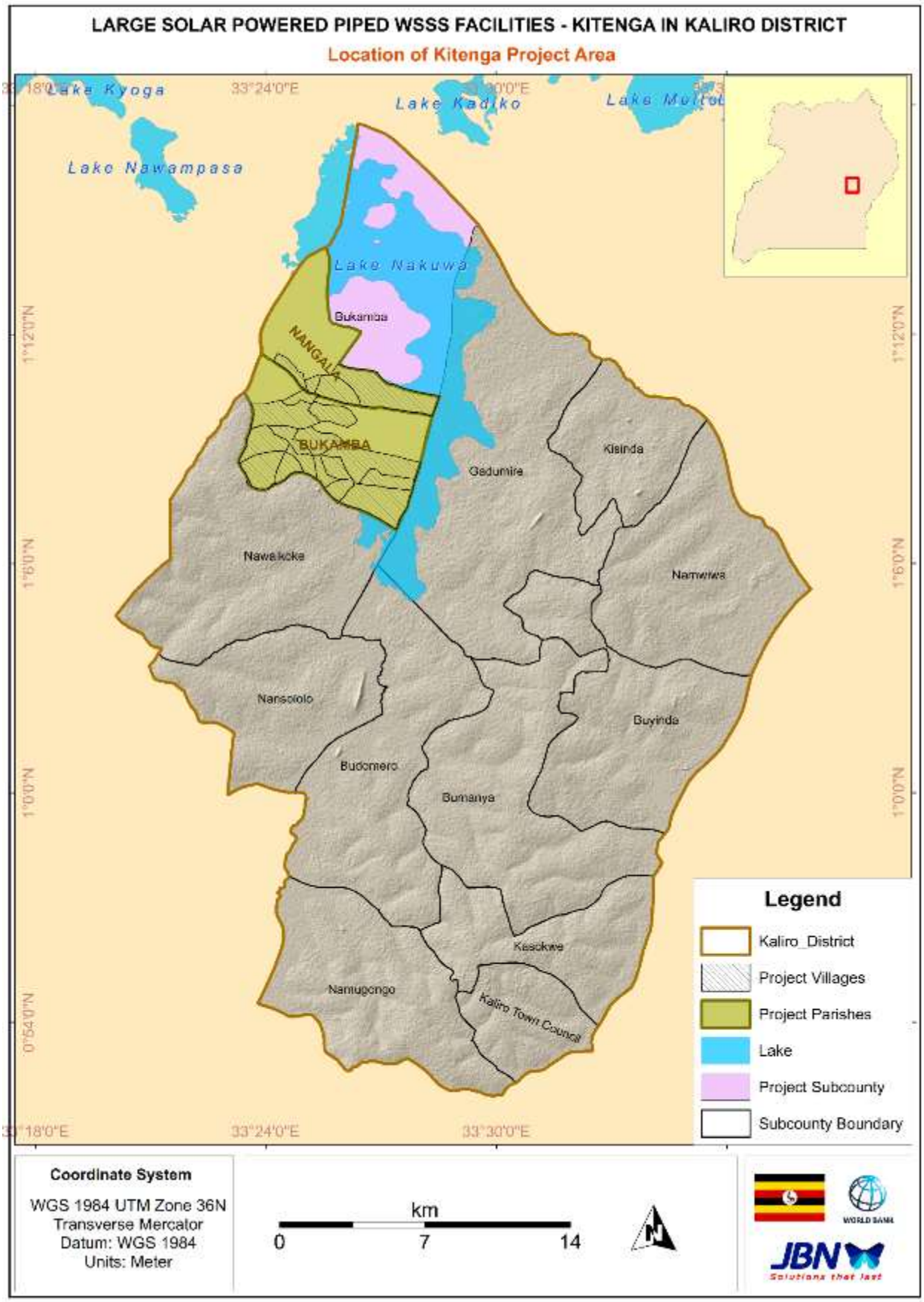


Figure 2-1: Location of the proposed Kitenga RGC Water Supply Systems and Sanitation Facility Project

AREA OF INFLUENCE

The proposed piped water supply system and sanitation facility project will cover 16 villages in 2 parishes; namely, Bukamba and Nangala in Bukamba sub county – Kaliro District (

Table 2-3). The water supply system will also cover several institutions in the RGC, namely; Bukamba Sub County Headquarters, St. Benedict Kitenga Primary School, Buvulunguti Primary School, Bukamba Police Post, and a weekly market in Bukamba Parish.

Table 2-3: Project area of influence

Sub County	Parish	Villages
Bukamba	Bukamba	Bukamba A, Bukamba B, Buvulunguti Centre, Kasuleta A, Kasuleta B, Lwamba Beeda, Kibuye B, Nabusira A, Nabusira B, Nakibungulya A, Nakibungulya B, Buvulumguti West, Buvulunguti East
	Nangala	Kanabi, Kisu A, Kitenga

2.3 DESIGN CRITERIA

Kitenga RGC WSS was designed based on a 20-year design period, starting with the initial year 2020 up to the ultimate year 2040. The projected population to be served by the water supply system by ultimate year is 21,534 people. The Average and Maximum Day Demand (MDD) over a 16-hour pumping regime, which depict the daily water consumption by domestic and nondomestic consumers are 896 m^3 and 1,165 m^3/day, respectively. The water demand was calculated based on the current and future projections on unit consumption rates by different categories of users (based on the ability to pay (5% of Income to access safe water), the preferred the levels of service (house connections, tap standard and yard taps) and the total population of consumers. At a tariff of Ush 50/20 litres, ***Table*** 2-4 summarises the water demand in Kitenga RGC.

Table 2-4: Water Demand by Tariff- ability to pay 5% Income

Design Year	2019	2020	2025	2030	2035	2040
Tariff - Ush 50 per 20 L (Umbrella Tariff)						
Served Population.	10,349	10,718	12,759	15,191	18,085	21,534
Domestic Demand	312	323	384	457	544	648
Government / Institutional Demand	23	24	28	34	40	48
Commercial / Industrial Demand	10	10	12	15	18	21
UFW (Unaccounted-for Water)	86	89	106	126	150	179
Average Day Demand	**431**	**446**	**531**	**632**	**752**	**896**
Maximum Day Demand	**560**	**580**	**690**	**822**	**978**	**1,165**
Source: Project Estimates						

2.4 PROJECT COMPONENTS

The main components of the proposed project will include a water supply system and a sanitation component. Under the water supply system, the following structures are proposed:

- Surface water abstraction point (Intake)
- Water Treatment Plant (WTP),
- Water pumping mains to reservoir (Transmission line),
- Elevated storage reservoirs on a steel tower (Reservoir),
- Solar Pumps and Solar Panels,
- Pump motors and Pump houses,
- Distribution network, and service connections.
- Water field offices.

The sanitation component will mainly consist of two waterborne public toilets.

WATER SUPPLY SYSTEM

Kitenga RGC water supply system will abstract 862.69 m^3/day of water from Lake Nakuwa – a satellite of Lake Kyoga in Nabusira Village. Raw water from the lake will then be transmitted through a 500 m transmission main to a 1,223 m^3/day capacity Water Treatment Plant (WTP). Raw water at the WTP will be treated by aeration, coagulation, flocculation, sedimentation, and filtration before transmission for 3.5 Km to a 346 m^3 capacity reservoir in Lwamba Trading Centre (TC). At the water reservoir, water will be pumped to a 10 m high steel tank to allow gravitational distribution of approximately 24.3 Km in 16 villages of Bukamba and Nangala parishes in Bukamba Sub County.

Figure 2-2: Google image of the Kitenga RGC water supply system

The size and capacity specifications of the water supply system components is presented in

Table 2-5 below. The designs and technical drawings for the water supply system components are included in **Annex B**.

Table 2-5: General specifications of the main water supply system components

No.	Parameter	Description
1	Water source	Lake Nakuwa – a satellite arm of Lake Kyoga
2	Water demand (Ultimate Year)	1,164.68 m^3/day
	Water demand (Phase 1)	**862.69 m^3/day**
3	Raw water transmission - Length	500 m (DN150 DI PN 6)
	Raw water transmission - Capacity	76.43 m^3/hr
4	Water Treatment Capacity	1,223 m^3/day
	Water Treatment Methodology	Aeration, coagulation, flocculation, sedimentation and filtration
5	Primary Power Source	Solar Power (148 No. of mono crystalline PV Solar panels rated 280pW 12 Volts DC)
	Secondary Power Source	HEP (100 kVA)
6	Treated water Transmission – length	3.5K m (OD160 uPVC PN10)
	Treated water Transmission - capacity	73 m^3/hr
7	Reservoir Capacity	346 m^3
	Reservoir Tower Height	10 m
8	Treated Water Distribution Length	24. 252 Km
9	Service Connections - Ultimate Year	2,643
	Service Connections - Phase 1	411

(Source: Kitenga RGC water supply system and sanitation facility design report, MWE, 2019)

The system was designed for a 20-year lifespan; however, initial project implementation will be phased with a gradual project expansion to the project ultimate year 2040.

WATER SOURCE AND INTAKE

Kitenga RGC water supply system will abstract water 500m off the shoreline of L. Nakuma, a satellite arm of Lake Kyoga, in Nabusira village, near Kitenga landing site (**Figure** 2-3) below.

Figure 2-3: Google image showing the location of the water intake

The intake structure (**Figure** 2-4) shall be a DN2000 precast reinforced concrete rings to accommodate the raw water pumps. A walkway with steel columns and an open grid decking will be provided to the intake point from the shores. A DN 150 ST raw water pumping main shall be fixed to the walkway (**Figure** 2-5). An electrical switchgear for the pumps will be housed in a weather proof and burglar proof console at the deck.

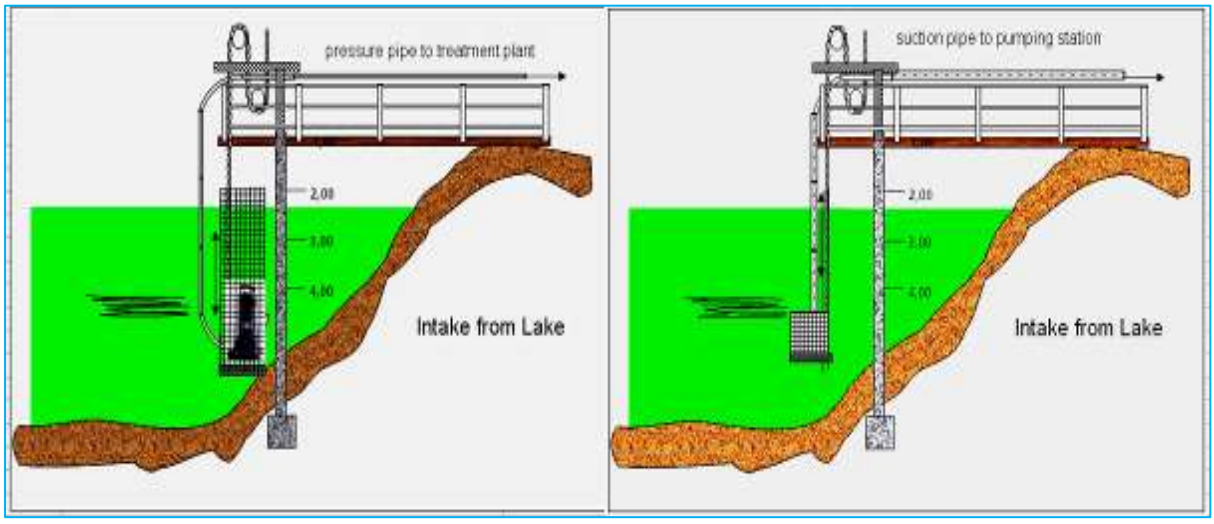


Figure 2-4: Design of the water intake

Figure 2-5: Pictorial representation of the intake structures

The proposed raw water pumps will be the submersible type installed in the intake water well. It is proposed to have a single duty pump and one stand by pump.

WATER TREATMENT PLANT

The Kitenga RGC - WTP will be in Nabusira Village, Bukamba Parish, Bukamba Sub County (**Figure** 2-6), which is located 500m from the project intake.

Figure 2-6: Proposed location of the Kitenga RGC WTP in Nabusira Village

The capacity of the treatment works is 1,223m^3/day inclusive of 5% plant use and is sized for the intermediate year (2030) maximum day. The plant will operate at a rate of 16 hours per day until the ultimate year 2040. The selected water treatment process will emphasise the removal of the total suspended solids (TSS) and colour through aeration, coagulation, flocculation, sedimentation, and filtration (**Figure** 2-7).

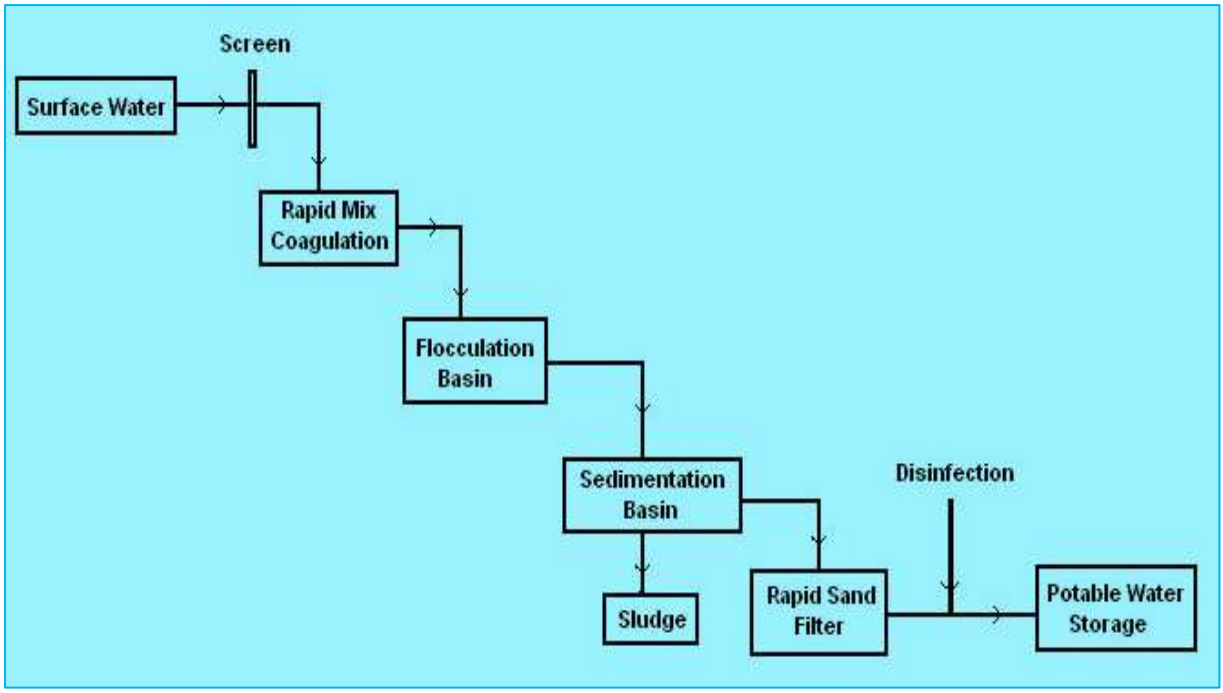


Figure 2-7: WTP flow process

2.4.1.1.1 AERATION

The purpose of aeration is to remove undesirable dissolved gases in water and to add oxygen to water to convert undesirable substances to a more manageable form. The Aerator will receive the raw water from the DN150 mm raw water pumping main through a vertical inlet pipe and bell mouth from where it will cascade over three circular platforms of increasing diameters.

2.4.1.1.2 RAPID MIXING

Rapid mixing is the process by which a coagulant is rapidly and uniformly dispersed through the mass of the water. The process usually occurs in a small basin immediately preceding or at the head end of the 'coagulation basin'. This process is used to generate a homogeneous mixture of raw water and coagulants which result in the destabilization of the colloidal particles in the raw water to enable coagulation. Mixing is provided by pumps, venturi flumes, air jets or rotating impellers (paddles, turbines, or propellers).

2.4.1.1.3 COAGULATION

The process of coagulation may be used in the softening of hard water with lime or lime and soda ash and removal of colour producing substances such as colloidal metallic hydroxides or organic compounds having a much smaller particle size. Coagulation treatment depends upon many factors such as pH, turbidity, chemical composition of the water, type of coagulant, temperature, and mixing conditions; with the pH being the most important factor. Aluminum sulphate, commonly known as alum, is effective for pH values of 5.5 to 8.0. Sodium aluminate is used in special cases or as an aid for secondary coagulation of highly colored surface waters and in lime soda softening to improve settling.

2.4.1.1.4 FLOCCULATION

During flocculation, slow-moving paddle mixers gently stir a mixture of water and coagulant to generate floc. A series of flocculation chambers is usually employed rather than a single basin. The chambers are designed to enhance laminar flow conditions to prevent floc destruction. A stepped-down mixing intensity is utilized in each successive chamber. Flocculation time is also a governing factor in floc formation. Inlet and outlet design must be such as to prevent short-circuiting and destruction of floc. Mixing devices are driven by variable speed drives with the peripheral speed of paddles. Allowances will be made to minimize turbulence at bends and changes in direction. The common mechanical mixing devices are paddle flocculator, flat-bed turbines, and vertical-turbine mixers etc.

2.4.1.1.5 SEDIMENTATION / CLARIFICATION

Sedimentation or clarification is the removal of particulate matter, chemical floc, and precipitates from suspension through gravity settling. The removal of particulate matter is accomplished in settling tanks. Water clarification is a vitally important step in the treatment of surface waters. Poor design of the sedimentation basin will result in reduced treatment efficiency that may subsequently upset other operations. One well known modification of conventional sedimentation basins used in water treatment is the application of laminar flow devices. These devices consist of bunks of small square shaped tubes commonly called tube settlers) or plates (commonly called plate settlers), inclined at 45° to 60° angles from horizontal.

2.4.1.1.6 FILTRATION

The vast majority of present-day water treatment plants use the gravity rapid sand filter. This filter is normally a single-media, down flow, fine-to-coarse filter. The size of the sand and the depth of the bed determine the velocity of applied wash water and the height of the gutter edge above the sand surface. Filters containing coarse sand must be deeper than those containing fine sand, and require a greater velocity of applied wash water to lift the sand and clean the bed properly. The best method of selecting the filter media for a particular plant is by pilot plant tests on the water to be treated.

2.4.1.1.7 CHLORINATION/ DISINFECTION

Lastly, the treated water must be disinfected to make sure harmful pathogens are killed, while not all pathogens are required to be killed, what is required is pathogens to be inactivated so they do not replicate or reproduce. The water is to travel a long way to end users, thus, to ensure it is pathogen-safe until then a certain amount of chlorine is added. The pH levels will be controlled to make it as relatively neutral as possible. Water is collected in the treated water tank and pumped in distribution system, to reach end user.

2.4.1.1.8 SLUDGE TREATMENT

Sludge thickening will be done to reduce the bulk water and to reduce the size of subsequent dewatering units. Thickening is achieved in gravity thickeners. The gravity thickeners receive the underflow from the flocculation tank and sludge from the clarification tank. For dewatering of thickened sludge, sludge drying beds are proposed.

2.4.1.1.9 DIRTY BACKWASH TANK

To keep the rapid sand filters functional, they have to be cleaned periodically to remove the particulate matter. A dirty backwash tank is proposed to collect this particulate matter after filter backwash. The particulate matter/heavy sediments will settle at the bottom of the tank in the form of sludge which will be pumped to Sludge Thickener for further processing. The dirty backwash tank will also collect the supernatant liquid from the thickener. The final supernatant from the tank will then be recycled back to the plant.

2.4.1.1.10 SLUDGE DRYING BEDS

Sludge drying beds are the oldest method of sludge dewatering. These are used extensively in small to medium sized plants to dewater digested sludge. Typical beds consist of a layer of coarse sand 15-25 cm in depth supported on a graded gravel bed that incorporates perforated pipe underdrains. Each section of bed contains watertight walls, underdrain system, and vehicle tracks for removal of sludge cake. Sludge is placed in 30 cm layers and allowed to dry. The drying period is in the range of about 3-5 weeks.

2.4.1.1.11 TREATED WATER PUMPING STATION AND PUMPING MAIN

Treated Water Pumping Station (TWPS) will have Vertical Turbine Pumps 1 Duty and 1 Standby of 66.49 lps discharge against a 176 m head) and motor rating of 170 KW for immediate stage to pump the treated water from treated water tank (capacity 1,040 m^3). The treated water pumping main (TWPM) will be a DI Pipe Class 40 DN-300 mm and 10.08 km long for immediate stage up to the Master Balancing Reservoir (MBR) which are the most economical to install and maintain.

2.4.1.1.12 AUXILIARY STRUCTURES AT THE WTP

These will include a pumping station, workshop/store (which houses an office and laboratory, workshop, and storage), a chemical regulator's office (above the chemical dosing unit), operator's housing units, parking space and power supply infrastructure. A Workshop/store building will have three rooms as follows:

i) Workshop - 42 m^2 floor space
ii) Chlorine store - 25 m^2 floor space
iii) Alum store - 65 m^2 floor space
iv) General store - 65 m^2 floor space

There is one pumping station which is conjoined with the clear water tank. It shall house the following:

a) 2 No. High Lift clear water pumps (1No. duty and 1No. standby)
b) Switchgear and controls
c) All associated pipe works
d) 2 No. air scour blowers (duty and standby)
e) Floor drainage channels and cable ducts

Vehicular access will be provided to facilitate the repair of equipment especially pumps, storage of materials/pipes/fittings/equipment, and operation of the Plant.

2.4.1.1.13 ENERGY AND POWER REQUIREMENTS

The water supply system shall be powered by a hybrid system of solar power augmented by Hydro Electric Power to power the pumps and treatment plant.

Table 2-6:Pumps and Power Requirements

Location	Head (m)	Flow (m^3/hr)	Power (kWh)	Qty	Required Motor Size KWh	Available Motor (kWh)	kva	Total power (KVA)	Amperage (A)	Starting KVA
Raw Water Pump	26	76.4	6	1	7.6	8.0	10.00	10.00	13.91	10.00
Backwash Pump	16	29.1	1.5	1	2.2	3.0	3.75	3.75	5.22	4.00
Clear Water Pump	76	72.8	17.7	1	19.5	20.0	25.00	25.00	34.78	25.00

The power requirement for the pumps and other water treatment plant structures will include the supply of and installation of 148 N^o. of mono crystalline PV Solar panels rated at 280 pW 12 Volts DC, including: PV solar panel support structure (solar array) for mounting solar panels; all electrical accessories; complete as per specifications.

Table 2-7:Solar Power

Location	SOLAR POWER OPTION	
	Solar Panels No. (1x280pW)	Solar Panels area (m2)
Raw Water Pumps	32	52.80
Backwash Pump	12	19.80
Clear Water Pump	79	130.35
Other WTP Pumps and Structures	25	34.56
Source: Project Estimates		

The mains power national grid is located 15 Km away, therefore, the HEP option will involve extending a three-phase power line (15 Km), supply and installation of 100 KVA transformer.

2.4.1.1.14 WATER TRANSMISSION

The Raw Water Transmission Main (RWTM) will be DN150 DI PN 6 from the intake to the aerators at the WTP with a total length will be 500 m and a design capacity of 76.43 m^3/hr. The treated water transmission main (**Figure** 2-8) will be OD160 uPVC PN10 layed along access roads across the villages of Nabusira, Nakibunguliya, Lwamba-Beeda and Buvulunguti in Bukamba Parish,

delivering water from the treatment plant to the reservoir in Lwamba TC for 3.5 Km. The treated water main will have the capacity to deliver a volume of 73 m^3/hr.

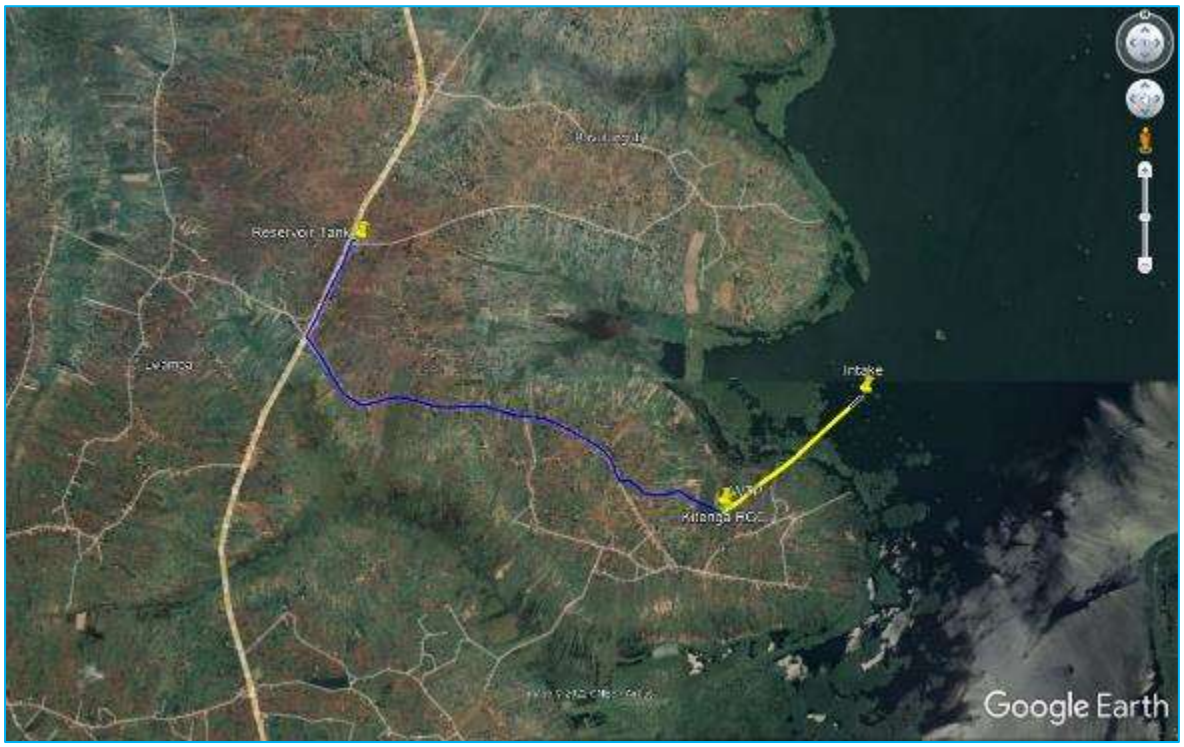


Figure 2-8: Kitenga RGC water transmission line

Table 2-8:Treated Water Transmission Design

Parameter	Clear Water Pumping Main
Demand- 2040 (m^3/day)	1,164.68
Treatment Plant Use (5%) (m^3/day)	0.00
Total Amount of Water Abstracted (m^3/day)	1,164.68
Hours of Pumping (hr)	16
Efficiency (%)	60.0%
Required Delivery (m^3/hr)	72.79
Required Delivery (m^3/s)	0.0202
Pump Installation Level (m amsl)	1043.620
Inlet Level (m amsl)	1089.210
Static Lift (m)	45.6
Hazen Williams Coefficient, Cwh (C)	140

Parameter	Clear Water Pumping Main
Pipe Details	OD160 uPVC PN16
Pipe Diameter ND (mm)	144.60
Pipe Diameter ND (m)	0.145
Velocity (m/s)	1.231
Flow in Pipe (m^3/s)	0.0202
Length of Pipe (m)	5040
Friction Loss (m)	51.2
Fittings losses - 10% (m)	5.1
Total Friction Loss (m)	51.2
Total Head (m)	101.9
Head Used (m)	102
Power (kWh)	33.7
Source: Project Estimates	

2.4.1.1.15 WATER RESERVOIR

The Storage Reservoir will be in Lwamba T C, Bukamba Parish, Bukamba Sub County (**Figure** 2-9).

Figure 2-9: Proposed location of the reservoir tank in Lwamba TC

The required storage capacity of the reservoir (**Figure** 2-10) will be 346 m^3 entailing 30% in the ultimate year of the maximum day demand for Kitenga RGC. Due to the topography of the project area and the high pressures experienced in the far reaches of the distribution network, the reservoir tank will be erected on a 10 m high steel tower of length 1.22 m. The access covers shall be at least 100 mm above the finished level of the roof and shall be lockable. The roof vents shall be similarly set out and shall be fitted with vermin proofing and mosquito proofing fabric. The overall internal dimensions of the reservoir (346 m^3) are Length 8.54 m, Width 8.54 m, and Depth 4.88 m. The pipe work (rated PN10) of the reservoir shall be in Epoxy Coated Steel Pipe work as follows;

- Inlet - DN 150,
- Outlet - DN 200,
- Overflow - DN 150,
- Drain - DN 100.

Figure 2-10: Typical set up of an elevated reservoir

2.4.1.1.16 DISTRIBUTION NETWORK

Water from the reservoir will be conveyed through the feeder mains by gravity for 24.3 Km to 16 villages in Bukamba and Namagala parishes (**Figure** 2-11). A total of 3,002 No. service connections are to be made in Kitenga RGC by the ultimate year 2040. For the initial year of the project, 411 service connections are planned, 377 of which will be household level connections, 2-yard tap stands and 32 stand pipes.

Figure 2-11: Kitenga RGC distribution network in 16 villages

The distribution system to the consumers will have pipes of mainly plastic material as they are the cheapest and the easiest to lay while steel or ductile iron pipes will be used on stretches where the rock out crops cannot be removed hence will be exposed. The number and location of the public stand posts will be determined during the construction period. The distribution corridor will be gained by use of existing public roads and access roads, as the pipes will be buried in the road reserves. The details of the distribution pipes are presented in **Table** 2-9 below.

Table 2-9: Distribution Mains

Pipe Details	Length (m)
OD225 uPVC PN10	915
OD160 uPVC PN10	3,165
OD110 uPVC PN10	4,397
OD90 HDPE PN10	4,560
OD75 HDPE PN10	2,190
OD63 HDPE PN10	4,804
OD50 HDPE PN10	4,221
Total	24,252

2.4.1.1.17 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.

2.4.1.1.18 ACCESS ROADS AND PIPELINE ROAD CROSSINGS

Access to all the project components will be gained through existing public roads, given their convenient location in closed proximity to the existing road network. Access to the intake and WTP will be through a motorable road to Kitenga Landing site. The same road will be used for transmission of the treated water from the WTP to the reservoir.

Table 2-10: Access roads to the intake and WTP in Nabusira village

Figure 2-12: Reservoir site located along the Kaliro-Nawaikoike-Buvuluguti road in Lwamba TC

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 distribution mains will make six major crossings along main access roads and eight minor crossing along village foot paths within Kitenga RGC. The coordinates of the major crossings are presented in ***Table*** 2-11 and their map shown in ***Figure*** 2-13 below. Eight additional minor road crossing are also noted Project works at road crossings have potential to disrupt traffic if planning and execution is not well planned.

Table 2-11: Pipeline road crossings

Road crossing	Village	Coordinate
Road crossing 1	Bukunya	549028.00 m E, 125417.00 m N
Road crossing 2	Nakibunguliya	548289.55 m E, 126182.13 m N
Road crossing 3	Lwamba Beeda	545658.69 m E, 127331.01 m N
Road crossing 4	Kasuleta	546039.02 m E, 128087.21 m N
Road crossing 5	Buvulunguti	546558.93 m E, 129023.98 m N
Road crossing 6	Kisu	546389.66 m E, 130406.20 m N

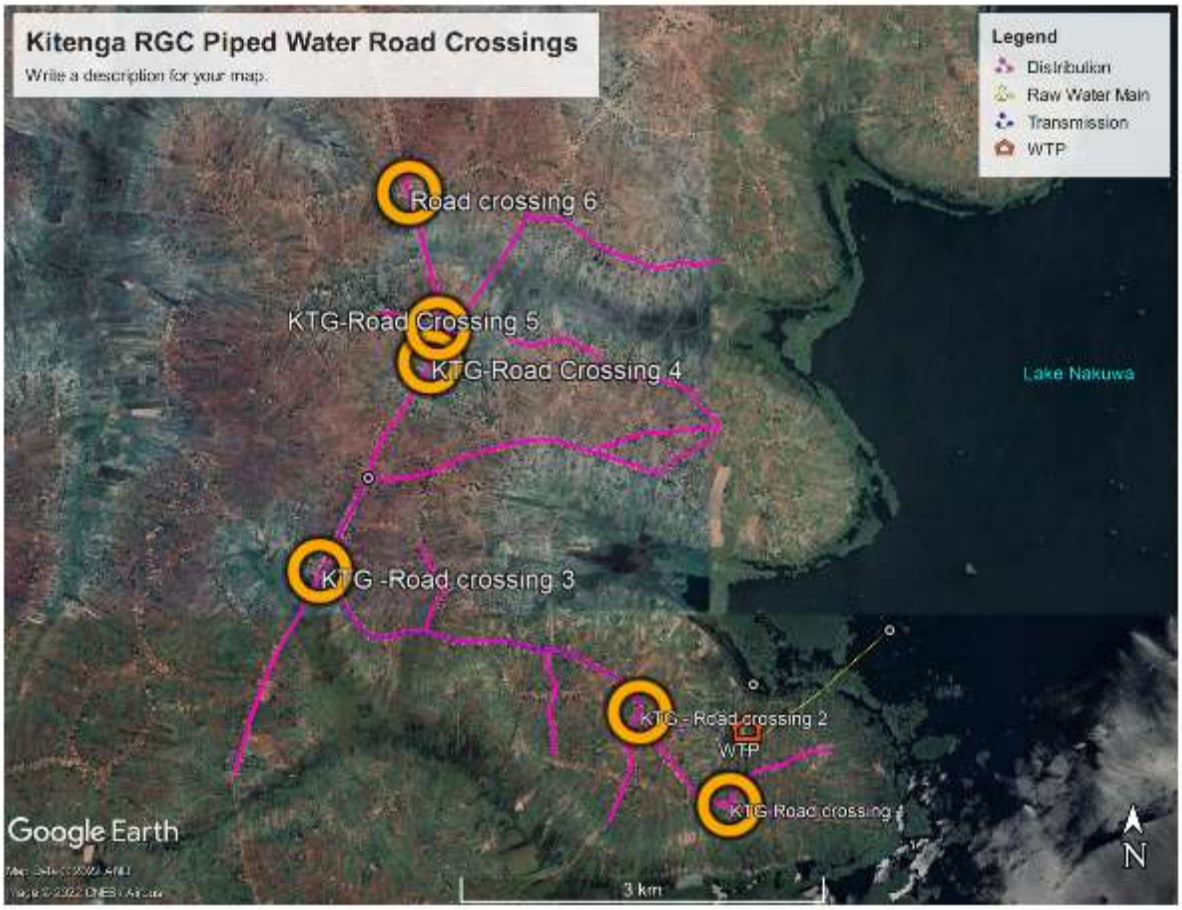


Figure 2-13: Major pipeline access road crossing

2.4.1.1.19 WATER FIELD OFFICE

The field water office will be located at Bukamba Sub County head office. The office (**Figure** 2-14) will include a general office, manager's office, accounts office, sanitation facilities, postage and a store and will be refurbished with a power supply and internet connection (for the online billing and payment system) and IT equipment.

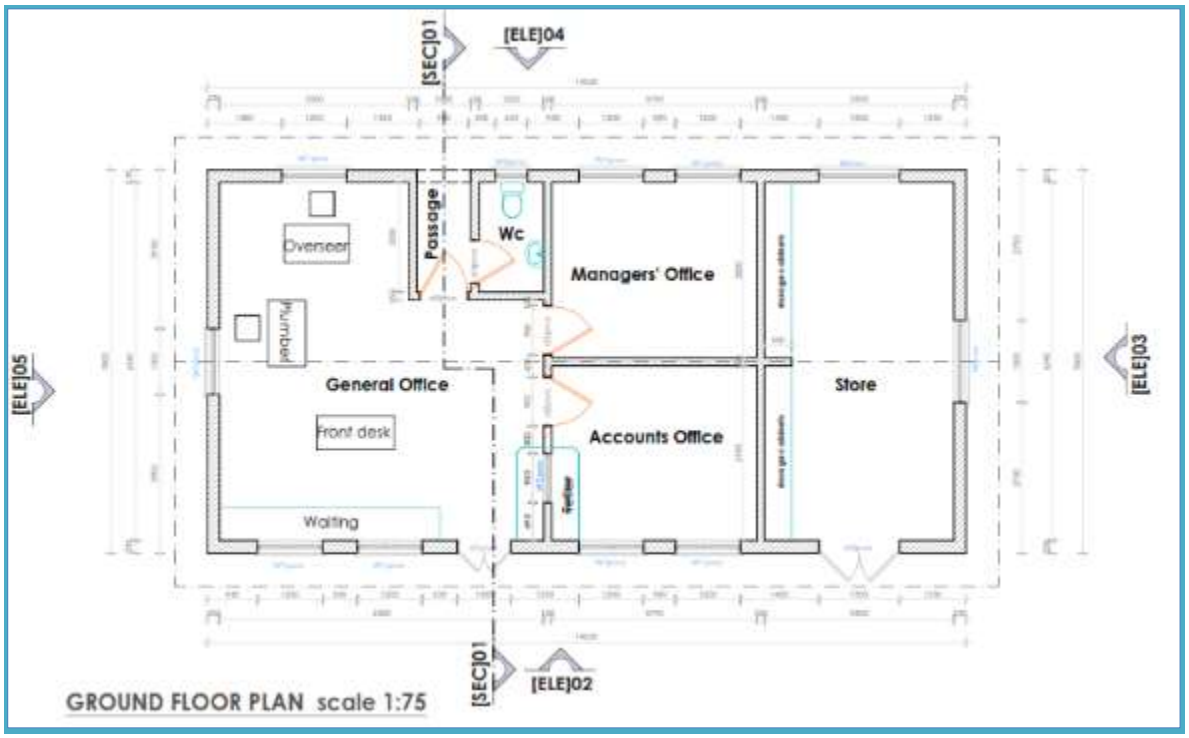


Figure 2-14: Design of the project water field office

The water field office will be located at Bukamba Sub County offices in Bukamba Village (126656.08 m N, 545304.40 m E), Bukamba Parish, Bukamba Sub County.

2.4.1.1.20 SANITATION FACILITIES

2.4.1.1.21 THE PROJECT WILL CONSTRUCT A 6-STANCE WATER BORNE TOILETS AT LUGONYOLA LANDING SITE AT GPS COORDINATES 549661.43 M E, 125849.49 M N IN BUKAMBA PARISH, BUKAMBA SUB COUNTY. THE TOILET WILL BE GENDER DISAGGREGATED (**FIGURE** 2-15) AND WILL COMPRISE OF 4NO. SINGLE STANCES, 1N^{O}. URINAL, 2N^{O}. DISABLED PEOPLE EQUIPPED STANCES, SHOWER FACILITY AND COMPLETE HAND WASHING FACILITIES.

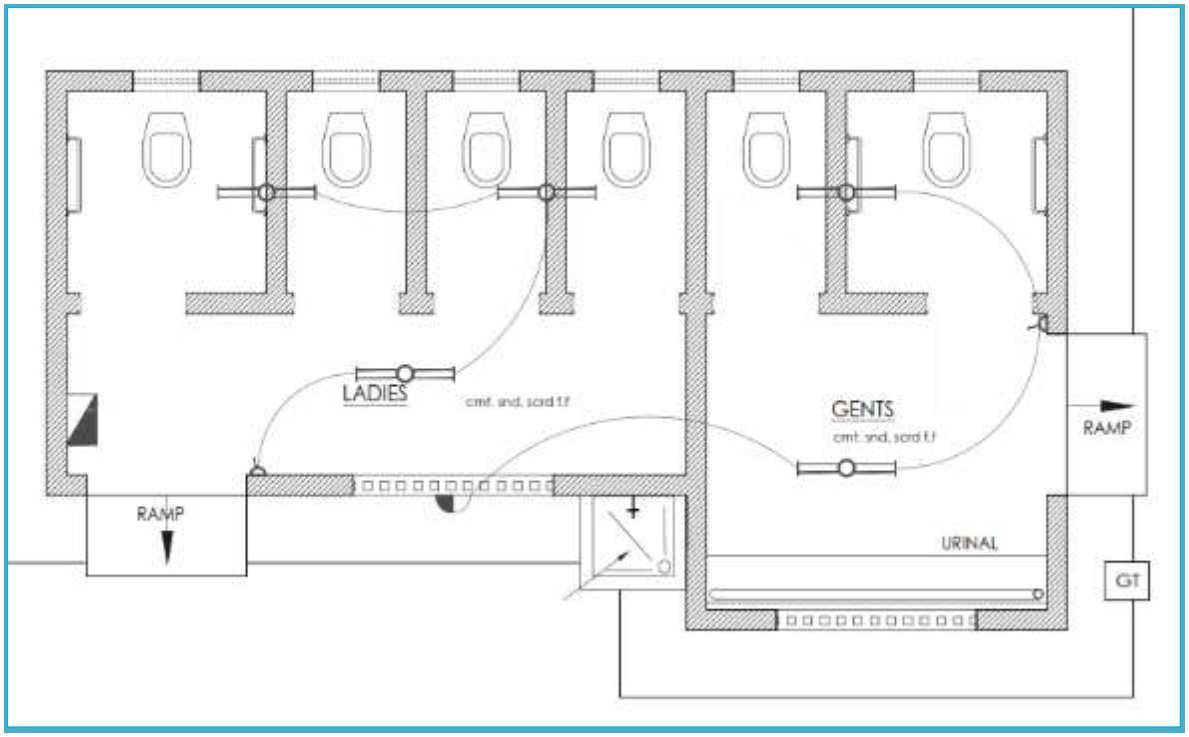


Figure 2-15: Proposed design of the sanitation facility

2.5 CONSTRUCTION PHASE

LABOUR FORCE

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 workforce is anticipated to constitute the key staff members of Contractor and supervising consultant on the project. These will typically include civil engineers, architects, an Environmentalist, a Sociologist, a Health and Safety officer, Site Nurse, site supervisor, foremen, equipment operators, administrators and support staff including about 50 – 80 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.

CAMP SITE AND OTHER AUXILIARY FACILITIES

It will be necessary for the contractor to establish workers camp to provide accommodations for experts that might come outside the project area as well as project offices for the contractor and supervising consultants. Other facilities with the camp shall include: parking yard, material storage yard, material stockpile areas, kitchen, sanitary facilities, site clinic etc. These facilities shall all be temporally acquired 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 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 assessment and approvals shall be secured from relevant authorities. On completion of the project implementation activities, all support infrastructure shall be decommissioned, and all disturbed areas shall be restored to their original state through landscaping and re-vegetation.

MATERIALS SOURCES

Materials such as water, sand, aggregates, and gravels, shall be required by contractor during construction period. These materials required shall be procured from legally existing and operating sources/ person/firms within Kaliro District, with priority sourcing in Bukamba Sub County. On completion of the project implementation activities, the contractor shall decommission, and restore material sources close to their original state through, backfilling, landscaping, re-vegetation etc.

WASTE HANDLING AND DISPOSAL

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

2.6 PROJECT MANAGEMENT

OPERATIONS AND MAINTENANCE

WATER SUPPLY SYSTEM

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

a. Operating the system in accordance with the set guidelines
b. Maintaining the system,
c. Developing the system,
d. Billing the consumers,
e. Collecting revenue,
f. Receiving applications for and making new connections,
g. Making extensions to the system or assets,
h. Attend to all customers,
i. Prepare draft business plans for the authority,
j. Prepare regular status reports for the operations of the system,
k. Maintain regular accounts for submission to the Ministry.

l. Operation of the Management Information System (MIS) as provided by the Ministry.
m. Keep records of the operation of the water supply system - both physical and technical,
n. Ensures that all accounts are audited,
o. Set and publish Tariff & Charges.

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 and fee for every time, they use the toilet or,
- A standard user fee is charged for using the toilet at any one time.

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

HUMAN RESOURCE

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

Table 2-12: Permanent roles during operation phase

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

▪

3 ESIA METHODOLOGY

3.1 GENERAL

The ESIA methodology presented is in line with the Environmental Impact Assessment Regulations, 2020, the National Environment Act 2019 as well as thematic tasks included in the project's Terms of Reference (ToRs).

3.2 SCOPING

Scoping was one of the initial steps in this Environmental and Social Impact Study (ESIS) process. It included consultation of a range of stakeholders to identify potential impacts or issues that were unique to the project context and this allowed for in-depth analysis in the environmental impact study. The general objective of the scoping exercise was to identify the critical biophysical, socio-economic, and cultural issues which needed to be addressed by the ESIA. In this regard, the developer prepared and submitted a scoping report and drafted the ToR for the ESIS to NEMA, which were approved by NEMA (Annex A).

3.3 REVIEW OF RELEVANT LITERATURE

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

a. National Development Plan III 2020/2021-2024/2025;
b. Ministry of Water and Environment Annual Sector Review Report 2021;
c. UBOS Statistical Abstract 2021
d. Project documents which included:
   - ❖ Uganda – IWMDP Project Appraisal Document-PAD No. P163782;
   - ❖ Uganda - IWMDP Project Implementation Manual, 2018;
   - ❖ Uganda - IWMDP Environmental and Social Framework 2018;
   - ❖ Uganda - IWMDP Resettlement Policy Framework 2018;
   - ❖ Detailed Design Kitenga Rural Growth Centre Water Supply System and Sanitation Report, 2021;
   - ❖ Feasibility Study Report for the Kitenga Rural Growth Centre Water Supply System and Sanitation Report, (2019); Environmental and Social Management Framework (ESMF) for the Integrated Water Management and Development Project N^{o}: P163782;

   a. World Bank Operational Policies (OPs);
   b. Uganda Poverty Assessment Report (2014)
   c. IFC Environmental Health and Safety Standards for Water and Sanitation 2007;
   d. Kaliro District Development Plan 2015/14 –2019/20)
   e. The Water Act, and accompanying regulations [Water Resources Regulations (1998), Waste Discharge Regulations (1998), the Water Supply Regulations (1999), Sewerage Regulations (1999); and
   f. The National Environment Management Policy (1994); The National Environment Act 2019; the National Environment (Environmental and Social Assessment) Regulations

2020; and the National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations (1999), National Environment (Waste Management) Regulations (1999) as well as EIA Guidelines 1997.

g. The National Red List for Uganda 2016, published by Wildlife Conservation Society
h. The International Union for Conservation of Nature (IUCN) Red List of threatened species 2019.

3.4 BASELINE ENVIRONMENTAL & SOCIO-ECONOMIC CONDITIONS

3.4.1 PHYSICAL ENVIRONMENT

The following parameters under physical environmental baseline conditions were studied:

3.4.1.1NOISE, AIR QUALITY AND VIBRATION ASSESSMENT

Baseline measurement of noise, air quality (Figure 3-1) and vibration will be undertaken at set out locations in and around the project sites during the ESIA study. The baseline measurements sites were selected considering the presence of potential receptor(s) and its sensitivity to noise, air pollution and vibration impact.

Figure 3-1: Baseline air quality, noise, and vibration measurements in Lwamba Trading Centre

CRITERIA FOR SELECTION OF SAMPLED SITES

The selection of sampling points in the ESIA study was guided by the provisions of the Uganda's Draft Regulatory Air Quality Standards and National Environment (Noise standard and Control) Regulations, 2003 which defines air quality, noise limits for various land uses zones i.e., commercial (urban centers, health units), mixed land use (residential areas, farmlands, schools and administrative units) and industrial zones, therefore, the sampling points were selected to

represent the above land uses in the project area. Noise levels from heavy construction equipment ranges from 80 to 120 dB(A) and power tools commonly used in construction produce noise levels up to 112 dB(A).

During the ESIA studies, the selected receptors for noise, air quality and vibration assessment were purposively sampled based on proposed project works likely to generate noise, air pollution and vibration above the permissible limits and location of major sensitive receptors in respect to project component sites (**Table** 3-1). As part of the ESIA studies, the consultant undertook site-survey/transect walks or drive through to ascertain the number, distribution and potential of the sensitive receptors and their distance from the proposed facility. The selection of location and number of points was guided by the project areas topography, which was mainly characterized by the terrain. Additionally, the land use and land cover (LULC) i.e., existence of tall structures and vegetation would constrain air mixing and cause variation in baseline air quality. Therefore, the baseline focused on selected sensitive receptors based on their location from the proposed project sites. Considering the above, the selected potential receptors for noise, air quality and vibration assessment were clustered and then randomly sampled.

The sampled sensitive receptors were:

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

Table 3-1: Criteria for selection of potential air quality, noise, and vibration sampling points

Project component	Type of activity	Range of noise, air pollution and vibration	Anticipated duration of activity	Anticipated level of nuisance	Key land use/ receptor	Current condition	Sensitivity of site	Selected for measurements
Intake and WTP	Excavation, Levelling, Installation of equipment Metal and carpentry work Haulage of material to the site (2 trucks)	Noise: 80 to 120 dB(A), Vibration:12.5 mm/s Air pollution: NO2, CO2, PM (2.5 and 10), VOCs	8-hour work day; Phased in 3 months	High	Farming Fishing Low/no population in proximity Aquatic environment (amphibians, reptiles, and fish)	No major sources of noise, air pollution or vibration	Negligible	Not selected
Raw water transmission and partly distribution, sanitation facility	Trenching Movement of trucks (about 2), Excavation by causal workers, Use of mobile compactors	Noise: 80dB(A), Vibration: <12.5 mm/s Air pollution: NO2, CO2, PM ($_{2.5}$&$_{10}$), VOCs	Project duration Intermittent (as and when vehicle passes and/or trenching by workforce)	Moderate	Relatively dense settlements (Buvulunguti, Kitenga and Kitenga Trading Centres), Bukamba Primary school, Buvulunguti Primary School	Conversations Motorcycle (1 per hour)	High	Selected: Major sensitive receptors along the stretch

Project component	Type of activity	Range of noise, air pollution and vibration	Anticipated duration of activity	Anticipated level of nuisance	Key land use/ receptor	Current condition	Sensitivity of site	Selected for measurements
Reservoir tank, water office	Excavation, Levelling, Installation of equipment Metal and carpentry work Haulage of material to the site (1 truck)	Noise: 80dB(A), Vibration: <12.5 mm/s Air pollution: NO2, CO2, PM ($_{2.5}$&$_{10}$), VOCs	8-hour work day; (Maximum 1 month)	Moderate	Dense settlement (Lwamba Trading Centre), St. Benedict Kitenga Primary School	Conversations Motorcycle (5 per hour) Sugar cane trucks and transport vehicles (3 per hour)	High	Selected; Representative for dense settlement (Lwamba Trading Centre)
Transmission	Trenching Transportation of workers	Noise: <80dB(A) Vibration: <12.5 mm/s Air pollution: None	Intermittent (as and when trenching is required in location)	Negligible	Settlements (mix of dense, scattered and none)	Conversations Motorcycle (5 per hour) Sugar cane trucks and transport vehicles (3 per hour)	Low	No selected

Selected sampling points: Kitega A village Trading Centre and Lwamba Trading Centre were selected for the assessment due of noise levels, air quality and vibration due to the proximity of the receptors to project works likely to generate moderate nuisance compared to prevailing conditions

AIR QUALITY MEASUREMENTS

Ambient air quality monitoring on seleted parameters was undertaken at two selected locations with potentially sensitive receptors where pollution impacts including dust nuisance are likely be a concern. Air quality measurements were undertaken using the Aeroqual S500 Monitor to establish the baseline values for $PM_{2.5}$, PM10, NO_2, SO_2, VOCs and CO. The Aeroqual monitor was placed on a tripod stand 1.2m above the ground, switched on, allowed 3 minutes of zeroing and 7 minutes of stabilizing readings. The monitor was then be set to start data logging at a frequency of five (5) minutes for 7-12 hours per site. The data was then be downloaded using Aeroqual S500 V6.5 Software and analyzed.

Aeroqual S500 Monitor placed on a tripod stand 1.2m above the ground in Kitenga TC

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

Figure 3-2: Field air quality measurement

NOISE MEASUREMENTS

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

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

The instrument has A, C and Z filter weightings satisfying IEC 61672-1: 2002 Class 1 and time weightings of Fast (F), Slow (S) and Impulse (I) according to IEC 61672-1: 2002.

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

a. LAeq–is the constant noise level that would result in the same total sound energy being produced over a given period.
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.

3.4.1.1.1 SET-UP AND MEASUREMENT

The Casella CEL-633B Environmental & Occupational Noise Meter was first calibrated using Acoustic sound level calibrator type CEL-251 for sound level meter at 114.0 dB (A) for every point measured. The device was placed on a tripod stand (1.2m high) from the ground, 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 was left to log noise readings at an interval of 30 minutes and the results will later be downloaded to a computer for analysis using the Casella Insight software.

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

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

Figure 3-3: Noise measurement at Kitenga TC

VIBRATIONS

Vibration measurements were undertaken at two selected locations within the project sites using Extech SDL800: Vibration Meter/Datalogger. The SDL800 measures and logs vibration data using

a remote vibration sensor with magnetic adapter on 47.2"(1.2m) cable. It offers a wide frequency range of 10Hz to 1kHz with basic accuracy of ± (5% + 2 digits). The machine continuously logs vibrations data using a SD memory card, which allows user to easily transfer collected data to a PC for further analysis. The distance from the point of measuring and the vibration source was measured and recorded. The machine was connected to a 6-inch nail using the magnetic adapter and the nail mounted into the ground near the facilities where vibrations will be measured from. The machine was switched on and allowed 1 minute to settle, it was then be set to start logging data at a frequency of 5 minutes. The peak particle velocity (PPV) will be measured in mm/s.

BIODIVERSITY ASSESSMENT

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

VEGETATION STUDY

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 identified and located along the proposed transmission, Distribution, intake and WTP site, Reservoir site, water field office and sanitation facility sites. 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 3-2: 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%

3.4.1.1.2 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 (***Figure*** 3-4).

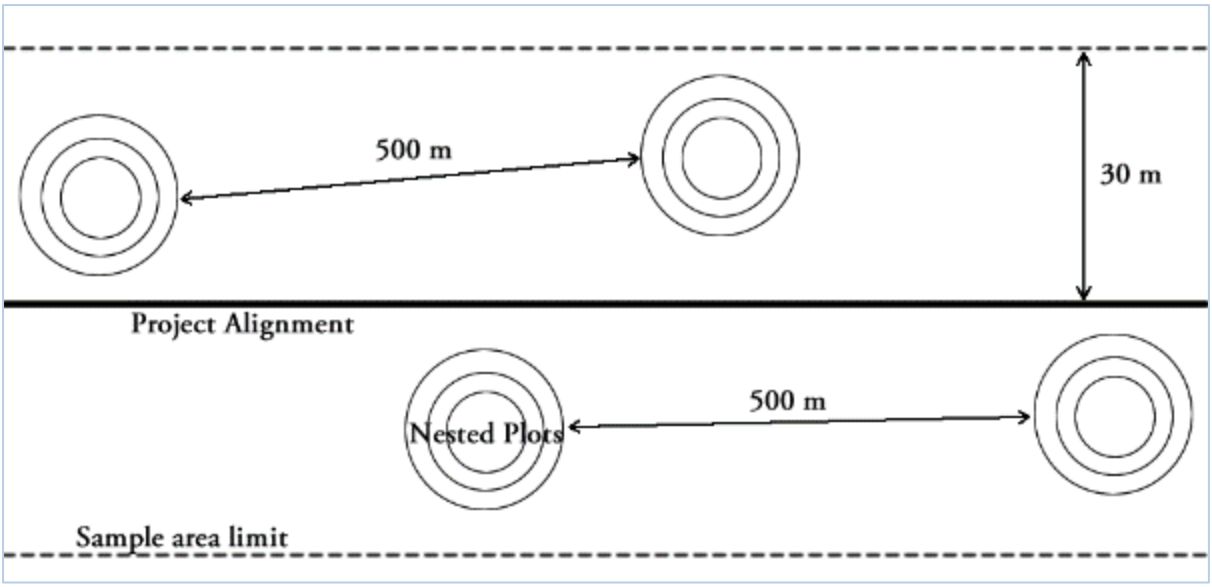


Figure 3-4: Illustration of the flora sampling technique

3.4.1.1.3 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 ≤ 10cm 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).

3.4.1.1.4 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.

3.4.1.1.5 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.

3.4.1.1.6 ANALYSIS

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

FAUNA STUDY METHODS

Fauna assessment were undertaken within the proposed project area especially along the proposed water distribution/transmission lines as well as proposed site for establishment of different project facilities, namely; at the intake/WTP, along the transmission line, at the

reservioir site and along the transimission lines, the project water offices and proposed sites for the sanitary facilities.

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

3.4.1.1.7 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.

3.4.1.1.8 FIELD SURVEYS AND LOCAL CONSULTATIONS

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

3.4.1.1.9 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.

3.4.1.1.9.1 BUTTERFLIES

Butterflies were surveyed using Pallard's sweep net method (Gall, 1985; New, 1991; Warren, 1992; De Vries 1997) along established transects within a radius of 500m of sampling point. The method was used to document the butterfly species richness, as well as estimate their relative abundance. The method was chosen because it is time-efficient and also chosen for the reason that the negative effects associated with handling of individuals are avoided (Nowicki, P *et al.,* 2008). At each of the sampling point, transects of 10m wide and 100m long were established. The fauna ecologists moved through the transect along a fixed line with 5m stretch on either side of the data collectors left and right hand. The observer moved at a slow and uniform / even pace of approximately 1km/h (Pellet 2007) through the transect, recording individuals sighted within the

10m width. Sampling was conducted when weather warmed up or in sunny weather (13-17°C) and between 9am-5pm.

Collected data was analyzed by (1) Estimating species richness based on recorded species presence or absence at the different sites that were sampled. (2) Estimating species relative abundance by counting and recording the number of individuals of the different butterfly species that were encountered while sampling. (3) by ascertaining species conservation status from the 2019 published IUCN red data list and the National red list of Uganda's threatened species (Wildlife Conservation Society 2016). Standard guide by Larsen (1991) was used to identify specimens to species level, and also by matching with Makerere University Museum collections. The species were arranged into families *Hesperiidae, Lycaenidae, Nymphalidae, Paeridae* and *Papilionidae* and genera.

3.4.1.1.9.2 DRAGONFLIES

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

3.4.1.1.9.3 HERPETOFAUNA (AMPHIBIANS AND REPTILES)

The methods employed to study herperto fauna included:

a. ***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.
b. ***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.
c. ***Dip netting:*** Using a dip net, ponds, pools, and streams and other water collection points were dip netted. Adult amphibians and tadpoles encountered were also recorded.
d. ***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) compiling Species checklist, 2) determining the species conservation status using IUCN 2019 published Red List of threatened

species as well as use of the 2016 National Red List for Uganda published by Wildlife Conservation Society.

3.4.1.1.9.4 AVI-FAUNA (BIRDS)

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

Prior to the commencement of field sampling, transects and sampling points were established in and around the different habitat types. The fauna ecologist walked along each transect searching for the presence of birds. Each TSC lasted one hour, during which time all bird species seen or heard were listed in order of detection. The bird surveys were also supplemented with opportunistic observations by recording species found present along the road alignment outside the time of the count. Species were identified through visual observations and the identification of bird vocalizations. The observer's eyes were aided by a 10 x 40 binocular. Efforts were made to sample the different habitats represented along the road alignment. All identifications were made to species level. Birds that were recorded during the survey were categorized as shown in ***Table*** 3-3 below.

Table 3-3: Categorisation of Avifauna by habitat

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	Palaearctic	Species breeding in Europe or Asia

	Ap	Afro-Palaearctic	Species with both Palaearctic and Afrotropical populations

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

3.4.1.1.9.5 MAMMALS

The mammals were surveyed using three main methods:

a. ***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;
b. ***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;
c. **Local consultations:** The fauna specialists held discussions with local residents in and around sampling points about the availability of mammal species in the area.

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.

3.4.1.1.10 CONSERVATION STATUS OF THE BIODIVERSITY IN THE PROJECT AREAS

The conservation status of each flora and fauna species encountered were ascertained using the 2019 versions of the published IUCN red data list and the National red list of Uganda's threatened species (Wildlife Conservation Society – WCS, 2016). This helped to identify species that are nationally threatened in case they exist based on the IUCN red list status. Through examining published distribution records and literature, assessment of distribution range limits of the different species, new records, lack of records of expected species, and determining how typical/representative/distinctive the species/communities in the area were conducted. Therefore, historically existing biodiversity such as indigenous, vulnerable, or endangered species were identified and recommended for preservation or propose other mitigation and enhancement measure for nature.

OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT

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

a. Assessing the capability of the district to handle fire outbreaks;
b. Assessing whether there are enough health facilities to handle emergencies that may arise during construction and operation of the project;
c. Assessing the common mode of traffic within the project area;
d. Assessing if the police have enough resource to provide security to the project's facilities

e. Identifying health and safety hazards construction and maintenance workers will be directly exposed to;
f. Assessing how the project will influence adherence to COVID-19 SOPs; and
g. Assessing how the project will impact on the health, safety, and security of the communities where it is being implemented.

The above assessments will be conducted through; field visits, observation, interviewing the respective stakeholders

- Reviewing primary and secondary literature
- Direct measurement of noise, air quality and vibrations

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

SOCIO-ECONOMIC SURVEYS

Mixed Methods approach in collecting and analysing data and information were 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.

SAMPLING PROCEDURES

Study Population and Sample Size: The total study population stands at 11,974 households as shown in **Table** 3-4 below. A total sample size of 372 respondent households was determined using Morgan and Krejcie (1970) Sample Size Determination **Table** 3-4 as shown in ***Annex C.***

Table 3-4: Study Area, Study Population (N) and Sample Size (S)

Study Area / RGC	Parishes	Study Population	Number of HH(N)	Sample Size (S)
Kitenga RGC	Bukamba and Nangala	11,351	2,738	372
	(Source: UBOS, 2021)			

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

Sampling Plan: A representative study sample using a two (2) stage stratified sampling method was used. In the 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 (Table 3-5).

Table 3-5: Stratified sampling method

Sampling Methods	Adult Female	Adult Male	Total	REMARKS
Probability (random) sampling methods				
a) Stratified random	187	185	372	This sampling methods overlaps in all the others.
b) Simple random	192	180	372	
Non-probability (non-random) sampling methods				
c) Purposive sampling				Applied after stratified sampling
Widow / Widower	30	45	75	
d) Cluster sampling	107	47	154	Applied after stratified sampling

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.

Figure 3-6: Data collection training

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.

DATA QUALITY MANAGEMENT

The consultant ensured proper quality management of all data processes, protocols and methods I.e., design and pre-test of tools, collection, handling, processing, analysis, interpretation and reporting consistently followed appropriate data life-cycle requirements. The consultant ensured that all data collected is enough, 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.

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.

STAKEHOLDER AND PUBLIC CONSULTATIONS

The consultant conducted stakeholder consultative meetings with both state and non-state actors. Effective and meaningful stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. Stakeholder engagement is most effective when initiated at an early stage of the project development process and is an integral part of early project decisions and the assessment, management and monitoring of the project's environmental and social risks and impacts. The consultations organised at target sites, villages, parish, sub county, and district levels. The key aspects consulted on are stated in consultative meeting guide attached. The meetings engaged farmers, fishermen, women, men, youth, local leaders and administration, lake/wetland user groups, transporters etc. In this ESIA studies, the process of stakeholder engagement involved:

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

3.4.1.1.11 STAKEHOLDER IDENTIFICATION

In this context, stakeholders are individuals and organizations potentially affected by the project (directly or indirectly), or who have an interest in or influence on the project and its impacts, either positive or negative. Therefore, to ensure a successful project, the project team identified and engage all stakeholders, determine their requirements and expectation, and manage their influence in relation to their requirements. Several stakeholders, important to this project were identified and analysed in respect to location, interest, mandate, influence, and vulnerability; and including level of literacy and potential mode of engagement. This criterion is explained below.

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

To adequately appreciate the views and concerns of stakeholders about the proposed project, key stakeholders, namely; local community members and leaders, government institutions, and other interested parties were identified and consulted (Table 3-7).

Having carried a reconnaissance to the field and established the location and the concentration of different groups such as neighbouring communities and businesses, schools among others, the ESIA study selected members of these groups (women, elderly and youths), as they are likely to be affected by the project especially during its implementation.

3.4.1.1.12 STAKEHOLDER ENGAGEMENT

Focus Group Discussions (FGDs): Focus Group Discussions (FDG) were useful for revealing through interaction the beliefs, attitudes, experiences, and feelings of participants, in ways that would not be feasible using other methods, such as individual interviews, observation or questionnaires (Gibbs 1997). Focus group discussions were chosen in order to; provide detailed information; on the many qualitative, non-measurable issues (for example, gender roles in the community, youth and women access to social services, nature of economic activities, cultural perceptions about water supply and sanitation, social issues such as child abuse, violence against children, gender based violence, sexual harassment, access to natural resources or the structure of social institutions); and to ensure a more inclusive, participatory approach (as illustrated in figure 4-7 below).

Key Informant Interviews (KIIS): The KII will be used to collect information from relevant respondents closely related to the proposed project. Several KIIs will be done with different personnel at different levels. This will be aiming at understanding or collecting voices/ perceptions, concerns, fears, expectations regarding gender related issues such as Gender Based Violence that might impact on the community among others. The target categories of key informants include DLG officials (DWO, DNRO, DFO, DAO, DEO, Extension officers, Parish Chiefs, etc.), water vendors, community groups, etc.

The details of the stakeholders consulted are listed in **Table** 3-7**,** and photographically catalogued in **Figure** 3-7 (Participant lists attached as Annex D).

Table 3-7: Stakeholders engaged

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
4th February 2022, 24th February 2022	Kaliro District Technical and Political Teams	Chief Executive Officer, District Water Officer, District Health Officer, District Environment Officer, District Community Development Officer, Local Council V Chairperson,	Kaliro District Water Office	6	2	8

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
		Resident District Commissioner, District Planner				
19th February 2022, **24th February 2022,** **8th May 2022**	Bukamba Sub County Technical and Political Teams	Local Council III Chairperson, Senior Assistant Secretary, Community Development Officer, Secretary for Production, Secretary for works and transport, Nangala Parish Chief, Bukamba Parish Chief, Cultural Leader – Bukamba Sub County, Catholic Representative, Councillor – Bukamba Sub County	Bukamba Sub County Headquarters	37	9	46
24th Feb 2022	Bunini, Lungonyora, Kitenga villages	Community members	Bunini village	20	36	56
24th Feb 2022	Land owner at the project water treatment plant	Community members	Kitenga A village	1	0	1
24th Feb 2022	Community members at proposed locations of public tap stand in Buvulunguti Village	Community members	Buvulunguti Village	0	2	2
8th May 2022	Kissi Village	Community members	Kissi Village	10	3	13
3rd May 2022	Lwamba TC	Community members	Lwamba TC	22	5	27
3rd May 2022	Kibuye village	Community members	Kibuye Village	18	0	18
2nd May 2022	Bukamba village	Community members	Bukamba village	4	4	8

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
2nd May 2022	Kitega village	Community members	Kitega village	19	12	41
3rd May 2022	Nabusira village	Community members	Nabusira village	8	2	10
3rd May 2022	Kitenga TC	Community members		15	9	24
25th March 2022	Uganda National Roads Authority -	Head of Design – Roads and Bridges	UNRA Head Quarters	2	0	2
17th May 2022	Ministry of Gender Labour and Social Development	Directors: Occupational Safety and Health	MGLSD Head quarters	2	0	2
8th June 2022	DWRM and DWM	Water officers, Water quality Wetlands Department	MWE headquarters	15	8	23
Total				179	92	281

In Kaliro District Technical and Political Team at Kaliro District Head Quarters on 4th February 2022

Meeting with DHI and DNRO, Kaliro district on 3rd May 2022

Consultation with the Kaliro District CAO on 24th February 2022

Meeting with RDC, Kaliro District on 3rd May 2022

Meeting with DEO, and Education Inspectors on 3rd May 2022

Meeting Bukamba sub county officials on 11th February 2022 in relation to Kitenga RGC

Consultation with the Bukamaba Sub County Political and Technical teams on 24th February 2022

Meeting Bukamba subcounty officials on 11th February 2022

Meetin Kaliro District Planner on 24th February 2022

Community meet Bunini village on 24th February 2022

Community engagement in Bunini village on 24th February 2022

Engagement of the land owner at the proposed location of the WTP on 24th February 2022

Household engagement on the project on 24th February 2022

Consultation on a possible location of a public tap stand on 24th February 2022

Community meeting Local leaders and some of their area residents in Kitega trading centre

Community meeting Local leaders and some of their area residents in Kibuye trading centre

Community meeting Local leaders and some of their area residents in Kibuye trading centre

Community meeting Local leaders and some of their area residents in Kitenga trading centre

Community meeting Local leaders and some of their area residents in Kisu A village

Community meeting Local leaders and some of their area residents in Kisu B village

Community meeting Local leaders and some of their area residents in Kanabi village

Community meeting Local leaders in Kitega village

Meeting UNRA HOD at UNRA on 25th March 2022

Meeting MGLSD on 17th May 2022

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

Figure 3-7: Consulting with relevant stakeholders for Kitenga RGC - WSSSP

GBV AND VAC RISK ASSESSMENT

To ensure that the GBV risk on the project is mitigated, an assessment was carried out to establish the prevalence rates of GBV and the causal effects in the community. As such corrective and mitigation measures were crafted to minimize or/alleviate risk impact during implementation. Notably, the following activities were carried out to inform the risk assessment. Relatedly, Violence Against Children (VAC) using qualitative methods using existing data and interviews from community development offices and community leaders. As such, the consultant:

- Consulted the Bukamba police post on gender and child related cases;
- Review of Ministry of Gender Labour and Social documents
- Uganda Police Crime Report 2019

During the study, the Consultant employed consultative approaches including group discussions with women, business people and roadside vendors, traders, and interviews with key informants such as Government officers to capture their views and concerns about the implementation of the proposed project. Issues raised include concerns and appreciation for the proposed project will be presented in the ESIAs.

DATA ANALYSIS METHODS

Data will be analyzed using a) Thematic Analysis for qualitative findings obtained from FGDs, KIIs, etc; b) Statistical Analysis using Ms Excel for quantitative findings obtained using KoboCollect.

DATA QUALITY MANAGEMENT

The consultant ensured proper quality management of all data processes, protocols, and methods I.e., design and pre-test of tools, collection, handling, processing, analysis, interpretation and reporting consistently followed appropriate data life-cycle requirements. In addition, effort was made to ensure data collected was adequate, accurate, reliable, valid, and acceptable for the purposes for which it was gathered. All the six stages of data management cycle namely; data sources, data collection, data collation, data analysis, data reporting and data usage were all properly managed and controlled

4 IMPACT IDENTIFICATION AND ANALYSIS METHODOLOGY

IMPACT DESCRIPTION

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

- Adverse or beneficial;
- Direct or indirect;
- Short, medium, or long-term in duration; and permanent or temporary;
- Affecting a local, regional, or global scale; including trans-boundary; and

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

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 4-1: 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**

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 4-2: 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***

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***

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 severity criteria and sensitivity criteria as in the significance matrix (Error! Reference source not found.).

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 4-3: Determination of impact significance

		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.

CUMMULATIVE 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.

4.1 FORMULATION OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

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

a. To ensure that all the recommendations in the approved ESIA report are adhered to by the relevant lead agencies/institutions;

b. To ensure that the prescribed environmental and social mitigation measures as well as the enhancement actions are well understood and communicated to all project stakeholders;

c. To ensure that the proposed environmental and social corrective/offset measures are implemented throughout the project implementation phases;

d. To evaluate the effectiveness of environmental and social mitigation/offset measures; and

e. To evaluate the effectiveness of various evaluation techniques and procedures.

The ESMP is included in **Chapter 9**of this report.

4.2 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.

4.3 MONITORING PROGRAM AND OTHER PLANS

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

- Disaster Management Plan
- Chance Finds Procedure
- Grievance redress mechanism

5 ANALYSIS OF ALTERNATIVES

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

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

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

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

5.1 PROJECT VS NO PROJECT OPTION

"NO PROJECT" ALTERNATIVE

Analysis of the "No project" option as an alternative, provides an environmental baseline against which impacts of the proposed action can be compared. Adopting this alternative means that the status quo remains and the proposed Kitenga RGC Water Supply System and sanitation facility is not developed.

a. The Lake Kyoga fresh surface water in Bukamba Sub County would remain unchanged as water will not be extracted;
b. Short-term impacts such as noise, dust generation, vibrations, etc., emanating from construction activities would be avoided;
c. The loss of the relatively small amounts of agricultural land and lake shore vegetation to the construction of water source facilities, water treatment plant and storage reservoirs would be avoided;
d. Temporary inconveniences emanating from construction activities within urban areas such as temporary road closure for pipeline crossings, would be avoided; and
e. The health risks associated with handling of harmful water treatment chemicals would be avoided.

However, the alternative ignores all the immense positive impacts. In this respect, Government and the communities would lose all potential benefits associated with clean water. The low water supply (14%) and poor access to improved sanitation (33%) in the area would continue to exist.

In the long term, the no-project scenario would be more disastrous as the biggest population in in the mushrooming urban centres of Bukamba Sub County would continue using unsafe point water sources and the open lake as the main source of water. These water sources are far from homes, prone to contamination and presenting a high risk of spread of waterborne related diseases. With respect to the socio-economic environment, the "no project" option would eliminate improved access to safe and affordable water, access to improved sanitation, and generation of short-term employment to both skilled and unskilled labour. This would imply more health burden on the local communities and perpetuate poverty because of lost revenue and productive hours.

PROJECT ALTERNATIVE

Project alternative means proceeding with the current plan and implementing the project as it is with some adjustments to forestall environmental damage and risks associated with community and occupational safety. The proposed Kitenga RGC WSSSP is urgently needed by the community to improve water access and to accelerate development in the project area. Stakeholders consulted had no objection to the proposed project and were very optimistic about the project citing its potential contribution to developments in the district through:

a. Accessibility to potable water within homesteads at various levels – stand posts, yard taps and house connections;
b. Potential reduction in incidences of diarrheal and other water borne diseases; this leads to reduction in mortality and morbidity, especially of children;
c. Improvement in hygiene and sanitation from increased use of hand washing, personal hygiene, and environmental sanitation;
d. reduction in hours spent searching for and fetching water from distant sources which would significantly increase the time allowed for other activities[7]; this is expected to lead to better livelihood for women and the girl child, who are traditionally, responsible for fetching water;
e. Reduction in domestic violence and abuse of women as people in the homestead compete for the little potable water;
f. 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;
g. Cleaner and more conducive environment for activities in the RGC such as sports, markets, public places, etc.;

[7] In Kaliro, the average travel time was over 2.5 hours per journey for water (Life water Report 2019).

h. 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;
i. 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; and
j. Increased revenue to the local authority and the country in general through the collection of taxes

CONCLUSION ON PROJECT OR NO PROJECT ALTERNATIVES

Kaliro District like most rural districts has a growing resident population and springing up of small towns and rural growth centres, thus the urgent need of a sustainable clean and safe water supply system and sanitation facilities. Virtually the entire Bukamba Sub County population relies on water supply from the boreholes, swamps, and fringes of Lake Kyoga for their consumption and livestock needs. Kitenga RGC currently has no central piped sewerage facilities. The population in this RGC is mainly served by privately owned pit latrines as there is no public toilet within any of the trading centres. The project area has no solid waste dump site and the waste when collected is burnt at household level. If this can continue, not only will the residents be exposed to public health risks but development opportunities will continue to be stifled and curtailed.

Secondary implications include 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. In general, the minor benefits of the No-Project option are far outweighed by the benefits to be attained on implementing the Katenga RGC Water Supply and Sanitation Project.

5.2 PIPED WATER SUPPLY SYSTEM

The project alternatives have been assessed based on:

a) Water source Alternative;
b) Choice of technology of water treatment; and
c) Tarif alternatives.

WATER SOURCE ALTERNATIVES

The option of a suitable and sustainable water source was arrived at based on the project water requirement for the ultimate year (2040) at a maximum day demand of 1,164.68 m^3/day. Ground water and surface water options were considered as further detailed below.

GROUND WATER

An analysis was carried for the number of boreholes and yield required for 16-hour pumping regime (**Table** 5-1**)** below.

Table 5-1: Available Borehole Capacity

Kitenga	Maximum Day Demand at Given Tariff (m^3/day)		
	USh. 36/ 20L	USh. 50/ 20L	USh. 83/ 20L
Demand- m^3/hr	77.39	72.79	66.23
1 No Borehole	77.4	72.8	66.2
2 No Boreholes	38.7	36.4	33.1
3 No Boreholes	25.8	24.3	22.1
4 No Boreholes	19.3	18.2	16.6
(Source: Project Feasibility Report (MoWE, 2019)			

Two (2) boreholes each of minimum capacity 36.4m^3/hr yield would be required over a 16hr pumping regime. However, analysis of the water quality test results from samples collected from boreholes in Kitenga RGC indicated salinity. A desalination treatment process would be required. The treatment plant would require high capital investment and hence ground water was not considered as a possible water source for the piped water supply system.

SURFACE WATER FROM LAKE NAKUWA (L. KYOGA)

The reliable surface water source near Kitenga RGC is Lake Nakuwa (Kyoga). Lake Nakuwa boards Bukamba Sub County to the North and is located about 3.5km from Kitenga Trading centre. Analysis of surface water quality results obtained from the proposed intake on Lake Kyoga indicated that the water samples meet the national set standards for portable water except for Colour, Turbidity, and Suspended Solids. The water treatment processes required will therefore emphasises the removal of the total suspended solids (TSS) and colour through aeration, coagulation, flocculation, sedimentation, and filtration.

CONCLUSION ON GROUND OR SURFACE WATER SOURCES ALTERNATIVES

Surface water from Lake Kyoga was selected due to availability of adequate water volume required by the project and ability of the system to adopt the proposed financially feasible water treatment systems.

TECHNOLOGY SELECTION ALTERNATIVES

The key WTP alternatives were based on:

a. **Scenario I:** Construction of 2N^o Packaged Water Treatment Plants (PWTP) near the intake site; or
b. **Scenario II:** Construction of semi conventional Water Treatment Plant (CWTP) nearby.

WATER TREATMENT PROCESS SCENARIOS

Results of water samples collected from the selected water source (L. Nakuwa, a satellite of L. Kyoga) meet the national set standards for portable water except for Colour, Turbidity, and Suspended Solids. The water treatment processes required for correct colour, turbidity and

suspended solids will include aeration, coagulation, flocculation, sedimentation, and filtration. Two water treatment plant scenarios were considered ().

Table 5-2: Two Alternative Water Treatment Scenarios

Component	Surface Water (MDD 1164.68m^3/day)	
	Scenario I (PWTP)	Scenario II (CWTP)
Intake Capacity (m^3/day)	1,222.92	1,222.92
Raw Water Pump House / Intake Structure	1No.	1No.
Raw Water Pumping Main (m) – OD160 uPVC PN10	600	600
Raw Water Pumps – Head 21m, Flow 76.43m^3/hr	2No. (1No. Duty, 1No. Standby)	2No. (1No. Duty, 1No. Standby)
Water Treatment Plant Capacity (m^3/day)	1,120.00	1,164.68
Packaged Water Treatment Plant (70m^3/hr)	2No.	
Alum Dosing Unit and House		1No.
Rapid Hydraulic Mixing Tank		1No.
Aerator		1No.
Flocculator - Horizontal Flow Type		1No. Channel with 5No. Compartments
		9.6mx1.2mx2.0m deep with 5 Baffels
Sedimentation Tanks		2No. Rectangular
		14mx3.8mx2.5m deep
Rapid Gravity Sand Filters		4No. Rectangular
		1.8mx3.2mx2.0m deep
Clear Water / Contact Tank		2No. Rectangular
		9.2mx4.2mx2.0m deep
Sludge Drying Beds		1No.
Sump, Chlorine Dosing Unit and Pump House	1No.	1No.

Component	Surface Water (MDD 1164.68m^3/day)	
	Scenario I (PWTP)	**Scenario II (CWTP)**
Clear Water Pumps - Head 120m, Flow 72.79m^3/hr	2No. (1No. Duty, 1No. Standby)	2No. (1No. Duty, 1No. Standby)
Backwash Pumps - Head 12m, Flow 4.09m^3/hr		2No. (1No. Duty, 1No. Standby)
Backwash Tank	1No. 40m^3 elevated on 10m tower	1No. 40m^3 elevated on 10m tower
Air Blowers		2No. (1No. Duty, 1No. Standby)
Clear Water Pumping Mains (m) - OD160 uPVC PN10	6,481	6,481
Storage Tank	346m^3 Cold Pressed Steel Tank Elevated on 10m steel tower	
Distribution Network (m)	25,452	
(Source: Project Feasibility Report (MoWE, 2019)		

The capital investment costs and the financial indicators for the two water treatment scenarios are computed in ***Table*** 5-3 **and** ***Table*** 5-4 below.

Table 5-3: Summary of Combined Capital Cost Estimates for the WTP scenarios

Item	Description	Capital Investment Costs	
		Scenario I (PWTP)	**Scenario II (CWTP)**
1.0	Preliminary and General Items	654,848,834	519,748,341
2.0	Intakes / Pump House	448,836,450	448,836,450
3.0	Treatment Plant Works	3,314,924,928	1,770,000,000
4.0	Raw Water Transmission Mains	42,582,384	42,582,384
5.0	Clear Water Transmission Mains	460,446,174	460,446,174
6.0	Storage Reservoir	389,965,000	389,965,000
7.0	Distribution Network and Service Connections	1,134,533,402	1,134,533,402
8.0	Water Office	120,000,000	120,000,000
9.0	Mechanical and Electrical for Raw Water	175,000,000	175,000,000
10.0	Mechanical and Electrical for Clear Water	221,000,000	497,000,000
11.0	Solar Items	241,200,000	159,120,000

Item	Description	Capital Investment Costs	
		Scenario I (PWTP)	Scenario II (CWTP)
	Sub Total 1	7,203,337,172	5,717,231,752
	Allow 10% Contingency	720,333,717	571,723,175
	Sub Total 2	7,923,670,890	6,288,954,927
	Allow 18% VAT	1,426,260,760	1,132,011,887
	Grand Total	9,349,931,650	7,420,966,814
(Source: Project Feasibility Report (MoWE, 2019)			

Table 5-4: Summary of Financial Indicators for the WTP scenarios

Item	Discounted Rate (%/year)				
	0%	5%	8%	10%	12%
Scenario I (Packaged Water Treatment Plant)					
Net Present Value (in USh million)	4,346	-2,510	-4,332	-5,078	-5,586
Dynamic Prime Cost - O & M (USh/m^3)	769	809	833	847	861
Dynamic Prime Cost - Total (USh/m^3)	1,821	3,315	4,485	5,367	6,320
Internal Rate of Return			2.6%		
Scenario II (Conventional Water Treatment Plant)					
Net Present Value (in USh million)	5,540	-925	-2,682	-3,415	-3,925
Dynamic Prime Cost - O & M (USh/m^3)	770	809	832	847	861
Dynamic Prime Cost - Total (USh/m^3)	1,644	2,902	3,887	4,628	5,429
Internal Rate of Return			3.9%		
(Source: Project Feasibility Report (MoWE, 2019)					

CONCLUSION ON WTP SCENARIOS

The best Internal Rate of Return (IRR) is got from the Scenario II (+4.2%) with Scenario I having an IRR of +2.8%. The investments required for the proposed Kitenga water supply system is justifiable as seen from the per capita investment costs. However, the type of sustainable investment varies with the type of water production facility. Scenario II (use of conventional water treatment plant) has the best financial indicators and is the recommended water source for the piped water supply system.

TARIFF DETERMINATION

The basic parameters for the design of the system are as below:

a. The population projections from the domestic and non-domestic consumers;
b. The water demand from the water use patterns of the population;
c. Household incomes used to set the tariff and the Ability to Pay for water bills.

The project proposed tariff were arrived at based on rate of consumption of domestic water by communities in Kitenga RGC against the ability of the consumers to pay (ATP) 5 percent of their income for access to safe water. Three existing tariff plans for access to safe piped water in Uganda were used, namely;

a. Existing Pro-poor Water Tariff in NWSC areas (2018) of UShs 1,800, (36sh/20litre jerrycan) excluding 18% VAT;
b. Existing MoWE Umbrella Tariff of UShs 2,500 (50sh/20litre jerrycan) excluding 18% VAT; and
c. Existing Domestic Water Tariff in NWSC areas (2018) of UShs 4,150, (83 sh/20litre jerrycan) excluding 18% VAT.

The details of the demand calculations projected over the design period are summarized in **Table** 5-5 below.

Table 5-5: Water Demand by Tariff at ATP (5% Income)

Design Year	2019	2020	2025	2030	2035	2040
Tariff - Ush 36 per 20 L (NWSC 2018 Urban PSP Tariff)						
Served Population.	10,349	10,718	12,759	15,191	18,085	21,534
Domestic Demand	333	345	411	489	582	693
Government / Institutional Demand	23	24	28	34	40	48
Commercial / Industrial Demand	10	10	12	15	18	21
UFW	92	95	113	134	160	190
Average Day Demand	458	474	564	672	800	952
Maximum Day Demand	595	616	734	873	1,040	1,238
Tariff - Ush 50 per 20 L (Umbrella Tariff)						
Served Population.	10,349	10,718	12,759	15,191	18,085	21,534
Domestic Demand	312	323	384	457	544	648
Government / Institutional Demand	23	24	28	34	40	48
Commercial / Industrial Demand	10	10	12	15	18	21
UFW	86	89	106	126	150	179
Average Day Demand	431	446	531	632	752	896

Design Year	2019	2020	2025	2030	2035	2040
Maximum Day Demand	560	580	690	822	978	1,165
Tariff - Ush 83 per 20 L (NWSC 2018 Domestic Tariff)						
Served Population.	10,349	10,718	12,759	15,191	18,085	21,534
Domestic Demand	280	290	346	412	490	584
Government / Institutional Demand	23	24	28	34	40	48
Commercial / Industrial Demand	10	10	12	15	18	21
UFW	78	81	97	115	137	163
Average Day Demand	392	406	483	575	685	815
Maximum Day Demand	509	527	628	748	890	1,060
Source: Project Feasibility Study – MWE, 2019						

CONCLUSION ON TARIF DETERMINATION

The computation based on ATP (5% income) at the water tariff of USh 50 per 20 litres results in the second highest demand when compared with the other tariffs. The demand at the Tariff of USh 36/20 litres gives the highest demand with that at the Tariff of USh 83/20 litres being the lowest. The demand at the proposed tariff of USh 50/20 litres was adopted at a 1,164.68m^3/day for the ultimate year to meet the feasibility of providing water to the RGC.

5.3 SANITATION FACILITIES

ALTERNATIVE TYPES OF SANITATION FACILITIES

There are many types of sanitation facilities used in Uganda (**Figure** 5-1), each with numerous variations. 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.

Generally:

a. 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
b. 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 enough fall is available to transport solids through the sewer without pumping.
c. 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.
d. Hybrid systems may be appropriate in medium- to high-density areas with a flat topography, particularly where the water table is high.

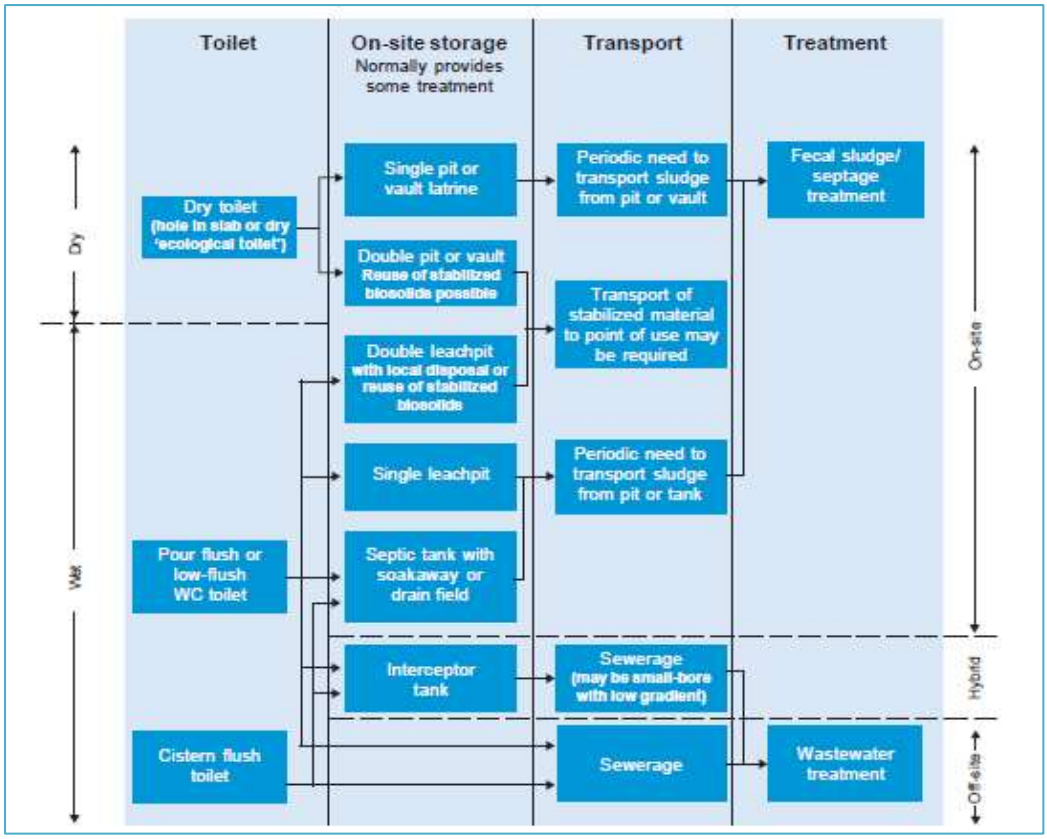


Figure 5-1: Categorisation of sanitation facilities

To determine the public sanitation facilities option for Kitenga RGC, several factors were considered. These are presented in

Table 5-6 below.

Table 5-6: Factors for selection of public sanitation technology options

Factor	Description
Institutional Factors	▪ 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	▪ 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	These factors are concerned with the source of water, for instance:

Factor	Description
	▪ 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	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). 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. 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
Cultural Factors	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 when social and cultural factors affecting sanitation and hygienic practices of the community members are not considered. • 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.

SANITATION FACILITY ALTERNATIVE

Table 5-7 below shows the different sanitation facility alternatives and how the project arrived at the appropriate technology for Kitenga RGC.

Table 5-7: 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.	Suitable for a household not public or institutional use			

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
		Can contribute to pollution of surface water and ground water sources.				
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 or all can be built by the householder		Higher capital costs than single pit latrines	
		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.	

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
		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 expensive than simple pit latrines).	Positive +8 Negative – 6 Total=2
	Significant reduction of pathogen.	Effective control of flies (if kept dark) and odours (better than VIP).	Emptying can be made manually with simple	Use requires practice and/or skills		

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
		Urine and treated faeces can be recycled for agricultural purposes if desired	precautions (low or no operation cost).	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		Excavation of humus is easier than faecal sludge (low or no operation cost).	
		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.				

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
		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 space with emptying and proper disposal of wastewater	Positive +10 Negative – 5 Total=5
	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.	
	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 somewhere and according to the Ministry of Water and Environment (National faecal sludge assessment for small towns, 2013). The Ministry proposed that faecal sludge treatment plants should be constructed in selected towns within the country. Kitenga RGC is in Bukamba sub-county and is placed in cluster 11 which consists of Busembatia, Namutumba, Kaliro, Bugiri, Idudi, Namungalwe. The waste stabilisation ponds in Iganga constructed in 2008 as the proposed treatment facility. 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.

5. POLICY, LEGAL AND REGULATORY FRAMEWORK

This chapter presents an overview of the key policies, laws, and regulatory framework relevant to the planned project and it is summarized as follows:

5.4 NATIONAL LEGISLATIONS AND REGULATIONS

POLICY FRAMEWORK AND PLANS

VISION UGANDA, 2040

In 'Vision 2040', Uganda sets goals to attain by the year 2040 ranging from political, economic, social, energy, water to environment. With respect to environmental goals, Ugandans aspire to have sustainable social-economic development that ensures environmental quality and preservation of the ecosystem. Vision 2040 recognizes water and sanitation infrastructure as key drivers of the economic development and notes that for Uganda to shift from a peasantry to an industrialized and urban society, it must develop its infrastructure. The 2040 vision acknowledges that the slow accumulation of infrastructure such as, water among others retards the economic development.

Relevance: *Vision 2040 notes that to improve access and availability of water to the rural and urban areas, especially to economic zones and other productive areas, new water supply lines should be established at an accelerated rate. Therefore, the proposed project is in line with aspirations of Vision 2040.*

THE THIRD NATIONAL DEVELOPMENT PLAN III, 2020/2022-2024/25

The plan provides guidance to the nation in delivering the aspirations articulated in Uganda Vision 2040 for the period 2020/21–2024/25. The Goal of NDP III is attaining Increased Household Incomes and Improved Quality of Life of Ugandans, under the theme: "Sustainable Industrialization for inclusive growth, employment and wealth creation". The NDP III Water, Sanitation and Hygiene objectives include, improved rural water coverage (85%), increased access to improved sanitation facilities (40) and improved adequacy to hygiene (handwashing) facility (50%) by 2025.

Relevance: *The project WASH objectives are geared towards improving access to safe water, improve sanitation and hygiene for residents in Bukamba Sub County, Kaliro District, in turn improving the national set targets of improved rural water, sanitation and hygiene in the country.*

THE NATIONAL ENVIRONMENT MANAGEMENT POLICY, 1994

The overall policy goal of the Policy is sustainable development which maintains and promotes environmental quality and resource productivity for socio-economic transformation to promote sustainable economic and social development, mindful of the needs of future generations. The policy calls for integration of environmental concerns into development policies, plans and projects at national, district and local levels, using ESIA as one of the vital tools**.**

Relevance: *The policy obliges development projects (such as the planned Kitenga RGC WSSP development) to conduct an ESIA to ensure that aspects for environmental and social sustainability are integrated in the project cycle.*

THE NATIONAL POLICY ON CONSERVATION AND MANAGEMENT OF WETLAND RESOURCES 1995

The objectives of this policy include establishing the principles by which wetland resources can be optimally used now and in future; to end practices, which reduce wetland productivity; maintaining the biological diversity of natural or semi natural wetlands; maintaining wetlands functions and values; and integrating wetlands concerns into the planning and decision making of other sectors. ***Relevance:*** *The proposed project water abstraction activities must be undertaken in a sustainable manner in keeping with this policy requirements.*

THE NATIONAL WATER POLICY, 1999

The objective of this policy is to provide guidance on development and management of the water resources in 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.

Relevance: *The policy advocates for integrated and sustainable development management and use of water resources with full participation of all the key stakeholders. Construction will require water, and therefore, the contractor shall secure the required surface water abstraction permit from Directorate of Water Resources Management (DWRM).*

THE UGANDA NATIONAL LAND POLICY, 2013

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 and land-based resources for poverty reduction, wealth creation and overall socio-economic development". ***Relevance:*** *The intended use of the Lake for construction of the Intake is consistent with The National Environment (Wetlands, River Banks, and Lake Shores Management) Regulations, No. 3/2000 that facilitates the sustainable utilization and conservation of resources on river banks and lake shore by and for the benefit of the people and community living in the area. The compliance requirement is for DWD to secure written approval (permit) from NEMA.*

NATIONAL SANITATION POLICY FOR UGANDA, 1997

The Government of Republic of Uganda has formulated National Sanitation Policy (1997) to guide, promote and preserve the health of community through improved sanitation.

Relevance: *The policy needs undertaking of sanitation interventions to preserve public health. This calls for project to consider safe disposal of human excreta whose response includes construction of sanitation facilities and execution of sanitation promotion campaigns. These planned project activities are in-line with National Sanitation Policy for Uganda (1997).*

NATIONAL 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 programmes at national and local government levels. It has been developed in support of the National Health Policy and primarily concerns the role of the Ministry of Health. However, environmental health is a cross-cutting discipline and the policy therefore has implications for other departments and agencies.

Relevance: *By ensuring availability of safe water supply and improved sanitation, the project will contribute to the reduction of water borne diseases thereby improving on the health of communities, especially the girl child and mothers who are mainly involved in collection of water.*

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 programmes at national and local government levels. It has been developed in support of the National Health Policy and primarily concerns the role of the Ministry of Health. However, environmental health is a cross-cutting discipline, and the policy therefore has implications for other departments and agencies. ***Relevance:*** *Environmental health encompasses a wide range of subjects but in the Ugandan context is concerned primarily with water supply, sanitation, and hygiene promotion; solid, liquid, hazardous waste management; air pollution control; food safety and hygiene; the control of insect vectors and vermin; occupational.*

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.

Relevance: *The contractor in will be required to mainstream measures to stem issues and forms of GBV in the project.*

THE NATIONAL EQUAL OPPORTUNITIES POLICY 2006

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 form the project to all citizens in line with the applicable Constitutional rights and privileges.

Relevance: *Discrimination and stigmatization, which acts as a barrier for marginalized and other groups of people in the project area to accessing employment and support opportunities will be eliminated throughout all project implementation phases.*

THE 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.

Relevance: *The contractor will mainstream measures for HIV/AIDS sensitization and awareness in the project as well provision of condoms and Voluntary Counselling and Testing (VCT) for both the workers and members of the nearby communities.*

THE UGANDA GENDER POLICY 2007

The Uganda Gender Policy mandates the Ministry of Gender, Labour and Social Development and other line Ministries to mainstream gender in all sectors.

Relevance: *The developer is an employer, which provide equal opportunity to work; therefore, women will be employed as far as applicable during the project lifecycle.*

THE NATIONAL HIV/AIDS POLICY, 2004

The policy aims at providing psychosocial and economic support to all those infected and directly affected by HIV/AIDS. Its subsection I under Policy Strategies 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.

Relevance: *The project will mainstream HIV/AIDS interventions in its plans and activities.*

NATIONAL POLICY ON DISABILITY 2006

The National Policy on Disability in Uganda aims at promoting equal opportunities for enhanced empowerment, participation, and protection of rights of PWDs irrespective of gender, age, and type of disability. 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.

Relevance: *During recruitment of workers to be employed to undertake construction activities, some PWDs will apply for some jobs and the contactor should consider the PWDs applicants who qualify for such jobs.*

THE UGANDA NATIONAL CULTURE POLICY 2006

It provides strategies to enhance the integration of culture into development. These strategies include advocating for culture, ensuring capacity building, ensuring research and documentation, promoting collaboration with stakeholders, and mobilizing resources for culture. These strategies are an integral part of the Social Development Sector Strategic Investment Plan (SDIP) whose mission is to create an enabling environment for social protection and social transformation of communities.

Relevance: *Cultural leaders and local leaders need to be involved and consulted during the ESIA process for the proposed project activities so that they can help guide the process especially on which natural-historical and traditional collections could be preserved based on their cultural importance or historical relevance in the project implementation process.*

NATIONAL CLIMATE CHANGE POLICY, 2012

The goal of the policy is to ensure a harmonized and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda. The overarching objective of the policy is to ensure that all stakeholders address climate change impacts and their causes through appropriate measures, while promoting sustainable development and a green economy.

Relevance: *The policy obliges the Developer to conduct an ESIA to ensure the project activities do not lead to adverse impacts that trigger climate change risks in the project areas and beyond.*

LEGAL FRAMEWORK

THE CONSTITUTION OF THE REPUBLIC OF UGANDA, 1995

The Constitution places obligations on both the state and the citizens of Uganda to among other things: a) protect the environment; b) protect important natural resources including land, water, wetlands and fauna and flora; c) promote sustainable development and conserve natural

resources in a sustainable manner. Article 39 and 41 of the Constitution of 1995 provide that everyone has a duty to maintain a sound environment. It also stipulates that every person in Uganda has a right to a healthy and clean environment and as such can bring legal action for any pollution or disposal of wastes.

Relevance: *Preparation of this ESIA is in line with requirements of Constitution of the Republic of Uganda and it seeks to ensure that, project activities will be undertaken while ensuring safe and healthy environment as provided for in the Constitution.*

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 Schedule 5 hence, the need to conduct this ESIA.

Relevance: *The proposed project falls under Schedule 5 for projects which require mandatory ESIAs before implementation, as such, the need to conduct this study. This ESIA has been carried out in compliance with this Act.*

WATER ACT, CAP 152

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.

Relevance: *The Act provides guidance for requirements of implementation of water supply projects especially on matters of water abstraction.*

LOCAL GOVERNMENTS ACT, CAP 243

Local Governments Act, 1997 establishes a form of government based on district as the main unit of administration. Districts are given legislative and planning powers under this Act. (Sections 36-45) They are also enjoined to plan for conservation of the environment within their local areas.
Relevance: *The implementation of Kitenga RGC WSSP will be consistent with Kaliro DDP and it is to be undertaken with technical guidance of the district technical staff supported by the political wing of the district as the Act provides guidance for requirements of implementation of water supply projects.*

THE EMPLOYMENT ACT 2006

Is the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management, sexual harassment, and compensation of workers.

Relevance: *Persons shall be employed in the project need to be issued with contracts and their welfare taken care by employer. This Act is relevant in that, it addresses matters of engagement of workers and their rights while at work.*

THE OCCUPATIONAL SAFETY AND HEALTH ACT, 2006

The Act makes provisions for the health, safety, welfare, and appropriate training of persons employed in workplaces.

Relevance: *When implementing the project, the employers must provide for the protection of workers from accidents and adverse weather by provision of full PPE, and provision of a clean and healthy work environment, sanitary conveniences, washing facilities, First Aid and facilities for meals.*

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. ***Relevance:*** *The key consideration regarding this Act in the project is to ensure landowners affected by the project are adequately and timely compensated.*

THE PUBLIC HEALTH ACT, CAP 281

Under Section 5 of this Act, every local authority shall take all lawful, necessary, and reasonably practicable measures for preventing the occurrence of, or for dealing with any outbreak or prevalence of, any infectious, communicable, or preventable disease; to safeguard and promote the public health; and to exercise the powers and perform the duties in respect of the public health conferred or imposed by this Act or by any other law.

Relevance: For the construction of workers camps and all ancillary infrastructures for the project shall be undertaken in cognizance of this Act and the Local Authorities will ensure compliance as by law established herein.

THE PHYSICAL PLANNING ACT, 2010 AND THE PHYSICAL PLANNING (AMENDMENT) ACT 2020

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 concerned, shall appoint for town areas and rural areas respectively.

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.

Relevance: *Act to the proposed solar-powered water supply and sanitation project under Kitenga RGC in Kaliro District. Different provision of this act will be implemented during the establishment and operations of the different proposed project components.*

THE HISTORICAL MONUMENTS ACT, 1968

The Act requires that any chance finds encountered during project construction shall be preserved by the Department of Monuments and Museum in the Ministry of Tourism, Wildlife and Antiquities.

Relevance: *Some objects of cultural and/or historical significance might be encountered/affected during project implementation and their preservation is called for by this Act.*

TRAFFIC AND ROAD SAFETY ACT, CAP.361

Section 119 of the Traffic and Road Safety Act stipulates that every person who uses, parks or stands a motor vehicle, trailer or engineering plant on any road carelessly or without reasonable consideration for other persons using the road commits an offence.

Relevance: *The contractor will ensure that all project machinery (construction equipment and material haulage fleet) observe traffic and road safety procedures including observing minimum speed limits, routine maintenance and observing road signs among others. In addition, more safety measures such as traffic guides/controllers, humps and road signage will be adopted to ensure safety of all road users during project implementation activities as guided by this Act.*

THE ROADS ACT, 2019

The Act prohibits erection of any building or planting of any trees or placing of pipelines within the road reserve except with a written permission of an appointed road authority. Article 16 (2) of the Road Act 2019 lists water pipelines amongst infrastructures that can be erected in a road reserve with written authority by UNRA.

Relevance: *The project developer will apply to UNRA to carry out activity in the road reserve while also stipulating measures for restoration upon completion of project activity.*

5.4.1.1.1 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.

Relevance: *Implementation of the proposed project (the contractor, MWE, consultants, etc…) should follow provisions in the Penal Code Act to avoid committing offences in Kitenga RGC that require application of the Act. In cases where offences are committed, the Law should be allowed to take its course.*

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.

Relevance: *There is no wildlife of conservation concerns in areas of proposed solar-powered water supply and sanitation project under Kitenga RGC in Kaliro District. However, measures will be undertaken to ensure protection of any wildlife resources encountered during works.*

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.

Relevance: *The employer (contractor) must protect the health and safety of all project workforce by providing them with all requisite PPEs, safety training, clean and healthy work environment. The Act seeks to safeguard the workers and ensure that they are appropriately compensated in case of injuries resulting from project implementation activities.*

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.

Relevance: *Child labour is to be prohibited during project implementation activities i.e., no employment of children below 18 years for all the project implementation activities.*

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 out procedures and guidelines to be followed by the courts in relation to the protection and compensation of victims of domestic violence as well as matters relating to cases of domestic violence in general.

Relevance: *The Act gives guidance to the contractor and their workers on how to handle cases of domestic violence.*

MINING ACT, CAP. 148 2003

Stone quarry sites and gravel borrow pits will be necessary for materials needed to construct the concrete works of the project components. The Act regulates mining developments including set up of new quarries and/or sandpits. It provides amongst others; the environmental restoration plan shall include a detailed timetable for accomplishment of each major step to be carried out under the restoration plan for such sites.

Relevance: *This Act will apply to the project's contractors who will be required to obtain license for extraction of stone/ aggregate and murram materials required for construction. The project should ensure that relevant assessment/ studies are conducted for all auxiliary sites and will be restored basing on the guidance on restoration activities.*

ACCESS TO INFORMATION ACT, 2005

Provides for the right to access to information pursuant to Article 21 of the constitution.

Relevance: ESIA shall be disclosed/ documented, It has critical information for the stakeholders and has documented stakeholder concerns which have formed basis for further stakeholder engagement and disclosure strategies.

REGULATIONS, STANDARDS AND GUIDELINES

THE NATIONAL ENVIRONMENT (ENVIRONMENTAL AND SOCIAL ASSESSMENT) REGULATIONS, S.I NO.143 OF 2020

The Regulations provide a framework within which ESIAs for projects are to be undertaken. It also emphasises that an environmental and social impact study for relevant projects be undertaken in accordance with section 113 of the National Environment Act and Schedule 5 of the same Act. ***Relevance:*** *The developer has undertaken this ESIA study with focus on the content specified within the First Schedule of these Regulations.*

WATER RESOURCES REGULATIONS, 1998

The Regulations apply to motorized water abstraction from boreholes or surface watercourses or diverting, impounding, or using more than 400m³ 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. As such, the project shall acquire water abstraction permits in compliance with these regulations.

Relevance: *DWD intends to construct an intake and abstract water from Lake Nakuwa (Kyoga) in Nabusira Village, Bukamba Sub County, Kaliro District and will therefore fulfil the requirements of these regulations. The Contractor will be required to abide by provisions of this law regarding water usage and conservation during use for construction civil works and associated project facilities such material yards, workers' camps among others.*

WATER SUPPLY REGULATIONS, 1999

The Water Supply Regulations, 1999 are meant to guide in the management of the water supply works including:

a) Permits requirements and procedures for water supply works by authority or connection to land owner (Division 1, clauses 4 to 6);
b) Application, examination and approval of Water supply plan (Division 2, clauses 7 to 11);
c) Cost of works, security deposit, inspection of works and plenty for violation (Division clauses 12 to 18); and
d) Metering system and charging rates (Part III, clauses 19 to 21).

THE NATIONAL ENVIRONMENT (WETLANDS, RIVERBANKS AND LAKESHORES MANAGEMENT) REGULATIONS 2020.

Regulation 12(1) prohibits any person from carrying out an activity in a wetland without a permit issued by the Executive Director of NEMA. Under regulation 34(1), a developer desiring to conduct a project which may have significant impact on a wetland to carry out an environmental impact assessment in accordance with sections 20, 21, and 22 of the National Environment Act 2019. ***Relevance:*** *Prior to any works in the wetland, DWD will seek a permit from NEMA, as provided for in these Regulations.*

NATIONAL ENVIRONMENT (WASTE MANAGEMENT) REGULATIONS S.I. NO. 49 OF 2020

These Regulations categorise the different types of waste including hazardous waste and provide that only licensed waste handlers can collect, store, transport and dispose of hazardous waste.

More so, a licensed handler shall be procured to handle any hazardous waste generated by the project activities. The practices emphasised under these regulations are aimed at preventing the contamination of water, air, soil and other components of the environment.

Relevance: The Regulations promote cleaner production methods that enable the recovery and reuse of wastes, reclamation, and recycling and spell out how the project can manage its waste.

NATIONAL ENVIRONMENT (STANDARDS FOR DISCHARGE OF EFFLUENT INTO WATER OR ON LAND) REGULATIONS, 2020

These Regulations require that a permit is acquired before a developer discharges waste water into water bodies or on land. Maximum permissible levels for discharge of waste have been provided under Schedules 2, 3 and 4 of the Regulations which must be complied with.

Relevance: *Effluent discharged from the water treatment works should conform to these regulations.*

THE NATIONAL ENVIRONMENT (NOISE STANDARDS AND CONTROL) REGULATIONS, 2003

Part III Section 8 (1) requires machinery operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible noise levels. The Regulations require that persons to be exposed to occupational noise exceeding 85 dBA for 8 hours should be provided with requisite ear protection. The regulatory noise limits at construction sites. ***Relevance:*** *Both during construction and operation of the water project, noise generated should not exceed limits prescribed by these regulations. The ESMP recommends that vibrations, noise, and movement of heavy machinery should be limited and monitored during construction, and where possible provide for vibration and noise proof or muzzling of all machines and power generators used at site.*

NATIONAL ENVIRONMENT (AUDIT) REGULATIONS, 2020

Schedule 3 provide projects for which an annual environmental compliance audit must be carried out by the respective developer. All projects listed in Schedule 5 of National Environment Act are among those listed in Schedule 3 of the Regulations and require a mandatory annual environmental compliance audit. Accordingly, after 24 months of its implementation, the *Developer will conduct Environmental Audits to assess compliance of the project in line with NEMA Approval Conditions and other related provisions.*

UGANDA NATIONAL ROADS AUTHORITY (GENERAL) REGULATIONS, 2017

The purpose of these Regulations is to provide for a) clear and transparent framework for the use of national roads and road reserves amongst others. With respect to the project infrastructures along the road reserves, the Developer will apply to UNRA in order to erect its *transmission and distribution lines within the road reserves.*

WATER SOURCE PROTECTION GUIDELINES

The Water Sources Protection Guidelines for Piped Water Supply Systems describe steps to follow to prepare a Water Source Protection Plan. The Water Source Protection Guidelines help the user identify the risk to a water source and to engage the people and organisations responsible for the problem in a positive way that leads to a mutually beneficial outcome.

Relevance: *The Guidelines recommend that for surface water sources from a lake or reservoir: consider the land area enough to address the catchment problems. A radius of not less than 10km from of the Source is recommended.*

NATIONAL ENVIRONMENT (CONTROL OF SMOKING IN PUBLIC PLACES) REGULATIONS, 2004

According to WHO, Second-Hand Smoke (SHS) is a human carcinogen for which there is no "safe" exposure level 1. To avoid public health risk from SHS, Uganda enacted this Regulations to regulate smoking in public places. Under this law, a public place is defined as, "any place to which members of the general public or segments of the general public ordinarily have access by express or implied invitation and includes any indoor part of a place specified in this schedule". These places include, office buildings, workplaces, eating areas, toilets, and public service vehicles. The Regulations task owners of such places to designate "NO SMOKING" and "SMOKING AREAS" in premises.

Relevance: *In this project, these regulations will apply to areas communally used by construction workers such as site offices, eating areas in camps and workers transport vehicles.*

5.5 INTERNATIONAL PROTOCOLS AND CONVENTIONS

The relevant international protocols and conventions for which Uganda is a signatory to as presented below.

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 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.

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 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 (ILO) CONVENTION, 1998

Sets out basic principles and labour rights at work, based on international best practise.

5.6 WORLD BANK OPERATIONAL POLICIES (OPS)

The proposed solar powered piped water supply system and sanitation facilities to be constructed under IWMDP interventions were screened against the World Bank Operational Policies as follows:

Table 0-1: Summary of how the planned project activities trigger WB OPs

Safeguard Policies	Triggered/ Not Triggered	Remarks
Environmental Assessment OP/BP 4.01	Triggered	The project alignment goes through rural growth centres with several activities and therefore potential impacts relating to influx of labour, drainage, traffic, noise generation among others are likely. In general, the project falls under Category B of the World Bank´s classification of projects requiring an ESIA/ESMP given that its potential adverse environmental and social impacts will be site specific, few if any are irreversible, and in most cases mitigation measures can be readily designed.

Safeguard Policies	Triggered/ Not Triggered	Remarks
Natural Habitats OP/BP 4.04	Triggered	There will likely lead to uptake of parts of wetlands in terms of construction of its water abstraction facilities thereby triggering this policy.
Forests OP/BP 4.36	Not Triggered	The proposed site for project implementation and the immediate neighbourhood do not have any forest or land gazetted as forest reserve.
Pest Management OP 4.09	Not Triggered	No application of pesticides is envisaged in the project.
Physical Cultural Resources OP/BP 4.11	Triggered	The project will involve excavations and such civil works could lead to accidental encounter of materials of physical cultural values hence, this policy is triggered and Chance Finds Procedures have been prepared as part of this ESIA.
Indigenous Peoples OP/BP 4.10	Not triggered	No known Indigenous Peoples exist within the project area.
Involuntary Resettlement OP/BP 4.12	Triggered	The project will involve instances of land acquisitions for sites planned for the water sources, WTP, reservoirs, and sump/ booster station as such, a Resettlement Action Plan (RAP) has been prepared for the project.
Safety of Dams OP/BP 4.37	Not Triggered	This OP is not triggered because the project works do not involve dam related works.
Projects on International Waterways OP/BP .50	Not Triggered	The project does not affect international water ways.
Projects in Disputed Areas OP/BP 7.60	Not Triggered	There are no disputed areas along the project corridor.
World Bank Policy on Access to Information (2015)	Triggered	There is need for disclosure of information Project information will remain accessible through its disclosure to its stakeholders through the sharing of information with stakeholders such as district technocrats, Town council/

Safeguard Policies	Triggered/ Not Triggered	Remarks
		Sub County leaders, Local council leaders, and communities among others during the consultations process. .

5.7 WORLD BANK EHS GUIDELINES

The World Bank has a number of sector-based EHS guidelines below, many of which are applicable to various components of the proposed project namely; water and sanitation, air emissions, hazardous waste management, noise, occupational health and safety, community health and safety including traffic safety such as during project construction or disease prevention and construction and decommissioning.

Relevance: The study has to the extent possible, endeavoured to evaluate a range of the proposed project activities and identified impacts will like to arise and typically covered most of these EHS and appropriate mitigation measures have been identified to ensure compliance during implementation of the project.

WBG EHS GUIDELINES: WATER AND SANITATION

The EHS Guidelines for Water and Sanitation include information relevant to the operation and maintenance of potable water treatment and distribution systems and 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.

Relevance: In the ESIA, GIIP practices relating to establishment and operation of water and sanitation facilities have built into the ESIA to ensure sustainability of the project.

WBG EHS GUIDELINES: AIR EMISSIONS AND AMBIENT AIR QUALITY

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).

Relevance: 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.

WBG EHS GUIDELINES: WASTE MANAGEMENT

GENERAL APPROACH

In relation to the proposed water supply and sanitation project works, this guideline provides for construction waste generated by and throughout all implementation phases. 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).

Relevance: The study recommends continuous monitoring to regularly track the waste categories and their amounts to have in place, appropriate mitigation measures in a timely manner. For instance, 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.

WBG EHS GUIDELINES: HAZARDOUS MATERIALS MANAGEMENT

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.

GENERAL HAZARDOUS MATERIALS MANAGEMENT

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.

Relevance: The ESIA recommends appropriate hazardous materials transportation, storage, handling and resulting waste management measures that meet the good international industry's best practices (GIIP).

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)

Relevance: The ESIA recommends the Developer to undertake decommissioning activities based approved decommissioning plans at the end of the project.

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.

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.[8]

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

The existing gaps are summarized in Table 0-2 & Table 0-3 below:

[8] Uganda Social Risk Management (SRM) Technical Paper (2019)

Table 0-2: 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)	• National Environment Management Policy, 1994. • National Environment Act No.5 of 2019. • National Environment (Environmental and Social Assessment) Regulations, 2020.	• Independent review is not specifically provided for under ESIA Regulations of Uganda and as a result, the review of ESIAs 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 ESIAs 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).

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
Natural Habitats (OP 4.04) and Forests (OP 4.36)	• 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.	The project is not located in an area with conservation status, however, the protection of wildlife encountered during project implementation has been recommended (Section 0). For trees likely to be affected by the project, recommendations on their management have been included in Section 0, among which is obtaining a permit for tree cutting in case they fall within the project foot print.
Physical Cultural Resources (OP 4.11)	• 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	• 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	This ESIA included the Chance Find Procedures (Section 0) to facilitate and assign responsibility for identification, handling and preservation of both tangible and intangible physical cultural resources during project implementation.

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
		developers and government officials do not understand the importance of conserving physical cultural resources.	
The current Historical Monuments Act is being reviewed to provide for an efficient law for the protection of the cultural resources of the country. The new law shall be inclusive of all aspects of culture, the tangible, intangible heritage of the country. The revised Environmental and Social Impact Assessment Regulations provide that risk assessment should include risks to cultural heritage.			

Table 0-3: 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, Leasehold tenure and Mailo land tenure. 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. Cash compensation is the recommended option.	World Bank Policy recognises the rights of those affected people: • 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.	The Ugandan law does not compensate those without legal right or claim to the land. WB OP 4.12 does not consider disturbance allowance. Uganda laws and the WB OP 4.12 are consistent in compensation at full replacement cost and cash compensation.	Alternative land (wherever available) or Cash compensation at full replacement value or (based on market value + 15% to 30% disturbance allowance). All forms of tenancy based on formal or informal rights. In kind compensation should be offered as an option to the PAPs where (alternative land is available for the PAPs).

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

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
Vulnerable groups	The 1995 Uganda Constitution stipulates that: "the State shall take affirmative action in favour of groups marginalised on the basis of gender, age, disability or any other reason […] for the purpose of redressing imbalances which exist against them". This regulation is not fully described in the context of resettlement and land acquisition.	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 children and indigenous peoples and ethnic minorities.	Both the Ugandan Constitution and WB OP 4.12 favour vulnerable groups. However, the Ugandan law, vulnerable groups are not fully described in the context of resettlement and land acquisition.	Special attention will be paid to vulnerable persons affected and necessary measures will be provided in the entitlement matrix of the RAP.
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	The project will provide transition allowance.

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
			persons of involuntary resettlement.	
Consultation and disclosure	There are no explicit provisions for consultations and disclosure but there are guidelines issued by separate ministries (e.g. roads and energy). The Land Acquisition Act, 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.	Consult project-affected persons, host communities and local NGOs, as appropriate. Provide them opportunities to participate in 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.	While the consultation requirement is inherent in the ESIA, it contains several differences with the requirements of Bank policy.	No gap.
Grievance mechanism and dispute resolution	The Land Act, 1998 states that land tribunals must be established at all districts. The Land Act empowers the Land Tribunals to determine disputes and it provides for appeal to higher ordinary courts. The Land Acquisition Act provides for the aggrieved person to appeal to the	Establish appropriate and accessible Grievance Redress Mechanism.	GRC structures exist within the Local Councils of Governance in Uganda, but in most cases, they are dysfunctional and ineffective given the	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

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	High Court.		limited projects knowledge.	resorting to expensive and time-consuming legal action. If the grievance procedure fails to provide a settlement, complainants can still seek legal redress.
Calculation of compensation and valuation	According to the Land Act, Cap 227 (section 77), the value of Customary land shall be the open market value of the unimproved land. Value of the buildings shall be at open market value for urban areas and depreciated replacement cost for rural areas. The crops and buildings of a non-permanent nature are compensated at rates set by District Land Boards	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.	There is no equivalent provisions on relocation assistance, transitional support, or the provision of civic infrastructure. 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).	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. 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.

5.8 REGULATORY FRAMEWORK

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. In relation to the Kitenga RGC water supply system and sanitation project, MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the ESMP and monitored based on the monitoring plans.

DIRECTORATE OF WATER DEVELOPMENT

The Directorate of Water Development (DWD) is responsible for providing overall technical oversight for the planning, implementation, and supervision of the delivery of urban, rural water and sanitation services, and water for production across the country. 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.

5.8.1.1.1 RURAL WATER SUPPLY AND SANITATION

The department coordinates utilization of district water and sanitation grant that involves resource mobilization and allocation, technical support to districts, monitoring compliance and capacity building to the district local governments. In addition, the Division supports planning and development of water schemes that traverse local government boundaries, largely gravity flow schemes and large motorized piped water schemes. The proposed Kitenga RGC Water Supply System and Sanitation project is being implemented by RWSS.

5.8.1.1.2 URBAN WATER SUPPLY AND SANITATION

The Umbrellas organisation is under the Urban Water Supply and Sanitation (UWSS) Department of the Ministry of Water and Environment and will effectively plan and manage budgets agreed within a contract framework. For Kitenga RGC, the EUWS will use experience gained elsewhere in the region to extend services to rural & urban poor areas.

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. The project falls under the Kyoga Water Management Zone (KWMZ), a zone under DWRM. The Directorate is mandated issue a surface water user permit with conditions on volume of water abstracted, water quality, wastewater quality before release into the lake and source protection requirements.

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. The proposed Kitenga RG CWSSS project will traverse a lake shore wetland in Nabusira Village, Bukamba Sub County, Kaliro District at coordinates. The WMD will regulate and monitor the activities proposed by the project in that location.

NATIONAL ENVIRONMENTAL MANAGEMENT AUTHORITY (NEMA)

The National Environmental Act 2019 establishes NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental conservation activities. NEMA works with District Environment Officers and local environment committees at local government levels who also undertake inspection, monitoring and enforce compliance on its behalf.

In this project, NEMA will review and approve the ESIA report and through the Project District Environment Officer, undertake environmental monitoring during project implementation.

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 implementation of the Resettlement Action Plan conducted on the project.

UGANDA NATIONAL ROADS AUTHORITY

UNRA is a key stakeholder under the project because the distribution line components largely run along the road reserves. The project transmission and distribution lines will be laid within the reserve of a UNRA trunk road (Kaliro-Nawaikoike-Buvuluguti Road) and district access roads. One UNRA trunk road and 5 access (district) road crossings are envisaged in the project.

RWSS will request for authorisation to lay pipes along the road reserve and excavate the road for water pipeline crossings from UNRA before project commencement.

MINISTRY OF GENDER, LABOUR AND SOCIAL DEVELOPMENT

The Ministry has the responsibility to empower communities in diverse areas with respect to aspects of gender, labor, occupational safety and health, HIV/AIDS and wider vulnerable groups. *In the project has the oversight role to ensure effective and meaningful mainstreaming of cross-cutting issues into sectors activities as will apply to this project.*

MINISTRY OF LOCAL GOVERNMENT

The 1997 Local Government Act provides for decentralization and devolution of government functions, powers, and services from the central to Local Governments and sets up the political and administrative functions of local governments. Specifically, local governments shall be

consulted on projects to be located within their jurisdiction and on matters that affect their environment as was done duing this ESIA study.

UGANDA POLICE

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

The project will be implemented in Kitenga RGC, Bukamba Sub County, Kaliro District. The police post at Bukamba Sub county will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Kaliro 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.

KALIRO DISTRICT LOCAL GOVERNMENT

The District Local Government is mandated under the Local Government Act and the National Environmental Act to ensure that all project activities are implemented in accordance with the national legal and policy framework. Therefore, Kaliro District Local Government is responsible for monitoring all the project implementation phases, to include construction and the functionality of the water system in Bukamba Sub County.

5.9 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 0-4.

Table 0-4: Permits, licenses and approvals required by proposed Kitenga RGC project activities

	Permit	Issuing agency	Use	Responsibility	Legal Framework
1	Environmental approval ESIA certificate.	NEMA	Approval for commencement of the project	MoWE	National Environment Act 2019

	Permit	Issuing agency	Use	Responsibility	Legal Framework
2	Water abstraction permit.	DWRM	Abstraction of water at the source (Lake Victoria)	MoWE	Water Act, cap 152
3	Waste Disposal Permit	NEMA	Contractor	MWE	National Environment Act 2019; National Environment (Waste Management) Regulation 2020
4	Mining Permit, Extraction of minerals, opening of quarries and sand pits	DGSM/ MEMD/	Contractor	MWE	Mining Act, Cap 148
5	Wetlands Resource Use permit, if need arises	NEMA	Approval to conduct work on/ in a wetland.	MoWE	National Environment Management (Wetland, Riverbank, Lakeshore) Regulation 2020
6	Hazardous waste storage, transportation and disposal license.	NEMA	Onsite storage of hazardous waste (e.g. used oil).	Contractor	National Environment Act 2019; National Environment (Waste Management) Regulation 2020
7	License to emit noise in excess of permissible noise levels	NEMA	Construction works noise levels regulation	Contractor	National Environment Act 2019
8	Workplace registration	MGLSD	Registration of project and auxiliary sites as workplace	Contractor	OHS Act, 2006
9	Work permits for Foreign nationals	Ministry of Internal Affair	Contractor & Supervising, Consultant/ MWE	Contractor	Immigrations Act, Cap 66
10	Building and hoarding Plan Approval (Workers camps, Workshops, and other structures to be	District Local Government	The plan must conform to regulatory	Contractor	Physical Planning Act, Local Government Act

	Permit	Issuing agency	Use	Responsibility	Legal Framework
	used as operation areas or accommodation for staff)		standards for human occupancy		
11	OTV licences	Ministry of Works and Transport	Transportation of workers	Contractor	Traffic and Road Safety Act
12	CESMP Document Approval	Client/MWE	Operationalise the ESMP from the ESIA	Contractor	Contract Document
13	Permit for Storage of Petroleum Products and dispensing license	PSD/MEMD	Use of petrol, diesels and other petroleum products for project equipment	Contractor	Petroleum Act, Cap 2003
14	Permit if the water transmission line is to cross the UNRA road (Road Permits)	UNRA	Road crossing permit	MWE	The Uganda National Roads Authority (General) Regulations 2017
15	Certification of statutory equipment	MGLSD, UNBS	Regulation and standardising equipment	Contractor	OHS Act, UNBS Act
16	Traffic Diversions consent	Uganda Police	Diversion of traffic	Contractor	Traffic and Road Safety Act 1998
17	RAP approval conditions for this project	CGV	Implementation of the RAP	MWE	The Land Act Cap 227

6 ENVIRONMENTAL AND SOCIAL BASELINE

6.1 PHYSICAL ENVIRONMENT

CLIMATE

Kaliro district has a Tropical monsoon climate which corresponds to the Köppen climate classification category. Tropical monsoon climates have monthly mean temperatures above 18°C in every month of the year and a dry season. The area experiences seasonal variations in monthly rainfall throughout the year. The area experiences a bimodal type of rainfall with peaks in March to May as well as August to November, with the March to May peak as the major one. The most rain is received in April 22, with an average total accumulation of 194 mm. The least rain is received in January and February, with an average total accumulation of 42 mm (***Figure*** 6-1**).** The mean annual rainfall in the Kitenga RGC ranges between 1500 mm to 1530 mm annually. Based on the amount of rainfall received, the area lies with in high rainfall climatic zones of Uganda. These are areas which receive more than 1000 mm of rainfall per annum.

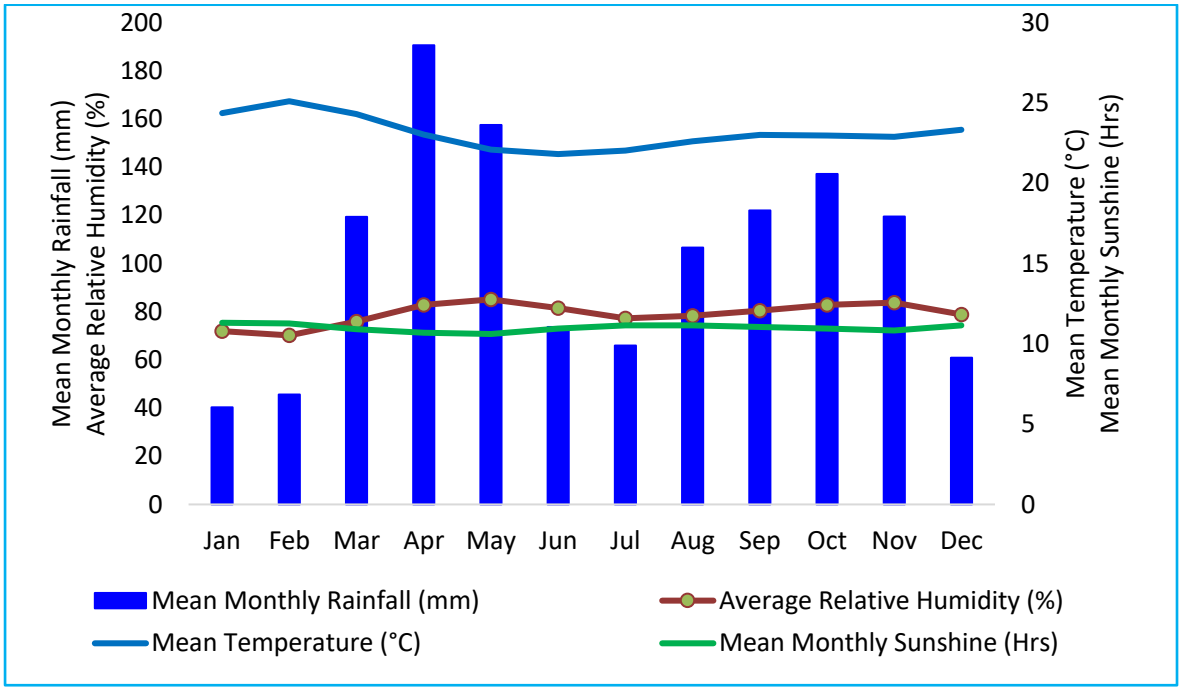


Figure 6-1: Mean monthly rainfall in Kitenga project area

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

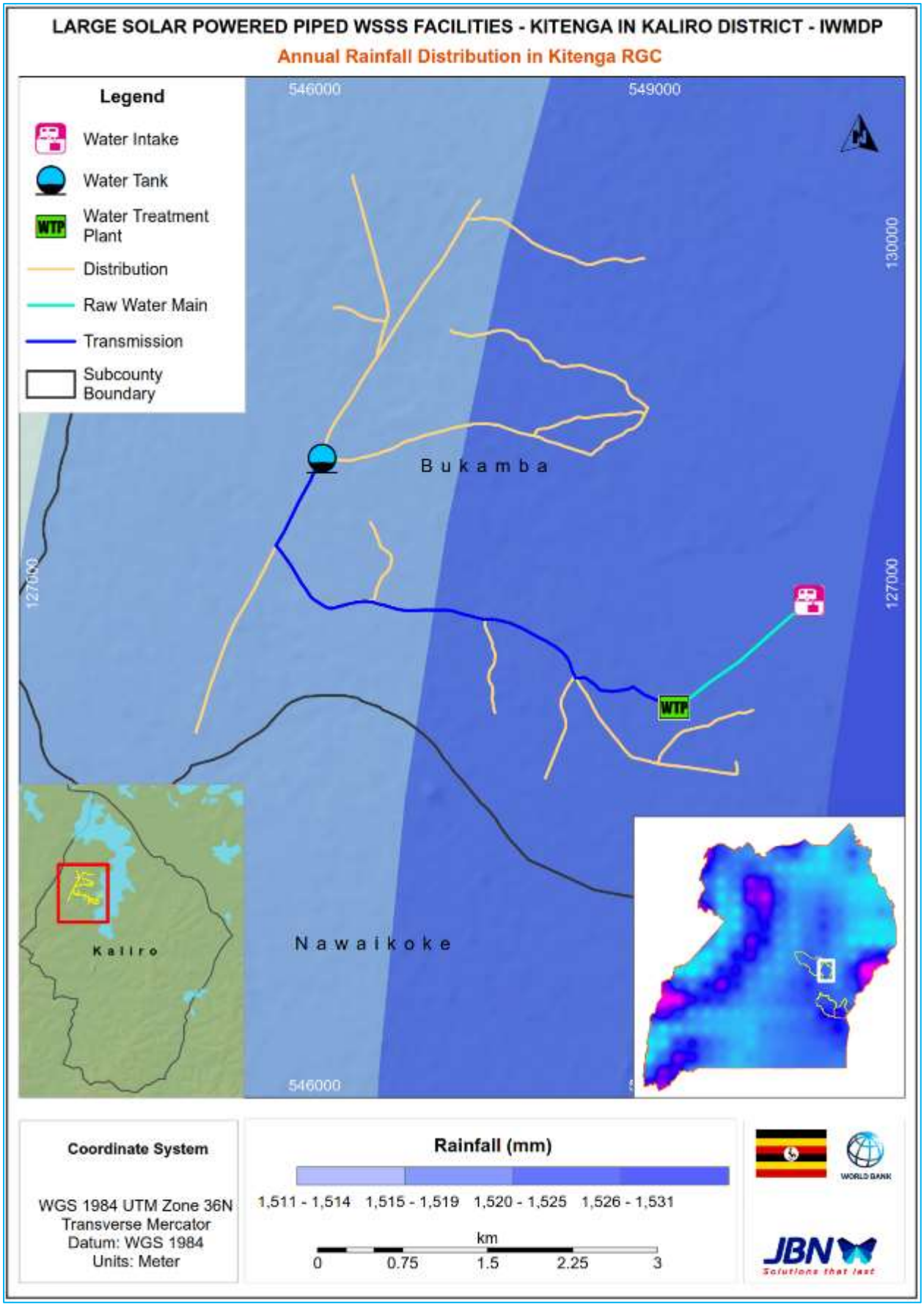


Figure 6-2: Mean annual rainfall distribution over Kitenga project area

WATER RESOURCES AND HYDROLOGY

Uganda has four (4) main Water Management Zones (WMZs) (Upper Nile, Kyoga, Victoria, and Albert) and eight (8) river basins (Albert Nile, Aswa, Kidepo, L. Kyoga, L. Victoria, L. Edward, L. Albert, and Victoria Nile). Kaliro district has both surface and ground water resources. The district is one of the well-drained districts in Uganda. It consists of lake Nakuwa in the North and rivers like; Namawamba, Nabulo, Kabega, Kamutaka, Wakoyeyo, Kobero, Bukere, Naigazi, Igombe, Nabikaliti, Mpologoma and Buluya.

Kitenga RGC project area is drained by Nabulo and Nabusira streams into L. Nakuwa which further drains into L. Kyoga - the largest surface water source in the district (***Figure*** 6-3). There also several wetlands in form of Riverine vegetation and swamps along the waterbodies. However, most of these swamps have been over exploited unreservedly leading to degradation.

Lake Nakuwa

Degraded wetlands at the intake

Figure 6-3: Surface water resources in Kitenga RGC project area

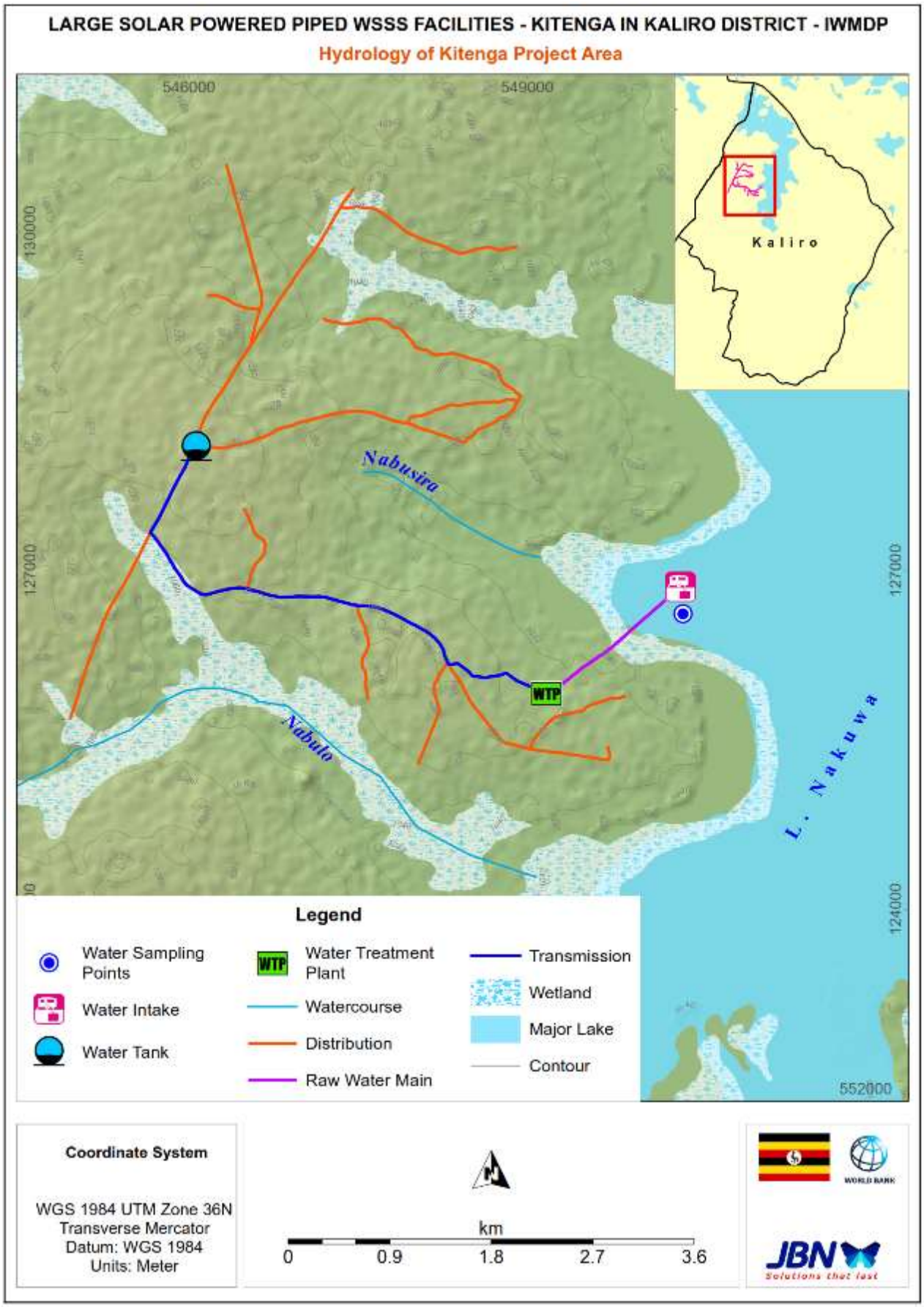


Figure 6-4: Hydrology of Kitenga Project Area

WATER QUALITY

A reconnaissance survey of the project area was undertaken to appreciate the existing water resources, their location in view of the proposed project components, and how they may be affected by the project. The reconnaissance survey further involved the identification and delineation of the potential pollution sources that are likely to impact on the water resources. From the findings of the reconnaissance survey, it was identified that the water intake and water treatment plant sites were the potential areas of focus for water quality assessment, and thus, a detailed water quality assessment was carried out on these sites. The selection of sampling points targeted the proposed intake point.

Water quality assessment was done through water sample collection for laboratory analysis of parameters (**Figure** 6-5). A water sample from the Nakuwa was collected using clean 1 L sampling bottle that was rinsed prior to sampling, and then kept in an ice-cooled box, and transported to the laboratory (MWE/National Water Quality Reference Laboratory - Entebbe) for analysis. The sample was delivered to the laboratory within 24 hours from the time of their 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 6-5: Water quality testing

WATER QUALITY LABORATORY ANALYSIS RESULTS

The water quality of L. Nakuwa, where the water will be abstracted (intake) is presented in ***Table*** 6-1**.** All tested water quality parameters were within drinking water standards (IDEAS 12 2018 Maximum permissible for natural potable water). Nevertheless, the water will be first treated to

ensure that it meets the recommended national standards for drinking water quality before being supplied to consumers.

Table 6-1: Water quality at the intake in Lake Nakuwa

Parameter (unit)	Test results	Uganda National Bureau of Standards - (**DUS ISO 24510:2007 -** Maximum permissible limits for potable Drinking water)
Turbidity (NTU)	11	25
pH (Units)	7.3	5.5-9.5
Electrical Conductivity (µS/cm)	285	2500
Total dissolved solids (mg/L)	200	1500
Total Hardness as $CaCO_3$ (mg/L)	78	600
Fluoride (mg/L)	0.09	1.5
Sulphate (mg/L)	8.9	400
Chlorides (mg/L)	17	250
Nitrates as N (mg/L)	0.25	10
Nitrites as N (mg/L)	<0.002	0.003
Manganese (mg/L)	<0.001	0.001
Total Iron (mg/L)	0.11	0.5
E. coli (CFU/100 mL)	TNTC	<1

Results from the water quality assessment indicate that all tested parameters were within national baseline values for lake water quality monitoring except for *E. coli*. The water quality analysis certificate is presented in Annex E.

TOPOGRAPHY

Kaliro district is a relatively flat district with a few undulating hills and valleys. The biggest part of the district forms the lake shoreline. The area has high ridges and isolated hills and adulating lowlands due to its location along the shores of L. Nakuwa and L. Kyoga. This renders most parts of the project area flat as they form lakeshore and wetland landscapes. The lowest and highest points in the project area are 1020 to about 1090m ASL with a mean elevation of 1055m ASL.

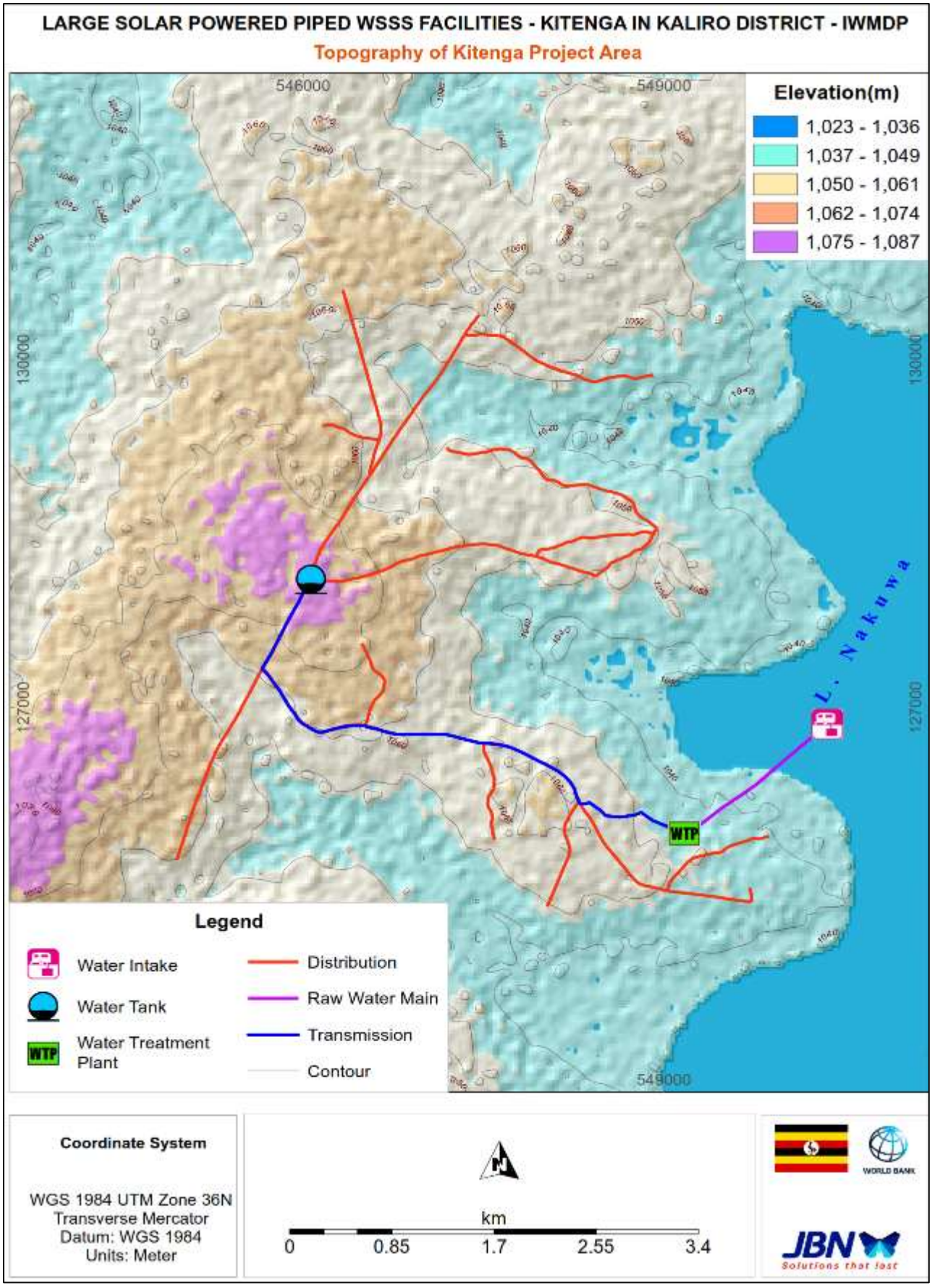


Figure 6-6: Topography of the project area

GEOLOGY AND GEOMORPHOLOGY

Geologically Kaliro like most of Uganda exists of “wholly changed rocks”, a kind of Precambrian rocks”. Only on the lakesides of Lake Kyoga one finds quaternary sedimentary rocks. The undifferentiated gneiss rock of the basement complex which is a high-grade metamorphic rock, formed by the metamorphosis of granite. These are the variable gneissic granitoid (2591±27 Ma; 2652±8 Ma) (**Figure** 6-7 & **Figure** 6-8).

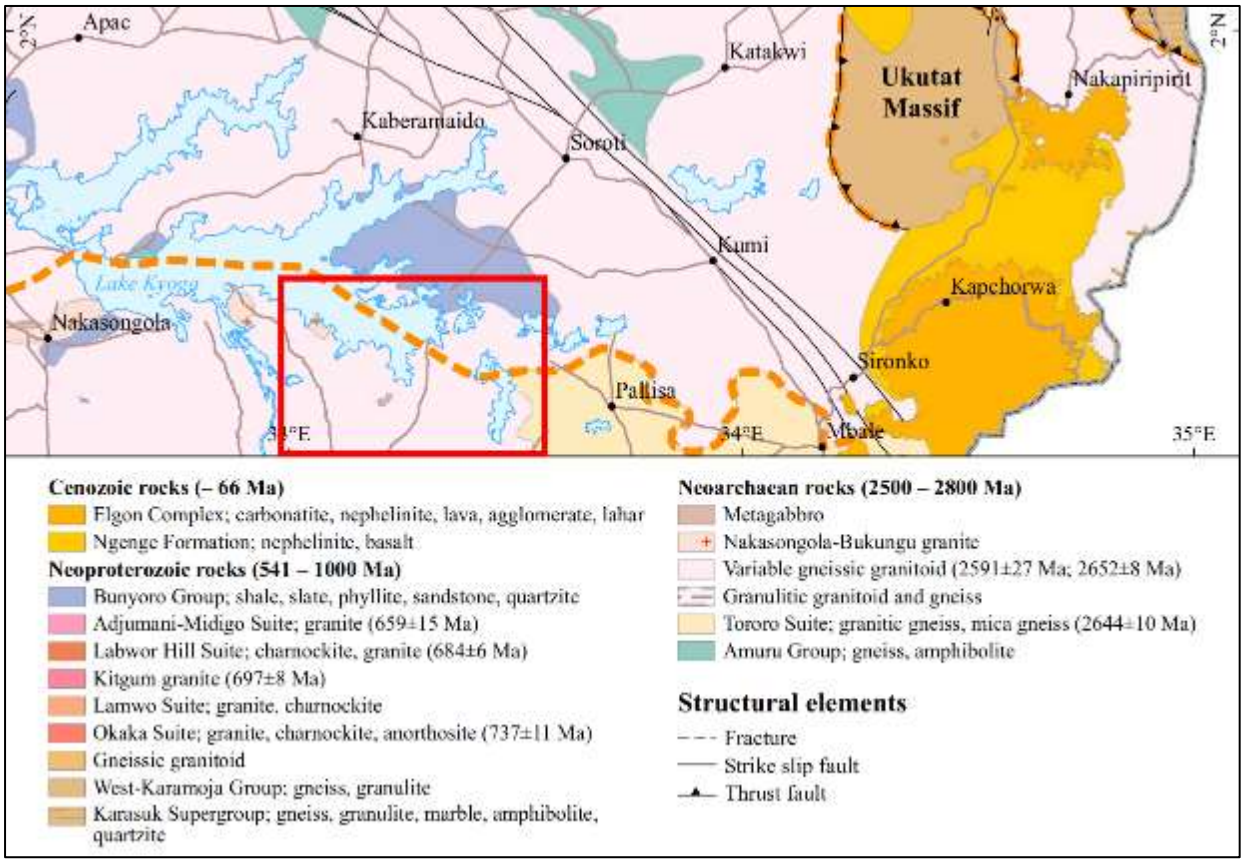


Figure 6-7: Geological map of Kaliro District in the West Tanzania Terrane (WTT)

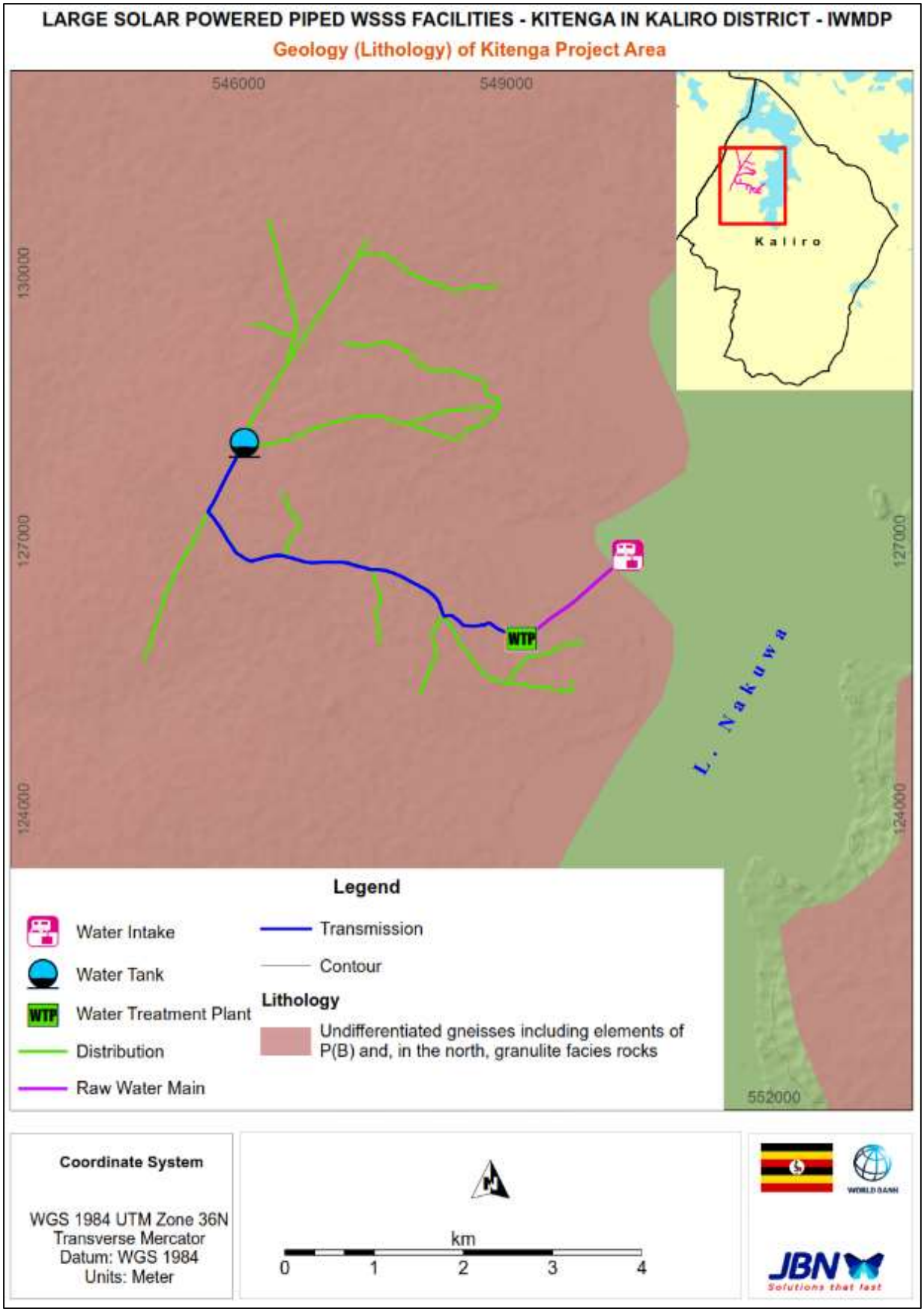


Figure 6-8: Geology of Kitenga project Area

SOILS

Kaliro district soils are predominantly dark brown clays (grumosolic soils), underlain by gneiss. It has generally shallow sandy loams of medium to low fertility. The project area of Kitenga RGC is composed of reddish-brown sandy loams and loams on laterite - the Petric Plinthosols (Acric) of Buruli Catena of Basement complex gneisses and granites; Greyish and yellowish-brown sands – the the Petric Plinthosols (Acric) of Lwampanga Series of Pleistocene beach deposits derived from Basement complex rocks; and Peat or peaty sands and clays - the Histosols of papyrus peat and of papyrus residues and river alluvium. The southern part of the project area has the Black and grey clays often calcareous – the Gleysols of undifferentiated alluvium of the river alluvium and the lake.

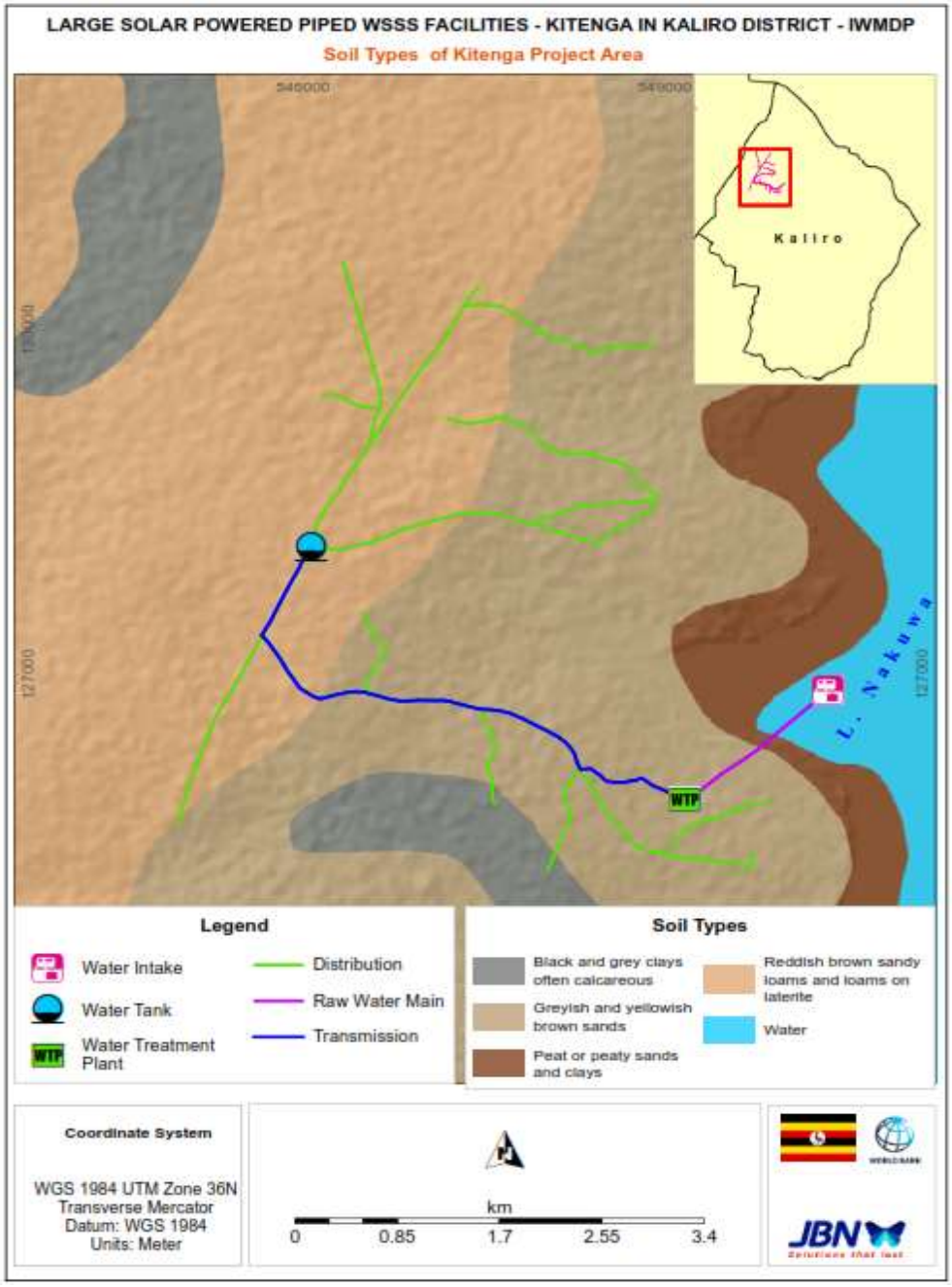


Figure 6-9: Soil formation of the Project Area

AIR QUALITY BASELINE

Ambient air quality monitoring for particulate matter (PM10 & PM2.5) and gas parameters namely: NO_2, SO_2, CO and VOCs was undertaken using a Portable Aeroqual S500 Monitor mounted on a tripod stand about 1.5m above the ground, at selected locations where pollution impacts including dust nuisance were likely be of concern during project implementation. The Aeroqual S500 Monitor was switched on, allowed 3 minutes of zeroing and 7 minutes of stabilizing readings at every site. The monitor was set to start data logging at a frequency of five (5) minutes for per site. Purposive sampling was used to ascertain the selected locations (***Figure*** 6-10) based on information gathered about the project footprint and the location of sensitive receptors.

Kitega A village

Lwamba Trading Centre

Figure 6-10: Sites selected for air quality sampling in Kitemga RGC

All ambient air quality measurements as presented in the following sections, were benchmarked against the World Health Organisation Air Quality Guidelines (WHO AQG), 2006 and the International Finance Corporation of the World Bank Group (IFC) Environmental, Health, and Safety Guidelines: Environmental Air Emissions and Ambient Air Quality (2007).

PARTICULATE MATTER

Results of particulate matter measurements ($PM_{2.5}$ and PM_{10}) undertaken at Kitega A village and Lwamba Trading Centre are presented in ***Table*** 6-2***, Figure*** 6-11 and ***Figure*** 6-12 below.

Table 6-2: Results of $PM_{2.5}$ and PM_{10} measurements

Location	**Date and Time**	**Coordinates 36N**	**PM_{10} (mg/m^3)**			**$PM_{2.5}$ (mg/m^3)**		
			Min	Aver	Max	Min	Aver	Max
Kitega A village	Date: 19/02/2022 Start time: 10:11am End time: 12:15pm	0549234 E 0125379 N	0.021	0.025	0.045	0.014	0.017	0.029

Lwamba Trading Centre	Date: 19/02/2022 Start time: 14:56pm End time: 16:26pm	0545702 E 0127449 N	0.029	0.069	0.199	0.018	0.029	0.061
WHO AQG (2021) - 24hr averaging			0.015			0.045		

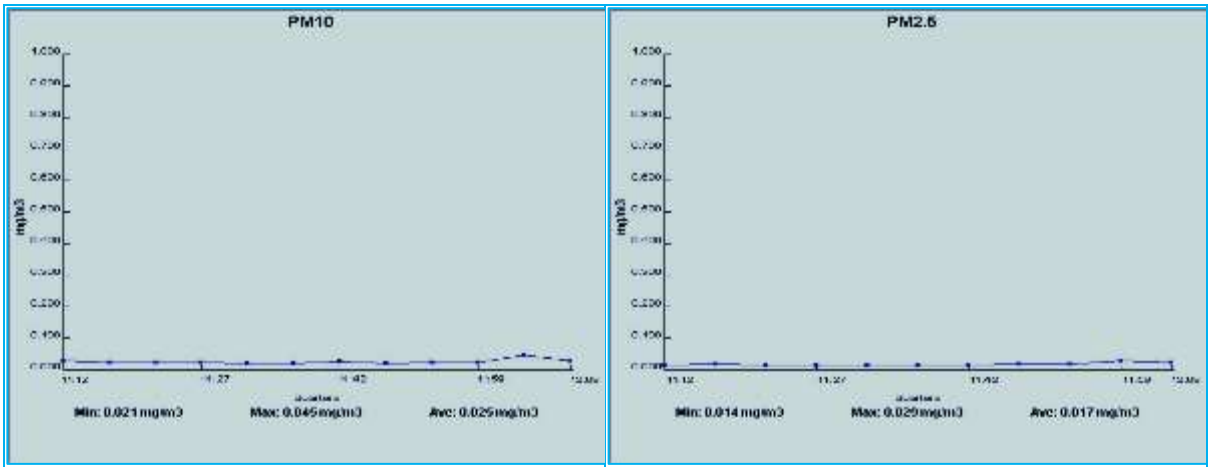


Figure 6-11: Variation of PM_{10} and $PM_{2.5}$ measurements at Kitega A village

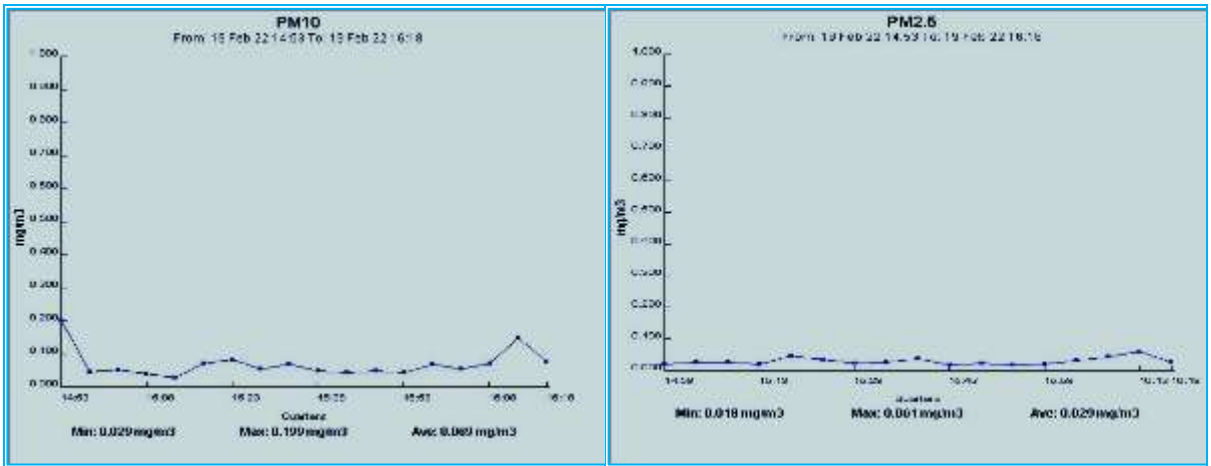


Figure 6-12: Variation of PM_{10} and $PM_{2.5}$ measurements at Lwamba Trading Centre

Results of $PM_{2.5}$ and PM_{10} measurements indicate that ambient average levels of PM $_{2.5}$ ranged from 0.017mg/m^3 to 0.029mg/m^3 while the average levels of PM_{10} ranged from 0.025mg/m^3 to 0.069mg/m^3 for both sites assessed. The values recorded at Kitega A village were within the WHO Air quality limits for particulate matter. The low levels of dust particles were attributed to the vegetation cover, subsistence farming and limited activities along the Lwamba-Kitenga landsite access road that traverses the villages. However, the values recorded at Lwamba Trading Centre were 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 the marrum road bisecting through the trading centre. The strong winds of the area also contributed to the dust generated.

GAS EMISSIONS BASELINE

Four gaseous air pollutants including; CO, NO_2, SO_2 and VOC were considered during the assessment. Of the total volume of air in the atmosphere, 78.09% is Nitrogen, 20.95% Oxygen and the remaining 1% consists of a mixture of other gases including gases considered for assessment.

SO_2, a colourless gas with a sharp odour and NO_2 are produced from burning fossil fuels (coal and oil). SO_2 and NO_2 affect the respiratory systems and cause irritation of the eyes. On the other hand, Carbon monoxide (CO), an odourless and colourless gas is formed by incomplete combustion fossil fuels. VOC are emitted by vehicles, solvents, and chemical industry. VOCs can also come from personal care products such as perfume and hair spray, cleaning agents, dry cleaning fluid, paints, lacquers, varnishes, and from photocopying and printing machines. Results of CO, NO_2, SO_2 and VOCs measurements undertaken at Kitega A village and Lwamba Trading Centre are presented in ***Table*** 6-3***, Figure*** 6-13 and ***Figure*** 6-14 **below**.

Table 6-3: Summary of baseline gas emission readings for Kitenga RGC

Location	**Date & Run time**	**Readings**			
		CO (ppm)	NO_2 (ppm)	SO_2 (ppm)	VOCs (ppm)
Kitega A Village	Date: 19/02/2022 Start time: 11:05am End time: 14:05pm	Min: 0.00 Ave: **0.00** Max: 0.00	Min: 0.081 Ave: 0.092 Max: 0.097	Min: 0.05 Ave: **0.075** Max: 0.12	Min: 0.02 Ave: **0.05** Max: 0.03
Lwamba Trading Centre	Date: 19/02/2022 Start time: 13:47pm End time: 16:47pm	Min: 0.00 Ave: **0.151** Max: 1.81	Min: 0.76 Ave: **0.096** Max: 0.113	Min: 0.02 Ave: **0.06** Max: 0.09	Min: 0.09 Ave: **0.13** Max: 0.28
World Health Organisation Air Quality Guidelines (WHO AQG), 2006		10mg/m^3 or 9ppm (8-hour average)	0.2mg/m^3 or 0.106ppm (1-hour average)	0.5mg/m^3 or 0.2ppm (10-minute verage)	No guidelines

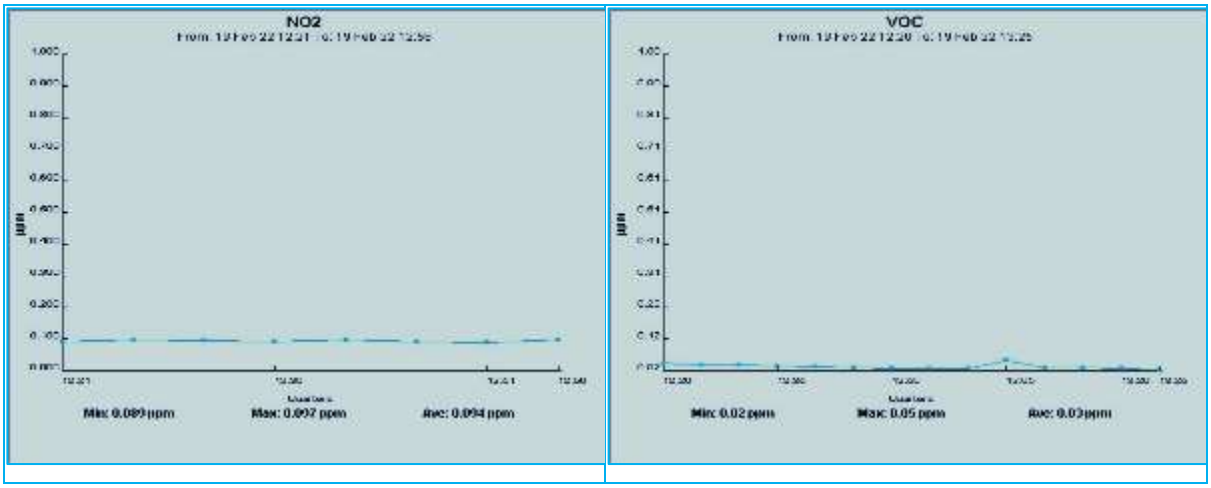


Figure 6-13: Variation of NO_2 and VOC levels at Kitega A village

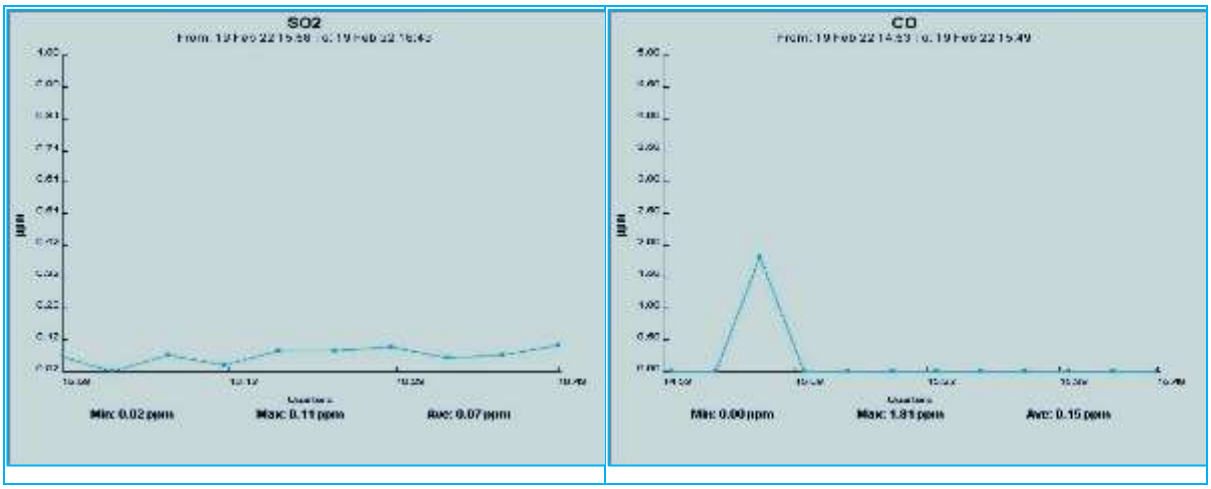


Figure 6-14: Variation of SO_2 and CO levels at Lwamba Trading Centre

The average values monitored at the two (2) sites; Nitrogen dioxide (NO_2) ranged from 0.092ppm – 0.096ppm, Carbon monoxide (CO) ranged from 0.00ppm–0.151ppm, Sulphur Dioxide (SO_2) ranged from 0.072ppm–0.075ppm and 0.04ppm–0.13ppm for Volatile Organic Compounds (VOC). All average values of gases were in conformity with WHO Air Quality Standards during the assessment. The low levels of gases recorded at selected receptors were attributed to limited economic activities. Activities were limited to movement of vehicles and motorcycles (boda-boda) especially within Lwamba Trading Centre. There were no major identified sources of gaseous air pollutants in the project area.

NOISE MEASUREMENTS

As with air quality assessments, the noise assessment study identified sensitive receptors to potential noise likely to be generated from project activities. These are; Lwamba Trading Centre, Kitega Trading Centre, and Kitega A village. Other receptors identified in the project area included Bukamba Subcounty Headquarters, St. Benedict Kitenga Primary School, Buvulunguti Primary School, Bukamba Police Post, and a weekly market in Bukamba Parish. However, these receptors were located at a considerable distance from the project sites likely to generate noise nuisance.

Noise level measurements at Kitega A village

Noise level measurements at Lwamba T/C

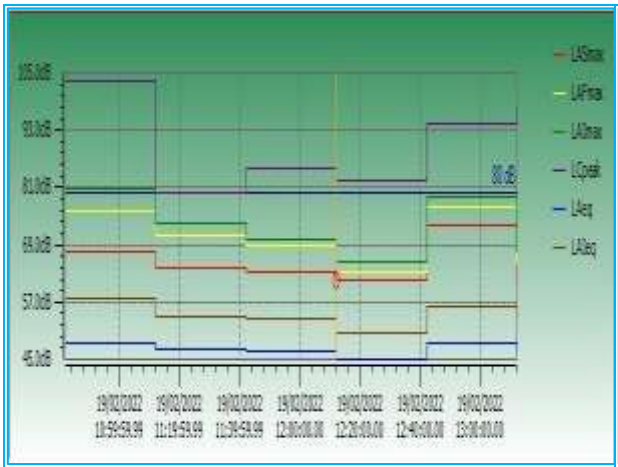
Figure 6-15: Ambient Noise measurements at selected receptors around the project area

NOISE MEASUREMENT RESULTS

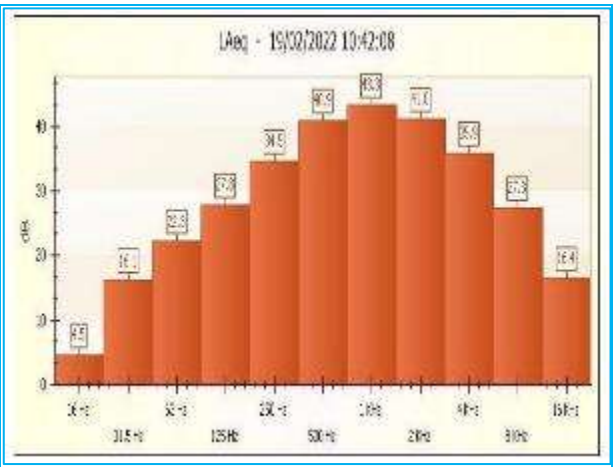
Results of noise level measurements undertaken at Kitega A village and Lwamba Trading Centre are presented in Table 6-4 and Figure 6-16 below.

Table 6-4: Summary of noise results at measured sensitive receptors

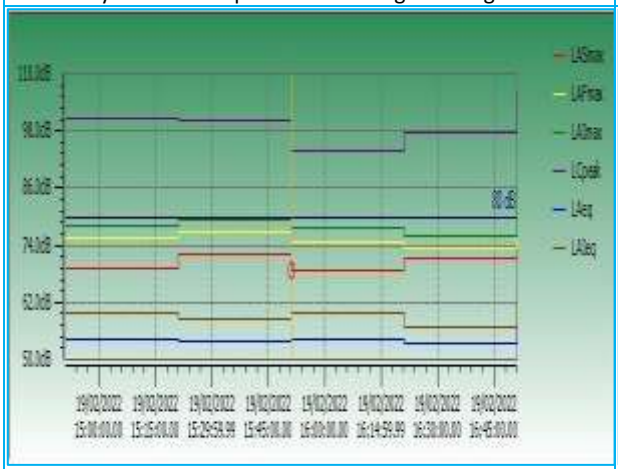
Location	GPS Coordinates	Date and run time	LAF min (dB)	LAF max (dB)	LAeq (dB)	Maximum Permissible Noise Limits Day (dBA)
Kitega A village	0549234 E, 0125379 N	Date: 19/02/2022 Start time: 10:59 am End time: 13:00 pm	30.1	77.1	47.3	50
Lwamba Trading Centre	0545702 E, 0127449 N	Date: 19/02/2022 Start time: 15:00 am End time: 16:45 pm	36.4	82.6	54.5	55



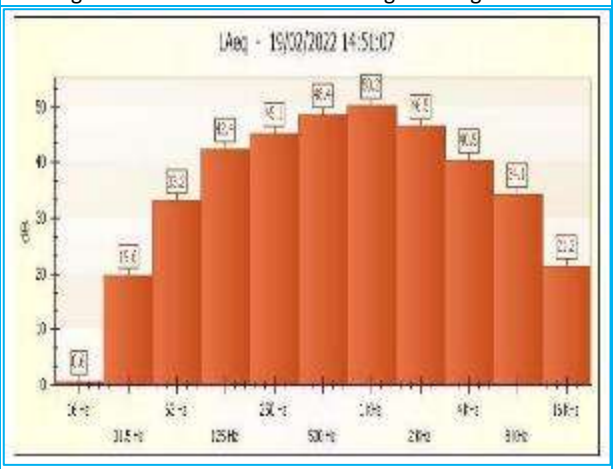
Summary of noise frequencies at Kitenga A Village



Average noise measurements at Kitenga A village



Summary of noise frequencies at Lwamba T/C



Average noise measurements at Lwamba C

Figure 6-16: Recorded noise levels over time of measurement

Continuous noise levels (LAeq) for the measurements undertaken at two selected semi-urban sites ranged from 47.3dBA at Kitege A village located in residential area to 54.5dBA at Lwamba Trading Centre located in a growing town centre. The noise levels recorded at these different sensitive receptor sites varied depending on the noise sources at a specific time of measurement. For Kitenga A village, the main sources of noise emanated mainly from people talking, while at Lwamba Trading Centre, motor cyclists traversing the access roads in the areas were the main source of noise. The baseline noise levels recorded at the two (2) sites were within the maximum permissible noise limits as prescribed in the First Schedule of National Noise Standards and Control Regulations, 2003.

VIBRATION MEASUREMENTS

Ground Vibration monitoring to measure the seismic movements of soil and rock particles at a frequency range of 10Hz to 1Hz was undertaken using an EXTECH SDL800 Vibration Meter and Data logger mounted on a tripod stand of about 3 inches in length. Using a cable of about 1.2m, the meter was attached to a remote vibration sensor with a magnetic adaptor reinforced to the ground by a 4inch stainless steel nail. The vibration meter was then switched on to set up mode and allow data logging of readings to an SD card inserted into the SD slot at the bottom of the meter (***Figure*** 6-17).

Figure 6-17: Vibration measurements

In absence of Uganda standards for vibrations, the ground vibrations standards are adopted from Ireland (Table 6-5).

Table 6-5: Adopted Vibration Standards

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

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

VIBRATION MEASUREMENT RESULTS

Results of vibration measurements undertaken at Kitega A village and Lwamba Trading Centre are presented in

Table 6-6 below.

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

Location	Coordinates 36N	Date and Time	VEL mm/S			
			Min	Ave	Max	Adopted Standard
Kitega A village	0598043 E, 0021617 N	**Date:** 18/02/2022 Start time: 10:15am End time: 13:09pm	0.1	0.75	2.7	12.5
Lwamba Trading Centre	0533930 E, 0136545 N	**Date:** 18/02/2022 Start time: 13:51pm End time: 16:47pm	0.0	0.41	7.6	

The vibration results averaged between 0.75mm/s in Kitenga A village and 0.41mm/s at Lwamba Trading Centre, both below the adopted standards for vibrations from construction activities.

6.2 HEALTH AND SAFETY

SECURITY ISSUES AROUND THE PROJECT AREA

The police station serving the project area is Bukamba Police Station, located in Bukamba Sub County. The station has only one motorcycle, two police officers and they use their phones to coordinate policing activities in the RGC. Between January and April 2022, 4 defilement cases, 20 theft, 11 domestic violence, 10 threatening violence, 2 child abuse, 32 assaults, 8 criminal trespass, 2 suicides and 1 road traffic accident were recorded at the Police Station.

FIRE EMERGENCY READINESS

The police station does not have firefighting equipment, trained fire officers, nor does it provide fire safety training. The nearest fire station is Iganga Town, approximately 55km from the project area. There were no fire emergency calls recorded between January 2022 to April 2022.

TRAFFIC SAFETY

According to the station in charge, the most common traffic accidents are motorcycle collisions, overturning of overloaded sugarcane trucks (***Figure*** 6-18) along access routes from sugarcane plantations, and inconveniences due to flooding during the rainy seasons (**Figure** 6-19).

Figure 6-18: An overturned- overloaded sugarcane truck along Kaliro-Nawaikoike-Buvuluguti road

Figure 6-19: Flooded bridge under construction along Lumbuye wetland in Matete Village

The roads to the project area are narrow and potholed, due to erosion of the road surface (**Figure** 6-20). The approximate daily traffic is 8 cars and 60 motorcycles. The most common road users are pedestrians, motorcycles, bicycles, and sugarcane lorries.

Figure 6-20: Narrow section of the Kaliro-Nawaikoike-Buvuluguti Road with gullies in Lwamba TC

6.3 BIOLOGICAL ENVIRONMENT

LAND COVER AND LAND USE

The main land uses and land cover types in Kitenga RGC are crop land, wetland, forestland and grassland as shown in Figure 6-21 and further described below in more details.

Land cover

The land cover of the project area consists of Crops (Cassava, Maize, Sugar cane, Rice etc), forests, wetlands, open water body and built-up areas. The major landcover is illustrated in figure 6-21 below.

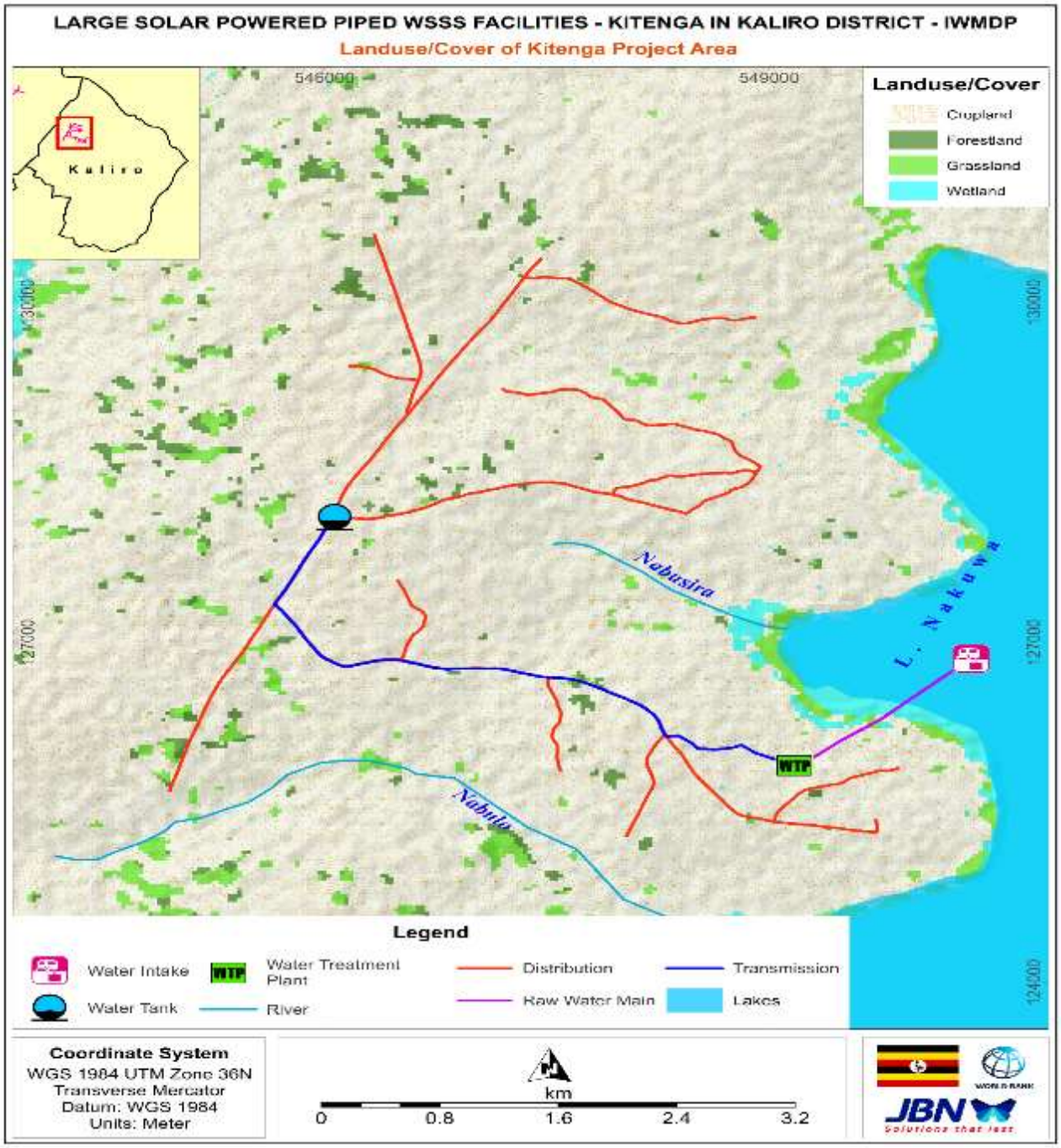


Figure 6-21: Land use and Land cover in Kitenga RGC

Landuse.

The dominant land use in the project area is crop farming. This is mainly characterised by monoculture (sugarcane blocks), and agro-pastoral farmland (a mix of subsistence in form of shifting agriculture and animal grazing areas) as further described below.

Monoculture: The district of Kaliro is typically characterized by monoculture practices of sugar cane blocks which has greatly contributed to the loss of vegetation in most swamps and flood plains throughout the district. The proposed site for the WTP is also partly covered by sugarcane blocks.

Agro-pastoral: The second dominant modified habitat types within the project footprints are agro-pastoral and fallow land which are generally located at the water intake and along the proposed distribution pipelines. Most swamps have ben degraded due to sugarcane, rice and tomato growing. About twelve (12) common species of annual and perennial crops were located within the project areas and these includes; - *Zea mays* (maize), *Manihot esculenta*, *Musa spp*., *Sorghum bicolar*, *Oryza sativa*, *Phaseolus vulgaris*, *Solanum lycopersicum, Solanum melongena*, *Citrullus lanatus*, *Cucurbita pepo*, *Vigna subterranean*, and *Sesamum indicum*. Kaliro district is largely known for subsistence farming mainly Maize growing, rice, Cassava tuber, groundnuts, sorghum, bean seed, sweet potatoes, Millett, Sugar cane, Soya bean, and leafy vegetables. Shifting cultivation or land rotation practices are however, generally fairly based on rudimentary method of traditional slash and burning techniques. Under suitable conditions, swamps are cleared for intensive cultivation of rice in the wet season, sugar cane and leafy vegetables.

Forestland is characherised by pockets of eucalyptus and pine plantations as the environment in the RGC has been modified. Grassland and wetland land cover types are characterised by pockets of secondary regenerating natural vegations in pockets of the RGC, especially along the lakeshores and within flood plains of L. Nakuwa.

Other land use types include settlement in form of homesteads, trading centres, and fishing over L. Nakuwa.

Settlements: A significant proportion of the project foot print lies within areas that have undergone through several vegetation transform and currently the project area is considered as secondary with degraded habitats due to several types of infrastructures, although the area holds sparsely populated trading centres like Lwamba, and Buvulunguti, natural habitats have declaimed due to poor land use planning with in the entire Busoga region.

Fishing: This is practiced at small scale in Lumbuye wetland and on L. Kyoga. The proposed water intake site is in area currently in use as small landing site for the fishermen.

Figure 6-22: Tomato growing at the location of the WTP

Figure 6-23: Maize Garden at the WTP site

Figure 6-24: Fishing near the intake site

FLORA

VEGETATION DESCRIPTION

The natural vegetation of Kaliro District can be described as: Tropical Savanna woodland mosaics, with remnant trees such a *Milicia excelsa* (Mvue), *Ficus mucuso*, *F. glumosa*, *Albizia coriaria*, and *Ficus sycomorus*, associated with tall and short grasslands predominantly *Pennisetum purpureum Schumach*, *Imperata cylindrica* (Linn.) *P. Beauv*, *Hyparrhenia ssp*, *Panicum maximum Jacq*., *Brachiaria documbens*, and *Cymbopogon nardus* (L.) Rendl.

Permanent and seasonal wetlands are characterized by Cyperus papyrus L, Typha domingensis, Burnatia enneandra, Echinochloa pyramidalis, Leersia hexandra Sw, mixed with Phoenix reclinata Jacq, Sesbania sesban, and Pseudospondias microcarpa (A. Rich.) Engl. Wetland edges are associated with Pseudospondias macrocarpa (A. Rich) Engl. Alchornia cordifolia (Schum. and Thonn.) Müll. Arg and Acacia polyacantha Willd.

However, the entire project footprint has been plethora degraded mostly due to human induced, which resulted loss of primary habitats. The modified area accounting for about 98% of the land cover reflective to natural habitats (2%) of the land cover (**Figure** 6-25**)**, which is a reflective of the significant anthropogenic activities within the vicinity of the project area

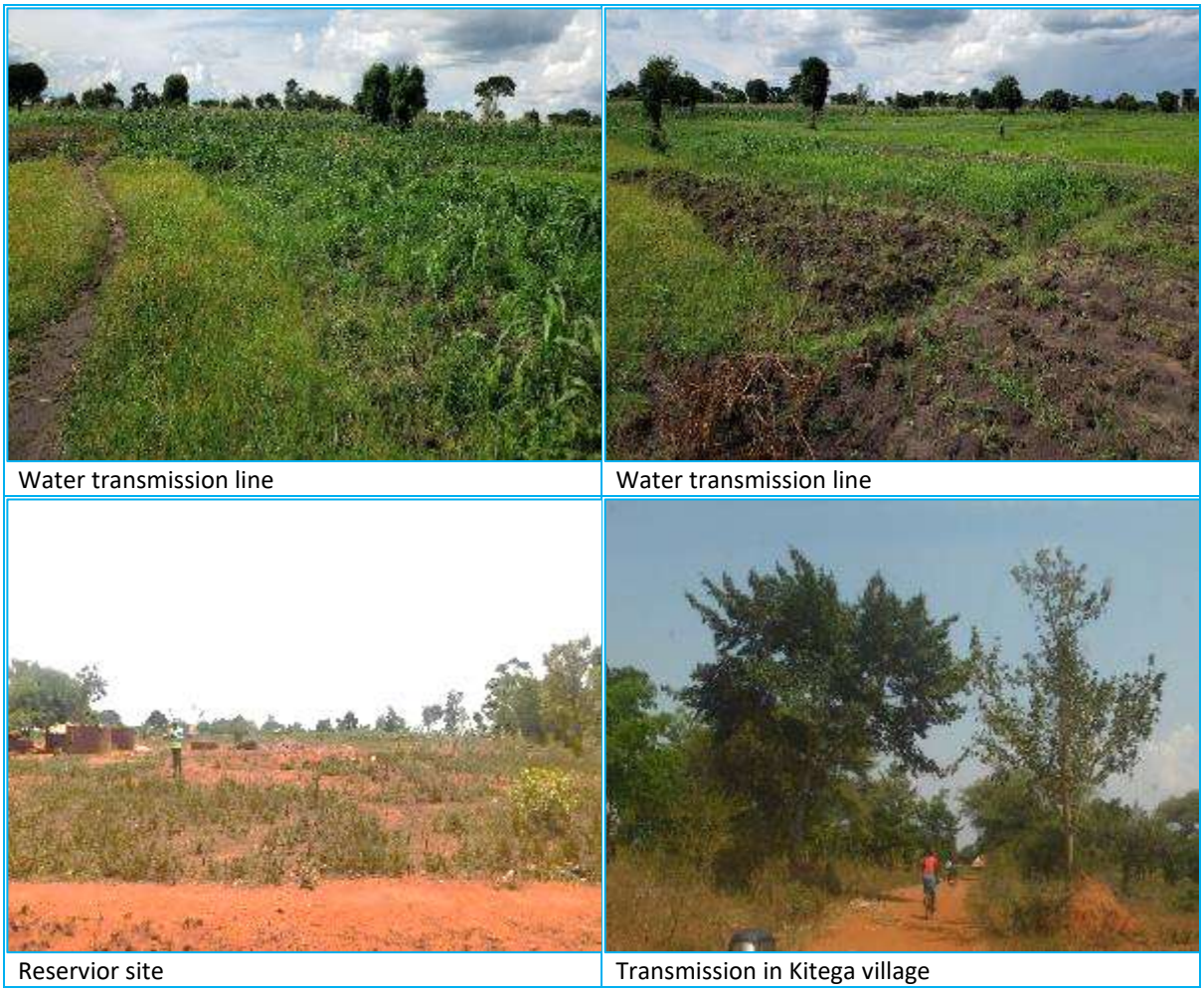
Figure 6-25: Fringe wetland at the intake site

Natural lakeshore vegetation at the intake

Location of WTP

Transmission line

AT the WTP



Water transmission line | Water transmission line

Reservior site | Transmission in Kitega village

Figure 6-26: Vegetation at the intake and WTP

FLORISTIC COMPOSITION, DISTRIBUTION, DENSITY AND DIVERSITY

The vegetation survey was undertaken at all the proposed locations for the project components and routes. The number of species recorded in any geographical location depended more on the time factor and sample size before other factors such as; ecological and anthropogenic activities. All the proposed sites and routes differed in an area covered, a factor that determined the number of sampling unit **Figure** 6-27 below represent species composition of Kitenga project area.

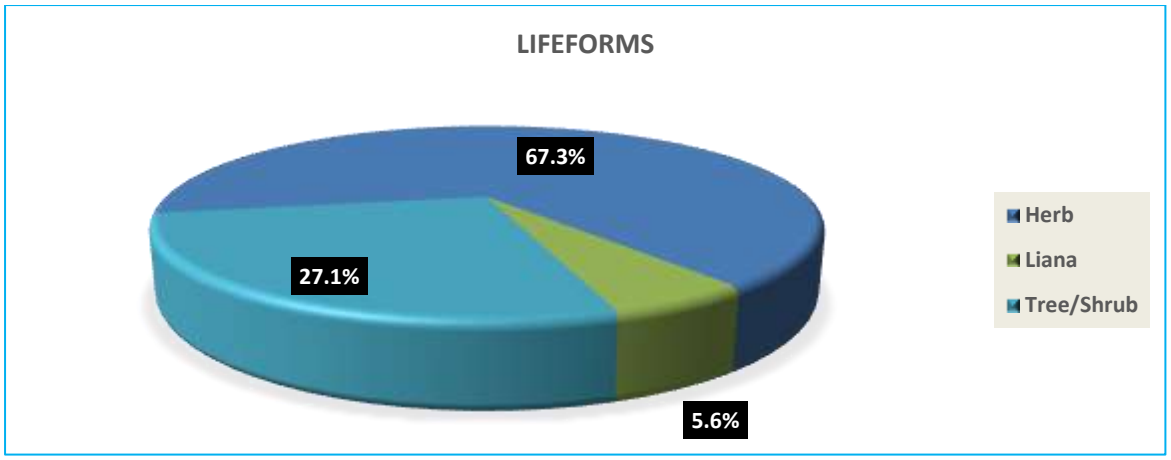


Figure 6-27: Species composition

A total of one hundred and seven (107) individual species were recorded from twenty-five (35) families. Herbaceous species recorded the highest individuals with seventy-one (71) contributing 67%, followed by trees/shrubs with twenty-nine (29) representing 27%, and lastly liana with only six (6) species contributing only 6% of the species composition.

Among the herbaceous plants are *Cyperus papyrus*, *Cyperus dives*, and *Burnatia enneandra* associated with *Cayratia ibuensis* dominated the wetland, *Cassia hirsute* and *C. occidentalis* dominated the open fallow area. *Ficus natalensis* and *Milicia excelsa* dominated among the remnant trees. In terms of the vertical structure, the savanna of the study area is a much less complex type of vegetation because it is located on subsistence land. The profile shows a tree stratum 4-30m high for the indigenous remnant trees. Canopy cover is open with only 5% or less closed and 95% open in most places.

SPECIES RICHNESS

The diversity of an area is the number of different species. From the field survey conducted in Kitenga RGC water system project area, diversity was low according to the log series. The Fabaceae recorded the highest number of species with 16, followed by Poaceae (Graminae) with 15, *Asteraceae* (Compositeae) 9, *Cyeraceae* and *Malvaceae* 6 each, and *Moraceae* 5, the rest registered 4 or less. (Annex F).

CONSERVATION STATUS OF THE SPECIES

Using the IUCN Red List Categories and Criteria at Global, Regional and National Levels. The IUCN Red List Categories and Criteria were developed for classifying species at high risk of global extinction, i.e. for assessment at the global level. All areas smaller than the global level are referred to as “regional” and at the National level.

Out of the one hundred, and seven (107) plant species encountered in all study sites, only two (2) species have been listed under the IUCN Red list of Uganda of 2018. Therefore, the species raises a great conservation concern in the country and in the region. These were:

a. *Milicia excelsa* (Mvule) in Moraceae, globally listed Near-threatened and nationally as (EN A2acd,) the tree is widely distributed in the Busoga region and it was observed from the water treatment site,
b. *Khaya anthotheca* (Meliaceae), globally, VU and nationally as (EN A2acd), only one tree was sighted long the transmission line between water treatment to the reservoir in Kitenga. Khaya anthotheca is not a native tree species to the Busoga sub-region, the tree was planted around some’s homestead. A linear structure like a small water transmission pipe line may not cause any major threat to trees in area.

INVASIVE PLANTS

Invasive alien species are species introduced deliberately or unintentionally outside their natural habitats where they can establish themselves, invade, out-compete natives and take over the new environments. Based on the above invasive definitions, a total number of seventeen (17) plant species were identified as invasive from all project footprints in Busoga. Although FAO, CAB, and IUCN categorized the species as invasive, some species were found to be useful to communities where they occur, therefore only eight (8) were invasive and responsible the habitat alteration in

the case study areas. Some species like: - *Cassia siemea* (Fabaceae) tree was commonly found planted at schools, trading centers and homesteads to act as a shade tree, *Eucalyptus ssp*, *Gravillea robusta* (Proteaceae), and *Maesopsis eminii* (Rhamnaceae), are planted to serve as wood lots, *Artocarpus heterophyllus* (Jackfruit), *Mangifera indica* (mango tree), *Psidium guajava* (Myrtaceae) and *Syzygium cumini* (Myrtaceae) but these are not a threat to communities where they occur, all of them have been planted to serve different purposes as shown in Table 6-7 below.

Table 6-7. List of the invasive plant species recorded in Kitenga RGC

Family	Species	Lifeform	Lifeform	Status	Source	Impact	Use
Apocynaceae	Cascabela peruviana	Shrub	Shrub	Invasive	Introduced	Fast growing, forming dense thickets displacing native species, all parts of the plant are extremely toxic to human and animals	None
	Bidens pilosa	Herb	Herb	Invasive	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
	Chromolaena odorata	Liana	Shrub	Invasive	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 of degraded agriculture land
	Xanthium strumarium	Herb	Herb	Invasive	Introduced	Major weed of row crops	None

Family	Species	Lifeform	Lifeform	Status	Source	Impact	Use
Lamiaceae	Hyptis suaveolens	Herb	Herb	Invasive	Native	Reduced native biodiversity	None
	Sida acuta	Herb	Herb	Invasive	Introduced	Infests various habitats, becomes most problematic in pastures and rangelands	None
Pontederiaceae	Eichhornia crassipes	Herb	Herb	Invasive	Introduced	Adversely affects human activities (fishing, water transport) and biodiversity	It ferments rapidly due to its high-water content and can supply biomass for biogas production.
	Lantana camara	Herb	Shrub	Invasive	Introduced	Damaged ecosystem services, fire regime, negatively impacts: agriculture animal health; forestry; human health, Reduced native biodiversity	Fodder, ornamental, Erosion control, Fuelwood

FAUNA

BUTTERFLIES

Thirteen (13) species of butterflies were registered in the project area (Table 6-8), at the water intake (WI), water treatment plant (WTP) site, water reservoir tank (WRT) site and along the areas of the transmission and distribution network (T&DN). The species are classified into eleven (11) genera and Six (6) families. Four of the species recorded are migratory in nature, six of the species

are wide spread and occur in a wide range of habitats, while three species are forest edge/woodland species and are more often encountered in a variety of forest edge, degraded forest, and woodland habitats. Four species are categories as open habitat species and prefer or occur in open habitats or grassland habitats. The Scalloped Sailer (Neptidopsis ophione), Brown Pansy (Junonia stygia) and Lady's Maid (Vanessula milca) occur in forest, woodland areas. African Migrant (Catopsilia florella) is a fast-flying butterfly that moves swiftly between flowers. It often engages in mud-piddling and is at times seen migrating in numbers.

Table 6-8: Butterflies encountered during the survey

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	WRT	T& DN
Nymphalidae	*Acraea serena* Orange Acraea – W	LC	1	0	0	0
Nymphalidae	*Acraea uvui* Tiny Acraea – f	LC	1	0	0	0
Nymphalidae	*Acraea esebria* Dusky Acraea - W	LC	0	0	0	0
Nymphalidae	*Danaus chrysippus* African Queen- M	LC	1	0	0	3
Nymphalidae	Junonia oenone Blue Pansy W	LC	0	0	1	1
Nymphalidae	Junonia orithya Eyed Pansy - M	LC	1	0	0	0
Nymphalidae	*Junonia stygia* Brown Pansy – f	LC	1	0	0	0
Nymphalidae	*Neptidopsis ophione* Scalloped Sailer - f	LC	1	0	0	0
Papilionidae	*Papilio demodocus* Citrus Swallowtail - M	LC	0	0	2	5
Pieridae	*Catopsilia florella* African Migrant - M	LC	2	1	4	19
Pieridae	*Eurema desjaridinsi* Angled Grass Yellow - W	LC	0	1	0	0
			7	2	3	4

Tiny Acraea (*Acraea uvui)*

Brown Pansy (Junonia stygia)

Figure 6-28: Some of the Butterfly species encountered during the survey

DRAGONFLIES

Dragonflies are important to their environment both as predators (particularly of mosquitos) and as prey to birds and fish. Because dragonflies require stable oxygen levels and clean water, scientists consider them reliable bioindicators of the health of an ecosystem. Uganda scores highly in terms of species because of its position between two important biogeographical regions and its extensive wetlands and forest areas and is known for 231 species of dragonflies. Of the 231 species, only two species of dragonglies were recorded in the project area. The two species represent two families, family *Coenagrionidae* and family Libellulidae. The Southern Banded Groundling Brachythemis leucosticta and Common *Citrils Ceriagrion glabrum*. Both species were registered at the Water Intake point. The Southern Banded Groundling *Brachythemis leucosticta* was the most common. The Common *Citrils Ceriagrion glabrum* is common and widespread across East Africa. 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 are categorized as Least Concern by the 2020 IUCN Red List of threatened species.***

Common Citrils Ceriagrion glabrum

Southern Banded Groundling *Brachythemis leucosticta*

Figure 6-29: Species of dragon flies encountered

HERPETOFAUNA

AMPHIBIANS

The amphibian survey was conducted during dry season and during dry weather amphibians are difficult to come by. Amphibians were mainly recorded in areas that are moist especially around wetland areas and streams and wet culvert points. Amphibians are also secretive creatures and they require ample time to compile a complete species list for the project area ***Table*** 6-9 below presents species recorded during the survey.

Table 6-9: List of amphibian species encountered

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	WRT	T&DN
Bufonidae	*Sclerophrys* maculatus Flat-backed Toad	LC	1	0	0	1
Dicroglossidae	*Hoplobatrachus occipitalis* Eastern Groove-crowned Bullfrog	LC	5	0	0	0
Hyperoliidae	*Afrixalus quadrivittatus* Four-lined Spiny Reed Frog	LC/ DD	1	0	0	0
Hyperoliidae	Hyperolius kivuensis Kivu Reed Frog	LC	3	0	0	0
Hyperoliidae	Hyperolius viridiflavus Common Reed Frog	LC	1	0	0	0
Phrynobatrachidae	Phrynobatrachus mababiensis Dwarf Puddle Frog	LC	1	0	0	0
Ptychadenidae	*Ptychadena anchietae* Anchieta's Rocket Frog	LC	0	0	0	3
Ptychadenidae	Ptychadena mascareniensis Mascarene Rocket Frog	LC/ (U-DD)	1	0	0	2
Total species count			7	0	0	3

From the survey, a total of Eight (8) amphibian species were recorded in the project area. One species was a toad and seven species were frogs. The recorded species represent 5 families and 6 genera. In terms of species richness, Family Hyperoliidae was the most represented with three species. Seven species were recorded at the water Intake / source, three species along the distribution and supply pipeline alignments and none at the Water Treatment plant and Reservoir tank infrastructure sites. The Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis* is usually found near or in water (Rödel 2000). The species tend to migrate during the dry season to the edges of rivers and in the wet season to surroundings of ponds (Spieler 1997). The Mascarene Rocket Frog *Ptychadena mascareniensis* (**Figure** 6-30) is an adaptive species that can adapt easily

to modified environment. Physiologically, the skin of Flat-backed Toad *Sclerophrys* maculatus are more adapted for dry weather than frogs.

Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis*

Mascarene Rocket Frog Ptychadena mascareniensis

Figure 6-30: Amphibians encountered in the project area

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

REPTILES

Sampling for reptiles was limited to a radius 200m around each point. Eight reptile species were recorded during the field survey (**Figure** 6-11**)**.

Table 6-10: Reptile species encountered/reported

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	RT	T&DN
Agamidae	*Agama agama* Red-Headed Rock Agama	LC	13	0	1	40
Crocodylidae	Crocodylus niloticus Nile Crocodile	LC	R	0	0	0
Elapidae	Naja melanoleuca Forest Cobra	LC	R	R	R	0
Lacertidae	*Heliobolus spekii* Speke's Sand Lizard	LC	0	0	0	1
Scincidae	Trachylepis maculilabris Speckled-lipped Skink	LC	1	0	0	4
Scincidae	Trachylepis margaritifer Rainbow skink	LC	21	0	0	0
Scincidae	Trachylepis striata Striped Skink	LC	0	0	1	6

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	RT	T&DN
Varanidae	Varanus niloticus Nile Monitor	LC	R	R	0	0
Least Concern, CITES Appendix II Listed		LC = Least Concern, R = Reported				
Total species count			6	2	3	4

The reptiles encountered include; one snake, three Lizards, and three skinks representing five families and five genera. The occurrence of the Nile Crocodile Crocodylus niloticus, Forest Cobra *Naja melanoleuca* and Nile Monitor *Varanus niloticus* was reported by the local community. The rest of the species were physically encountered during the survey. The intake / Water Source area recorded the highest number of species. Six species were recorded at the site during the baseline survey. The distribution and supply pipeline areas recorded four (4) species, Water Treatment Plant areas two (2) species and the Reservoir tank areas recorded three (3) species. The Red-Headed Rock Agama *Agama agama* and Rainbow skink *Trachylepis margaritifer* were the most common (***Figure*** 6-31). Fifty-three (53) and twenty-One (21) individuals each were encountered respectively. Several them were seen basking on buildings, wall fences, trees culvert embarking's, heaps of bricks and heaps of stone in and around the study sites.

None of the reptiles encountered and those reported by the community members are Red Listed. All the species are listed as least concern by IUCN 2020 Red List of threatened species.

Striped Skink Trachylepis striata

Male Red-Headed Rock Agama

Figure 6-31: Reptiles encountered

AVIFAUNA

Birds prefer different habitats with different ecological characteristics which have been modified over time. The project area is a modified environment, and is therefore expected to have birds adopted to different modified environments. Forty-Three (43) species of birds (**Table** 6-11) were recorded in the project areas for Kitega water supply system and sanitation project These constitute 4% of Uganda's bird fauna. The species encountered are grouped into Twenty-Eight families and Thirty-Nine genera.

Table 6-11: List of Birds recorded in the project area

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	RT	T&DN
ACCIPITRIDAE	122 - Lophaetus occipitalis Long-Crested Eagle - F	LC	1	0	0	0
ACCIPITRIDAE	73 - Elanus caeruleus Black-Shouldered Kite - G	LC	2	1	0	1
ACCIPITRIDAE	75 - *Milvus migrans* Black Kite – pA (widespread)	PM	1	0	0	2
ALCEDINIDAE	373 - *Halcyon leucocephala* Grey-Headed Kingfisher - Afw	LC	0	0	0	2
ALCEDINIDAE	375 - *Halcyon senegalensis* Woodland Kingfisher - A	LC	1	0	0	0
ALCEDINIDAE	376 - *Halcyon chelicuti* Striped Kingfisher - G	LC	0	0	0	1
ALCEDINIDAE	378 - *Ispidina picta* African Pygmy Kingfisher - fw	LC	0	0	0	1
ALCEDINIDAE	380 - *Corythornis cristata* Malachite Kingfisher - W	LC	0	0	0	1
ANHINGIDAE	7 - *Anhinga rufa* African Darter – W	LC	1	0	0	0
APODIDAE	358 - *Cypsiurus parvus* African Palm Swift - G	LC	50	0	6	20
ARDEIDAE	17 - *Bubulcus ibis* Cattle Egret - G	LC	8	0	0	21
ARDEIDAE	26 - *Ardea melanocephala* Black-Headed Heron - w	LC	1	0	0	0
CICONIIDAE	30 - *Anastomus lamelligerus* African Openbill Stork - AwG	LC	5	0	0	30
CICONIIDAE	32 - Ciconia abdimii Abdim's Stork - AG	AM	0	0	0	53
CICONIIDAE	35 - *Ephippiorhynchus senegalensis* Saddle-Billed Stork - W	R-VU, U-VU	0	0	0	2
Cisticolidae	645 - *Cisticola chiniana* Rattling Cisticola - O	LC	0	2	0	0
CISTICOLIDAE	677 - *Camaroptera brachyura* Grey-Backed Camaroptera - f	LC	0	0	0	1

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	RT	T&DN
COLLIIDAE	369 - *Colius striatus* Speckled Mousebird - O	LC	0	0	0	5
COLUMBIDAE	281 - *Columba guinea* Speckled Pigeon - f	LC	0	0	0	1
COLUMBIDAE	283 - Streptopelia semitorquata Red-Eyed Dove - f	LC	1	0	0	0
COLUMBIDAE	284 - *Streptopelia decipiens* African Mourning Dove - O	LC	0	2	1	2
COLUMBIDAE	289 - Streptopelia senegalensis Laughing Dove - f	LC	0	0	0	3
CORVIDAE	858 - Ptilostomus afer Piapiac - G	LC	2	0	0	10
CUCULIDAE	323 - *Centropus superciliosus* White-Browed Coucal – O	LC	0	1	0	1
ESTRILIDIDAE	963 - *Lagonosticta rubricata* African Firefinch - O	LC	0	0	0	4
ESTRILIDIDAE	980 - *Spermestes cucullata* Bronze Mannikin - widespread	LC	7	0	0	0
HIRUNDINIDAE	499 - *Riparia paludicola* Plain Martin - O	LC	0	0	0	3
LANIIDAE	812 - Lanius collaris Common Fiscal - G	LC	0	0	0	1
LARIDAE	264 - *Chlidonias leucopterus* White-Winged Tern - PW	PM	1	0	0	0
MALACONOTIDAE	843 - *Laniarius erythrogaster* Black-Headed Gonolek - f	LC	1	0	1	6
MOTACILLIDAE	516 - *Motacilla capensis* Cape Wagtail - W	LC	1	0	0	0
MUSOPHAGIDAE	305 - *Crinifer zonurus* Eastern Grey Plantain-Eater - widespread	LC	0	2	0	0
NECTARINIIDAE	803 - *Cinnyris erythrocercus* Red-Chested Sunbird - W	R-RR	0	1	0	0
NUMIDIDAE	142 - *Numida meleagris* Helmeted Guineafowl - G	LC	0	2	0	0
PASSERIDAE	881 - *Passer griseus* Northern Grey-Headed Sparrow - O	LC	0	0	2	0

Family	Species Scientific and Common Names	Red List Status	Project components			
			WI	WTP	RT	T&DN
PLOCEIDAE	908 - *Ploceus cucullatus* Black-Headed Weaver - O	LC	0	7	0	36
PLOCEIDAE	920 - *Malimbicus rubricollis* Red-Headed Malimbe - FF	LC	0	1	0	0
PSITTACIDAE	292 - Poicephalus meyeri Brown Parrot - O	LC	0	0	0	2
PYCNONOTIDAE	732 - *Pycnonotus barbatus* Common Bulbul - f	LC	1	2	1	4
RALLIDAE	178 - *Zapornia flavirostra* Black Crake - W	LC	5	0	0	0
STURNIDAE	872 - *Lamprotornis purpuroptera* Ruppell's Starling - O	LC	0	0	0	3
THRESKIORNITHIDAE	39 - *Bostrychia hagedash* Hadada Ibis - w	LC	2	0	0	2
TURDIDAE	612 - *Turdus pelios* African Thrush - f	LC	0	1	1	0
Species count			18	11	6	27

In terms of ecological characterization (**Table** 6-12), one species is a forest specialist, one species a forest generalist, and seven bird species were forest visitors.

Table 6-12: Ecological Characterization

Ecological description	No.	Descriptions
Forest specialists (FF)	1	Forest interior birds
Forest generalists (F)	1	Breed in forests or fragments but may occur outside
Forest visitors (f)	7	Non-forest birds
Water specialist (W)	6	Restricted to wetlands or open water
Water generalist (w)	2	Often found near water
Open habitat (O) and Grassland specialist (G)	17	Characteristic of open grasslands
Afrotropical (A)	4	Species migrating within Africa
Palearctic (P)	1	Species breeding in Europe or Asia
Afro-Palearctic (Ap)		Both Palearctic and Afrotropical populations
Wide Spread	3	Species with a wide distribution

These species prefer trees as an ecological feature and were recorded in and around trees. Six birds were water specialists which are restricted to wetlands or open water and these were recorded where wetlands or open waters are represented. Two species were water generalists and these comprise wetland visitors. Seventeen species are grassland specialists and prefer open habitat or grassland areas. The Black Kite *Milvus migrans* is categorized as migratory but the tropical ones are resident. It is widely distributed in Uganda. The White-Winged Tern *Chlidonias leucopterus* are palearctic migrants. Woodland Kingfisher *Halcyon senegalensis*, African Openbill Stork *Anastomus lamelligerus*, Abdim's Stork *Ciconia abdimii* and Grey-Headed Kingfisher *Halcyon leucocephala* are afro-tropical and migrate within the African continent. Fifty (50) birds of Abdim's Stork *Ciconia abdimii* were seen circling in the sky

At the Water Intake Eighteen (18) species were recorded, Treatment Plant Eleven (11), Reservoir Tank Six (6) were recorded and along the distribution and supply pipeline twenty-seven (27) species were recorded. The distribution and supply pipeline had the highest number of species registered because of the bigger area the distribution pipeline covers and the different habitat characters that the distribution pipeline go through. The African Palm Swift *Cypsiurus parvus*; Abdim's Stork Ciconia abdimii; Black-Headed Weaver *Ploceus cucullatus*; African Openbill Stork *Anastomus lamelligerus* and Cattle Egret *Bubulcus ibis* were the most common species recorded during the survey. Seventy-Six (76), 53, 43, 35 and 29 individuals of each were recorded. All species encountered and recorded during the survey are categorised as Least Concern (LC).

Black Crake Zapornia flavirostra

Speckled Pigeon *Columba guinea*

Figure 6-32: Birds encountered near the intake

MAMMALS

Four mammal species including the Black Rat *Rattus rattus*, Black-Backed Jackal *Canis mesomelas*, Unstriped ground squirrel *Xerus rutilus* and Hippopotamus *Hippopotamus amphibius* were recorded during the survey. One of the residents reported that Hippos used to occur but shifted to the nearby Lumbuye wetland. The hippopotamus, also called the hippo, common hippopotamus, or river hippopotamus, is a large semiaquatic mammal and ungulate which is mostly herbivorous and native to sub-Saharan Africa. It is one of only two extant species in the family Hippopotamidae. Recent fecal droppings of the Black-Backed Jackal *Canis mesomelas* were encountered during the survey, indicating that Jackals are present in and around the project area.

Except for the Hippopotamus *Hippopotamus amphibius*, the recorded species are listed by IUCN as being Least Concern (LC). In Uganda, the Hippos are widespread and locally abundant. The population in Uganda ranges between 7,000-10,000. ***The Fauna encountered during the survey of the proposed water infrastructure facility sites are widely distributed and still abundant in Uganda. The project area is in a modified environment. The fauna species have been impacted over the years by habitat modification and some have become adapted to habitat change.***

6.4 SOCIO-ECONOMIC BASELINE

A field socio-economic survey was conducted on sample size of 372 respondent out of the total population of 11,351 people in 2,221 households within Kitenga RGC. The sample was determined using Morgan and Krejcie (1970) Sample Size Determination included in **Annex C**. The results of the household survey are included together with data from secondary sources in the sub sections that follow.

6.4.1 PROJECT AREA

Kitenga RGC is located approximately 35km by road from Kaliro District headquarters along the Kaliro-Nawaikoike-Buvuluguti road in Bukamba Sub County. Bukamba is bordered by the sub-counties of Kagulu and Nawaikoke to the West and South, Pallisa District to the East and Lake Kyoga in the Nort Table 6-13 **and Figure** 6-33below shows the administrative units (parishes and villages) that will benefit from the Kitega RGC Water Supply System and Sanitation Project.

Table 6-13: Project Area of Influence

District	Sub County	Parish	Villages
Kaliro	Bukamba	Bukamba	Bukamba A, Bukamba B, Buvulunguti Centre, Kasuleta A, Kasuleta B, Lwamba Beeda, Kibuye B, Nabusira A, Nabusira B, Nakibungulya A, Nakibungulya B, Buvulumguti West & Buvulunguti East
		Nangala	Kanabi, Kisu A & Kitenga

The project will cover 47 percent (16 out of 34) core beneficiary villages that make up Bukamba Sub County. By distribution, 86.7 percent (13 out of 15) villages in Bukamba parish; 33.3% (3 out of 9) in Nangala parish.

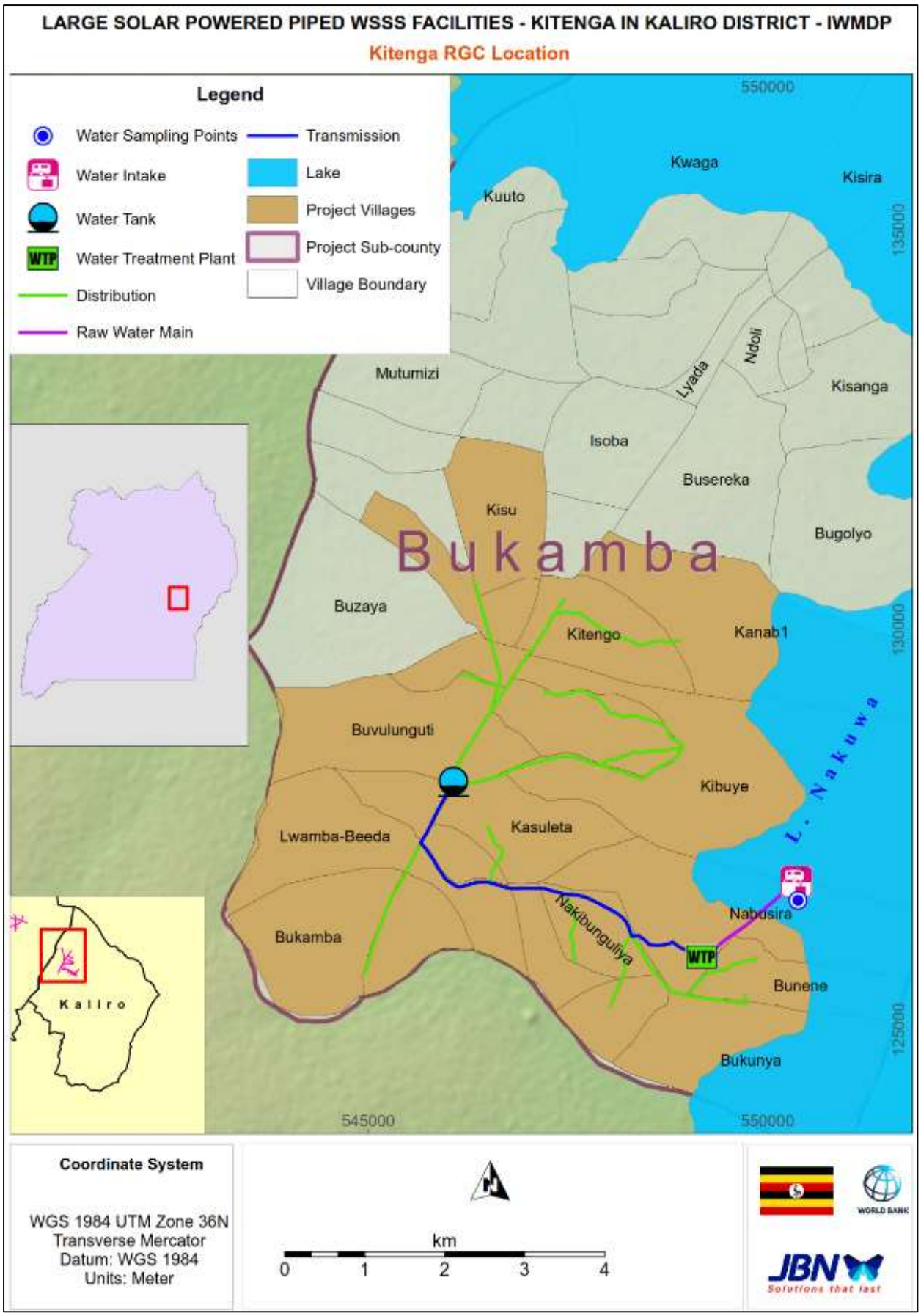


Figure 6-33: Villages of Kitenga RGC water supply systems and sanitation project

6.4.2 POPULATION

The district population was estimated at 236,927 people with 121,767 females (51%) and 115,160 males (49%) giving a 94.6 sex ratio (UBOS, 2020). The district has a total of 43,222 households with an average household size at 5.4 and population density of 271 people per Km^2 compared to 219 persons per Km^2 in 2002. Of the total district population, 11% (32,600) live in Bukamba Sub-County, 16,000 of whom are males and 16,600 females (UBOS, 2020). The Sub County has a population density of 251.5 persons per Km^2 (UBOS, 2020). The population growth rate of Kaliro is high at 3.55 percent compared to 3.31 percent in 2002 and the national average of 2.88 percent.

Based on UBOS (2020) population projections, the core beneficiary villages have a total population of 14,786 people and 2,738 households, thus an average household size of 5.4. The most populated is Lwamba- Beeda Trading Centre with 382 Households (HH), followed by Kibuye B (366 HHs), Kiisa A (339 HHs) and Kanabi (252 HHs) as shown in **Figure** 6-34 below.

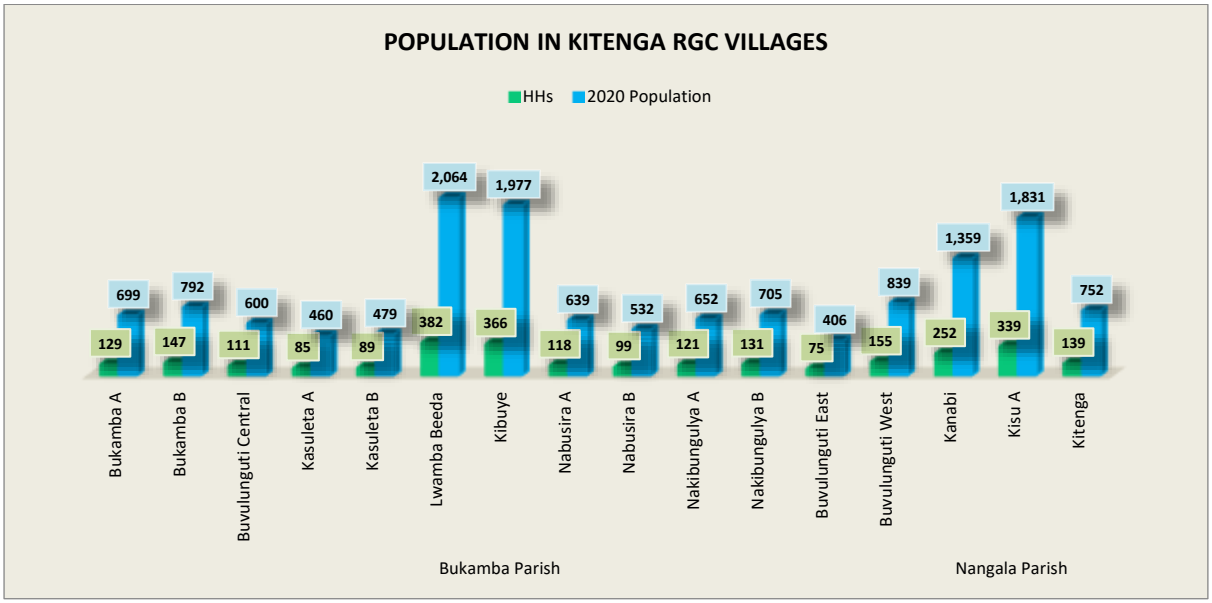


Figure 6-34: Population of Kitenga RGC beneficiary villages

(source: UBOS 2020 population projections)

Implications: According to the design report (water demand assessment) for Kitenga RGC, its notable that the intake (862.69 m^3/day) was designed to meet the average day demand (896 m^3/day) for a projected population of 21,534 people in the ultimate year (2040).

6.4.3 AGE-GROUP OF RESPONDENTS

Age is one of the important factors in socio-economic analysis thus finding out the age groups in the project area of influence is important as it helps to inform development planning and how to mitigate project related impacts in the beneficiary communities. Notably, age can be used to give an indication of the need, physiological status and healthcare needs of a given population. Field findings indicate that the majority of the respondents lie within the 15-45 age bracket with a combined percentage of (65.9%). Other respondents/householders were in the age-group of 46-55 years (19%) and (18%) at 56 and above years (Figure 6-35).

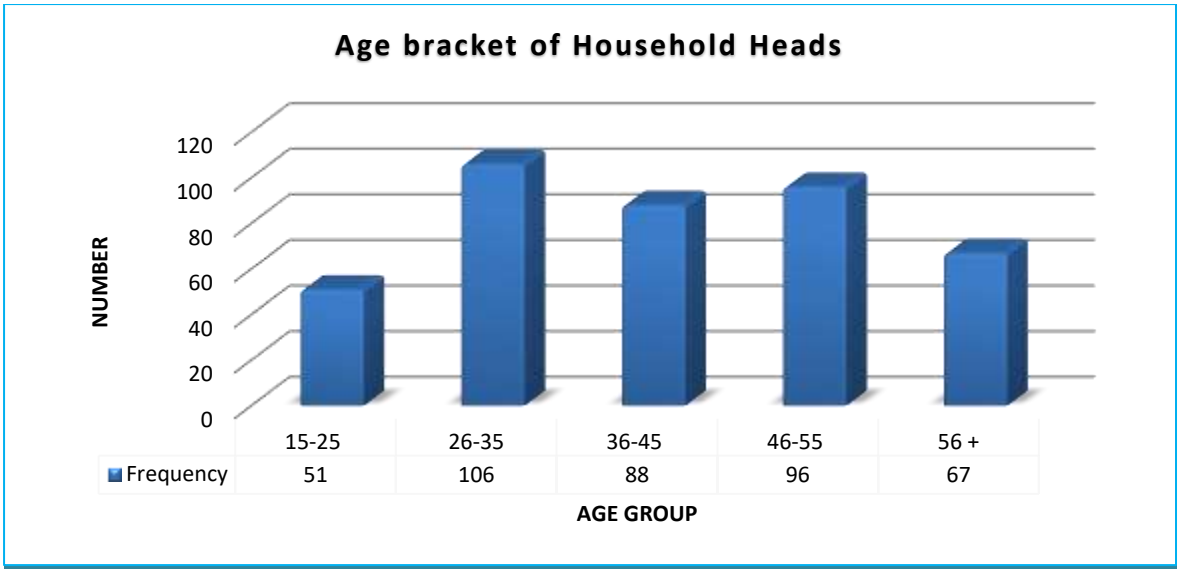


Figure 6-35: Age group of respondents

Source: Field survey

6.4.4 AGE-GROUP OF HOUSEHOLD MEMBERS

When asked about the age-group of people who live within the household, the field results connote a combined demographic structure with a large dependency population (53.3%) in the 0–19-year age group in comparison to the productive (adult) age bracket (46.7%) as shown in Figure 6-36 below. Such a demographic structure is amenable to poverty since considerable household incomes are spent on non-working young dependents and constraints household resources. However, this is also an indication that there are a strong and young people who could provide local labour on the project that will affect them in the future because they are residents of these areas.

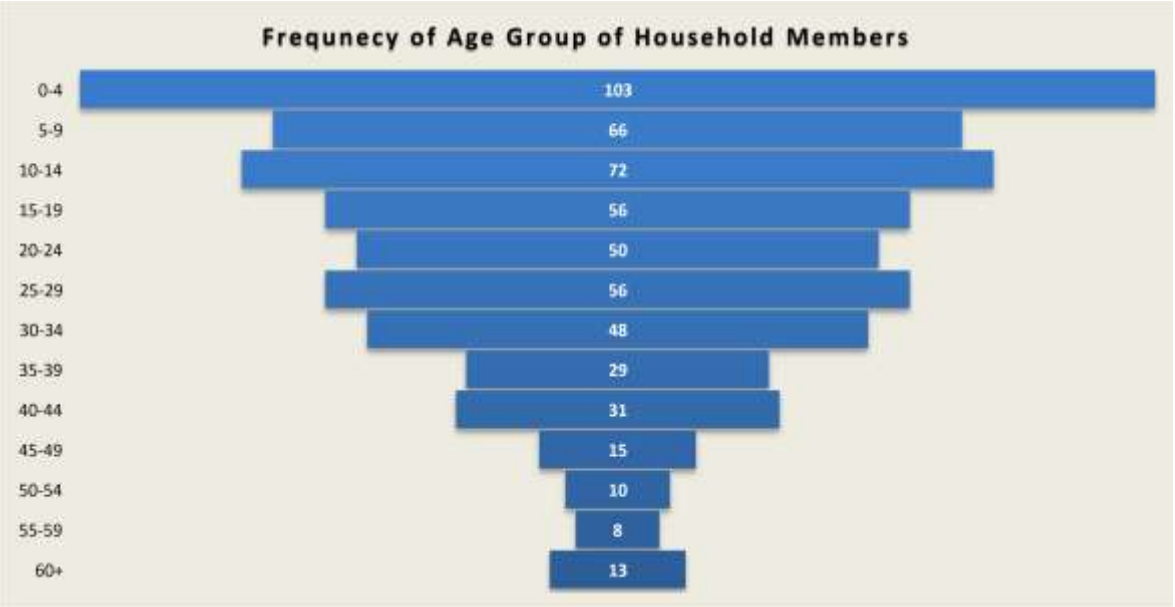


Figure 6-36: Frequency of recorded Age groups of household members in respondent HHs

Source: Field survey

6.4.5 GENDER OF RESPONDENTS /HOUSEHOLD HEAD

As indicated above, the UBOS 2020 report indicates that Bukamba Sub County has a population of 32,600 people of whom 16,000 of are males and 16,600 females[9]. Results from the field survey (**Table** 6-14) conducted on 372 households indicate that 87.4% of the household heads were male while 12.4% were female. One female child headed household was also interviewed among the survey respondents. This is consistent with the patrilineal environment of most Ugandan households where men a considered to be the household heads and inheritance of property exclude women, in many cases as women who become heads of household following widowhood, divorce/separation or still single which is evinced by (2.7%), (3.5%) and (3.2%) in comparison to the men (1.3%), (0.3%) and 6.2%) respectively as shown in **Table** 6-15 below.

Table 6-14: Type of household head

Type of household head	Frequency	Percent (%)
Female headed	46	12.4
Male headed	344	87.4
Child headed below 18yrs (Female)	1	0.3
Total	372	100

Source: Field survey

Table 6-15: Distribution of gender and marital status of household heads

Gender		Single	Married	Divorced/Separated	Widowed	Total
Female headed	Count	9	11	13	12	45
	%	2.4	3.6	3.5	3.2	12.5
Male headed	Count	23	29	5	1	325
	%	6.2	79.8	1.3	0.3	87.6
Child headed below 18yrs (Female)	Count	1	-	-	-	1
	%	0.3	-	-	-	0.3
Total	Count	33	307	18	13	371
	%	8.9	82.7	4.9	3.5	100

Source: Field survey

[9] https://www.ubos.org/explore-statistics/20/

Gender equity is critical for good governance as it ensures the effective participation of women and men in the democratization process, leadership, decision-making and law enforcement[10]. As such, there should not be any discrimination or unfair labour or employment practices against any gender, especially as is common in most construction sites to discriminate against women. Similarly, design and implementation of this water project should involve women, since at a local level in many societies, 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) as should therefore be involved from the onset.

According to the Kaliro District development Plan (DDP) 2020/21 – 2014/15, Only about 29% of women in the district participate in making major household purchases and men believed that a husband should play the major role in making most household decision. These social vulnerabilities are as a result of demographic characteristics like age, disability, culture, unemployment as well as poverty and disaster. There are also gender differences in poverty situations, women are poorer compared to their male counter parts because most of the women are not employed. Only 8,457 of women are employed against 74,246 employed men according to the 2014 Uganda Population and Housing Census. Most of the employed women are in low paying positions. Given that 35.6% of women in the district are illiterate against 22% of men in the district who are illiterate. The district is implementing vocational skills training for women and youth groups to bridge this gap. Additionally, in Kaliro, gender roles overburden females and in turn, disadvantages girl children disproportionately. Girls are in most cases held backing home to attend to domestic chores which interrupts their school attendance manifested in absenteeism and dropping out of school.

6.4.6 GENDER ROLES IN WATER COLLECTION

Data from the field survey indicates that most gender roles and responsibilities are shared between males and females at HH level. This is evinced by 39.6% of the adult females, 9.7% girl children, 24.3 percent of adult male and 26.4% of boy children (Figure 6-37& Figure 6-38).

10 https://www.ubos.org/wp-content/uploads/publications/06_2018women_and__men_in_uganda_FF2016.pdf

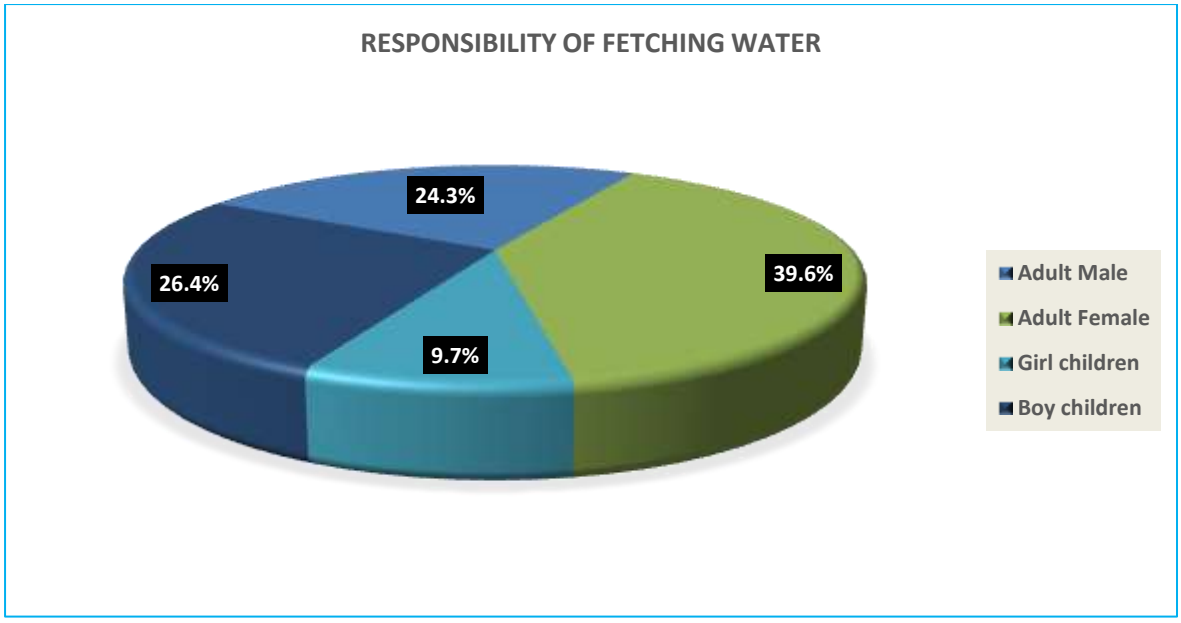


Figure 6-37: Gender role in water collection

Source: Field survey

Figure 6-38: Women, men and children collect water in Kitenga RGC

6.4.7 VULNERABILITIES WITHIN THE HOUSEHOLD

Respondents were also asked about the issue of vulnerabilities and the vast majority (**Figure** 6-39 indicated that they had none (87%). While others reported having household members with physical impairments (3.2%), Old age (4.3%), blindness (2.1%) hearing disorder (2.4%), mental disorder (0.5%).

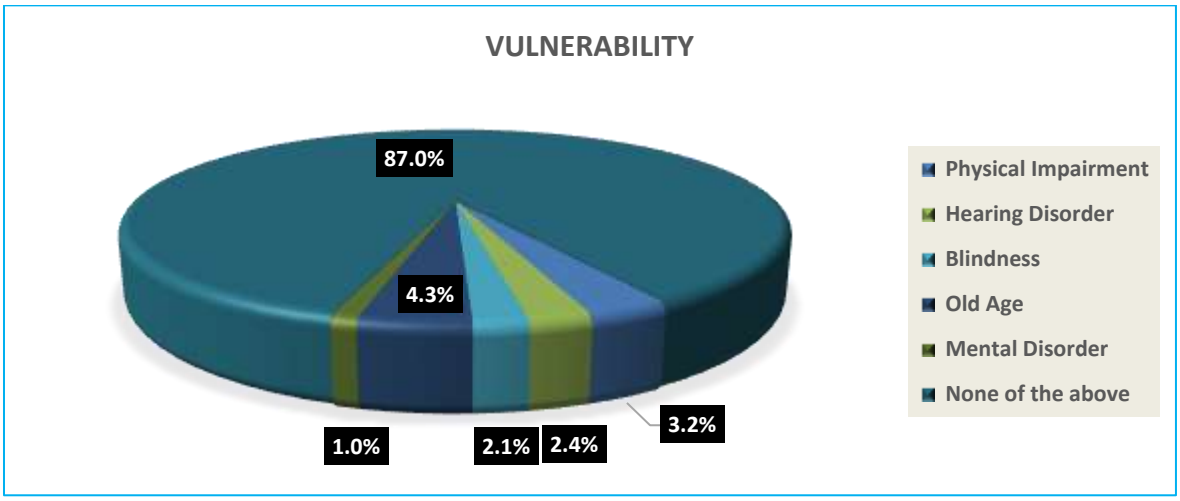


Figure 6-39: Vulnerability within household

Source: Field survey

6.4.8 ETHNICITY AND RELIGION

Ethnic composition in the project area was heterogeneous. The respondents living in the project beneficiary communities were dominantly Basoga (96.8%), Banyole (0.5%) and Iteso (2.7%). Despite coming from different cultural backgrounds, it was observed that the communities were living harmoniously and had a sense of sense of community life, sense of good human relations and sense of hospitality.

The project area of has strong cultural and religious heritage expressed in traditional beliefs, religious practices and attitudes. Survey results show that Protestantism (40.9%) is the, most widely practiced religious faith **(Figure** 6-40) followed Catholicism (19.1%), Islam ((25%). Christianity was also denoted by other religions such as Pentecostal born again (10.8%) and Seventh Day Adventists (2.7%).

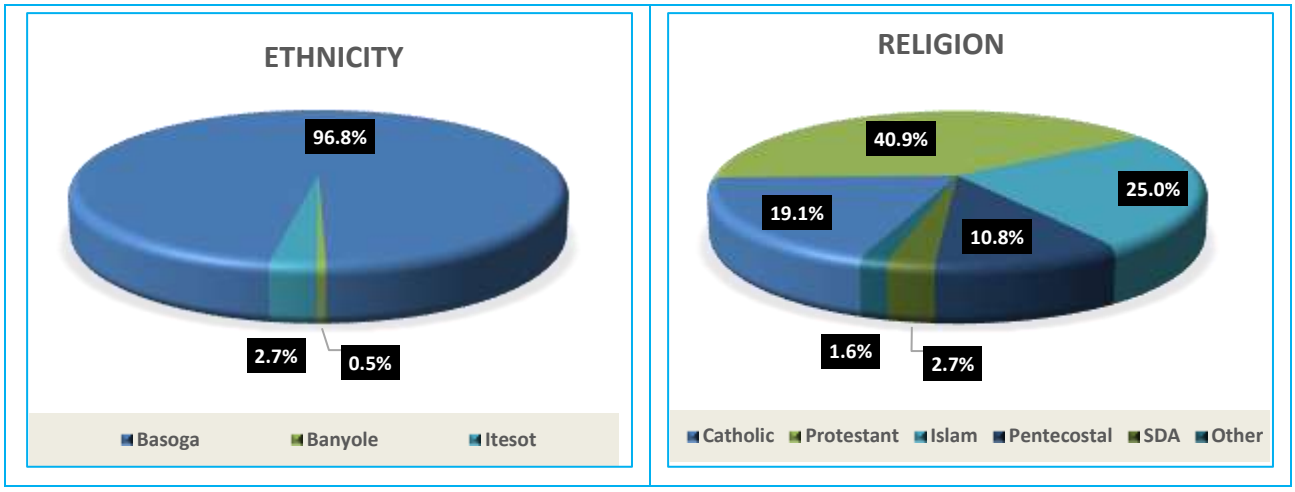


Figure 6-40: Ethnicity and Religious affiliation of household

Source: Field survey

6.4.9 HOUSING AND SETTLEMENT

SETTLEMENT

The major human settlement patterns in Bukamba Sub county are, namely; dispersed or dotted settlements with dwelling located far apart and often within a village landscape, as observed in Kitenga A village, the location for the project water source (**Figure** 6-41**)** and linear settlements along roads as observed in Lwamba-Beeda Trading centre, the location for the proposed project reservoir site (**Figure** 6-42**)**.

Figure 6-41: Settlement pattern in Kitenga A village

Figure 6-42: Settlement pattern in Lwamba Trading Centre

There is an increasing rural-urban migration evidenced through expansion of villages into urban agglomerations formations. A Historical Trend analysis (**Figure** 6-43) of urbanization for the last 10 years shows a changing urban morphology of Kitenga RGC, more so in Lwamba and Kitenga Trading Centres. The two areas have over the years transformed from small human settlements (hamlets), into villages and now into growing trading centres. There are observable characteristics of an expanding congested dwellings in both areas with inappropriate sanitation and hygiene facilities especially pit latrines and solid waste management facilities. There are also many other expanding urban agglomerations such as Kibuye, Buvulunguti, Bulondo, Buzinge, Nangalakuto A, Nangalakuto B, Kabinga, Bugolyo, Kisenga villages.

Google image of Kitenga RGC villages in 2012

Google image of emerging urban centres in Kitenga RGC in 2022

Lugonyola landing site- Kitenga

Kitenga Trading Centre, located near the water source & WTP

Figure 6-43: Change in settlement patterns in Kitenga RGC over the years

HOUSING

The 2014 UBOS Kaliro District Report indicates that 50.6 percent (5,774) households in Bulamogi North West County lived in semi-permanent dwelling units and 32.8% (3,745) lived in temporary dwelling units. The survey team took note of the physical condition of the residences/houses in the form of roofs, walls, and floor. More than half of the respondents' residences/houses (59%) were observed to be Mud and wattle, 20 percent mud block, 15.2 percent mud block and plater and 2.9 percent Reed thatch or sticks (**Table** 6-16). This indicates that some of the respondents' residential houses are either semi-permanent or permanent.

Table 6-16: Nature of dwelling

Nature of dwelling	Frequency	Percentage (%)
Mud block	21	20
Mud and Wattle	62	59
Mud block with plaster	16	15.2
Concrete Blocks	3	2.9
Reed Thatch or Sticks	3	2.9
Total	105	100

Source: Field survey

Figure 6-44: A mix of permanent, semi-permanent and temporary dwellings in the project area

6.4.10 OWNERSHIP OF PHYSICAL ASSETS

Evidence suggests that physical assets can improve the well-being of poor households through income generation, livelihood diversification, risk mitigation, and creation of access to markets and essential services. In economic terms, household assets are considered drivers of sustainable growth that lead to better economic, social, political, psychological, and intergenerational

outcomes (Siegel 2005). As such, the ESIA study sought to establish the physical assets to assess the economic wellbeing of these households. From the field survey, respondents indicated that they owned physical assets ranging from houses (26.9%), mobile phones (84.4%), radio (16.5%), domestic animals (15.5%) and bicycle (13%) among other assets they possessed (**Table** 6-17). Assets promote the economic well-being of households by generating income, creating additional stocks of assets (e.g., animal husbandry), smoothing consumption during periods of uncertainty and hardship, and building resilience in the face of external shocks. Beyond such economic benefits, they provide personal and social benefits, including improvements in education, health, future orientation, and political participation[11].

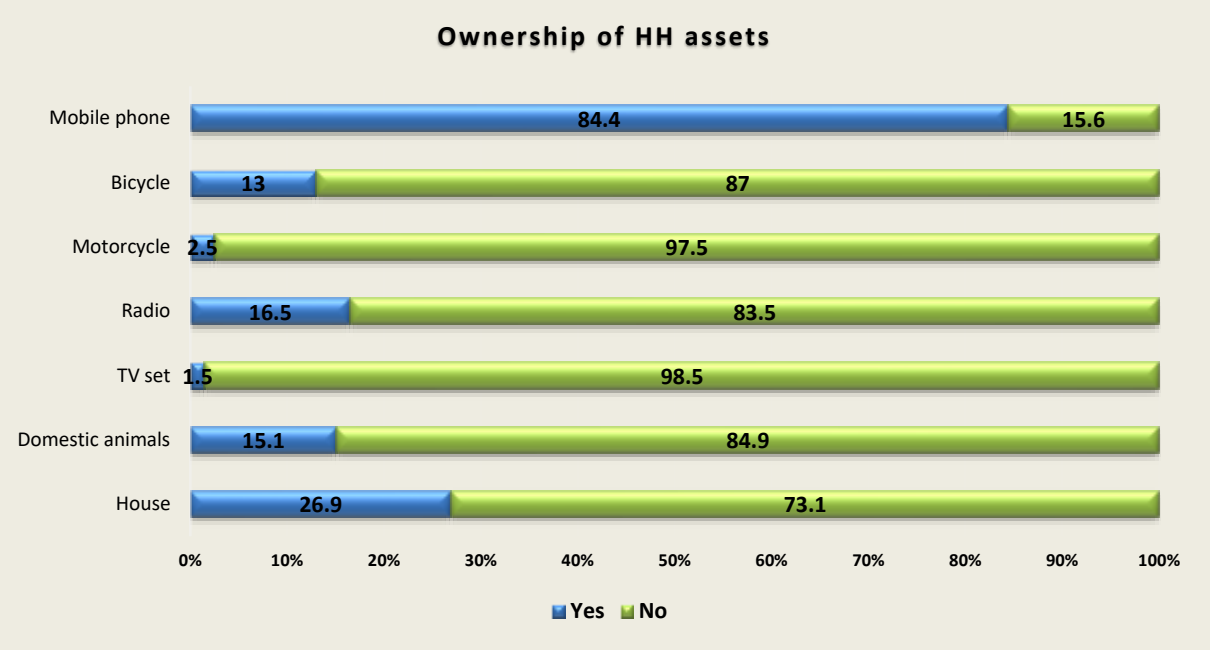


Table 6-17: Household assets

*Multiple choice allowed; Source: Field survey

It was reported during focus group discussion with women in the Kitenga village that the most productive assets like Land/ houses, bicycles and domestic animals tend to be more owned by men compared to women. Overall, the survey established that ownership of key assets like houses across both genders remains low as many were in rented premises.

6.4.11 LAND TENURE AND METHOD OF ACQUISITION

Land in Kaliro district is predominantly owned under customary tenure 76.6% own land under customary, Tenant (Kibanja) (22.3%), Co-owner (0.5%) and 0.5% Licensee (9.9%). Regarding the method of acquisition, 56.5% of the respondents indicated that they inherited the land from parents while 35.8 percent procured the land (**Figure** 6-45). Only a slight fraction (7.7 %) of them were renting while other were living on the land as squatters (3.7%).

11 https://www.cgap.org/sites/default/files/publications/2020_02_WorkingPaper_Assets_Matter.pdf

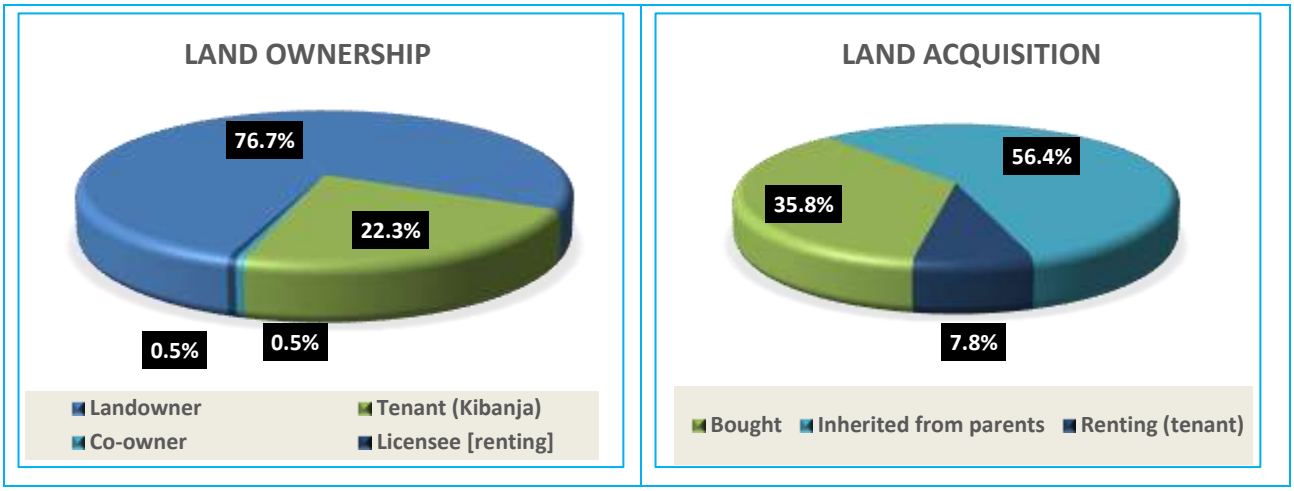


Figure 6-45: Land Tenure and method of land acquisition

Source: Field survey

Those who rented the land, had entered arrangements with land owners in the same community (93.9%), land owners living outside (3.4%) and 3.4% from relative's/clan members (**Table** 6-18).

Table 6-18: Agreement on Rented Land

Persons from whom land is rented	Frequency	Percentage (%)
Relatives/clan members	1	3.4
Land owner in the same community	27	93.9
Landowner living outside	1	3.4
Total	29	100

Source: Field survey

Land required for the intake, WTP and reservoir are located on privately owned land as indicated in **Table** 6-19 below. The details of other land requirements for the transmission and distribution lines are appended as Annex G of this report.

Table 6-19: Land requirements on the project

Project Component	Land Requirement by Project (Acres)	Village	Owner (Name, Contact)	Land Tenure
Water Intake Structure on Lake Kyoga and Raw Pump House		Kitenga A	Protected Lake Shore Zone	
Water Treatment Plant	2.21	Nabusira A	Talisenza Fred, 0772400654	Customary
			Magino Majidu	Customary

Project Component	Land Requirement by Project (Acres)	Village	Owner (Name, Contact)	Land Tenure
			Magino Musolo	Customary
			Behe Ben	Licensee
Reservoir Site	0.22	Buvulunguti East	Gampweire Krussen, 0760993251	Customary
Public Toilet Site	0.01	Lugonyola B	Nawampiti Landing Site	Customary

Source: RAP report

6.5 ECONOMIC ACTIVITIES

6.5.1 SOURCES OF INCOME

Subsistence crop farming is the primary source of income for the project-affected households (75.8%), followed by fishing (5.9%), retail training (5.4%) and service provision (1.6%). Within the Kitenga RGC, other economic activities (8.6%) were also carried out and this included charcoal burning, retail trading, hawking, transport business mechanical work and carpentry as shown in the **Figure** 6-46 below.

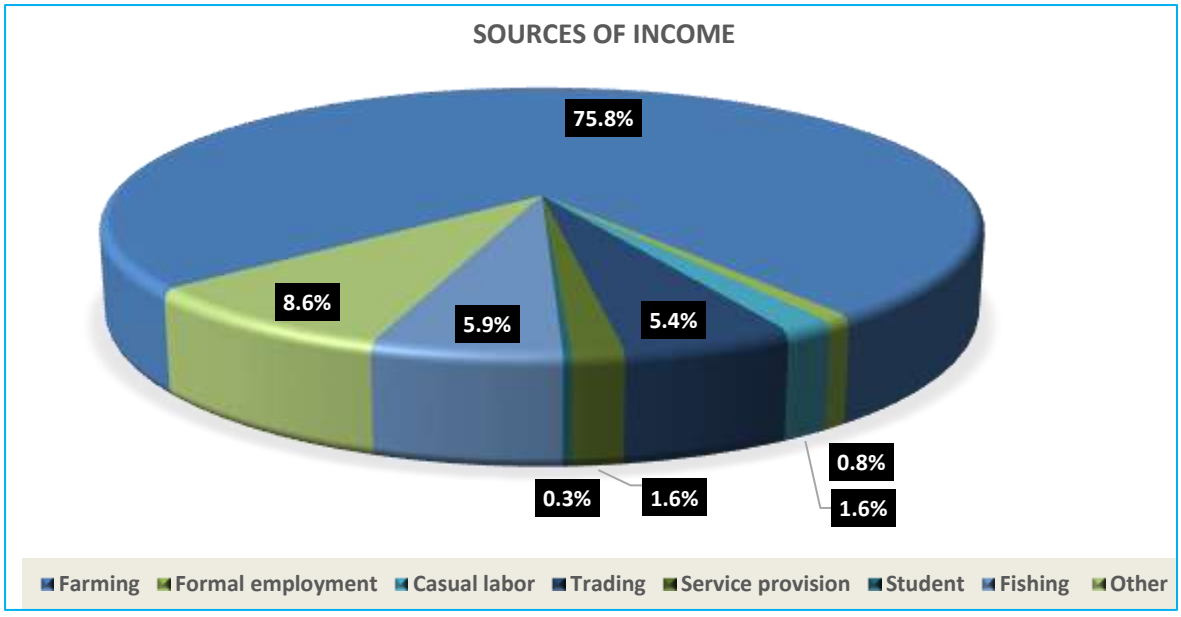


Figure 6-46: Main income sources in Project area

Source: Field survey

6.5.2 TYPICALLY GROWN CROPS AND COMMONLY REARED LIVESTOCK

Commonly grown crops in the proposed project area include maize (27.5%), beans (11.6%), and some grain such as rice (3.2%). Root tubers were also common in the area with Cassava (23.5%)

and sweet potato (15%) being among the most grown food commodities in the farmland of the respondents (**Table** 6-20). Sugarcane fields, although common in the project area, were mainly developed on leased land by farmers originating from outside the project area. Regarding livestock rearing, predominantly reared livestock within communities traversed by the proposed water project include, poultry (37.5%), goats (36.6%), cattle (23.2%) and rabbits (1.8%). During the assessment herdsmen were observed grazing the livestock especially the cattle and goats along the road.

Table 6-20: Typically grown crops and animals reared

Crops grown	Percentage (%)		Animals reared	Percentage (%)
Beans	11.6		Goats	36.6
Maize	27.5		Cattle	23.2
Irish potato	4.8		Poultry	37.5
Sweet potato	15.0		Pigs	0.9
Cassava	23.5		Goats	36.6
Sorghum	5.3		Rabbits	1.8
Vegetables	4.5			
Rice	3.2			
Others	4.5			

Source: Field survey

Maize field

Rice field

A household peeling cassava

Cattle grazing in the RGC

Figure 6-47: Crops grown and animals reared in Kitenga Village, Bukamba SC in Kaliro District

6.5.3 AVERAGE ANNUAL INCOME OF RESPONDENTS

Data collected from the field indicates that 25.3 percent of the respondents earn more than 1,403,000 per annum. The biggest number of respondents (39.5%) earn less than 503,000, while on average (35%) earn between 503,000 - 1,403,000 as shown in the **Table** 6-21 below. Average yearly household incomes earned among the respondents was way below the national indicator (Ugx. 3,636,000) for the rural population for 2017/18 (UBOS,2018)

Table 6-21: Annual Household Income Levels

Average annual income (Household head)	Percent (%)
Less than 503,000 (Low)	39.6
503,000 - 1,403,000 (Medium)	35.0
More than 1,403,000 (High)	25.3
Total	100

*Income ranges adopted from the MWE Water Supply Design Manual 2000

6.6 ACCESS TO WATER

SAFE WATER COVERAGE

Globally, Sustainable Development Goal (SDG) 6.1 targets to achieve universal and equitable access to safe and affordable drinking water for all by 2030. Nationally, the Uganda National Development Plan (NDP) III and Vision 2040 target to attain rural access to safe water at 85 percent by 2025 and 100 percent by 2040, respectively (Uganda National Planning Authority (UNPA), 2020). By 2020, the population of Ugandan using safely managed drinking water services the global indicator was 17 percent, and the proportion of the population using an improved water source at 83 percent (UN Water, 2020). According to Uganda Water Atlas, the rate of access to safe water as ratio of people served by a safe water point to the total population in Uganda stands at 66 percent (MWE/ Water Atlas, 2022).

In Kaliro District, 49 percent in the entire District population has access to safe water, with rural access to safe water at 49 percent, and urban access at 41 percent (MoWE/ Water Atlas, 2022). In Bukamba Sub County, where the project is located, the rate of access to safe water stands at 14 percent (**Figure** 6-48).

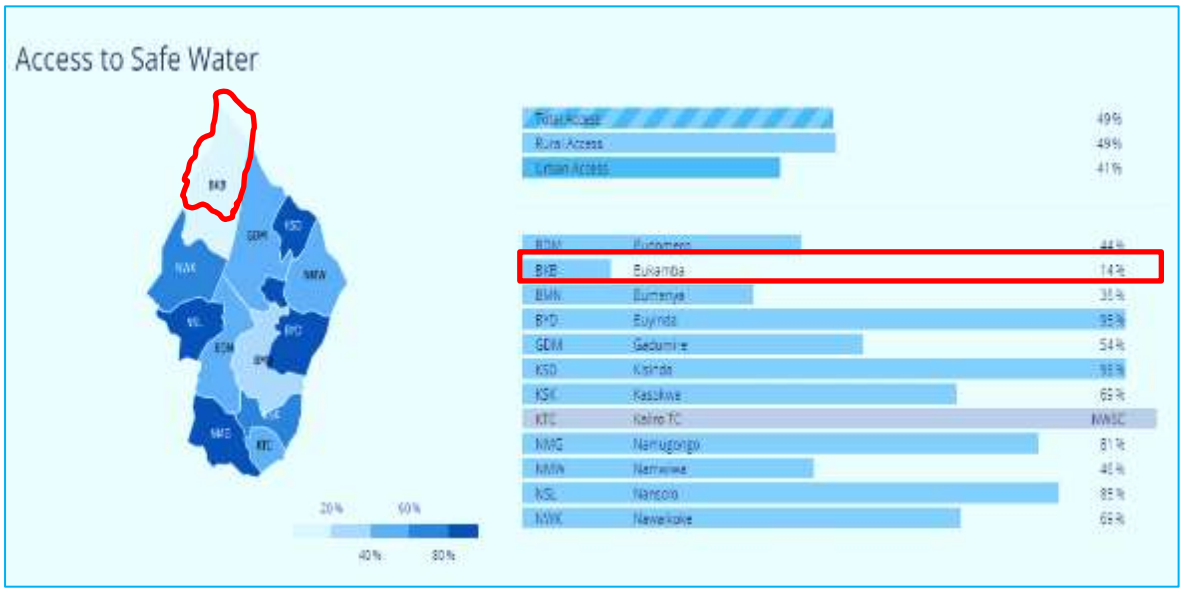


Figure 6-48: Access to safe water in Kaliro District

(Source: Uganda Water Atlas, MWE, 2022)

The main sources of safe water in the district are deep boreholes (93%), 5 percent of which (25 out of 539) are in Bukamba Sub County (MoWE, 2020). Results from the baseline survey indicate that 83.9 percent of the respondents in the project area access their water from boreholes and 15.9 percent from the Lake (**Figure** 6-49).

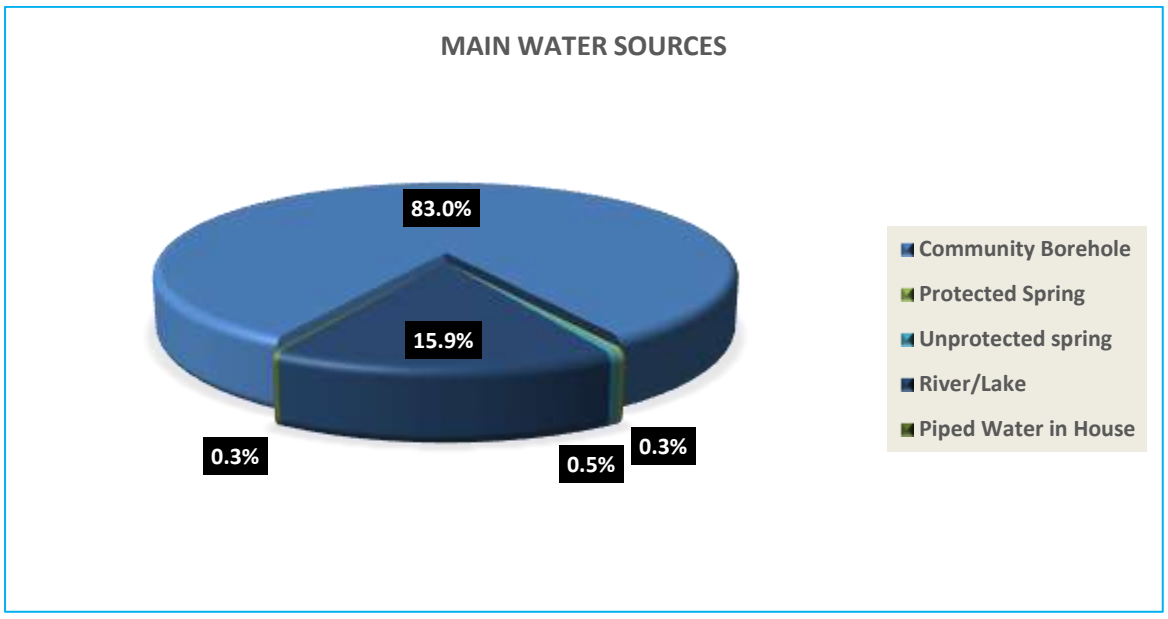


Figure 6-49: Water sources

Source: Field survey

The objective of the Water and Environment Sector Development Plan 2015/16-2019/20 for Ministry of Water and Environment, is to provide "sustainable provision of safe water within easy reach and hygienic sanitation facilities, based on management responsibility and ownership by the users, to 77% of the population in rural areas and 100% of the urban population by the year 2015 with an 80%-90% effective use and functionality of facilities". Functionality of safe water sources in Kaliro (**Figure** 6-50) is marred by low yielding of protected springs (29%), technical breakdown of shallow wells (29%) and poor water quality of boreholes (29%).

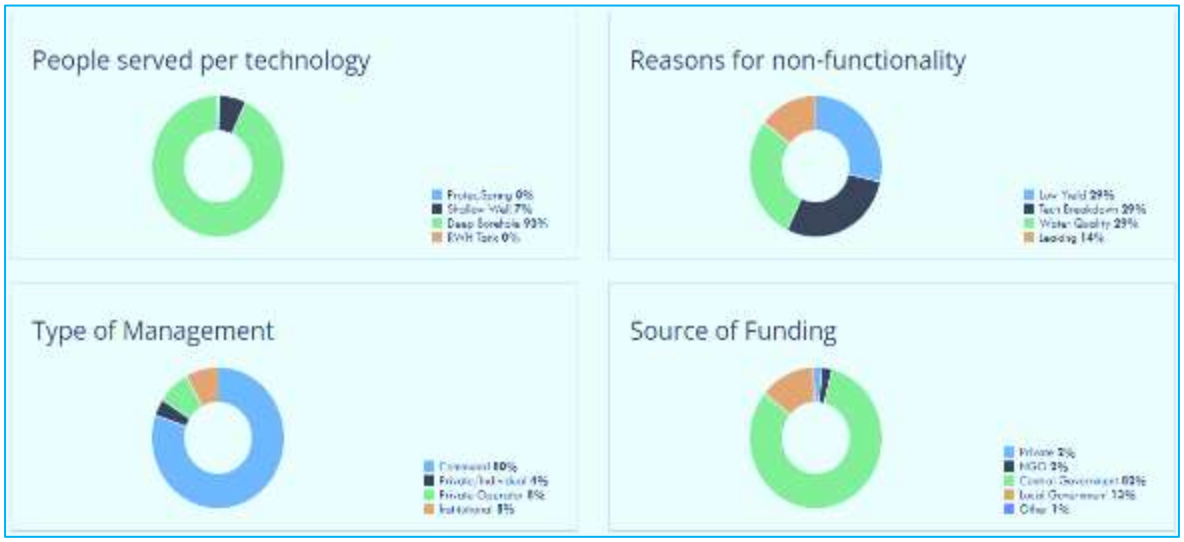


Figure 6-50: Technology, management, and functionality of safe water sources in Kaliro District

(Source: MWE/ Water Atlas, 2022)

Figure 6-51: Community borehole in Kitenga A Village

There are several challenges in provision and access to safe and clean water. A review of third Kaliro District Development Plan (DDP) of 2020-2025 indicated that the quality of the water in Lake Nakuwa has been compromised by increasing contamination from industrial pollution, agro-chemicals, human excreta, and soil erosion from surrounding agricultural land uses around the

lake. The industrial pollution was noted to originate from the release of untreated effluents into water bodies by the sugarcane processing factory in Kaliro and agrochemical usage on large scale commercial sugarcane plantations in the district.

In addition, it is noted in the DDP that latrine coverage in Bukamba Sub County was low (40%), indicating that most people have no access to sanitation facilities and may practice open defecation resulting in contamination of nearby open water sources with faecal matter. The report also noted that there was observable reduction in water levels during dry seasons. Other major constraints to access to safe water were noted to include: (a) inadequate funding to construct, repair and maintain water sources especially deep boreholes; (b) high rate of non-functionality attributed to communities abandoning boreholes; (c) low community participation in Operation and Maintenance of water and sanitation facilities

DISTANCE TO A WATER SOURCE

Related to distance from water source, the majority (40.7%) and (41.2%) of respondents reported living within 100-500 meters and 1-1.5km from water source while only (3.8%) travelled over 5km to access the nearest water source in the project areas of the district (**Figure** 6-52).

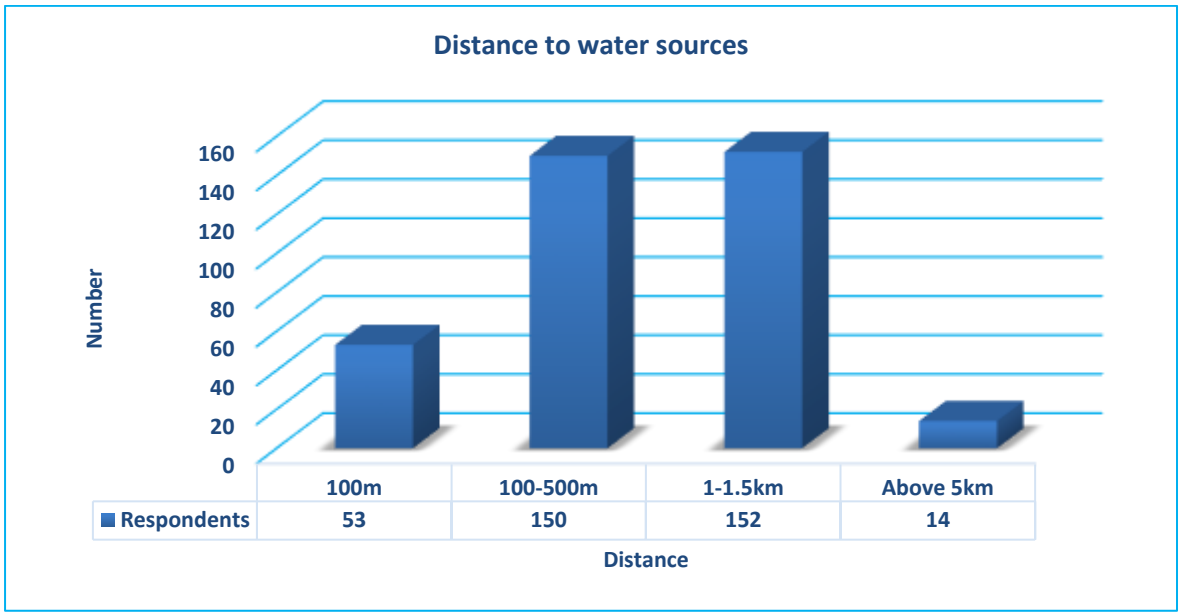


Figure 6-52: Distance to water sources

Source: Field survey

When asked about their preference of certain water sources, 30.8% indicated that they had no other option, 26.3% preferred it because access to water was free and 23.7% being short distance to the water source (Table 6-22).

Table 6-22: Water source preference

Reasons for water source preference	Number	Percentage (%)
Short distance	132	23.7
Free water	147	26.3

Clean water	98	17.6
Water tastes better	9	1.6
No other option	172	30.8
Total	558	100

Source: Field survey

TRIPS MADE TO COLLECT WATER

On the issue of trips made by household members to collect water, 52.2% indicated that they make 1-2 round trips (to and from the water source) a day ,45.2% make 3-5 trips and 2.7% more than 6+ trips a day.

QUANTITY OF WATER FETCHED

Water planning and management requires an understanding of all the parts of the system to ensure the water system work together to maintain sustainable water supply in the project area. As such the project collected data on water usage to inform the planning and design on the indicative quantities used by each household in the project area. From the field survey it was established that over half of the respondents (50.8%) fetched more than 50litres of water per trip (Figure 6-53).

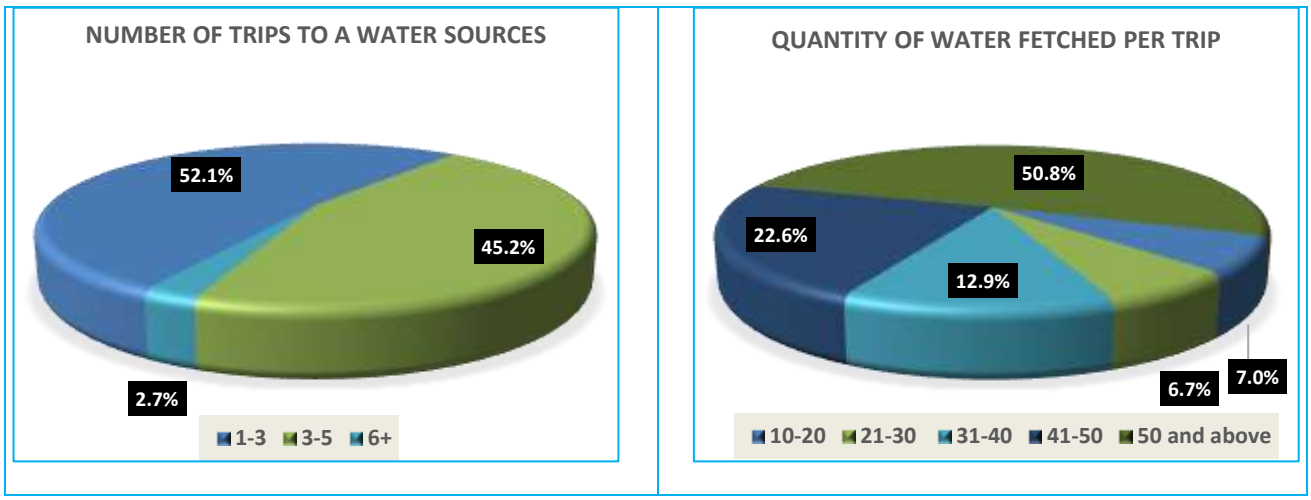


Figure 6-53: Trips and quantity of water fetched

Source: Field survey

Average amount of water used per day per household: **Assumption:** Based on the average number of trips made per day (1-2 trips a day – taking 1.5 trips as an average) and the average amount of water fetched per trip (50+ litres per trip – taking 50l as the average water fetched per trip). **Amount of water used per HH per day:** Most households use an average of 75l of water per day. The average household size in the project core villages is 5.4 (see **Section 0 above**). Therefore, on average, **an individual in a household is allocated approximately 14l of water per day**.

This is consistent with the Mellor et al study 2012 which established that Ugandans use an average of 15.4 ± 0.5 litres per person per day regardless of their perceived effort in terms of collection times or distances travelled[12].

TIME TAKEN TO COLLECT WATER

Time spent fetching water reduces the time that can be devoted to generating livelihoods or in remunerated work, whether in the formal or informal economy. Poor households rely heavily on the time its members have for formal and informal work. As a result, time poverty due to the need for fetching water and other domestic chores cause trade-offs putting food security, child nutrition, health, and education at risk (Kes and Swaminathan, 2006). When asked about the time taken, 47.8 percent of the respondents indicated taking 1 hour,38.4 percent more than 1-2 hours and only 7.8 percent indicated taking between 3-5 hours (Table 6-23). Longer hours at water points are normally attributed to drying of nearby water sources especially during the dry period when they must trek a longer the journey to the Lake.

Table 6-23: Time taken to collect water

Time taken (Hrs)	Percentage
1	47.8
1 - 2	38.4
3 - 5	7.8
Above 5	5.9

Source: Field survey

WATER USES

The social economic baseline also sought to establish the main water uses among the rural households in Kaliro (Table 6-24). Respondents gave a variation of water uses to include; washing clothes (33.6%), drinking (32.6%), cooking food/tea (29.4%), livestock (3.9%) and crop irrigation (0.2%).

Table 6-24: Uses of water

Main uses of water	Number	Percentage (%)
Water for drinking	141	32.6
Washing clothes	145	33.6
Cooking food/tea	127	29.4
Crop irrigation	1	0.2

12 Rural water usage in East Africa: Does collection effort really impact basic access?2012

Main uses of water	Number	Percentage (%)
Livestock	17	3.9
Business (saloon, shop, restaurant)	1	0.2
Total	432	100

Source: Field survey

PAYMENT FOR WATER AND NUMBER OF TIMES IT IS SUPPLIED

Current trend in payment for water: When interviewed about payment for water 47.6% indicated that they pay for water while 52.2% do not pay (Figure 6-54). On the issue of frequency of payment for water supplied, 67.8% revealed that they get daily supplies, 29.9% monthly and 2.3 percent weekly. All respondents who noted daily payments indicated use of water vendors to access water, while weekly and monthly payments were user fee payments at water sources, for instance at a borehole.

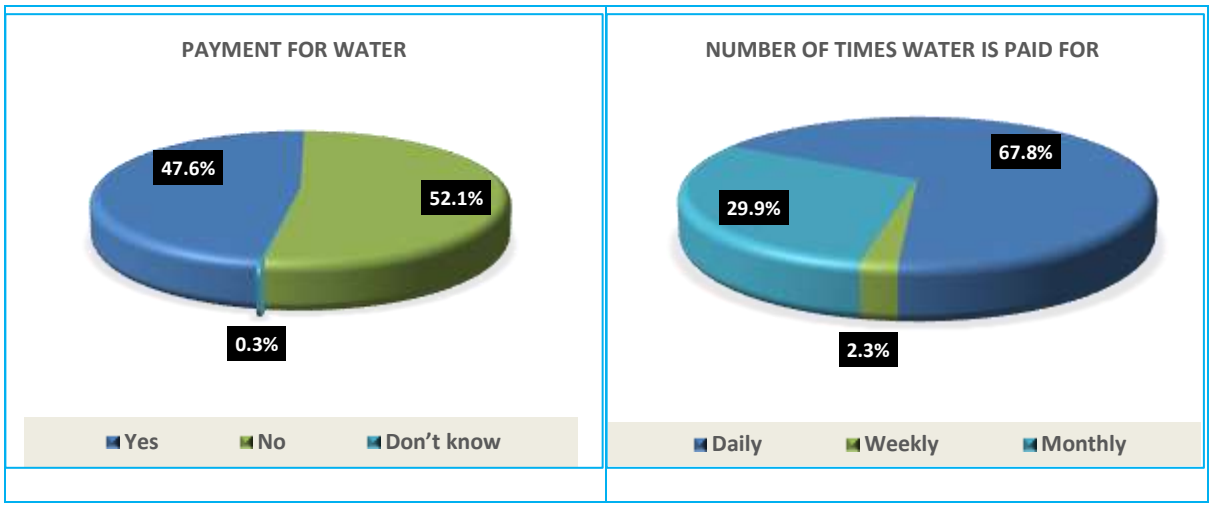


Figure 6-54: Payment for water

Source: Field survey

Amount paid for access to water: Regarding the cost of a 20 litre jerrycan, majority of the respondents (78.5%) indicated spending between 100-500 Uganda shillings (Table 6-25), while 20.9 percent paid more than 600 Ugx to get access to water.

Table 6-25: Cost of water

Cost of a 20-liter jerry can of water	Frequency	Valid Percentage
Less than 100/=	19	10.7
200/=	15	8.5
300/=	59	33.3
400/=	20	11.3

Cost of a 20-liter jerry can of water	Frequency	Valid Percentage
500/=	26	14.7
600/=	1	0.6
More than 600	37	20.9
Total	177	100.0

Source: Field survey

PREFERRED SERVICE OPTIONS

Willingness to pay: A question on willingness to pay for a new service was posed to the respondents, 98.6% revealed that they would be able to pay for an improved service. Only 1.4% of the respondents registered their unwillingness to pay for a new and improved water supply service (***Figure*** 6-55).

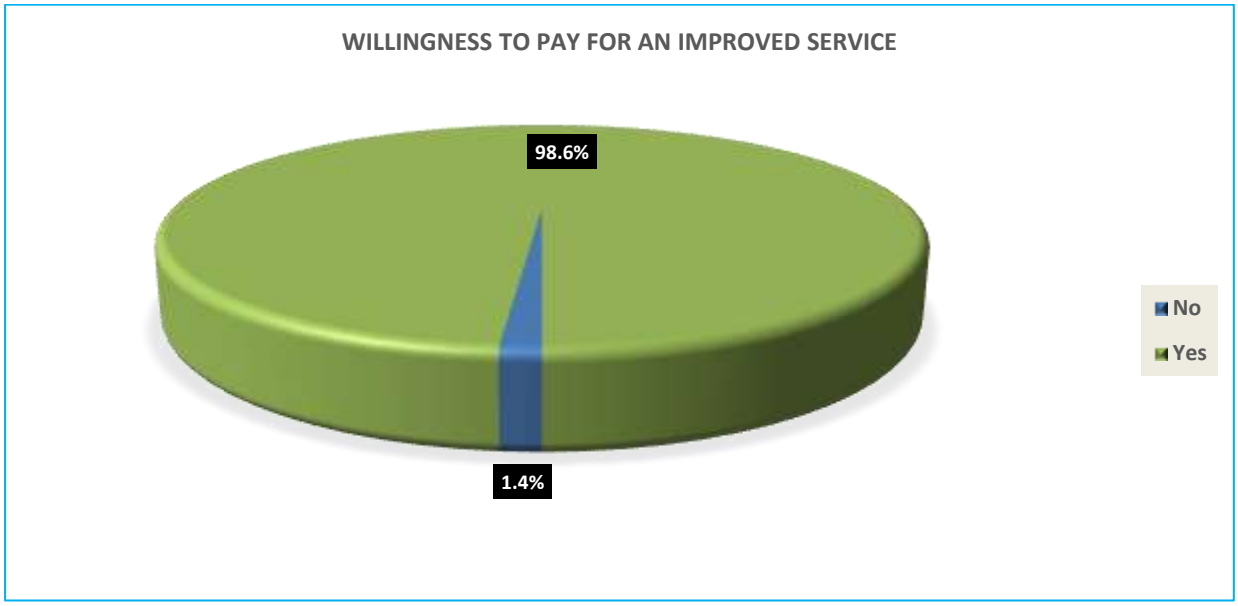


Figure 6-55: Willingness to pay for an improved service

Source: Field survey

Among the services that they would be able to afford, 51.1% indicated yard tap connection, 25.3% Public stand pipe and 23.7% house connections (Figure 6-56). Before project roll out, it is pertinent to establish the preference of services in line with the social economic indicators such as household income, business establishment levels of a given community and socio-cultural practices to assess the feasibility of planned interventions by the project proponent.

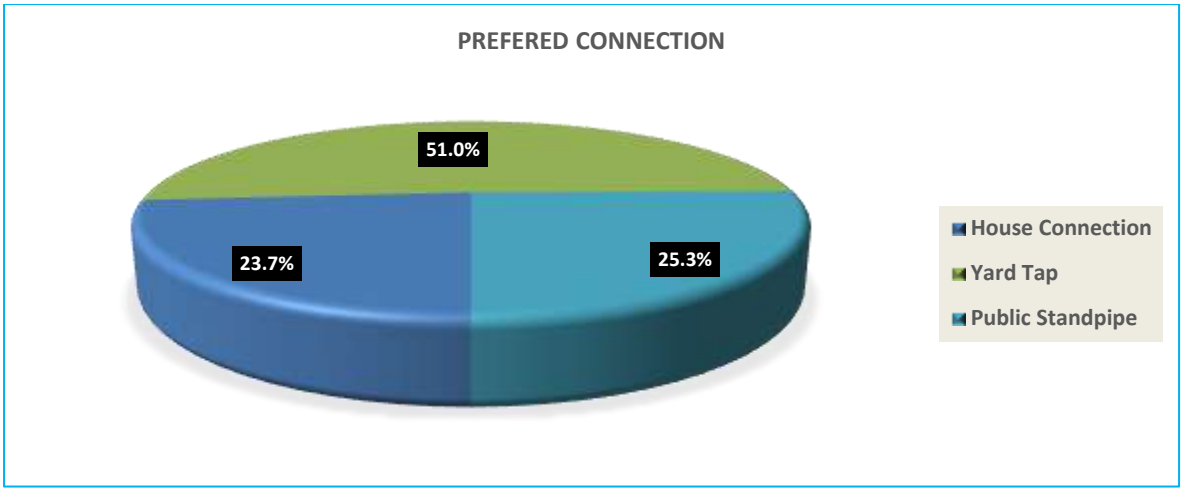


Figure 6-56: Willingness to pay and preferred connection

Source: Field survey

WILLINGNESS TO PAY TO OBTAIN A HOUSE CONNECTION

Respondents were also interviewed about the amounts that they would be willing to pay for a new house connection for water supply services. Survey results included that 30.7% of the households were willing to pay between 5000-10,000, 10,000-20,000 (22.7%),20,000-30,000 (18.2%) and 3000-5000 (13.6%) Uganda shillings for a house connection. A variation of fees respondents is willing to pay is presented in the Table 6-26 below.

Table 6-26: Amount willing to pay

Amount	Frequency	Percentage
50,000 – 60,000	4	4.5
30,000-40,000	6	6.8
20,000-30,000	16	18.2
10,000-20,000	20	22.7
5,000-10,000	27	30.7
3,000-5,000	12	13.6
2,000-3,000	3	3.4
Total	88	100.0

Source: Field survey

Further assessment on willingness to pay for a jerrycan of water reveals that respondent (35.3%) were willing to pay 100 Ugx, Ugx.50 (21.1%), Ugx 300 (13.2%), and Ugx. 400 (7.9%), respectively (Table 6-27).

Table 6-27: Willingness to pay for a jerrycan of water

Willingness to pay for a jerrycan	Frequency	Valid Percentage (%)
600	2	1.1
400	15	7.9
300	25	13.2
200	15	7.9
100	67	35.3
50	40	21.1
40	7	3.7
30	8	4.2
20	10	5.3
Don't Know	1	0.5
Total	190	100.

Source: Field survey

*In comparison, the **project feasibility study (MWE, 2019)** proposed a **Ugx.50/20 litres water tariff**, a computation based on ability of the consumers to pay (ATP) **5 percent of the household monthly income on an improved water service**. Therefore, **86.5 percent of the HHs** in the RGC **may be willing to pay the proposed water tariff for the improved water supply system**.*

PERCENTAGE OF ANNUAL INCOME ALLOCATED TO ACCESS TO WATER

Assumption 1: If on average, households in Kitenga RGC earn between Ugx.503,000 and Ugx.1,403,000annually – **average income = Ugx 953,000** (see Section 0 above),

Assumption 2: On average each household uses **75l of water per day** (see Section 0 above), which translates into **27,375l a year, thus 1,369 jerry cans (20l) of water a year** per household per year.

A jerrycan of water will cost Ugx. 50 (proposed price adopted from the project feasibility report). A household will spend (1,369*50) = **Ug. 68,450 per year on access to water**.

*This translets to **a household spending** (68,450/953,000) X 100 = **7.2% of their annual income on water compared to the adopted tarrif**, where the target households will spend 5% of their annual income on access to water.*

PREFERRED PAYMENT SCHEDULE

When asked about the preferred payment schedule, 64.9% indicated daily, 27.7% monthly, 6.4% whenever collected and 1.1 percent bi-weekly (Table 6-28).

Table 6-28: Preferred payment schedule

Preferred payment schedule	Frequency	Valid Percentage
Daily	61	64.9
Bi-weekly	1	1.1
Monthly	26	27.7
Whenever collected	6	6.4
Total	94	100.0

Source: Field survey

OWNERSHIP OF MOBILE PHONE AND ACCESS MONEY PAYMENT

Mobile payments have been adopted for urban water payments in most area with access to telecommunication services in Uganda (Figure 6-57).

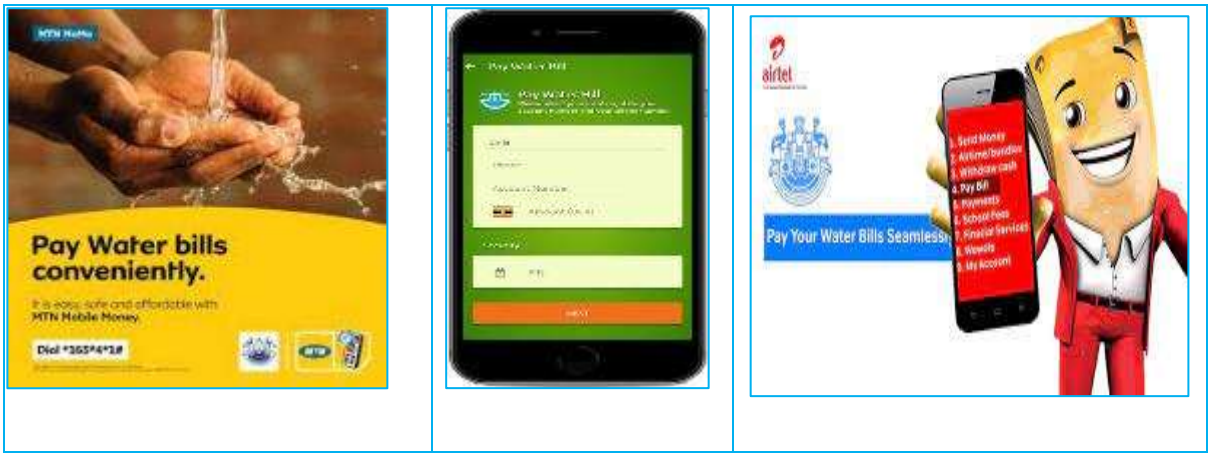


Figure 6-57: Examples of advertised platforms for mobile water payments by NWSC

Respondents were also interviewed on issues related to access to possession of mobile money accounts and access to mobile money payments as modes of mobile payments for utilities. Most (84.4%) of the respondents indicated owning mobile money accounts and 96.2% having access to mobile money payment within their areas of residence (Figure 6-58).

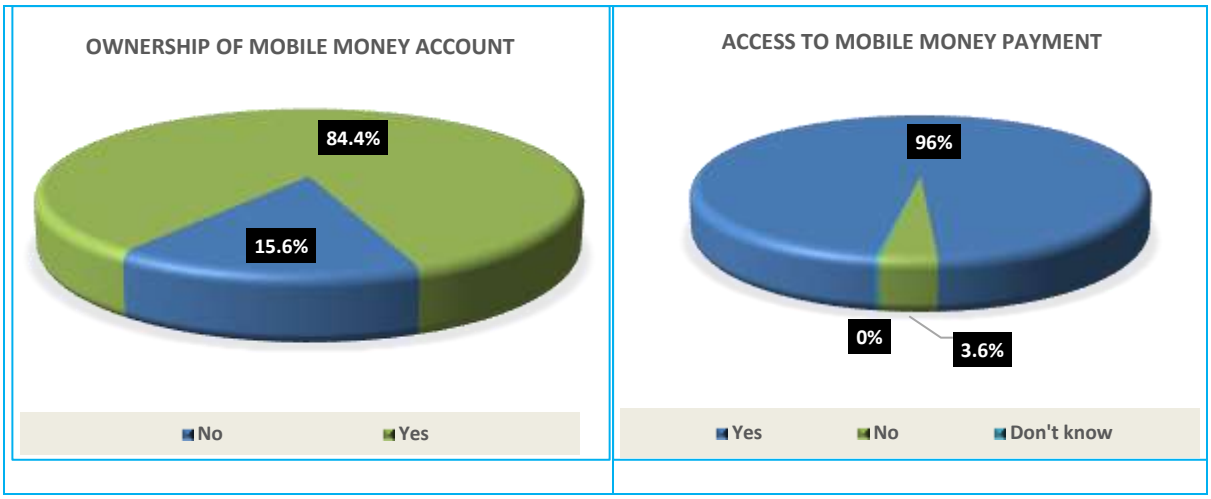


Figure 6-58: Ownership of mobile phones and money accounts

Source: Field survey

WATER FOR PRODUCTION

A review of Bukamba Sub County Development Plan (2021) revealed that there is a high demand for water for crop and animal production. The area is commonly affected by prolonged dry spell and drought during dry seasons. These have increased exposure to vulnerability accruing from declining and/or loss of livelihoods mainly due to poor agricultural yield and productivity. However, from the field survey, (***see Sub section 0 (Water uses) above***) it was established only a few HHs use water for watering of animal (3.9%), and crop irrigation (0.2%). It is likely that adoption of piped water for use in agricultural production will be negligible due already exisiting behaviour in water usage and the cost implications in relation to water bills and equipment and capital investments required in extending the water to farms and animal houses.

6.6 HEALTH SERVICES

ACCESS TO HEALTHCARE

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, 44% of the respondents indicated that they were using Privately run clinic /drug shop, 28% government aided health centre IIIs to access healthcare services, 8 percent of the respondents went to referral hospitals to access healthcare services, 9% went to Health centre IIs, 6% to Privately run hospital, and Community health Centre (5%) for the same services. Some members of the community other places to access healthcare such as traditional healers and self-medication (Table 6-29).

Table 6-29: Health facilities within the project area

Type of nearest health facility	Frequency	Percentage (%)
Referral hospital	30	8
Privately run hospital	22	6
Health center III	103	28
Health center II	33	9
Community Health Centre	20	5
Privately run clinic /drug shop	162	44
Other	2	1
Total	372	100

Source: Field survey

DISTANCE TRAVELLED TO ACCESS HEALTHCARE SERVICES

Distance to a health facility has a strong influence on access to healthcare which influences the outcome of health conditions. 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 (Table 6-30), nearly half of the respondents (35.5%) indicated that they travel 1-1.5km, 32% travel 100-500m ,15.3% travel 100m and 17.2% over 5km (to access the health facility in the respective areas where they reside in the project area).

Table 6-30: Distances to the nearest health facility

Distance to nearest health facility	Frequency	Percentage (%)
100m	57	14.3
300-500m	119	32
1-1.5km	132	35.5
Above 5km	64	17.2
Total	372	100

Source: Field survey

COMMON DISEASES

Disease Prevalence refers to the number of individuals who have an illness or condition at any moment (WHO, 2004). Water scarcity and/or overabundance are directly linked to incidence and prevalence of water related illnesses. Water borne illness can be both communicable and non-communicable attributed to poor water, sanitation, and hygiene conditions.

A review of Kaliro DDPIII (2020/21-2024/25) indicates that Bukamba Sub County, where Kitenga RGC is located is affected by waterborne disease outbreaks due to: (a) Water logging in floodplains during the rainy seasons, which increases chances of vector breeding and cross contamination of water; and (b) Long dry spells in the dry seasons, which cause water scarcity and may result in less use of water for sanitation and hygiene such as in handwashing.

The Kaliro DHO/HMIS2 data for 2015-2021 indicates that the major water related illnesses in Bukamba Sub County included flu and cough, malaria, diarrhoea, intestinal worms, gastrointestinal disorders, pneumonia, and typhoid (HMIS2, 2021). Similarly, respondents were also interviewed about the most common diseases that affect them. Majority of them (44.4%) indicated Malaria and Respiratory tract infections (36.1%) as the most common diseases afflicting the households in the project area (Figure 6-59). Other diseases that affecting households are ulcers, skin diseases and dysentery as shown in the table below.

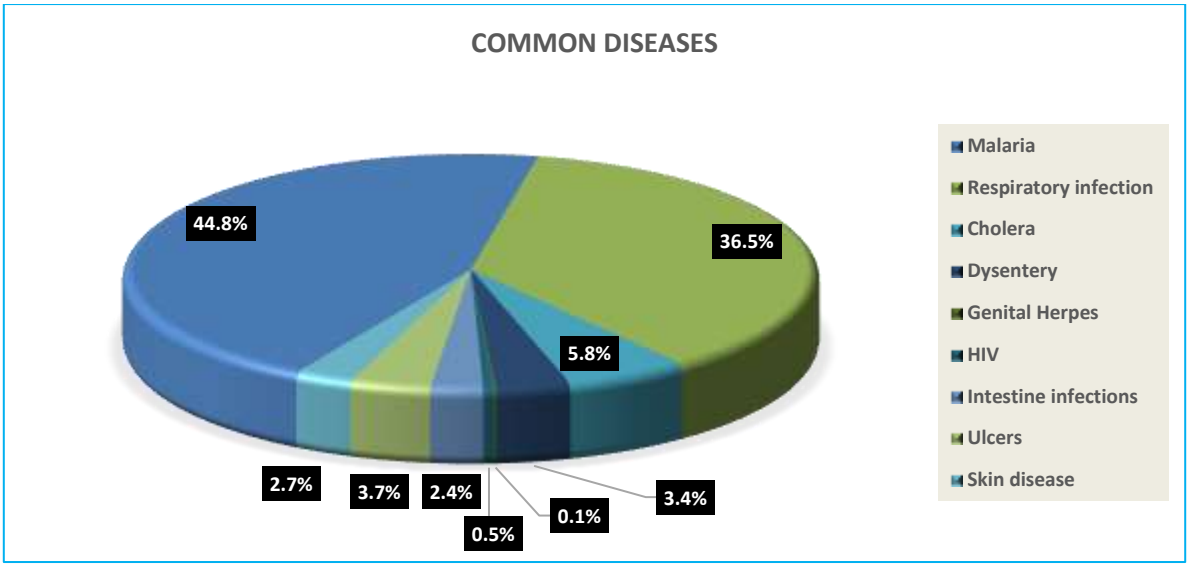


Figure 6-59: Common illnesses in the project area

Source: Field survey

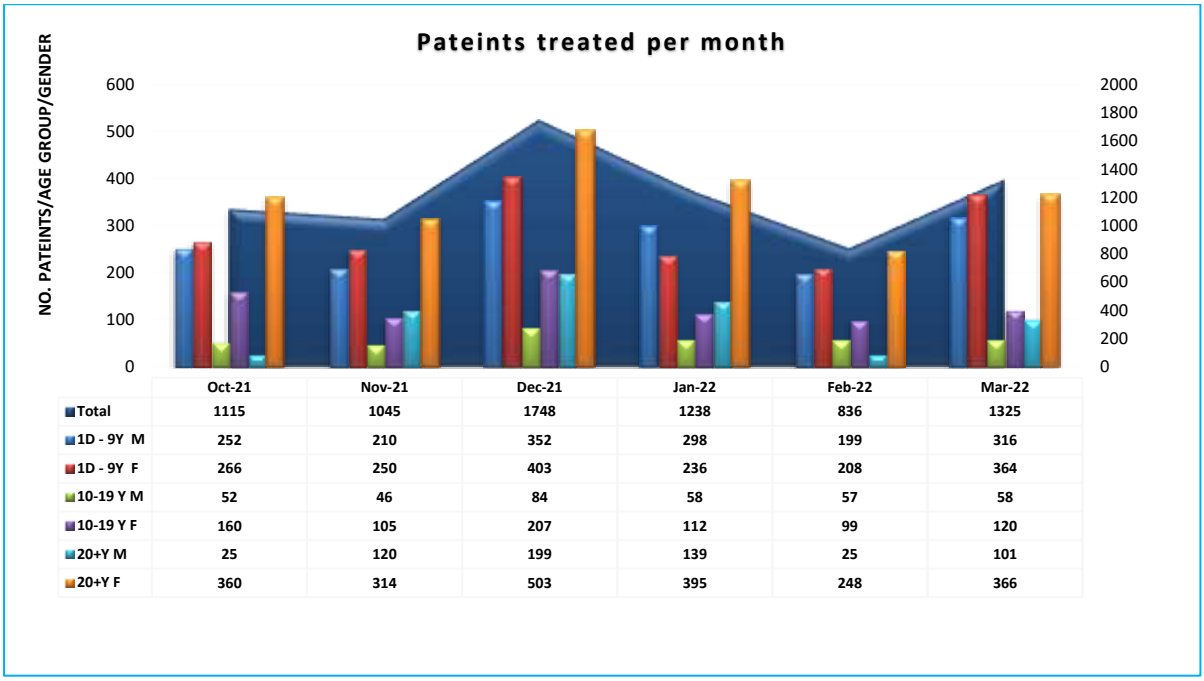
STATE OF THE HEALTH FACILITIES AROUND THE PROJECT AREA

The nearest government aided health facility to the project area is Nawampiti HC III (Figure 6-60), which serves a population of about 28,500 people with 1,217 average number of patient per month (Figure 6-61).

Figure 6-60: Nawampiti HC III in Bukamba Sub County

The most common illnesses treated at this facility are malaria, diarrhoea, cough, and pneumonia. The facility has no emergency unit, one ambulance stationed at Nawaikoke H/C III, no beds assigned for emergency cases, no blood transfusion, and no theatre. The services provided by this facility are; Voluntary Counselling Testing for HIV/AIDS, reproductive health education, HIV/AIDS

testing and treatment, antenatal and maternity services, and first aid. The health facility has 13 staff.



	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Total	1115	1045	1748	1238	836	1325
1D - 9Y M	252	210	352	298	199	316
1D - 9Y F	266	250	403	236	208	364
10-19 Y M	52	46	84	58	57	58
10-19 Y F	160	105	207	112	99	120
20+Y M	25	120	199	139	25	101
20+Y F	360	314	503	395	248	366

Figure 6-61: Patients treated per month at Nawampiti HC III

(Source: Nawampiti Health Centre III data for October 2021 – March 2022)

WATER IN HEALTH CARE FACILITIES

Nationally, 33% of health facilities in Uganda have basic water supply (WHO Global Baseline Report, 2019). According to UNICEF/JMP13, Uganda ranks highest in terms of 'Limited" water at HCF at 65.15 percent 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 percent and 10th rank for having 'No Service". In Kaliro district, there are 25 health facilities (13 Government owned; 8 Private Not For Profit; 4 Private For Profit). Out of the 25 health facilities, there are 13 Health Centre II, 11 Health Centre III and 1 Health Centre IV. According to Kaliro District Health Officer, only five (5) out of 25) of the health facilities have access to piped water system; while 19 the health units have a total of 22 functional Rain Water Harvesting Tanks. However, within Kitenga RGC, has no access to any safe water source as shown in ***Table*** 6-31 below.

Table 6-31: Water in Health Facilities in Kitenga RGC area

Facility	Location	Ownership	Piped Water	Borehole	Water Tank	No. of tanks

13 UNICEF Joint Monitoring Programme (JMP)

Nawampiti Health Centre III	Bukamba Sub County	Ministry of Health / Government aided	No.	1	Yes	1 (10,000l)

Source: Field survey

The project should provide improved supply of safe and clean water to Nawampiti HC III. It has been proposed that a Yard Tap (YT), PSP can serve the health facilities better. Additional water storage tanks (>50,000 liters) can potentially be useful for each facility. It is anticipated that the piped water will make a positive impact on 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" (WHO14, 2017).

6.8 EDUCATIONAL SERVICES

LITERACY LEVELS

Results from baseline data regarding the education level of respondents in the project area of influence indicate that most respondents had attained primary education (53%), and ordinary level education (25%). Few respondents had attained advanced level (3%), vocational education (2%) university education (0.3%). Some respondents (16%) had never gone to school (Table 6-32). 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 for the less educated rather than written communications for better understanding by the project affected/beneficiary communities. Additionally, most stakeholders engaged emphasised the need for employment of local labour during the project; however, education levels of the population limit employment to unskilled labour due to the literacy levels in the project area.

Table 6-32: Education level of household head

Education level of household head	Frequency	Percentage (%)
Primary Education	198	53
Ordinary level	92	25
A' level	12	3

14https://www.who.int/docs/default-source/searo/hsd/hwf/01-monitoring-the-health-related-sdgs-background-paper.pdf?sfvrsn=3417607a_4#:~:text=The%20health%20goal%20(SDG%203,one%20must%20be%20left%20behind%27.

Vocational	6	2
University/college	1	0.3
None	61	16
Junior	2	0.5
Total	372	100

Source: Field survey

DISTANCE TRAVELLED TO ACCESS EDUCATION SERVICES

Among key barriers that have the most effect on school attendance and learning outcomes is the distance travelled to access education services. This survey, therefore sought to establish the distances travelled by children and teacher to access education services in the project area as it impedes constructive learning. Data from the field shows that most households were able to access primary school that were within walking distance of 1-1.5km (47.4%) 100-500meter-(20.6%) (19.5%), and 100 (12.6%). However, 19.4% of the respondents indicated travelling over 5km to access primary schools from their places of residence (Table 6-33). Similarly, secondary schools were also not located so far from principal places of residence and, most respondents indicated that they must travel 1-1.5km (45.9%) 100m (5.1%) and 100-500m (4.5%). Nearly half (44.4%) of the respondents indicated travelling over 5km, to access secondary schools.

Table 6-33: Distance travelled to nearest primary and secondary schools

Distance travelled	Frequency	Percentage (%)
Distance to nearest primary school		
100m	43	12.6
100-500m	70	20.6
1-1.5km	161	47.4
Above 5km	66	19.4
Total	340	100
Distance to nearest secondary school		
100m	17	5.1
100-500m	15	4.5
1-1.5km	153	45.9
Above 5km	148	44.4
Total	333	100

Source: Field Survey

ACCESS TO WATER IN SCHOOLS

A review of Kaliro DDP III (2020-2025) reveals that there is water scarcity in 370 schools (149 pre-primary, 189 primary schools, 28 secondary schools and 4 tertiary institutions) in the district. In all the schools, the major water source are deep boreholes. There are four (4) functional Rain Water Harvesting Tanks while 20 are non-functional in all the schools in Kaliro District. In Kitenga RGC, there are six (6) primary schools with a total population of 4,701 learners and 71 teachers. Access to water in the Primary schools in Kitenga RGC is as shown in Table 6-34 below.

Table 6-34: Access to safe water in primary schools in Kitenga RGC

	Name of School in Kitenga RGC	Owner ship	School Popn		Major Source of water	No. of Water Tank	Capacity in Litres
			Male	Female			
1	Bukamba PS	Gov't	336	243	Borehole	1	5,000
2	Nangala PS	Gov't	378	285	Borehole	0	-
3	Kitenga PS	Gov't	551	274	Borehole	0	-
4	Buvulunguti PS	Gov't	719	422	Borehole	0	-
5	Lugonyola PS	Gov't	372	279	Borehole	0	-
6	Nawampiti PS	Gov't	537	315	Borehole	0	-
Overall School Population			2,893	1,818	(33%)		5,000
School Going Age Population in RGC			8,054	6,202			

Source: Schools Management/Kaliro District Education Department, February 2022

The project will likely benefit 33 percent, representing 4,701 leaners out of 14,256 school age population in Kitenga RGC. 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 Kitenga RGC system (SGI-Uganda/MWE, 2019). The potential benefits of PSP and/or YT will as well trickle down to neighbouring households 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, absenteeism, lower the rate of absenteeism and dropout rate for girls, improve menstrual hygiene and health for girls and female teachers. In this regard, the project will contribute to achievement of the 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'.

6.9 SANITATION AND HYGIENE

Pit latrine (basic sanitation facility) is critical sanitation facility within the households and community, and it has direct influence on the water, sanitation, and hygiene (WASH). According to a UNICEF (2021), about 50 per cent of the rural population in Uganda has no toilets and is therefore using the bush. A review of Kaliro DDP III (2020-2025) shows that pit latrine coverage is lowest in the four sub counties of Bukamba, Kisinda, Bumanya, Gadumire and Namwiwa at 40 percent.

Pit Latrine Coverage – Survey findings indicated that 6.18% (23 out of 372) of the respondent households don't have pit latrines.

Type of sanitation facilities: When asked about methods of disposing of human waste, majority of respondents (Table 6-35) indicated that they use pit latrines (98.1%) while others used VIP latrine (semi improved sanitation facility) (1.3%) and 0.3% for Ecosan and Double vault latrine respectively. No respondent mentioned use of a flush toilet (standard sanitation facility).

Table 6-35: Management of human excreta

Excreta management	Percentage (%)
VIP latrine	1.3
Pit Latrine	98.1
Ecosan	0.3
Double Vault Latrine	0.3

Source: Field Survey

There is no functional public toilet in Kitenga RGC. The project proposed to construct 2N^{o}. 6 stance water borne public toilets complete with 4N^{o}. single stance, 1N^{o}. urinal, 2No. disabled people equipped stances, shower facility; complete with hand washing facilities.

Figure 6-62: A 2-stance pit latrine at Bukamba Sub County

At a consultation meeting with the Technical Team at Bukamba Sub County, it was noted that the suitable location for the proposed public toilet would be in a densely populated area within the RGC. Therefore, two sites; namely, Lugonyola and Kitenga Trading Centres were proposed. The Local Council three (LCIII) Chairperson of Bukamba Sub County pledged that he would mobilize local communities to offer land on which the public toilets would be constructed.

Regarding hygiene, respondents were asked if they shared toilets, 69.2% indicated sharing toilet facilities while 30.8% didn't share the toilet facilities (Figure 6-63). The main reason for sharing sanitation facilities included (i)lack of HH owned facility, and (ii) sharing with visitors/travellors as there are no public sanitation facilities in the RGC. Related to that was the issue of hand washing where majority of the respondents (77.2%) also indicated practicing handwashing. It is imperative to note that correct hand washing makes a huge difference to a person's health and well-being.

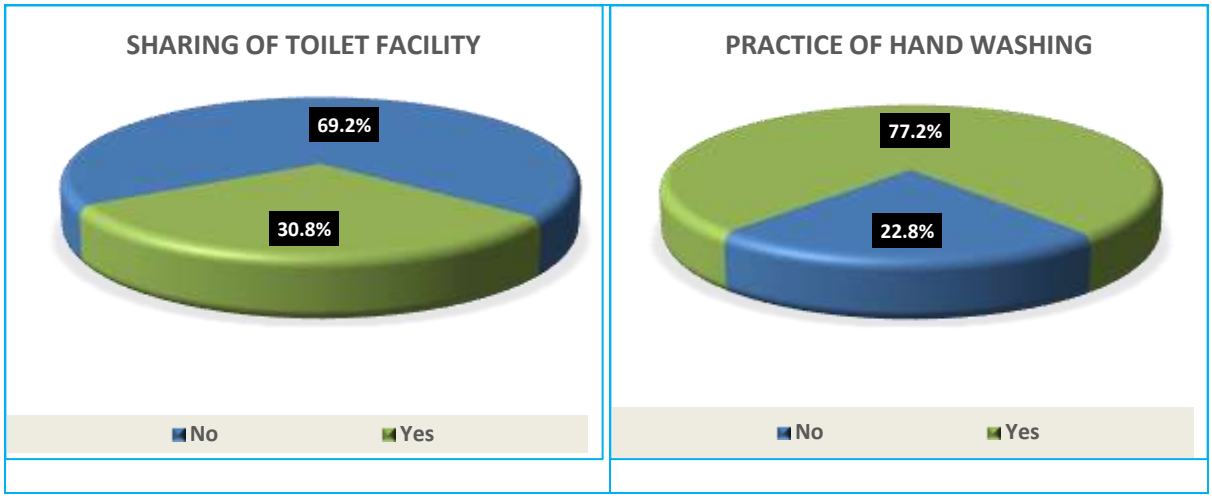


Figure 6-63: Shared toilets and practice of hand washing

Source: Field Survey

There is no designated public sanitation facility (toilet) or landfill or waste disposal location in Bukamba Sub County. At household and community level, most of the respondents indicated digging a pit (67.8%), use on farm as manure (30.9%), 1% disposal on communal dump site, 0.4 percent throwing by the road side and 0.6 percent Collected by Town Authority or Private Company (0.2%) - Table 6-36 below. It was also observed that a few homesteads burn domestic solid wastes.

Table 6-36: Household disposal of solid waste

Disposal of solid waste	Frequency
Dug-pit	67.2
Farm as manure	30.1
Collected by Town Authority or Private Company	0.6
Communal Dump	1

Thrown at Road side	0.4
Others (Please specify)	0.6

Source: Field Survey

Open defecation is a contributing factor to water and food contamination, hence increasing the risk of exposure to incidence and prevalence of water borne diseases (WHO15, 2015). Study findings indicated that open defecation is prevalent in Kitenga RGC. Most outstandingly, survey findings indicate that 74.4% respondent admitted to have ever observed evidence of open defecation in / near open-source water points (L. Nakuwa, rivers, wetland); and 46% admitted have observed it in open ground, grass, bushes, crop / grazing fields as shown in Table 6-37 below.

Table 6-37: Response on observation of open defecation within Kitenga RGC

Observed open defecation		Yes	No	Not Sure	Total
People defecating in / near open-source water points (Lake Kyoga, rivers, wetland, ponds)	Count	276	48	48	372
	%	74.4	12.8	12.8	100
People defecating in open ground / grass / fields / bushes	Count	171	140	61	372
	%	46	37.6	16.6	100

Source: Field Survey

PAYMENT FOR SOLID WASTE

On payment for solid waste, 65.6% of the respondents indicated that they don't pay for solid waste, while 15.6 percent pay less than Ugx.5000 and 7.6 pay less than Ugx 1000 shillings only per interval of collection. The others (Figure 6-64), 7.6%) pay Ugx 1000 and Ugx.5000 (2.8%).

15 https://www.who.int/gho/publications/mdgs-sdgs/MDGs-SDGs2015_chapter5_snapshot_waterborne_diseases.pdf?ua=1

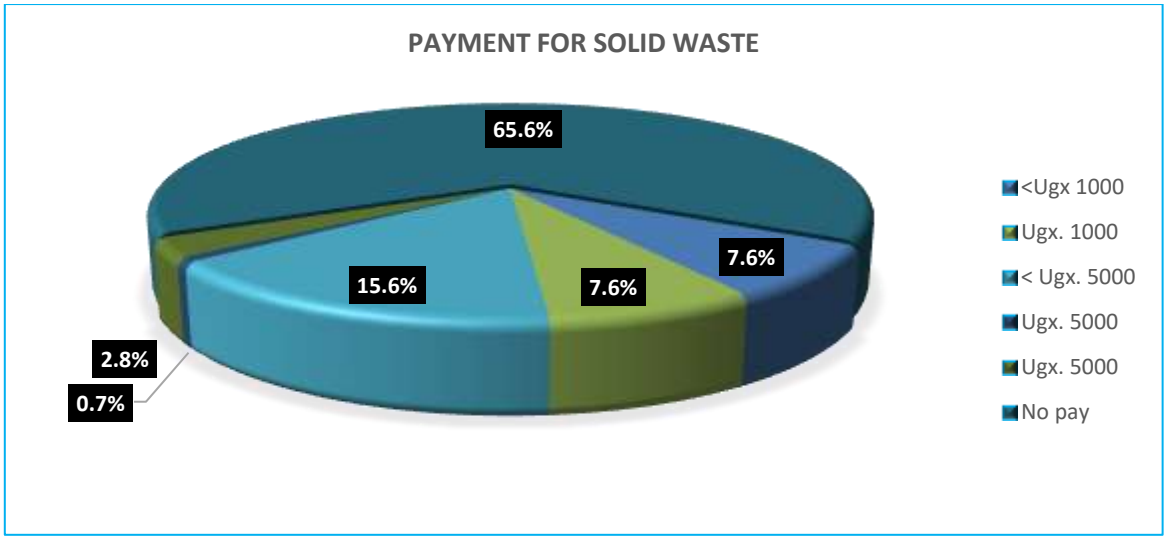


Figure 6-64: Payment of Solid waste

Source: Field Survey

6.10 ENERGY SOURCES IN PROJECT AREA

The socio-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 6-38 below. firewood (77.3%) and Charcoal (22%) were the most highly used sources of energy for cooking. Overall, solar (75.1%) and Kerosene (14.2%) are the dominant sources of energy for lighting within the households. The use of solar in these urban areas also points to the proliferation of renewable energy sources in up-country households.

Table 6-38: Sources of cooking and lighting

Major energy source for cooking	Percentage	Percentage (%)
Firewood	355	77.3
Charcoal	101	22
Solar	3	0.7
Major energy source for lighting	Percentage	
Firewood	5	1.2
Charcoal	4	1
Solar	301	75.1
Kerosene	57	14.2
Biogas	1	0.2
Other	33	8.2

Source: Field survey

6.11 GENDER BASED VIOLENCE

According to the Kaliro DDP III (2020/21-2014/15), Gender Based Domestic Violence (GBV) is common in the District. There is no clear statistics on this matter but from the informal interaction between the district and police indicate that common crimes reported include; assault, defilement and rape cases were directed towards women. The plan notes that the department of community-based services is overwhelmed with both domestic violence and child neglect due to irresponsible parenting.

Cases of gender-based violence including defilement, rape and child neglect are still common in the district. Although 60% of women have experienced gender-based violence in some form, access to prevention and response services is limited. Factors contributing to gender-based violence include traditional cultural practices like payment of bride prize, poverty, insecurity, alcohol and drug abuse, and lack of information and rights awareness. Gender based domestic violence remains a serious violation of rights in Kaliro district. Children are affected more with the consequences of this domestic violence. Although the government has domesticated a number of human rights commitments and fights against corruption by setting up legal instruments and institutions, there are still major gaps in such areas as educating citizens, including children, about their rights, securing access to justice and services, holding duty-bearers accountable, improving access to legal recourse and justice on gender-based violence and gender inequalities.

According to records obtained from Bukamba Police Post, the most common cases reported between January to April 2022 included threatened violence, assault, domestic violence and theft as shown in Table 6-39 below.

Table 6-39: Common Crimes in Bukamba Sub County

Month	Defilement	Theft	Domestic Violence	Threatened Violence	Child Abuse	Assault	Criminal Trespass	Road Traffic Accidents	Suicide
Jan-22	3	6	8	4	1	9	5	0	0
Feb-22	1	4	3	2	0	7	3	1	0
Mar-22	0	6	0	2	1	6	0	0	1
Apr-22	0	4	0	2	0	10	0	0	1
Total	4	20	11	10	2	32	8	1	2

(Source: Bukamba Sub County Police Post – May 2022)

From the survey, respondents were asked on the forms of GBV that they are aware of, many (33.2%) and (30.4%) indicated Verbal abuses/insults and Battering/beating respectively as the

most common forms of violence they are aware of. Other forms of domestic violence are shown in Figure 6-65 below.

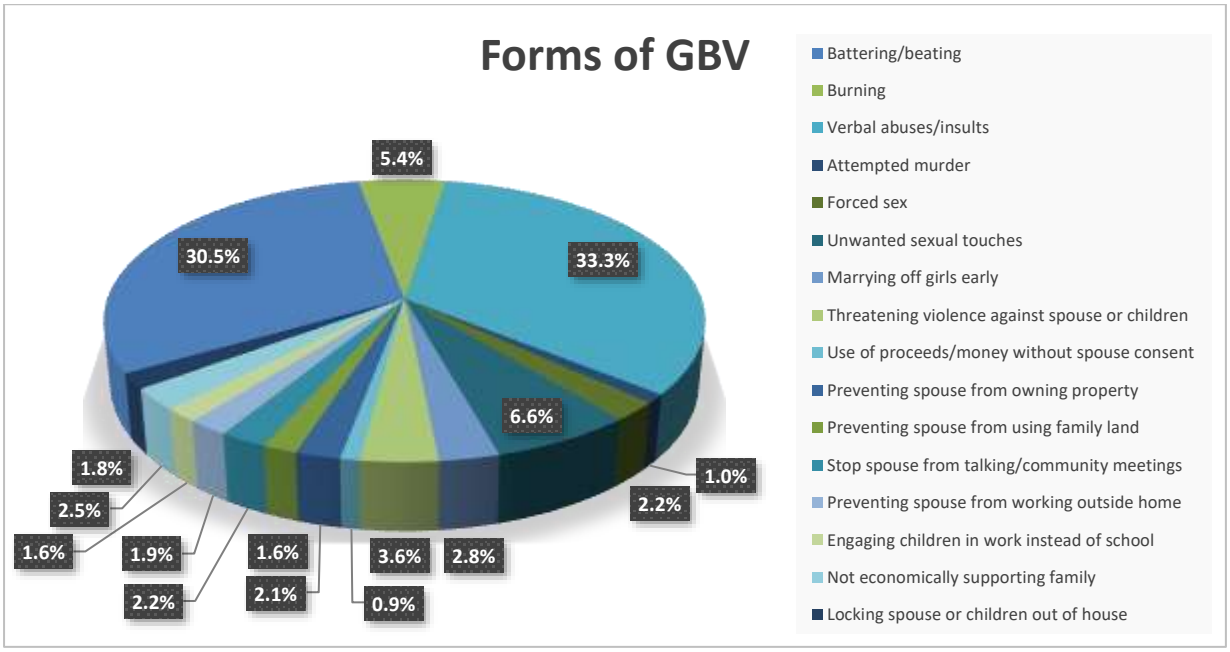


Figure 6-65: Forms of GBV Respondents were Aware of.

Source: Field survey-*Multiple response question

VICTIMS OF GBV

Further analysis about respondents perception of the victims of gender-based violence, indicated that females are the main victims of gender-based violence with 37.9% occurs to married women while 39.5% occurs to girls. Various victims of GBV are presented in Figure 6-66 below.

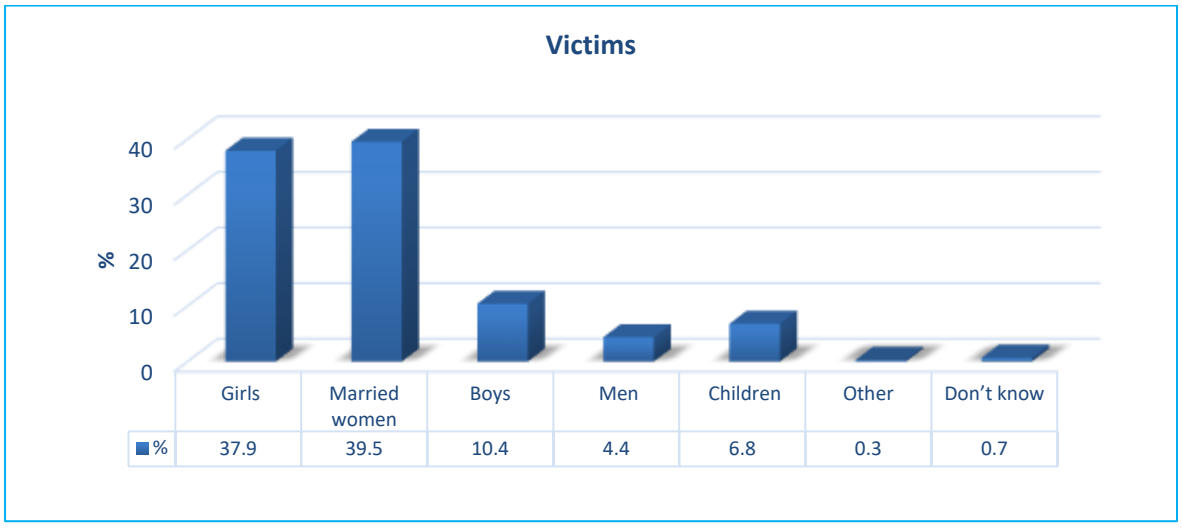


Figure 6-66: Victims of GBV

Source: Field survey-*Multiple response question

Relatedly, when asked about who they think are the perpetrators of this violence are, 51.9% and 22.8% cited male and female spouses respectively as the main perpetrators of gender-based violence, other relatives (12.8%), and strangers (5.8%) among others (Figure 6-67). This is

consistent with the UBOS, (2014) report which indicated that of all reported cases at 47.5% in 2011 and 45% in 2016 the perpetrators were male specifically husbands and male partners16.

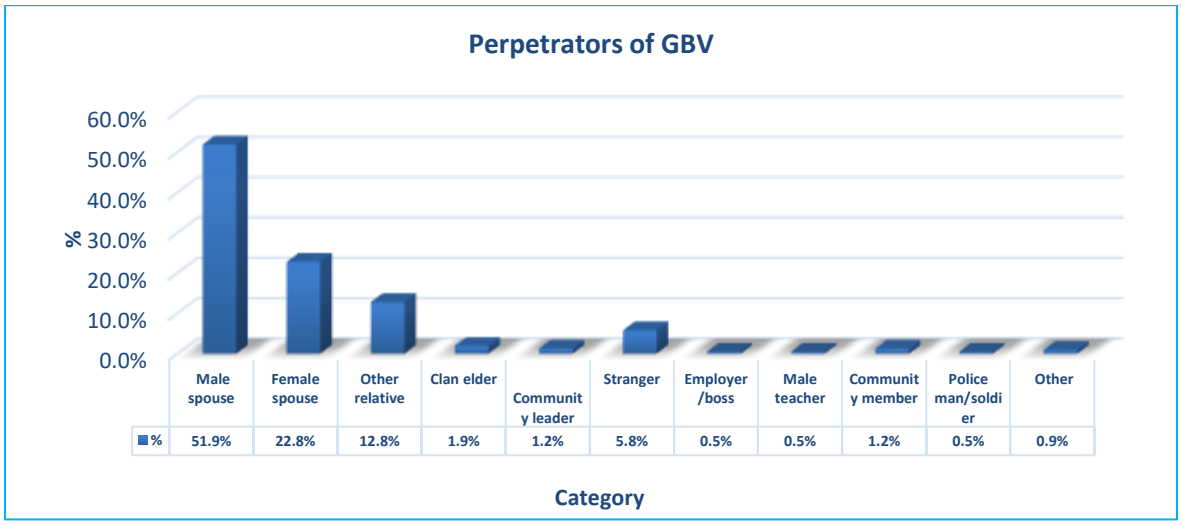


Figure 6-67: Perpetrators of GBV

Source: Field survey-*Multiple response question

Respondents were further asked where they think cases were being reported in the community. They revealed that they are normally referred to the LC/community leaders (44.9%), Police (28.6%), religious leaders (17.9%) Clan leader (3.4%) and Sub- County/probation officer/CDO (1%) among others (Table 6-40). During project implementation it would be important to co-opt these community structures in their grievance redress mechanism to ensure that project related grievances are expeditiously and appropriately handled with their support.

Table 6-40: Reporting of gender based violence case

Gender based violence case reference	Number	Percentage (%)
Police	192	28.6
LC/community leaders	301	44.9
Religious leader	120	17.9
Clan leader	23	3.4
Sub-county/probation officer/CDO	7	1.0
Head-teacher	1	0.1
Health worker	26	3.9
Others	1	0.1

16 Gender Issues in Uganda, an analysis of gender-based violence, asset ownership and employment,2014

Total	671	100

Source: Field survey-*Multiple response question

6.12 HIV/AIDS SITUATION

By national comparison, the Mid-Eastern region (covering project area), had an HIV/AIDS rate at 5.1% among the adult age 15-64 years by 2017 slightly lower than in rural areas at 5.8% in Central 1 region (UPHIA, 201717). At national level, the prevalence of STI (active syphilis) is higher among rural residents at 2.3% compared to 1.6% in urban areas (PHIA, 2017). The ART initiation rate is at 88% with 46.5 % having HIV positive Individuals with presumptive TB. The HIV/AIDS epidemic has had its impact on the population and the disease burden remains a negative factor in agricultural production in many rural communities. This is because the prevalence has not significantly changed for the better with the prevalence rate standing at 6.7%18. According to the field findings (Table 6-41), many of the respondents indicated that the HIV prevalence in the community was low (49.9%) to very low (23.1%). However, 20.4% indicated that it is high, while 1.1% revealed that there were not certain of the prevalence rates. As such the project should have a robust HIV/AIDS management plan to guide the sensitization and VCT activities geared towards prevention and spread of HIV/AIDs.

Table 6-41: Prevalence of HIV/AIDS

Prevalence of HIV/AIDS infection in the area	Frequency	Valid Percentage
Very low	84	23.1
Low	181	49.9
High	74	20.4
Very high	20	5.5
Don't know	4	1.1
Total	363	100.0

Source: Field survey

Related to the prevalence rate, were the factors that lead the spread of HIV/AIDS. Respondents gave several reasons which included lack of information (21.8%) poverty (19.2%) that exposes mainly women to sexual exploitation by men, peer pressure (12.5%), substance abuse especially

17 Uganda Population-Based HIV Impact Assessment - https://phia.icap.columbia.edu/wp-content/uploads/2019/07/UPHIA_Final_Report_Revise_07.11.2019_Final_for-web.pdf

18 KALIRO DISTRICT LOCAL GOVERNMENT FIVE YEAR DISTRICT DEVELOPMENT PLAN FOR THE PERIOD 2015/16-2019/20

alcoholism 12.5% and use of drug 5%, prostitution 8.3% and parental neglect 5.6% was also referred to as one of the reasons that trigger HIV/AIDS spread **(**Table 6-42).

Table 6-42: Factors leading to spread of HIV/AIDS

Factors	Number	Percentage (%)
Poverty	197	19.2
Lack of information	224	21.8
Peer pressure	177	17.2
Alcohol abuse	129	12.5
Drug abuse	51	5.0
Parental neglect	58	5.6
No antenatal care service	26	2.5
No HIV service providers	29	2.8
GBV	20	1.9
Prostitution	85	8.3
Early marriage	30	2.9
Don't know	2	0.2
Total	1028	100

Source: Field survey-*Multiple response question

Results from the field also revealed, a variation of strategies that can be used to control the spread of HIV/AIDS and these included sensitizations (21.9%), By law against prostitution (13.4%), Testing and counselling (9%) and promotion of ABC strategy (11.9%) among others (Table 6-43).

Table 6-43: HIV/AIDS control measures

HIV/AIDS control measures	Frequency	Percentage
Sensitization activities	207	21.9
Prevention of GBV	121	12.8
Bylaws against prostitution	127	13.4
Promotion of ABC	112	11.9
Bylaws against drug/alcohol abuse	64	6.8

Improve antenatal care services	75	7.9
Engage HIV service providers	64	6.8
Bylaws against early marriage	39	4.1
Gender empowerment	50	5.3
Testing & counselling	85	9
Other (specify)	1	0.1
Total	945	100

source: Field survey-*Multiple response question

Regarding the source of information about HIV/AIDs respondents indicated radio (31.4%), health facilities (16.3%) Newspapers (8.7%), community outreach (7.1%) Religious leaders (7%) as shown in Table 6-44 below.

Table 6-44: Source of HIV/AIDS information

Source of HIV/AIDS information	N	Percentage
Television	43	5
Radio	270	31.4
Newspapers	75	8.7
Billboards	28	3.3
Posters/brochures	26	3
Community outreaches	60	7
Drama performances	20	2.3
Health facilities	143	16.6
NGO/CBO/CSO	11	1.3
Religious leaders	61	7.1
Traditional leaders	21	2.4
Local leaders/Political leaders	24	2.8
Family members	38	4.4
Friends/peers	41	4.8

Source of HIV/AIDS information	N	Percentage
Total	861	100

Source: Field survey

6.13 PHYSICAL CULTURAL RESOURCES (PCR)

There were no physical cultural resources encountered during the field work, however the ESIA proposed chance find procedures to be followed in case of any encounter during civil works.

6.14 STAKEHOLDER PERCEPTION ABOUT THE PROJECT

It is important to assess the perceived impacts of development project by the beneficiary community, to gauge the mindsets towards ownership of projects and ensure responsible control and management of water infrastructure. As such respondents were interviewed on certain socio-economic parameters related to the perceived project impact and 37.5% revealed that the project works will bring about positive changes by improving the quality of life, increase job opportunity (21.9%), and improving agricultural productivity (17.7%). Some also indicated boosting business in trading area (4.2%) and other reasons among other reasons such as sanitation and hygiene in the community as shown in Figure 6-68 below.

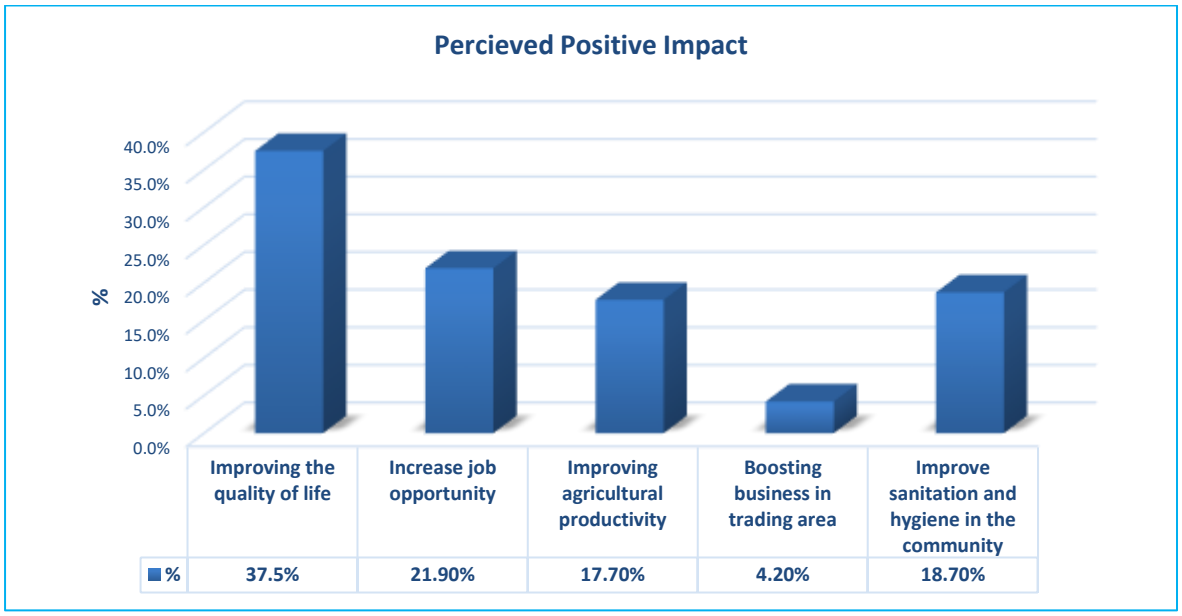


Figure 6-68: Community perceptions about the project

7 STAKEHOLDER CONSULTATION AND ENGAGEMENT

7.1 INTRODUCTION

This section of the report presents the objectives, process, and the outcomes of the stakeholder involvement in the process of this ESIA. Emphasis has been placed on a fully inclusive, open and transparent public participation process and the transfer of information regarding the proposed construction of Large Solar Powered Piped Water Supply System and Sanitation Facility in Kitenga RGC, Kaliro District to interested and affected persons (I&APs). The provision of sufficient and useful information on an on-going basis to I&APs to allow them to participate in the project and offer comments is a cornerstone of this Environmental Assessment process.

The ESIA process started with a scoping exercise aimed identifying relevant issues to form focus of the ESIA study and refine the terms of reference provided by the project proponent. This chapter presents the results of stakeholder engagement activities undertaken during February 2022 for the scoping stage and for the final ESIA during March and April 2022. Chapter three provides the list of stakeholders engaged under table 3-7 and engagement methods.

7.2 OBJECTIVES OF CONSULTATION AND DISCLOSURE

Relevant and adequate project information were provided to stakeholders to enable them to understand project risks, impacts and opportunities. Consultation targeted relevant stakeholders, communities, government ministries, surrounding business/commercial entities and aimed at:

a. Generate a good understanding of the project.
b. Understand and characterize potential environmental, socio-economic risks/impacts of the project.
c. Developing effective mitigation measures and management plans.
d. Enhance local benefits from the proposed project.
e. Enable affected communities to provide views hence participating in or refining project design, where applicable.

7.3 STANDARDS FOR CONSULTATION

The public consultation was guided by Ugandan guidelines as well as World Bank policy guidelines summarized in Box below.

Although no regulations exist for public consultation, national guidelines for EIA in Uganda require that the public is given full opportunity for involvement and participation throughout the EIA process. People including individuals, or groups of local communities who may be directly affected by a proposed project should be a focus for public involvement.

Since identification of the “public” likely to be indirectly affected by the proposed activity is often more difficult, it is required to exercise care in deciding who participates to ensure that a fair and balanced representation of views is obtained, and views of minority groups are not overshadowed by more influential members of the public.

The public may appropriately be involved in the EIA process through:

i. Informing them about the proposed project.
ii. Open public meetings on the projects.
iii. Inviting written comments on proposed project.
iv. Use of community representatives.
v. Comment and review of the Environmental Impact Statements; and,
vi. Making relevant documents available to any interested members of the public in specified places or at the cost of reproduction.

Three stages for public involvement in the ESIA process are spelt out:

a) public consultation before ESIA is done

If after receiving and screening/reviewing the developer's project brief, the Authority (NEMA), in consultation with the Lead Agency, decides that it is necessary to consult and seek public comment, it shall, within four weeks from submission of the project brief and/or notice of intent to develop, publish the developer's notification and other supporting documents or their summary in a public media. It is required that objections and comments from the public and other stakeholders shall be submitted to the Authority and to the Lead Agency within 21 days from the publication of notice.

b) public consultation during the ESIA

The team conducting the ESIA shall consult and seek public opinion/views on social and environmental aspects of the project. Such public involvement shall be during scoping and any other appropriate stages during the conduct of the study.

c) public consultation after ESIA (ESIA Review)

The EIS shall be a public document and may be inspected at any reasonable time by any person. Considering the scale and level of influences likely to result from the operation of a project, the Authority, in consultation with the Lead agency, shall decide regions where it is necessary to display the ESIA report to the public.

World Bank Safeguard Policy: Stakeholder Engagement and Information Disclosure

The Policy recognizes the importance of open and transparent engagement with project stakeholders. Success of any project is hinged on level and quality of stakeholder engagement which is an inclusive process expected to occur throughout the project life cycle. Engagement is more useful when introduced in the early phases of project development and is mainstreamed into all levels of decision making. Additionally, consultations should be done in a manner that gives affected communities, opportunities to express their views on project risks and impacts and their mitigation measures.

In applying Policy, the following scope is envisaged:

a. ***Stakeholder identification and analysis:*** The Policy requires the identification of key project affected parties and those with interests in the project. At this level emphasis will be on vulnerable people or groups of people whose situation are likely to be

accelerated by project implementation. Identification should be able to bring out different sets of affected people and their interests.

b. ***Information Disclosure:*** The borrower is obliged to undertake timely and effective disclosure of information regarding the project including its purpose, nature, scale, potential risks and impacts on the local communities and further present possible mitigation measures.

c. ***Meaningful:*** Consultation is meaningful if a dialogue exists, communities and individuals should be given an opportunity to interact with respect and dignity. Interactions should be based on prior disclosure of project relevant information to all parties.

7.4 SUMMARY OF EMERGING ISSUES FROM STAKEHOLDER CONSULTATIONS

The key emerging issues recorded through consultations are summarised below and further detailed **in Annex D.**

a. The project is viewed to be able to contribute to better access to safe water and improved sanitation in Bukamba subcounty, which aspects were very poor in Kitenga RGC;
b. The Ministry of Water and Environment should ensure that the project is executed to the highest level of quality as some public projects deliver substandard work and don't take long before breaking down;
c. Recruitment of local labour for skilled and unskilled work during the project construction phase is key for its acceptance by the communities (not to import even porters who come to the area and bring conflict over women and spoiling school girls;
d. Timely payment of workers to avoid grievances that delay project completion. Sometimes delayed payments make workers to begin stealing project fuel etc;
e. Sensitization of communities on their roles and responsibilities on the project to improve ownership of the project;
f. The project to review location of intake facility as the current spot in on community land with agricultural activities that may result in contamination of the water source;
g. The contractor should put in place measures to avoid, minimise, and mitigate workers' misconduct that could result in sexual relations with community members, increased prevalence of HIV/AIDS and STIs, and increased gender-based violence in the project area;
h. The proposed project should consider water tariff plans that are affordable by the communities in Kitenga RGC;
i. Crops may be destroyed by construction trucks and digging of trenches to install water transmission and distribution pipes should be compensated since such may lead to food insecurity at those households;
j. The project design team should provide definite crossing points especially at town junctions called service ducts for road crossings to avoid damaging the road's right of way; and
k. The Ministry of Water and Environment should update UNRA on the water networks master plan for major and small towns to allows coordinated and collectively for when designing public infrastructure such as roads, bridges, and water supply pipelines.

l. Develop Water Source Protection Plan and ensure that it is implemented during the commencement of the construction phase of the project through to implementation. The Water SPP should consider 3% of the total development and implementation budget (include in the BOQ) as stipulated in the guidelines
m. The project is abstracting water from a wetland around Lake Kyoga, obtain a surface water abstraction permit. Additionally, the project should consider the concept of payment for ecosystem services to the communities and the sub county and district of origin.
n. Ensure to develop sanitation/ solid waste management plans and clearly indicate the appropriate dumping for faecal waste
o. Consider baseline water quality assessment and water quality monitoring after project establishment
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. Consent forms from local leaders and other concerned authorities on land ownership should be availed to address the issues of land ownership.
q. Permits and approvals: All certification from concerned ministries and authorities i.e.; Directorate of water resources etc., should be acquired.
r. Site layout plans and architectural designs for solar powered piped water system and all that is entailed therein, should be submitted to the ministry for approval. Additionally, geotechnical survey/ study reports on bearing ratio to hold the pipes should be submitted
s. The community members anticipate that the project will:
    - Improve the health of the whole community because tapped water is always clean and free from faecal waste contamination,
    - Improve on the family savings since less or no money will be required for the treatment of water related diseases; especially, Bilharzia, Diarrhoea and Malaria.
    - Source of employment (casual jobs) for the youth during the project construction phase,
    - Reduce on the time women and children spend fetching water, therefore creating more time to attend to other tasks for women and more time at school for children.
    - Eliminate the risk of attacks from wild animals, such as; snakes and crocodiles, especially on the children and women who fetch water in Lake Nakuwa,
    - Eliminate the risk of drowning in flood water by women and children who fetch water from the Lake during the rainy season
t. Main questions ask during community meetings were:
    → How soon will the water supply process start?
    → Is the piped water going to be at a cost or free? If yes how much will be charge per jerrycan?
    → Will the community member be considered for job opportunities?
    → How much will be charged to extend water to an individual house?
    →

7.5 GRIEVANCE REDRESS MECHANISM

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 I. The GRM shall be disclosed as part of stakeholder engagement.

PURPOSE AND OBJECTIVES OF THE GRM

The purpose of the GRM is to put in place a simple and easily accessible systematic process for recording, processing and promptly resolving grievances during project planning and implementation. The specific objectives of the GRM are:

i. To provide project stakeholders with a clear mechanism of channeling grievances;
ii. To set up and make known to all stakeholders a clear, accessible, transparent and efficient system for receiving and resolving grievances;
iii. To record, categorize and prioritize the grievances;
iv. To provide an environment that fosters free and honest exchange of information and ideas in regard to resolving received grievances;
v. To define clear roles and responsibilities of the various parties involved in managing grievances.
vi. To promptly resolve grievances in consultation with stakeholders within a specified timeframe

COMMON SOURCES OF COMMUNITY GRIEVANCES

Considering the nature and extent of works, the following community grievances may arise during the construction phase of the project:

- Grievances related to Land acquisition
- Restrictions on land 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
- Complaints related to noise, dust, and traffic incidents
- Complaints on workers behavior or conduct specially towards women, girl and boy children eg GBV and VAC
- Illicit behaviors like alcoholism, smoking, drug abuse etc. of the contractor's workers
- Disruption of social set up and security

- Disputes on compensation values
- Increased pressure on social services and infrastructure, including water supply
- Contractor failure to pay workers and suppliers
- Accidents arising out of contractor's negligence to provide necessary information, protective gears and supervision
- Sexual Harassment and Sexual Exploitation and Abuse

MEMBERSHIP AND COMPOSITION OF GRIEVANCE MANAGEMENT COMMITTEES STRUCTURES

a) GMCs at Village or Parish Levels
b) Village and Parish GRM committees will be established as voluntary committees for each infrastructure to be constructed at village or parish levels depending on the community dynamics, area covered and nature of works. Community GRM Committees will have 10 members including
c) Chairperson,
d) Vice Chairperson,
e) Secretary,
f) Other Members (7) including a youth, Elderly Person, PWD and at least 3 members should be female. Quorum sitting shall be of at least five (5 members).

The LC I Chairpersons and Vice Chairpersons will be ex-officials to these committees.

NB: The committee shall be formed either at village or parish level given that linear projects traverse several communities. It is important that committees are accessible to communities at village or parish level.

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.

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.

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
h) PWD representative

Note: Due to complex nature of grievances, the committees can be extended to include any other relevant officers suitable for addressing the prevailing grievances.

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.

WORKERS' COUNCIL

The workers' council shall be constituted on the basis of directly elected representatives on the basis of different work sections. It will have representative workers including operators, drivers, mechanics, office/administration, technicians/lab, masons, flag ladies, foremen, clinic, casual laborers, surveyors etc. The different workers' categories shall mobilize and elect a representative to form a council of 5 members.

The 5 members shall select a Chairperson, Vice Chairperson, Secretary and members.

The council shall sit on a regular basis or monthly to discuss all complaints, welfare, working conditions among others. The Supervising Consultant's Sociologist shall be the patron of the

Worker's Council and shall ensure that the members are provided with the support and protection to freely discuss and voice workers' issues.

Any issue that has not been addressed by the Workers' Council shall be escalated or referred to either disciplinary or Site Grievance Committee. The issues that disciplinary in nature shall be referred to the Disciplinary Committee while other issues that are not disciplinary shall be referred to the Grievance Committee.

SITE DISCIPLINARY COMMITTEE

During the construction phase, a number of disciplinary related cases might emerge. Hence, each Site shall have to set up site disciplinary committee to ensure self- enforcement mechanism of discipline among workers.

The committee shall comprise of;

a) Consultant's Sociologist (Chairperson)
b) Contractor's Human Resource Officer (Secretary)
c) Workers' representatives (a Female and a Male).

The site disciplinary committee shall receive all disciplinary related complaints referred from the Workers' Council or from the Contractor's Management.

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) Environmentalist for the Consultant
f) Environmentalist for the Contractor
g) Health and Safety Officer for the Contractor

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 I.

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7.6 CAPACITY BUILDING FOR THE GRIEVANCES MANAGEMENT COMMITTEES

MWE/PST with support from the World Bank shall provide over all training on E&S general and on GRM in particular, once the contractor, and the supervision consultant have been procured. Further training of the GRM committee members shall be under taken by the stakeholder engagement consultant. The contractor shall also continuously provide training of their staff on GRM.

8 ENVIRONMENTAL AND SOCIAL IMPACT ANALYSIS, ENHANCEMENT AND MITIGATION MEASURES

One of the key components of an ESIA is to identify and analyse impacts (both positive and negative), for the various project phases, on physical/chemical, biological and socio-economic environments. This section presents the identified impacts and analysis for the pre-construction, construction, and operation phases of the project. The project developer (MWE) will be required to develop a comprehensive decommissioning plan before the decommissioning exercise, analysing the impacts of project decommissioning, which will be submitted to NEMA for review and approval.

8.1 PROJECT IMPACT IDENTIFICATION AND ANALYSIS

9.1.1 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 (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.

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.

9.2.1 SHORT-TERM EMPLOYMENT

Limited employment opportunities shall be realized by local residents. These will work as guides for the survey teams and further for the design team. The impact will occur and result in employment of few people in the community.

Enhancement

- Non-skilled jobs shall be reserved for residents along the alignment

8.3 PRE-CONSTRUCTION PHASE NEGATIVE IMPACTS

9.3.1 SOCIAL ANXIETY

Information disclosure on impending implementation works of Kitenga RGC Large Solar-powered Water Supply and Sanitation Project will create high levels of anxiety among project host communities especially households within the eight beneficiary villages in Kitenga and Buchumba Parishes, Bukamba Sub County. Unsubstantiated information on possible land take for project implement activities especially along the transmission lines, WTP site, reservoir tank site, water intake point among others, hence coming with displacement and compensation fears and excitement. Such false information on possible property appropriation and compensation will not only confuse residents but lead to poor decisions. The sensitivity of the host community to social anxiety, speculation and manipulation is low since the project footprint is already known (Section **Error! Reference source not found.**) 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. Impact intensity is also **low** since sensitization indicating the fact that the transmission and distribution pipelines will mainly be laid along community access roads. The only private land requirements on the project will be for the WTP and reservoir. Overall impact significance is hence **Minor.**

Mitigation measure:

- 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.

Residual impact significance: Minor

8.4 CONSTRUCTION PHASE POSITIVE IMPACTS

The construction phase under Kitenga RGC is 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

9.4.1 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[19]. This sensitivity of the community to the impact is high due to the low levels of livelihood alternatives and high employment among the youth in the project area (see Section **Error! Reference source not found.**), however the impact intensity will be low since the project will be phased and will employ few people (approximately 50) for the available direct and indirect jobs, resulting in Moderate Impact Significance.

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 supply system at the lowest level while providing the necessary awareness on sanitation management in Kitenga RGC.
- Available work opportunities be disclosed to the wider public in the project areas.
- Give priority to qualified/eligible persons in the project parish 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.
- Workers' grievance redress mechanism be established with involvement of District Labour Officers.
- The Contractor should 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 worker's camp.
- Issue codes of conduct and training to avoid GBV, documentation of workers and issue of work contracts for fair pay and employer accountability.

9.4.2 CREATION OF MARKET FOR CONSTRUCTION MATERIALS

The Project will require construction materials, some of which will be sourced locally from Kitenga and Budala trading centres among 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. These will provide a ready market for suppliers in and outside the project area. The impact is thus short-term, reversible and of **moderate** significance.

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.

9.4.3 SKILLS DEVELOPMENT AMONG LOCAL RESIDENTS

Approximately 100-200 workers will be deployed on the project majority of which will be Ugandans and project area locals. This has the potential to employ local residents in different aspects of project construction works. A number of 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 local 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.
- The contractor will employ majority of the workforce from project area.
- 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

9.4.4 RENTAL INCOME

Property owners in Kitenga Trading Centres and surrounding areas in Bukamba Sub County and beyond 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. 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.

9.4.5 IMPROVED / INCREASED ACCESS TO SAFE AND CLEAN WATER AT COMMUNITY LEVEL

The proposed piped water supply system will supply 862.69 m^3 of safe affordable (Ugx 50 per 20 litres) water per day to a population of 14,786 people and 2,738 households in 16 villages of Bukamba and Nangala Parishes in Bukamba Sub County–Kaliro District. The water supply will cover a 24.5Km distribution network. By design, the project proposes 3,002 N^o. service connections by the ultimate year 2040. In the initial year, 411 service connections are planned, 377 of which will be household level connections, 2-yard tap stands and 32 stand pipes.

The proposed project will partially contribute to achieving the global SDG - Target 6.1 of universal and equitable access to safe and affordable drinking water for all by 2030. Additionally, the project will contribute to achieving the national targets of increased access to safe water in rural and semi-urban areas to 85 percent by 2025 and 100 percent by 2040 according to the third Uganda NDP and the Uganda Vision 2040, respectively (UNPA, 2020).

According to baseline information, the current safe water coverage in Bukamba Sub County is 14% (Figure 6-48). The project anticipates to cover 47% core beneficiary villages that make up Bukamba Sub County, which translates to 86.7% of the villages in Bukamba parish and 33.3% in Nangala parish. The project will therefore increase safe water coverage from 14% in Bukamba Sub County to 61%, close to the national average of 66 percent in 2022. Improved safe water coverage will eliminate disparities related to access, namely;

a. Reduce average distance to a water source for the 45% of the people in Bukamba that travels more 1km to a water source to the recommended 100 meters to a water source by WHO standard. The project shall reduce critical walking distance for a hamlet to reach a PSP to less than 500m between each PSP/Yard Tap. Presently, 45% of household access water in distance of more than 1km. This will be reduced because the recommended users per yard tap (YT 1 & 2) is 2- 5 households, as per SGI / MoWE Design Report 2021.
b. Reduce the time spent collecting water to less than one hour (all respondents indicating more than an hour fetching water per day, and

c. Improve the gender inequalities related to collection of water, where boys more than girls and women more than men collect water in households; and
d. Furthermore, to some extent, farmer households may increase usage of piped water for production from the current 3.9% used in animal husbandry and 0.3% for crop irrigation.

Figure 8-1: Children carrying water on bicycles from a water source

9.4.6 IMPROVED COMMUNITY SANITATION AND HYGIENE

The project proposes to construct 2N^{o}. 6 stance water borne public toilets complete with 4N^{o}. Single Stances, 1N^{o}. urinal, 2N^{o}. disabled people equipped stances, shower facility; complete with hand washing facilities. The communities selected Buvulunguti and Lwamba Trading Centres as the priority locations for the proposed public sanitation facilities due to high semi-urban populations.

According to baseline information, access to sanitation facilities stands at 40% in Bukamba Sub County. In Kitenga RGC, 98.1% of the people noted that usage of pit latrines for faecal waste management, however, 69.2% admitted sharing the facilities with neighbours. In addition, about, 74.4% of the sampled population admitted to have observed evidence of open defecation in/ near open-source water points and 46% have observed it in open ground, grass, bushes, crop/grazing fields. Furthermore, there are currently no public sanitation facilities in Kitenga RGC. This indicates challenges of access to sanitation facilities and behavioural characteristics in the RGC that require transformation.

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

SHORT TERM EMPLOYMENT OPPORTUNITIES FOR LOCAL COMMUNITIES

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

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

IMPROVED ACCESS TO SAFE AND CLEAN WATER AT PUBLIC INSTITUTIONS

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

ENSURE ENVIRONMENTAL SUSTAINABILITY

The skill for managing water supply and sanitation would result in building social capital which could be extended to better manage the local environment and water resources. The project would include environmental awareness which could be deployed to manage the environment better. This impact will be enhanced through training of local communities on aspects of environmental and social management.

PROMOTION OF GENDER EQUALITY AND EMPOWERMENT OF WOMEN AND THE GIRL CHILD

The proposed project would free women and girls of the burden of having to spend a lot of their time collecting and carrying water almost daily often from sources distant from their houses. This reduction in burden would allow women and girls time for other activities including involvement in economic ventures that could contribute to reducing poverty and furthering their education (thus increasing school enrolment). This impact will be enhanced through:

a. Ensuring that women and girls are given priority while recruiting personnel for the project.
b. Ensuring the all the households within the project footprint are either connected or have access to clean and safe water.

CONTRIBUTE TO LOCAL ECONOMY GROWTH IN THE AREA

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

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

HUMAN CAPACITY BUILDING AND CREATION OF JOBS

Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled labourers. Skilled personnel will be employed as managers, supervisors, and in other technical positions whereas unskilled laborers will be support staff and perform non-technical work. The income accruing from such activities will obviously change their standards of living. During construction, about 100-150 people will be employed and about 10-20 people will get jobs during operation phase. More employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services.

8.5 NEGATIVE IMPACTS AND RISKS CONSTRUCTION PHASE

9.5.1 IMPACTS ON LAND USE/COVER

The project components, namely; WTP, transmission, water reservoir and distribution, mostly traverses farmland under cultivation along settled and built-up areas. According to the project Resettlement Action Plan, the project will acquire land as shown in the above **Error! Reference source not found.**9.

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

The clearing of corridor, movement of equipment and contractor staff and laying of pipes may lead to spot destruction of crops. Construction of the water intake, WTP, reservoir, water transmission and distribution system will to certain extents involve taking of land permanently from the original owners. In general, the loss of land/and damage to crops/vegetation will be direct, permanent, and irreversible resulting in a High impact sensitivity. The extent of land take/ project footprint is however is low (**Error! Reference source not found.**9), thus a low impact Intensity. These impacts have been detailed in project RAP report and results in **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

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

Residual impact significance: Minor

DEGRADATION OF THE LANDSCAPE AND INCREASING BREEDING GROUNDS VECTORS

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

Since material sites are not yet known, there may be instances of sourcing materials from unlicenced borrow pits and mines, and without decommissioning resulting in a High impact sensitivity.

However, since the duration of these activities is considered short term, limited in extent, and the low volumes of material required on the project, the impact intensity is rated low. The resultant impact significance is scaled 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

a. Construction materials (stone-based products, murram and related fill materials) subsoil will be sourced preferably from relevant licensed sources i.e. extraction and processing of such materials (as applicable) be in accordance with the provisions in such licences. It is suggested that, the contractor(s)/suppliers be asked to provide copies of proof for such licenses before effecting the supply process;
b. The sites be fully land scaped close to original and revegetated with plants species approved by the Supervising Engineer and DEO;
c. 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;
d. 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
e. There should be close and routine monitoring of restoration activities in the site by environmentalist from the Contractor and the Engineer.

Residual impact significance: Minor

LOSS OF VEGETATION COVER

Vegetation clearance and removal will take place at the water source site, water treatment plant, transmission mains, reservoir sites and distribution. According to the project baseline studies on vegettaion, the entire project footprint has been modified by a combination anthropogenic factor such as cropping/farming grazing and seasonal fires amongst others, hence the areas do not have any prestine natural vegetation. In addition, baseline information indicates that the entire project site manifested low plant species diversity which is largely the Fabaceae plant families with 16 species, followed by Poaceae (Graminae) with 15, *Asteraceae* 9, *Cyeraceae* and *Malvaceae* 6 each, and *Moraceae* 5, the rest registered 4 or less.

Out of the one hundred seven (107) plant species encountered in all study sites in the project, only two (2) species were listed under the IUCN Red list of Uganda of 2018 and these are: *Milicia excelsa* (Mvule) in Moraceae, globally listed Near-threatened and nationally as (EN A2acd) and *Khaya anthotheca* (Meliaceae), globally, VU and nationally as (EN A2acd). *Milicia excelsa* (Mvule) is widely distributed in Busoga region and as of now, the trees are secondary regenating tpyes

following heavy harvesting throughout region between the 1990's and early 2000's (Figure 8-2). During the ESIA study, the Team ecountred a freshly huge Mvule tree cut down by the land owner and when interviewed on the conservation value he replied*…." emitii dheno, dhamela dene" meaning, these trees grew by themselves and others will also grew up here… (Mr. Waigulo Stephen during pers. Interview in Kitenga RGCs area).*

Figure 8-2: Freshly cut Mvule tree in Kitenga enroute to the water abstraction source (Photo ESIA Team March 2022)

Apart from vegetation clearance at the intake, WTP, water office and the proposed locations of the public sanitation facilities, vegetation clearance is expected to be linear and minimal along the transmission and distribution lines with allowable instances of repositioning to avoid sensitive vegetation. The reservoir sites and pipeline routes are mainly covered by short grass that will rejuvenate on completion of construction works. However, several invasive/alien plant species, namely*; Cascabela peruviana, Bidens Pilosa, Chromolaena odorata, Xanthium strumarium, Hyptis suaveolens, Sida acuta, Eichhornia crassipes,* and *Lantana camara w*ere registered in project area and if not appropriately handled could be spread further by construction activities.

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

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

Mitigation measures

a. The project design should avoid the locations of the two trees of conservation importance to ensure their protection;
b. Vegetation clearance should be limited to only localities required for project development needs; and
c. The contractor should restore sites where activities will be carried out at all the project sites. This site restoration and revegetation should involve planting of indigenous trees/vegetation types.
d. The Contractor should get permit for tree cutting in case they fall within the project foot prints.
e. Contract should undertake tree replacement planting, by planting at least 5 trees for each tree cut at locations of project components.

Residual impact significance: Negligable

LOSS OF FAUNA AND HABITATS

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

a. Thirteen (13) species of butterflies, classified into eleven (11) genera and Six (6) families were registered in the project area. ***All the butterfly species encountered are categorized as Least Concern by the 2020 IUCN Red List of threatened species.***
b. Only two species of dragonflies represented by two families, family *Coenagrionidae* and family Libellulidae were recorded in the project area. ***The species are categorized as Least Concern by the 2020 IUCN Red List of threatened species.***
c. Eight (8) amphibian species (one toad and seven species frogs) were recorded in the project area. All the species encountered are categorized as least concern according to 2020 IUCN Red List of threatened species.
d. Six species of reptiles, namely; one snake, three Lizards, and three skinks representing five families and five genera were encountered during the baseline study. ***None of the reptiles encountered and those reported by the community members are Red Listed. All the species are listed as least concern by IUCN 2020 Red List of threatened species.***

e. Forty-Three (43) species of birds (Water Intake (18), WTP (11), Reservoir (6) and along the distribution and supply pipeline (27)) were recorded. ***Most of the species encountered were of least conservation significance.***

f. Four mammal species including the Black Rat *Rattus rattus*, Black-Backed Jackal *Canis mesomelas*, Unstriped ground squirrel *Xerus rutilus* and Hippopotamus *Hippopotamus amphibius* were recorded during the survey ***and by and large, the recorded species are listed by IUCN as being Least Concern (LC) according to the IUCN 2020 Red Data List.***

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

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

Mitigation measures

a. Clearance of fauna habitat (vegetation and soils) should be limited only to localities required for development;
b. The contractor should restore sites where activities will be carried out at all the project sites;
c. All project workers should be sensitized to observe instructions aimed at no hunting of any opportunistic wildlife in the sites;
d. Trenching, pipework laying as well as well as backfilling will be done concurrently. For pits like at the booster station, the contractor shall ensure that every evening, the pits are covered with timber while being secured with a warning tape to check accidental falls of wildlife and livestock in excavated pits;
e. The natural vegetation at the location of the intake and water treatment plant should not uncessarily cut to avoid impacting possible habitats for invertebrates.

Residual impact significance***: Negligable***

DISTURBANCE AND DEGRADATION OF WETLAND ECOSYSTEMS

The project is likely to affect the wetland at the proposed location of the project intake, raw water transmission pipeline and the WTP. The main activities that will be undertaken in a wetland are installation of pillars for anchoring the project intake and excavation and establishment of an approximately 500m raw water transmission pipeline from the intake to the WTP. The WTP will be located outside 200m buffer zone prescribed in seventh schedule of the National Environment (Wetlands, River Banks, and Lake Shores Management) Regulations, N^{o}. 3/2000. However, off site effects from construction of the WTP are likely to occur.

Project works within the wetland will involve removal of wetland vegetation, excavation, installation of project infrastructure and redesigning of topography to suit the proposed project structures. The need for extensive earthworks to remove the vegetation and soil to anchor the intake and other loose subsoils to reach stable ground suitable for the foundation works for the raw water transmission and water treatment plant may likely impact on the soils thereby erosion.

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

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

- Occupy a small space of approximately 60m^2 compared to the size of the wetland,
- Short-term duration (duration of construction works),
- Be reversible at completion of works, and
- The proposed project location within the wetland is already disturbed by human activity.

Therefore, the overall impact significance will be **Moderate**.

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

Mitigation measures

- Obtain a wetland user permit from NEMA before constructing the intake and raw water transmission line within the protection zone of the Lake Nakuwa, a satellite of Lake Kyoga;
- The project implementation should then keenly follow the conditions in the Wetland User Permit to issued by NEMA;
- Construction works of the intake, raw water transmission line within the wetland, and the WTP near the wetland should be limited to project footprint and allocated timeline;
- All project workers should be sensitized on minimization of damage to the wetland flora and fauna; and
- Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas.

Residual impact significance***: Minor***

GENERATION OF SOLID WASTE

The proposed project will likely generate waste based on its various activities and the waste can comprise food remains (kitchen based), polythene bags, plastic bottles, plastic offcuts from the HDPE and uPVC pipes papers, wrappings for components to be installed, excavated soil and left overs of construction materials (timber, aggregates, sand, bricks/blocks, steel bar cuttings, glasses, and cement). Such waste needs to be handled reasonably and must not remain in the road reserves or along the water trenches. Inappropriate disposal of waste or spoil could have medium or long-term environmental and public health impact. Improper managing of these wastes could result in contamination of soil, air, surface water and thereby posing public health risks.

The sensitivity of the project intake, raw water transmission and water treatment plant is high due to their location in/next to a wetland. The sensitivity of other locations such as the reservoir sites and along the transmission and distribution networks is also high since there is no regulated waste management in the RGC. The impact intensity is assigned Low due to the low volumes of waste expected on the project resulting in a **moderate** impact significance.

Mitigation measures

		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

- The Contractor shall develop and implement a Waste Management Plan that will ensure that:
  - ❖ The wastes are properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills;
  - ❖ Solid waste storage bins and/or skips are provided at contractor's sites and at the construction sites and ensure they are collected or emptied in time. Depending on the rate of accumulation, waste collection is made at least once in 24 hours and done in such a way to minimize nuisance of smell and dust during collection; and
  - ❖ Hazardous wastes such as paints, cement, adhesives are managed through a third-party contractor certified by NEMA. The wastes shall be transported in a NEMA approved box body trucks to the NEMA approved waste disposal facility in Iganga.
- All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities;
- All organic waste generated at eating places during construction such as food stuffs shall be collected and disposed appropriately;

- All solid waste from works site be collected and disposed at Kaliro Town Council waste dump sites. Once segregated, plastic waste such as mineral water bottles, polyethene bags, jerricans and cups will be collected by individuals who collect and sell it to plastic waste dealers. The ESIA Team met some of these and they expressed readiness to take up such waste if they are notified of its existence in the project (Figure 8-3);
- The contractor will work with Kaliro district Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records always maintained.

Figure 8-3: Babalanda Isaac loading plastics to Kaliro. He bought it from private collectors near Kitega areas.

Residual impact significance***: Minor***

NOISE AND VIBRATIONS IMPACTS

Noise and vibration will occur both on and off site. This will emanate from movement of trucks, excavation works, usage of equipment (compactors and generators). Exposure of communities, workers and fauna to high noise and vibration levels can be a health concern. According to baseline noise level recorded in Kitenga RGC, average noise levels ranged from 47.3dBA in Kitege A village a residential area near the location of intake, WTP and water transmission line to 54.5dBA in Lwamba trading centre, a mixed residential and urban area, the main location for the reservoir tank, and distribution lines. The baseline noise levels measured were within the maximum permissible noise limits for mixed residential areas. The noise levels emanated mainly from people talking and motor cyclists.

Table 8-1: The noise impact significance per project component site

Component	Expected equipment on site	Sensitive receptors	Sensitivity	Impact Intensity	Significance
Intake, raw water transmission and WTP	Movement of trucks, Excavation works, Usage of equipment (compactors and generators) Masonry works.	Workers	Medium	Use of heavy construction equipment for a short term and limited in extent = Low	Moderate (6)
Water transmission	Movement of trucks, Excavation by causal workers, Use of mobile compactors	Workers, peri-urban population (businesses and settlements) incl. school	Medium	Use of manual labor, short term and limited in extent = Very low	Minor (3)
Water reservoir	Movement of trucks, Excavation works, Installation of reservoir parts, Masonry works, usage of equipment (compactors and generators).	Semi-urban population (mix of businesses and settlements)	Low	Use of diverse equipment for a short term and limited in extent = Low	Minor (4)
Distribution network	Movement of trucks, Excavation by causal workers, Use of mobile compactors	Workers, Semi-urban population (mix of businesses and settlements), Schools	Medium	Use of manual labor, short term and limited in extent = Very low	Minor (3)
Construction of sanitation facilities and water office	Manual labor, Metal work, Compressors	Semi-urban population (mix of businesses and settlements)	Low	Short term and limited in extent = Very low	Minor (3)
Along access roads	Movement of trucks	Workers, peri-urban population (mix of businesses and settlements), School	Medium	Approximately 3 trucks for the entire construction phase = Low	Moderate (6)

Mitigation measures

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

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

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

Baseline information on structures in Kitenga RGC indicates that most of the houses are semi-permanent. The baseline vibration measurements in Kitenga RGC averaged at 0.75 mm/s in Kitega A village and 0.41mm/s in Lwamba Trading Centre.

Vibration monitoring may be necessary in case the contractor utilizes equipment with vibration frequency beyond 30 Hz to detect any structural damage risks. However, given the scale of works, use of equipment with such high levels of ground vibrations that can cause structural damage is not envisaged. Therefore, the sensitivity of the area to vibration is very low and even when it occurs the impact intensity is very low since vibration from construction equipment falls within the permissible limit of 12.5mm/s resulting in an overall Negligable impact.

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

The overall residual impact significance***: Minor***

AIR POLLUTION

Baseline Ambient air quality measurements indicate that the environment around the project area has pollution levels which are lower based on-air quality measurements which averaged below the recommended limit prescribed in the World Health Organisation Air Quality Guidelines (WHO AQG), 2021 for Particulate Matter ($PM_{2.5}$, PM_{10}), CO, NO_2, and SO_2. The project location is generally rural with motorcycles as the main mechanism of transport on community roads.

Due to the pristine nature of the project location, the impact on air quality will be easily noticeable due to introduced construction equipment and trucks ferrying materials to project sites; originally not in present in the RGC. The sensitivity of the area to the impact is therefore High, however, the intensity is very low due to the low number of equipment expected on the project thus **minor** in overall 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. Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h;
b. 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;
c. Workers will be provided with PPE and the use of PPE shall be enforced;
d. Accessed roads which of murram/gravel will be routinely sprinkled with water to suppress dust and frequency of which shall be included in the Contractor's Traffic Management Plan.
e. Stockpiles of friable material will be grassed to prevent wind erosion; and
f. A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO_2 and NO_2 are minimised.

Residual impact significance***: Negligible***

TRAFFIC ACCIDENTS

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

Due to the rural nature and introduction of construction activities not common in the project location, the impact on traffic will be easily noticeable 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

Mitigation measures

- The Contractor shall develop and implement a Traffic Management Plan which is to guide aspect of traffic in the project;
- Likely disruptions to public access shall be identified in the Contractor's works schedule and responsive traffic management measures instituted to guide traffic through such areas;
- Vehicular access through areas of public institutions (markets, schools, and health centres) shall be managed by traffic/flag persons who are work 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).

Residual impact significance***: Minor***

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**

RISK OF INCREASING SPREAD OF HIV-AIDS AND OTHER STDS/STIS INFECTION

According to Kaliro District Local Government Five Year District Development Plan 2015/16-2019/20, HIV alone contributes to the total disease burden in the district with a prevalence rate of 6.7%. This is attributed to factors that include the districts’ strategic location at cross roads of boarder district, widow inheritance, polygamy, poverty, and prostitution which is rampant in Kaliro 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[20].

The concentration of workers in the villages, in migration of people from different regions as well as occasional payment in wages may lead to behavioural influences which may increase the risk spread of diseases thus exposing the workers or other members of the surrounding community to the hazard of infections that include HIV-AIDS and sexually transmitted diseases. Similarly, labour influx of job seekers is associated with social vices which can disrupt the social order and even lay the ground for escalation of HIV/AIDS cases whose impacts are likely to be prolonged in prevalence. However, few people (may be 5) will be employed on the project, and others, especially casual and semi-skilled labourers (about 40-50) will be recruited from within communities thus low impact intensity. The sensitivity is however high as these poor communities would struggle to cope with the challenges of being HIV positive. The impact significance ***is Moderate.***

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

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

Mitigation measures

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

Residual impact significance***: Minor***

RISK OF GENDER BASED VIOLENCE AND FAMILY / MARRIAGE BREAKDOWN

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

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

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

Mitigation Measures

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

Residual impact significance***: Minor***

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

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

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

Mitigation measures:

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

a) Strict adherence to rules prohibiting Child Labour as in national laws and ILO on matters out-lawing child labor in the project establishment,
b) Continuous monitoring of VAC by CDOs, LCs, Police to ensure no child labor cases.
c) Involving local CSOs in the prevention, reporting and management of VAC cases.
d) **Codes of conduct to be issued to workers:** The contractor to develop, translate, sensitize, and enforce ESHS codes conduct which among others shall be code of conduct SEA/SH to project workers and communities.

Residual impact significance: **Minor.**

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

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

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

Mitigation Measures

a. All workers must sign contracts as part of engagement in the project;
b. Include clauses for equal pay for equal work;
c. Institute Contractor Grievance Committees to handle grievances including those related to labour issues;
d. Involve the District Labour Officers in project supervision to offer guidance on management of labour issues;
e. The provision of 'pay when paid clause' should be introduced in the contractor and supplier/sub-contractor contract;
f. Understanding the terms or clauses of payment in the project;
g. The effect of delayed payments on the project progress must be understood by all parties and personnel involved; and

Residual impact significance: **Negligible.**

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

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

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

Mitigation measures:

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

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

Residual impact significance: **Minor.**

DESTRUCTION OF PHYSICAL CULTURAL RESOURCES (PCR)

There were no PCR encountered in the proposed right of way for the project. However, given that the excavation works involved in the laying of the transmission and distribution system, the possibility that some cultural features being encountered along the alignment cannot be ruled out completely. The impact Intensity is low given that no PCR was established in the Right of Way. The overall impact significance is **moderate**.

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

Mitigation measures

a. At the local level, additional consultations will be carried out prior to commencement of works by the contractor at the project sites;
b. A 'chance find' procedure will guide actions to be taken if suspected archaeological artefacts or paleontological items are encountered and they should be handed over to Ministry of trade and industry- Department of Museums and Monuments;
c. Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artifacts before commencement of work. Such training should be administered in liaison with the Department of Museums and Monuments (DMM);
d. Construction works will be designed to ensure no damage to any cultural sites or medicinal plants that may be encountered including older-trees that are culturally significant. Where such sites cannot be avoided, culturally appropriate measures will be agreed and implemented prior to the construction activities;
e. Compensation of the affected sites will be undertaken before construction activities commence in accordance with World Bank requirements; and
f. Re-adjust the transmission lines in case of any encounter of PCR.

Residual impact significance: **Minor.**

OPERATION AND MAINTENANCE PHASE

IMPACT OF WATER ABSTRATCION ON THE LAKE

The project will abstract 862.69 m^3/day of raw water from Lake Nakuwa, a satellite of L. Kyoga per day to meet the average day demand for Kitenga RGC of **896** m^3/day by 2040. Compared to change in storage for L. Kyoga of 10m^3/s, the proposed water abstraction for the project represents only 0.12% of the total storage, which is negligible. Overall impact significance on Lake storage is gauged as Negligible.

		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 developer should apply/acquire the abstraction permits with clear water abstraction details and provisions which are to be strictly observed in the project for sustainability of the Lake ecosystem for its uses and values;
b. The water abstraction levels have to be strictly monitored by the Supervising Engineer in line with Water Abstraction Permit provisions; and
c. Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction.

Residual impact significance: **Negligible.**

POTENTIAL WATER USE CONFLICTS

Information generated from the project feasibility report indicate that the project will only abstract 0.12% of the total Lake storage (MWE, 2019), which is negligible. Baseline information indicates that there were no notable water users (consumption above 1000m^3 per day) of the water from the Lake in the project area; except community water collection (using jerricans) for domestic use and watering of animals and fishing with canoes. However, the land near the intake is flat and suitable for irrigation. Future utilisation of lake water for irrigation on rice and sugar cane fields as competing water users could be possible. It is noted that, though they are currently not potential enormous water users, in future, some of the current low-grade users could increase their water demands thereby causing heightened conflicts over availability and usage.

Due to presence of potential competing needs for the lakeshore, the impact is long-term. The sensitivity is currently very low, although unregulated use of the lake protection zone can lead contamination of water and compromising the filtering function of the Lake protection zone resulting in increased cost of water treatment. The impact is distended by presence of agricultural

activities at the location of the intake. The impact intensity is low due to the planned development and implementation of the project source protection plans as long-term strategies for impact management. 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

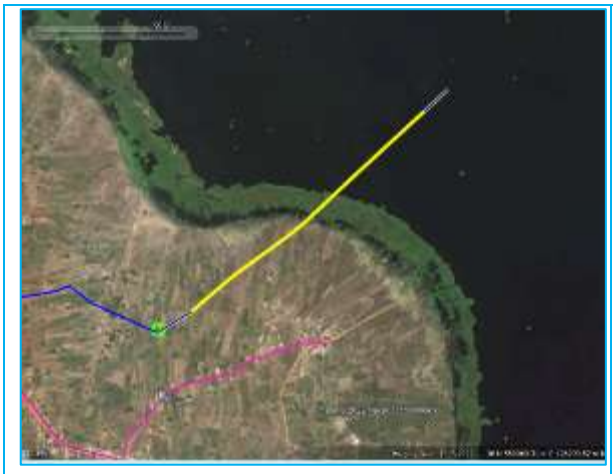
Mitigation Measures

a. Adherence to established water abstraction levels will serve to control possible risks of conflict in demand and usage of water in the areas and around the project; and
b. The Consultant is amongst others, contracted to prepare a Source Protection Plan for Kitenga RGC as long-term strategies for management of the ecological and socio-economic impacts envisaged from the project development and implementation. The source protection plan includes project mitigations and recommendations from project impacts, especially in relation to the source of water. In relation to implementation of a functional project source protection plan.

Residual impact significance: **Negligible.**

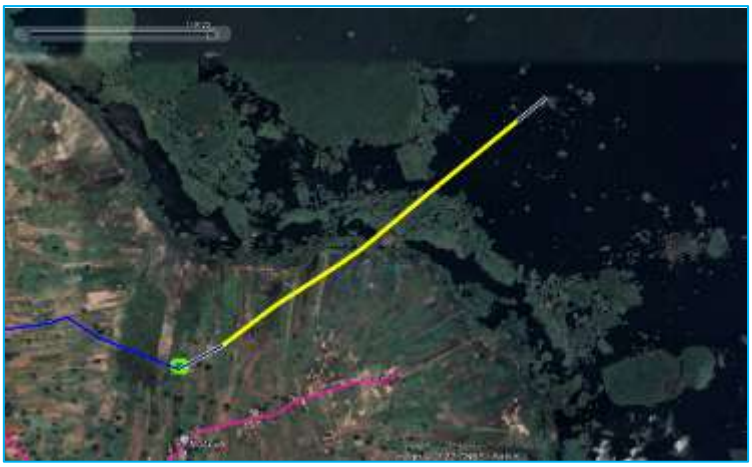
POTENTIAL RISKS ON PROJECT INTAKE INFRASTRUCTURE

L. Kyoga is swampy and characterized by floating islands. The islands pose a risk to the intake structure and can affect the water quality and project infrastructure. For instance, a comparison between 2012 and 2018 and 2022 google imagery indicates floating islands in 2022 compared to the years before (**Figure** 8-4**:C)**.



A- Google image of the intake in 2012

B- Google image of the intake in 2018



C- Google image of the intake in 2022 with floating islands/wetlands

Figure 8-4: Google imagery of the project intake areas

However, the project design has proposed a strong intake structure with precast reinforced concrete rings to accommodate the raw water pumps incurred on a steel columns walkway from the shore to the intake point and a raw water pumping main fixed to the walkway. An electrical switchgear for the pumps will be housed in a weather proof and burglar proof console at the deck.

This is long-term and wide impact. The impact intensity is high as has been indicated in the 2022 google imagery, however, sensitivity of the intake structure to the impact is low due to the proposed design of the intake structure to fit the identified risk. The overall impact significance is **Moderate**.

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

Mitigation Measures

a. EUWS should include periodic/emergency repair and maintenance of the intake structure in the operation and maintenance resource allocations; and
b. EUWS should incorporate the risk of increased treatment of raw water due to impacts of floating islands in water treatment resource allocation.

Residual impact significance: **Moderate.**

POTENTIAL POLLUTION OF LAKE NAKUWA FROM WTP WORKS

The project WTP will be located approximately 600m from the intake (from Lake Kyoga). Water treatment sludge generated from treatment of raw water will most likely be allowed to flow back

into the Lake. Surface water treatment for potable supplies typically involves coagulation, flocculation, sedimentation, and filtration processes for removing colloidal as well as suspended solids from raw water. Water treatment plants produce waste/residue known as water treatment sludge during the purification of raw water, and consists of about 60% fine sand in grain size range 150-75µ. Silica, alumina, ferric oxide, and lime constitute the major percentage of chemical components present in the sludge. Some heavy metals are also found in the sludge. Discharging water treatment sludge into river, streams, ponds, lakes, drains is not environment friendly disposal option. Water pollution may also occur due to poor storage and handling of water treatment chemicals.

Baseline water quality results for a sample collected from the location of the intake, indicate that except for *E. coli*, all the other parameters (electrical conductivity, total dissolved solids, total iron and manganese) assessed remained within the maximum permissible limits for natural portable water.

The is long term, however, due to the size and natural wetland systems around the lake to further purify the effluent, the sensitivity of the lake to pollution from WTP works is considered low. The impact intensity is low since low volumes of treated sludge will be released into the lake. 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 project proposes to drain sludge into drying beds where wastewater will be drained from the sludge and drains into the lake. However, the project does not recommend standards for the discharge of wastewater generated from treatment sludge back into the Lake. The treatment chemicals will be housed in a bunded and roofed unit to allow appropriate clean-up in case of spillages. It is recommended that based on the characteristics, sustainable and profitable disposal through recycling and reuse be reviewed. For instance, utilization of sludge in brick making, in ceramics making, in the manufacture of cement and cementitious materials and as a substitute to building materials could provide safe disposal route are recommended. Reuse in wastewater treatment, in removal of heavy metals from aqueous solutions and in nutrient reduction from laden soils and runoffs are also some of the possible alternatives. It is required to explore suitable option for developing sustainable sludge management strategies under stringent environmental norms. Therefore:

a. EUWS should treat the wastewater generated from sludge treatment before it is release back into the lake according to the National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020; and
b. EUWS should monitor the quality of the wastewater released back into the lake; and
c. The project should undertake an assessment of the most feasible method of re-use and/or disposal of the sludge generated from water treatment.

Residual impact significance: **Negligible**.

POTENTIAL WATER AND SOIL POLLUTION IN THE PROJECT SMALL TOWNS

Baseline information indicates there are no wastewater management facilities such as septic tanks, wastewater stabilisation ponds or lagoons in Kitenga RGC. The most common sanitation facilities are pit latrine both at homestead and institutional level while wastewater from washing and other tasks are poured on open ground. The closest wastewater stabilisation ponds are in Iganga town, 55km from Kitenga RGC. The wastewater management challenge may also be an avenue for individual innovation and adoption of new wastewater technologies, however at RGC level, it will remain a challenge.

The project will supply water to about seven small and unplanned towns in Kitenga RGC, within Bukamba Sub County; the main ones being Lwamba TC, Nakibungulya TC, Buvulunguti Landing site, and Kitenga 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 breading grounds for water related illnesses and other related sanitation problems if proper treatment systems such as septic tanks are not utilized. In cases where household are connected to water and not to sewerage system, they may use septic tanks whose cesspool or soak pit overflow may lead to contamination of soil and/or groundwater.

The impact Intensity is High because Kitenga RGC/Bukamba Sub County does not have a development and structural plan. The sensitivity of the small towns and its population to the impact is high and will be spread across all the semi-urban locations/ small towns of Kitenga RGC. The overall impact significance is 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 project (EUWS) should support Bukamba Sub County should develop and implement a development and structural plan that incorporates waste and/or wastewater management;
b. EUWS/MWE should create awareness on wastewater management and promote through community/youth skills development affordable technologies such as construction of soak pits, septic tanks at household and institutional levels.

Residual impact significance: **Moderate**.

IMPACT OF SOLID WASTE NUISANCE AS A RESULT OF THE PROJECT

During the operation of the project, solid waste will be generated from the activities of the water office, WTP and activities of maintaining the water transmission and distribution lines. The wastes that will be generated include food remains, polythene bags, plastic bottles, papers, wrappings for spare parts, and offcuts from plastic pipes among others. Waste expected from the WTP include used oils and grease from operations and maintenances activities, containers for treatment chemicals such as chlorine and water treatment sludge. Wrappings/cylinders for treatment chemicals can be hazardous to humans and the environment if not safely disposed. The sludge composition is 60% fine sand in grain size range 150-75µ. Silica, alumina, ferric oxide, and lime constitute the major percentage of chemical components present in the sludge. Sludge and chemical wrappings/cylinders should either be re-used or disposed of as hazardous waste.

Baseline information indicate that there is no designated hazardous and non-hazardous waste disposal site within Kitenga RGC. The closest waste management hazardous and non-hazardous disposal/management site are in Iganga and Kaliro Towns, 55km and 35km away from the RGC, respectively.

The sensitivity of the impact is medium since waste generation will be long term and continuous and there are no hazardous and non-hazardous waste disposal sites. However, the impact intensity is low due to the low volumes of waste expected from operations. The overall impact significance is Moderate.

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

Mitigation measures

a. A Waste management plan for the operation phase of the project should be developed and implemented;

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

Residual impact significance: **Minor.**

RISK OF POLLUTION FROM POOR MISMANAGEMENT OF SANITATION FACILITIES

The project will support construction of two waterborne toilets at public places to serve the residents of Lwamba and Kitenga trading centres. Baseline information indicates that the area has no sewerage system. Therefore, the waterborne public toilets will have septic tank systems. The septic tanks shall be emptied and treated at a site (waste treatment plant) gazetted by NEMA such as the waste stabilization ponds at Iganga town, 55km from the project area. Therefore, the collection, transportation and disposal of sewage must be done correctly to minimise or and avoid health risks to communities. Any mismanagement of sanitary waste generated during the operation may lead to pollution of the area which may end up polluting the water sources. This may cause risk to public health.

The sensitivity of the impact is high since there are no sewerage system in the project area and the proposed sanitation facility type is new in Kitenga RGC. The impact is long term and continuous although low volumes of waste are expected from sanitation facilities per time interval (emptying may take 6 months – a year) resulting in medium impact intensity. The overall impact significance is **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. A Periodic maintenance regime including emptying and desludging should be put in place and implemented to prevent sewage over flows.
b. Use of manifest system to ensure that the wastes are disposed of at a site (waste treatment plant) gazetted by NEMA.
c. 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 pauses a danger to the community.

Residual impact significance: **Minor.**

INCREASED COST PER UNIT/REDUCED AFFORDABILITY

At baseline (Section 0), majority of the respondents (98.6%) indicated a willingness to pay for piped safe water, with 86.5 percent willing to pay Ugx.50 per20l jerry can and above. In fact, most (51.1%) preferring yard taps while 23.7 percent requested for household connection.

The **project feasibility study (MWE, 2019)** proposed a **Ugx.50/20 litres water tariff**, a computation based on ability of the consumers to pay (ATP) **5 percent of the household monthly income on an improved water service**. A comparison between baseline information and the proposed tariff indicates that **86.5 percent of the HHs** in the RGC **may be willing to pay the proposed water tariff for the improved water supply system (**Section 0).

Nonetheless, the amount charged may hinder affordability and utilization, especially for the 13.5% that may not be willing to pay the proposed tariff, hence increased substitutability. The sensitivity of the population to change in access to water may be high since most people in the RGC (52,4%) did not previously pay for access to water, however they indicated a willingness to pay (98.6%) for improved access to clean water resulting a low impact intensity. The overall impact significance is Moderate.

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

Mitigation measures

a. Alternative water sources such as the boreholes should continue to be maintained by the Local government and water user committees.
b. EUWS under the guidance of MWE should put into consideration the project area's economic profile and vulnerability when setting affordable water prices.

Residual impact significance: **Minor.**

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.

8.6 CUMMULATIVE IMPACTS

OTHER PROJECTS (EXISTING AND PLANNED) IN THE PROJECT AREA

Although the scope of this report only covers the proposed development of the solar powered piped WSSS in Kitenga RGC, there are other inter-related activities in the project area. For example, the proposed upgrade of Lumbuye wetland bridge and the ongoing (Kaliro Sugary Factory) within a 20 Km radius of the project area. The proposed water and sanitation project is timely and beneficial; however, the population and activities of the area are expected increase.

VALUED ENVIRONMENT AND SOCIAL COMPONENTS

The identified VECs may include;

a) Material Source Areas

Projects implementing infrastructure development especially water pumping station, water reservoirs, water office blocks and sanitation facilities shall require gravel, murram, sand, rocks and among other products hence impacting on source areas.

b) Shared Land Corridors

Linear projects like roads, power lines and telecom cables normally share corridors. Relocation of such services is an impact and acquisition and compensation of such corridors may raise social and economic concerns.

c) Land and Wetlands

The project area has a sever, namely; Lumbuye wetland and 16 villages (Bukamba A, Bukamba B, Buvulunguti Centre, Kasuleta A, Kasuleta B, Lwamba Beeda, Kibuye B, Nabusira A, Nabusira B, Nakibungulya A, Nakibungulya B, Buvulumguti West & Buvulunguti East, Kanabi, Kisu A & Kitenga) which continue to expand due to the population growth as a result of services within and the surrounding landing sites hence putting pressure on land and wetlands (cultivation, settlements and sanitation facilities). The water source is located within L. Kyoga, which renders it prone to floods during the rainy seasons from increased surface runoff in case of continuous and uncontrolled land use activities e.g. clearing landcover and wetland degradation.

IDENTIFIED CUMULATIVE IMPACTS

The assessment has established three major Valued Environmental and Social Components (VECs) in the project area. (a) water source abstraction area (lake Kyoga), (b) the two river Nabusira and Nabulo and lake Bank wetlands, where the treatment plant and the distribution pipelines will be located and (e) the settlement areas in the 16 villages which may be directly or indirectly impacted by the project and other activities in the project area.

The assessment noted that there were ongoing projects proposed upgrade of Lumbuye wetland bridge and the ongoing (Kaliro Sugary Factory) within a 20 Km radius of the project area have the potential to attract more human activities related to settlements e.g., dwelling units, commercial units and sanitary facilities.

The anticipated cumulative impacts of the ongoing projects in conjunction with the proposed Kitenga WSSP will include degradation of Wetlands, River and lake Banks, water and air pollution.

Proposed Mitigation Measures:

a. Limiting the area of the project foot print,
b. Promotion of tree planting
c. Restoration of degraded wetland
d. Obtaining and complying with Wetland use permit
e. Awareness creation on environmental and social safeguards amongst communities in the project area.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

9.1 OVERVIEW

The general approach to effective monitoring is to compare the pre- and post- project situations, measuring relevant environmental and social 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 Kitega 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 Kaliro and Bukuma Local Governments, NEMA and DWRM. It is the role of the Developer to ensure that the Contractor implements the proposed mitigation measures presented in this ESIA report. The planned mitigation measures indicated in this ESIA ESMP (**Table** 9-1) shall be planned and checked against their effectiveness in reducing the negative impacts/or enhancing the benefits identified in this report.

The process shall also include regular reviews of the impacts that cannot be contemplated at the time of doing this Environment and Social 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. Behavioral changes among the community and Contractors staff,
f. Water Quality,
g. Noise and dust pollution, and
h. Biodiversity changes.

Table 9-1: Environmental and Social Mitigation Plan

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
POSITIVE IMPACTS – CONSTRUCTION PHASE			
Provision of direct jobs (casual workers) for locals - youth, women and men	• Recruit locals for construction jobs according to their skills. • Promote labour-intensive construction methods to create more jobs • Adhere to the local labour laws of 30% women in employment and remuneration of workers above the minimum wage. • Ringfence some jobs such as cleaning and cooking specifically for local women. • Encourage qualified females to apply for jobs. • Gender sensitive facilities such as bathrooms, toilets and breastfeeding spaces to be provided to create a conducive working environment.	Contractor	10,000,000
NEGATIVE IMPACTS			
CONSTRUCTION PHASE			
Land use/ cover change	LGs in the respective areas should be involved in mobilisation and sensitizing PAPs on the project land requirements	RWSS	RAP Budget
	Where land take is envisaged, compensation should be adequate and timely done. All land acquired for establishment of the water sources, water treatment plant, reservoir tanks and any other activity either by the developer shall be compensated for in accordance with applicable land acquisition legal instruments and GIIP relating to land acquisition	RWSS	
	PAPs should be given financial literacy on how to use their compensation packages to avoid squandering and remaining in worse off conditions	RWSS	
	In-kind compensation can be considered especially where the PAPs prefer so	RWSS	
	Sensitize the community early enough about the project so that, those affected by the project will have time to relocate their businesses and manage their cropping calendars to avoid loss of crops.	RWSS	

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
Degradation of the Landscape and breeding grounds vectors	Construction materials (stone-based products, murram and related fill materials) subsoil will be sourced preferably from relevant licensed sources i.e. extraction and processing of such materials (as applicable) be in accordance with the provisions in such licences. It is suggested that, the contractor(s)/suppliers be asked to provide copies of proof for such licenses before effecting the supply process	Contractor	No cost addition
	The sites be fully revegetated with plants species approved by the Supervising Engineer and DEO	Contractor	
	Excavated soil shall be stock-piled with its edges protected from erosion and such materials can be used during site restoration with the approval of the Engineer and Kaliro DEO	Contractor	
	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	Contractor	
	There should be close and routine monitoring of restoration activities in the site by environmentalist from the Contractor and the Engineer	Contractor	2,000,000
Loss of Vegetation	The project design should avoid the locations of the two trees of conservation importance to ensure their protection	Contractor	No cost addition
	Vegetation clearance should be limited to only localities required for project development needs		
	Restore sites where activities will be carried out at all the project sites. This site restoration and revegetation should involve planting of indigenous trees/vegetation types		
Loss of Fauna and Habitats	Clearance of fauna habitat (vegetation and soils) should be limited only to localities required for development	Contractor	No cost addition
	Restore sites where activities will be carried out at all the project sites		

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	All project workers should be sensitized to observe instructions aimed at no hunting of any opportunistic wildlife in the sites		
	Trenching, pipework laying as well as well as backfilling will be done concurrently. For pits like at the booster station, ensure that every evening, the pits are covered with timber while being secured with a warning tape to check accidental falls of wildlife and livestock in excavated pits		
	The natural vegetation at the location of the intake and water treatment plant should not unnecessarily cut to avoid impacting possible habitats for invertebrates		
Disturbance and degradation of wetland ecosystems	Obtain a wetland user permit from NEMA before constructing the intake and raw water transmission line within the protection zone of the Lake Nakuwa, a satellite of Lake Kyoga	Contractor	No cost addition
	The project implementation should then keenly follow the conditions in the Wetland User Permit to be issued by NEMA		
	Construction works of the intake, raw water transmission line within the wetland, and the WTP near the wetland should be limited to project footprint and allocated timeline		
	All project workers should be sensitized on minimization of damage to the wetland flora and fauna		
	Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas		Annual audit costs
Generation of solid waste	The Contractor shall develop and implement a Waste Management Plan	Contractor	No cost addition
	All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities		5,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	All organic waste generated at eating places during construction such as food stuffs shall be collected and disposed appropriately		
	All solid waste from works site be collected and disposed at Kaliro Town Council waste dump sites. Once segregated, plastic waste such as mineral water bottles, polyethene bags, jerricans and cups will be collected by individuals who collect and sell it to plastic waste dealers. The ESIA Team met some of these and they expressed readiness to take up such waste if they are notified of its existence in the project		No cost addition
	The contractor will work with Kaliro District Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records always maintained		
	Facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records always maintained.		
Noise Nuisance	Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs	Contractor	5,000,000
	Periodic medical hearing checks should be performed on workers exposed to high noise levels	Contractor	10,000,000
	Construction sites must be hoarded to curb noise impacts to neighbouring communities	Contractor	No cost addition
	Works should be undertaken during day time that is, from 8am to 6pm		
	Works near schools or health centres should be done in periods like weekends for noise not to interfere with learning/health environment		
	Weekly monitoring of noise levels at active sites should be carried out by the contractor		

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Avoid operating noisy equipment when not required, such as idling of cars, operating of generators when not required		
Air Pollution	Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h	Contractor	No cost addition
	Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas	Contractor	No cost addition
	Workers will be provided with PPE and the use of PPE shall be enforced	Contractor	No cost addition
	Accessed roads which of murram/gravel will be routinely sprinkled with water to suppress dust and frequency of which shall be included in the Contractor's Traffic Management Plan	Contractor	10,000,000
	Stockpiles of friable material will be grassed to prevent wind erosion	Contractor	No cost addition
	A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO_2 and NO_2 are minimised	Contractor	No cost addition
Traffic Safety	The Contractor shall develop and implement a Traffic Management Plan which is to guide aspect of traffic in the project	Contractor	No cost addition
	Likely disruptions to public access shall be identified in the Contractor's works schedule and responsive traffic management measures instituted to guide traffic through such areas	Contractor	No cost addition
	Vehicular access through areas of public institutions (markets, schools, and health centres) shall be managed by traffic/flag persons who are work hand-in-hand with the traffic police in their areas	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Road and site safety training should be conducted as part of tool-box talks in the project	Contractor	No cost addition
	Conspicuous signage shall be well placed on roads and the Contractor's Traffic guides on ground shall direct traffic in case of diversions or open trenches.	Contractor	5,000,000
	All company vehicles used in the transportation of construction workers, material, and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form before usage	Contractor	No cost addition
	All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits	Contractor	No cost addition
	The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities	Contractor	No cost addition
	Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm).	Contractor	No cost addition
Occupational Health and Safety Risks	Prepare and implement an occupational safety and health plan for all sites, approved by the MWE.	Contractor	No cost addition
	Provide safety guidelines to all operations prior to start of work.	Contractor	No cost addition
	Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	On-site training shall be conducted on how to prevent and manage incidences and such could involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences	Contractor	10,000,000
	Regular drills on site safety will be routinely conducted followed on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in case of incidences	Contractor	No cost addition
	Personnel on duty shall always wear appropriate PPEs, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff	Contractor	No cost addition
	The Contractor shall establish emergency entrances, exits and amenities in the project facilities	Contractor	No cost addition
	The Contractor shall ensure that there are First Aid Kits on the site and such shall be modestly stocked with consumables that are key in delivery of first aid on the site	Contractor	5,000,000
	The Contractor shall secure site boundaries with fences or hoardings as appropriate to keep off intrusion in the project	Contractor	5,000,000
	The Contractor shall install caution signage around the site to discourage the public from being close to the site, for example, “falling debris”, “keep off the site	Contractor	2,000,000
	The Client through the Construction Supervisor will continually monitor Contractors´ compliance with Health and Safety measures	Contractor	5,000,000
	An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions	Contractor	No cost addition
	Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor	Contractor	No cost addition
Risk of increasing the spread of HIV-AIDS and other venereal diseases	Sensitize workers and the surrounding communities on awareness, prevention, and management of HIV/AIDS through staff training, awareness campaigns, multimedia, and workshops or during community barazas	Contractor	5,000,000
	Provide VCT services and Anti-Retro-Viral Treatment to both the workers who test HIV positive and those from the community who come test at the project site	Contractor	5,000,000
	Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights	Contractor	No cost addition
	Ensure supply of condoms for the workers and the community members who access the project through points where such items are deposited in the project sites	Contractor	2,000,000
Risk of Gender Based Violence and Family / Marriage Breakdown	Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project such as effective and on-going community engagement and consultation, review of specific project components that are known to heighten GBV risk at the community level, for instance; compensation schemes; employment schemes for women; delivery of water supplies	Contractor	12,000,000
	Amongst project staff, the project PCU shall have a GBV Specialist to oversee GBV issues in the project	Contractor	12,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Specific plan for mitigating such risks, for instance; sensitization around gender equitable approaches to compensation and employment; water services	Contractor	5,000,000
	Ensure adequate referral mechanisms are in place if a case of GBV conflicts on project staff level is reported to police due to their criminal nature	Contractor	No cost addition
	The Contractor should have a "No sexual harassment" policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges	Contractor	No cost addition
	Include gender affirmative actions and workplace conditions such as engendered washrooms, changing rooms, female condoms, breastfeeding room for breast feeding mothers, observing working time of 8:00AM to 5:30 PM so that parents especially women can attend to their domestic duties	Contractor	No cost addition
Risk Violation of children rights by contractor and labour force on site	Strict adherence to rules prohibiting Child Labour as in national laws and ILO on matters out-lawing child labor in the project establishment	Contractor	No cost addition
	Continuous monitoring of VAC by CDOs, LCs, Police to ensure no child labor cases	Contractor	5,000,000
	Involving local CSOs in the prevention, reporting and management of VAC cases	Contractor	5,000,000
Risk of Non-Payment of Workers, Suppliers and Subcontractors	All workers must sign contracts as part of engagement in the project	Contractor	No cost addition
	Include clauses for equal pay for equal work	Contractor	No cost addition
	Institute Contractor Grievance Committees to handle grievances including those related to labour issues	Contractor	5,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Involve the District Labour Officers in project supervision to offer guidance on management of labour issues	Contractor	5,000,000
	The provision of 'pay when paid clause' should be introduced in the contractor and supplier/sub-contractor contract	Contractor	No cost addition
	Understanding the terms or clauses of payment in the project	Contractor	No cost addition
	The effect of delayed payments on the project progress must be understood by all parties and personnel involved	Contractor	No cost addition
	Right for contractors to suspend work in the event of late or non-payments by the client to avoid unnecessary stand offs with suppliers	Contractor	No cost addition
Liability for loss of life, injury, or damage to private property	Provision of PPE to all worker	Contractor	No cost addition
	The contactor will ensure that the Project is implemented by total adherence to the Employment Act 2006	Contractor	No cost addition
	The workers should receive requisite training especially on the operation of the machinery and equipment	Contractor	5,000,000
	There should be adequate warning and directional signs	Contractor	2,000,000
	Ensuring that the prepared code of conduct for staff is followed to prevent accidents	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls	Contractor	No cost addition
	Cordon off unsafe areas and provide safe crossing points across trenches	Contractor	No cost addition
	Provide an onsite clinic to provide first aid services to the staff	Contractor	30,000,000
	Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements	Contractor	No cost addition
	The Contractor to repair any damage done to private property	Contractor	Project contingency (10% pf total contract value)
Destruction of Physical Cultural Resources	At the local level, additional consultations will be carried out prior to commencement of works by the contractor at the project sites	Contractor	2,000,000
	A 'chance find' procedure will guide actions to be taken if suspected archaeological artefacts or paleontological items are encountered and they should be handed over to Ministry of trade and industry- Department of Museums and Monuments	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artifacts before commencement of work. Such training should be administered in liaison with the Department of Museums and Monuments (DMM)	Contractor	5,000,000
	Construction works will be designed to ensure no damage to any cultural sites or medicinal plants that may be encountered including older-trees that are culturally significant. Where such sites cannot be avoided, culturally appropriate measures will be agreed and implemented prior to the construction activities	Contractor	No cost addition
	Compensation of the affected sites will be undertaken before construction activities commence in accordance with World Bank requirements	RWSS	Included in the RAP valuation
	Re-adjust the transmission line by 10m in Bunene village to avoid a graveyard	Design consultant	No cost addition
OPERATION PHASE			
impact of water Abstraction on the Lake	The developer should apply/acquire the abstraction permits with clear water abstraction details and provisions which are to be strictly observed in the project for sustainability of the Lake ecosystem for its uses and values	RWSS	6,000,000
	The water abstraction levels have to be strictly monitored by the DWRM in line with Water Abstraction Permit provisions	EUWS	5,000,000
	Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction	EUWS	5,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
Potential water use conflicts	Adherence to established water abstraction levels will serve to control possible risks of conflict in demand and usage of water in the areas and around the project	RWSS	Source protection plan budget
	The Consultant is amongst others, contracted to prepare a Source Protection Plan for Kitenga RGC as long-term strategies for management of the ecological and socio-economic impacts envisaged from the project development and implementation. The source protection plan includes project mitigations and recommendations from project impacts, especially in relation to the source of water. In relation to implementation of a functional project source protection plan	RWSS EUWS	Source protection plan budget
Potential Risks on project Intake Infrastructure	EUWS should include periodic/emergency repair and maintenance of the intake structure in the operation and maintenance resource allocations	EUWS	Project maintenance budget
	EUWS should incorporate the risk of increased treatment of raw water due to impacts of floating islands in water treatment resource allocation	EUWS	Project maintenance budget
Potential Pollution of Lake Nakuwa from WTP works	The project proposes to drain sludge into drying beds where wastewater will be drained from the sludge and drains into the lake. However, the project does not recommend standards for the discharge of wastewater generated from treatment sludge back into the Lake. The treatment chemicals will be housed in a bunded and roofed unit to allow appropriate clean-up in case of spillages	EUWS	Project maintenance budget
	It is recommended that based on the characteristics, sustainable and profitable disposal through recycling and reuse be reviewed. For instance, utilization of sludge in brick making, in ceramics making, in the manufacture of cement and cementitious materials and as a substitute to building materials could provide safe disposal route are recommended. Reuse in wastewater treatment, in removal of heavy metals from aqueous solutions and in nutrient reduction from laden soils and		No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	runoffs are also some of the possible alternatives. It is required to explore suitable option for developing sustainable sludge management strategies under stringent environmental norms		
	EUWS should treat the wastewater generated from sludge treatment before it is release back into the lake according to the National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020	EUWS	Project maintenance budget
	EUWS should monitor the quality of the wastewater released back into the lake	EUWS	Project maintenance budget
	The project should undertake an assessment of the most feasible method of re-use and/or disposal of the sludge generated from water treatment	EUWS	Project maintenance budget
Potential Water and Soil Pollution in the Project Small Towns	The project (EUWS) should support Bukamba Sub County to develop and implement a development and structural plan that incorporates waste and/or wastewater management	RWSS, EUWS	100,000,000
	EUWS/MWE should create awareness on wastewater management and promote through community/youth skills development affordable technologies such as construction of soak pits, septic tanks at household and institutional levels	RWSS, EUWS	5,000,000
Impact of Solid Waste Nuisance as a Result of the Project	A Waste management plan for the operation phase of the project should be developed and implemented	RWSS, EUWS	5,000,000
	Waste collection bins should be provided at strategic positions at the water offices, WTP and reservoirs sites for temporary waste storage. The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes		5,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	The water supply system operator should hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA	EUWS	6,000,000
	Project workers (both sub-contracted and EUWS) should be trained on appropriate waste handling by category for appropriate management	EUWS	No cost addition
Risk of Pollution from Mismanagement of sanitation facilities	A Periodic maintenance regime including emptying and desludging should be put in place and implemented to prevent sewage over flows	RWSS, EUWS	20,000,000
	Use of manifest system to ensure that the wastes are disposed of at a site (waste treatment plant) gazetted by NEMA	RWSS, EUWS	No cost addition
	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 pauses a danger to the community	RWSS, EUWS	5,000,000
Increased cost of user fees / water bill per unit	Alternative water sources such as the boreholes should continue to be maintained by the Local government and water user committees.	KDLG – water office	5,000,000
	Under the guidance of MWE should put into consideration the project area's economic profile and vulnerability when setting affordable water prices.	RWSS, EUWS	5,000,000
Risk of Sexual exploitation and abuse of community members by project workers	Develop and implement and SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018) and the Ministry of Gender, Labour and Social Development (Social, Safety and Health Safeguards Implementation Guidelines for Local Governments,2020)	RWSS, EUWS	15,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	The SEA action plan will include how the project will ensure necessary steps are in place for: • Prevention of SEA, • Response to SEA, • Engagement with the community, • Management and Coordination	RWSS, EUWS	No cost addition
Total			294,000,000

9.2 STAKEHOLDERS TO BE INVOLVED IN THE IMPLEMENTATION

The management and supervision of the ESMP is strictly the responsibility of the Ministry of Water and Environment as the Developer. During construction, the Contractor will be responsible for the day-to-day implementation of the ESMP. During the operation phase, the National Water and Sewerage Corporation (NWSC), who will take over management of the project, will be responsible for the implementation of the ESMP. The Developer, the Contractor and the Operator should employ an Environmentalist with relevant academic qualification and work experience. At the local level Jinja, Iganga and Kaliro 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 Ministry of Gender, Labour and Social Development will be involved. MWE also employs environment and social safeguard specialists and other staff who are responsible for handling E&S issues arising from implementation of the project. 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 MGLSD through DOSH is to issue permits and periodically inspect the project site. DOSH will issue workplace Certificates every year if the project meets working conditions as set out in the Occupational Safety and Health Act 2006. In addition to OSH under DOSH, the Ministry also has mandate for other social issues like employment and Labour, gender and child protection, culture, grievances management among others. The district and Sub County councils will approve and monitor local statutory permits and approvals like development 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.

INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

The Project will be implemented by MoWE through its regional entities (WMZs, WSDFs) in close collaboration with Iganga, Kaliro and Jinja 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) [21]

Table 9-2: Institutional Mandates

Institution	Mandate/ Responsibilities
Funding Institution	

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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). MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.
Directorate of Environmental Affairs-DEA	The DEA is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change. On this project, DEA together with NEMA will be responsible for issuing wetland user permits for the water abstraction and treatment plant sites.
Directorate of Water Development (DWD)	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. 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.
Directorate of Water Resources Management-(DWRM)	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.

	On this project, DWRM will be responsible for issues surface water abstraction permits for the project as well as approval and monitoring the implementation of source protection plans.
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, develop and formulate national policies on all taxes, fees, levies, rates for Local Governments. kaliro DLG fall under this Ministry and will be supervised and supported by MoLG.
National Environment Management Authority-NEMA	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 ESIAs 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.

	Specifically, the Environmental Monitoring and Compliance Department of NEMA is responsible for the review and approval of ESIAs, 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.
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 (Bukamba Police Post/ Kaliro District Police)	The project will be implemented in Bukamba Sub County, Kaliro District. The police post at Bukamba Sub County will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Kaliro 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.

ROLES OF THE CONTRACTORS DURING PROJECT IMPLEMENTATION

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.

THE ENVIRONMENTAL AND SOCIAL MONITORING TEAM

While the Developer will do his own internal monitoring; a monitoring team headed by the District Environment Officer of Kaliro Districts and composed of the local environmental authorities, representatives from the District and NEMA and any other lead agencies may also carry out monitoring. The Contractor shall undertake monitoring of key environmental parameters like water quality, noise, and air pollution etc. and make monthly reports to the Developer.

Table 9-3: Environmental and Social Monitoring Plan

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
NEGATIVE IMPACT								
CONSTRUCTION PHASE								
Land acquisition/ displacement of land uses	PAPs	Before commencement & continuous throughout implementation	BH areas & along TL	No. of PAPs Compensated Land consent agreements	RAP Implementation Report/ Grievance Log	100% compensation	MWE/ RAP Consultant	Proj. Sup. RAP Budget
Land use/ cover change	Area cleared; Species type	Monthly After construction/ material extraction	Quarry site, Sand mines, Intake/ WTP/ Reservoir site	Ha No. species	Progress Reports Restoration/ completion certificates	Restricted to TL & DL Restored	Supervising Engineer MWE/NEMA	Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
			Along the TL and DL					
Loss of Fauna and Habitats	No of trees cleared and restored Area of wetland/ forest cleared and restored	Monthly	Quarry site, Sand mines, Intake/ WTP/ Reservoir site Along the TL and DL	No. Ha.	Progress Reports Restoration/ completion certificates	Restricted to TL & DL Phasing Restored	Supervising Engineer MWE/NEMA Contractor	contract
Wetland management	Area cleared; Species type Wetland integrity	Monthly After construction/ material extraction	Intake site	Ha No. species	Progress Reports Restoration/ completion certificates	Compliance with Wetland permit	Supervising Engineer MWE/NEMA	Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
Waste management	Amount of Solid waste	Once a week	Project site	Kg for Solid waste, Litres for Liquid waste	Observations and Measurements	0 Legal disposal	MWE DLG Contractor	5,000,000 MWE Budget Contract
Noise pollution	Noise level Workers	Once a week Before and after project	Project site	dBA Hearing medical check	Noise Level Meter Health report	Ntl Stds Hearing standard	MWE	5,000,000 10,000,000
Air Quality	Dust (PM_{10})	Once per months (daily inspection to be made to detect and remedy excessive dust generation).	Project site	ppm	Micro-dust Pro	Ntl Stds	Contractor MWE / Sup. Consultant	Contract 10,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
Safety and health risks	Signage No. of training First aid kits No. and type of PPE. Fence in place Monitoring Health and sanitation facilities in site.	Daily by contractor, weekly by Consultant and Quarterly by MWE.	Project site	Number of safety measures provided No of near misses, incidences/accidents recorded. No. of toolbox talks conducted	Incidents/Acc. Log, injuries and inspection	0	MWE Contractor	5,000,000 10,000,000 5,000,000 2,000,000 Contract Contract
HIV/AIDS	No. of sensitization training	Monthly Sub contracted	Project site Community	Number of HIV/AIDS mainstreaming	Monthly report		MWE Contractor	5,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
	VCT services and Anti-Retro-Viral Treatment Supply of condoms			strategies provided				5,000,000 2,000,000
GBV, VAC Cases	Nature of GBV Case GBV specialist Monitoring of VAC Reporting and management of VAC cases	Daily by contractor, weekly by Consultant and Quarterly by MWE.	Project site	No. Reported Cases No. of cases resolved	Grievance Log Police Case Files	0	MWE Consultant Contractor	12,000,000 12,000,000 5,000,000 5,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
Management of grievances for workers and communities	Community and Contractor Grievance Committees	Monthly	Project site	No. Reported Cases and ressolved	Grievance Log	!00% of reported grievances addressed	MWE Consultant Contractor	10,000,000
Liability for loss	Training on the operation of the machinery & equipment Signage Onsite clinic	Daily by contractor, weekly by Consultant and Quarterly by MWE.	Project site	No. of losses recorded	Grievance Log	0	MWE Insurance Company Contractor	5,000,000 2,000,000 30,000,000
Physical cultural resources	Consultation Training Compensation/preservation	During project construction phase	Project sites	No. of resources identified	Consultation Chance finds	0	Contractor MWE MMU	7,000,000 RAP budget
Operation phase								

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
Water levels	Water levels Monitoring Quality monitoring	Before operation, Daily, Monthly, quarterly, annually	Intake	M^3	Abstraction permits	DWRM	EUWS DWRM	6,000,000 5,000,000 5,000,000
Water Quality & Quantity	All	Monthly	BHs	All	Lab. Analysis Hydrogeological analysis	Ntl Stds	MWE	40,000,000
Waste Management	Amount of Solid waste	Once a week	Project site	Kg for Solid waste, Litres for Liquid waste	Observations and Measurements	0 Legal disposal	MWE DLG	6,000,000 MWE Budget

10 CONTRACTOR'S ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS DURING CONSTRUCTION PHASE

The contractor shall prepare a number of management plans as recommended in the Contract and by the ESIA report as summarized in below;

Ecosystems and Biodiversity Management Plan (ESBMP)

- Biodiversity identification, management, monitoring and restoration
- Actions to ensure no net loss and preferably a net gain of biodiversity
- Tree planting requirements
- Alien species management

Environmental Management Plan

- Noise and vibration levels mitigation and monitoring
- Construction dust mitigation and monitoring
- Pollution prevention and protection measures
- Design input on spill prevention/location/containment structures around sensitive equipment, installation of appropriate spill clean-up equipment and development of response procedures
- Waste Management, including:
    - Waste hierarchy (i.e. reduction at source, reuse, recycling, energy recovery, responsible disposal) and green procurement;
    - Identification and classification of waste;
    - Waste register;
    - Waste handling (i.e. collection, segregation and containers, storage, treatment, transport and documentation, disposal); and
    - Monitoring and reporting.
- Resource Management including:
    - Objectives, targets, processes in place for resource efficiency
    - Water abstraction, conservation, discharge measures
    - Energy and fuel management

Soil Erosion, Reinstatement & Landscape Management

- Defines soil erosion controls and associated standards
- Temporary and permanent erosion control measures
- Inspection and maintenance programme
- Reinstatement and re-vegetation measures

Auxiliary Sites and Associated Facilities Management Plan

- EHS screening of associated facilities
- Verification of compliance for third-party facilities
- Associated facilities EHS assurance
- Traffic-related aspects management (for construction traffic to/from associated facilities)

Stakeholder Engagement Management Plan & Grievance Mechanism Procedure

- Overarching framework for all stakeholder engagement-related activities
    - Stakeholder identification;
    - Stakeholder engagement programme

    - Monitoring and reporting
- Framework for grievance management for workers and communities
    - Defines process of managing and resolving grievances
    - Grievance classifications and definitions
    - Defines reporting and monitoring requirements

Human Resource and Labour Force Management Plan

- Mobilization of the key staff
- Preparation of the Local Recruitment Procedure
- Promotion of local recruitment at all levels of the Project and facilitating the qualification and recruitment of local candidates, for example with appropriate skills training.
- Information to the local population (e.g. through the Liaison Officers of the Project) about opportunities for employment
- Training and skill development activities;
- Employee grievance mechanism; and
- Monitoring and reporting
- Maximize use of local subcontractors and suppliers. Information about work opportunities will be made available to the local population.
- Workers' community interaction behavioural code of conduct
- Subcontractor employment practices conformance, reporting and monitoring
- Key Organization Plan, Recruitment and Career Development Procedure, Working Conditions, Disciplinary Procedure, Training Procedure, staff contracts, benefits

Cultural Heritage Management Plan

- Cultural heritage supervision and management during construction
- Chance finds training, management and response
    - Interface and coordination with relevant authorities
    - Monitoring and reporting of intervention activities to recover and record cultural heritage values

Occupational Safety & Health Management Plan

- Summary of OHS hazards and risks identification and assessment
- High-risk activities identification and management
- Occupational Health and Safety Communication and Training Programme which will apply during the Construction Phase across all contractors. The Plan will also apply to the quarries. The Plan will subsequently be updated as appropriate for the subsequent Operation Phase.
- PPE Use
- Hazard, Risk and Impact Assessment Procedure
- Accident Investigation and Reporting, Near Miss Procedure
- Emergency Evacuation Procedure

Emergency Response Plan

- Emergency response in event of spills, fire, accidents, earthquake, flood, extreme weather, terrorist threats or attacks etc.
- Emergency response equipment/materials requirements
- Spill containment and clean-up plan
- Procedure for staff and subcontractors to report any incidents and the investigation, remediation and preventive actions taken.
- Regular emergency response training including in the use of spill response equipment

- Emergency Communication Procedure including with local communities and authorities

Community Health, Safety & Security Management Plan

- Sets out the security measures, particularly for the Construction Stage of the Project (e.g. access control by fencing of construction section in the vicinity of settlements or communities).
- HIV/AIDS and STIs prevention and management
- Accidents prevention and management
- Screening and vetting of workers
- Mechanisms for collaboration with security agencies

Gender Management Plan

- Sets out mechanisms for strategically identifying gender needs on the project
- Including gender requirements in contract execution
- Preventing and managing gender concerns like gender-based violence on the project

Child Protection Management Plan

- Sets out the mechanisms for identifying risks to children
- Protecting children from any harm during construction
- Ensuring that the project does not promote child rights violations
- Mechanisms for identifying, reporting and managing child rights violations

Transport Control and Site Access Procedure

- Road traffic management including:
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures
- Local traffic signage.
- Training of Pedestrian workers to work safely around trucks and operating equipment and provide constant warnings to each other in the event of being in risky locations or conditions.
- Training of drivers and equipment operators.
- Site Access Procedure
- Communication protocols and procedures
- Internal monitoring and reporting

Subcontractors & Suppliers Management Plan

- Roles & responsibilities of sub-contractors
- Includes key requirements extracted from above plans & procedures
- Need to develop subcontractor's ESHS Management Plan
- Establish Health, Safety and Environmental performances to monitor sub-contractors and suppliers
- Monitoring and reporting to the main contractor

11 MANAGEMENT PLANS DURING OPERATION

11.1 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.

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.

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.

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 2nd 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.

11.2 DECOMMISSIONING

The Kitenga RGC Water Supply and Sanitation Project has been planned to operate up to 2039 after which, a system upgrade may be required. Therefore, for the next 20 years, full scale decommissioning of the project is not anticipated to take place except a site construction decommissioning approach which can be considered 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.

12 CONCLUSIONS AND KEY RECOMMENDATIONS

12.1 RECOMMENDATIONS

Based on the assessment the following are the key recommendations:

- The Design of the public sanitation facilities should provide for two stances (one for female and the other for male) for PWDs
- Construct the proposed water lines along the road reserves of the existing public roads as proposed by the Developer to avoid delays, impacts and negotiations associated with land acquisitions with private landlords.
- Detailed design for the water transmission and distribution lines shall be undertaken in close consultation with UNRA and Local Governments so as to take care of the new road designs which UNRA/ Local Governments may be planning to implement in the project area.
- Conduct and implement pre and post construction phase mitigation measures by coordinating with local authorities and involving the district and sub-county officials.

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

- Ensure employment opportunities for the local people.
- Ensure health and safety for both workers and the public.
- Institute a programme where all communities affected by the water and sanitation project have access to adequate and clean water.
- Control negative impact on biodiversity and wetlands.
- Ensure all livelihoods lost are restored through a transparent and adequate compensation procedure and livelihood restoration plan.
- Mainstream HIV/AIDS prevention in contractors SEAP.
- The Contractor should develop a Construction specific ESMP after developing the final designs. This should constitute the monitoring checklist to be used by the Supervising Consult and MoWE.

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

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

12.2 CONCLUSIONS

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

Adverse impacts were identified, mitigation measures to avoid, reduce and minimize these impacts have been suggested, either as part of the design, or as measures to be implemented.

Good practice measures were also identified in order to minimize the impact of the proposed development further. The proponent has agreed to these mitigation measures and they are, therefore, expressed as commitments.

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

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

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(Source:https://www.macrotrends.net/countries/UGA/uganda/rural-population#:~:text=Uganda%20rural%20population%20for%202020,a%203.01%25%20increase%20from%202017 .

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ANNEXES

ANNEX A: NEMA APPROVAL OF TOR

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17,19 & 21, Jinja Road.
P.O.Box 22255, Kampala, UGANDA.
Tel: 256-414-251064, 251065, 251068
342758, 342759, 342717
Fax: 256-414-257521 / 232580
Email: info@nema.go.ug
Website: www.nema.go.ug

NEMA/4.5

7th June, 2022

The Permanent Secretary,
Ministry of Water and Environment,
P.O. Box 20026,
KAMPALA.

Tel: +256 417889400
Email: mwe@mwe.go.ug

RE: SCOPING REPORT AND TERMS OF REFERENCE FOR UNDERTAKING AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR FIVE LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES IN, IGWAYA AND KIDERA IN BUYENDE DISTRICT, KITENGA IN KALIRO DISTRICT, BUKIZIBU-BUMWENA IN MAYUGE DISTRICT AND LUGALA IN NAMAYINGO DISTRICT (EIATOR 8454)

Reference is made to the Scoping Report and Terms of Reference (TOR) for carrying out an Environmental and Social Impact Assessment (ESIA) for the above-mentioned Project, which was submitted to this Authority on 6th April, 2022, for review and consideration for approval.

This Authority has finalized the review and grants formal **approval** of the said TOR. Please note that the approval of the TORs **does not grant permission** to start implementing any of the proposed project activities, as this is not a Certificate of approval.

Please undertake separate Environmental and Social Impact Assessments (ESIAs) in respect to piped water supply systems and sanitation facilities in:

(a) Igwaya and Kidera, Buyende District;
(b) Kitenga, Kaliro District;
(c) Bukizibu-Bumwena, Mayuge District; and,
(d) Lugala, Namayingo District.

In addition to the scope of work presented in the TOR, you are advised to make due consideration of the aspects below during the conduct of the ESIA studies, and the preparation of ESIA reports:

i. Provide a comprehensive description of the project components and activities covering the construction and operational phases, associated infrastructure, details of the design and capacity of water supply systems, the methods and

Page **1** of **3**

7/6/2022

chemicals to be used for water treatment, and size of the workforce; and the implications of these on the environment.

ii. Undertake geotechnical investigations of the proposed project sites so as to inform the design and construction of the Water Supply Systems and Sanitation Facilities.

iii. Include in the ESIA reports hydrological investigative reports in regards to the potential impacts of the project on underground water resources within the proposed project areas, and mitigation actions to address such impacts.

iv. Provide a detailed description of the waste streams that will be generated from the activities of the piped water supply systems and sanitation facilities, and the measures and equipment that will be put in place to handle such waste.

v. Include in the ESIA reports other relevant baseline information that is project site specific, on the soils, water, air quality and noise levels; as well as, clear-coloured photographs depicting the current status of the project areas and the neighbouring environs.

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

vii. Append to the ESIA report well-labelled copies of the proposed site layout plan (*preferably covering A3 or larger paper size*) that shows the layout and placement of the different project components.

viii. Carry out comprehensive consultations with all the relevant key stakeholders including, Buyende, Kaliro, Mayuge and Namayingo District Local Government Authorities, Department of Occupational Safety and Health (Ministry of Gender, Labour and Social Development), local communities in the neighbourhood and the Directorate of Water Resources Management (DWRM) particularly in regards to potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA reports.

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

x. Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified environmental impacts of the proposed project.

nbk
7/6/2022

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.

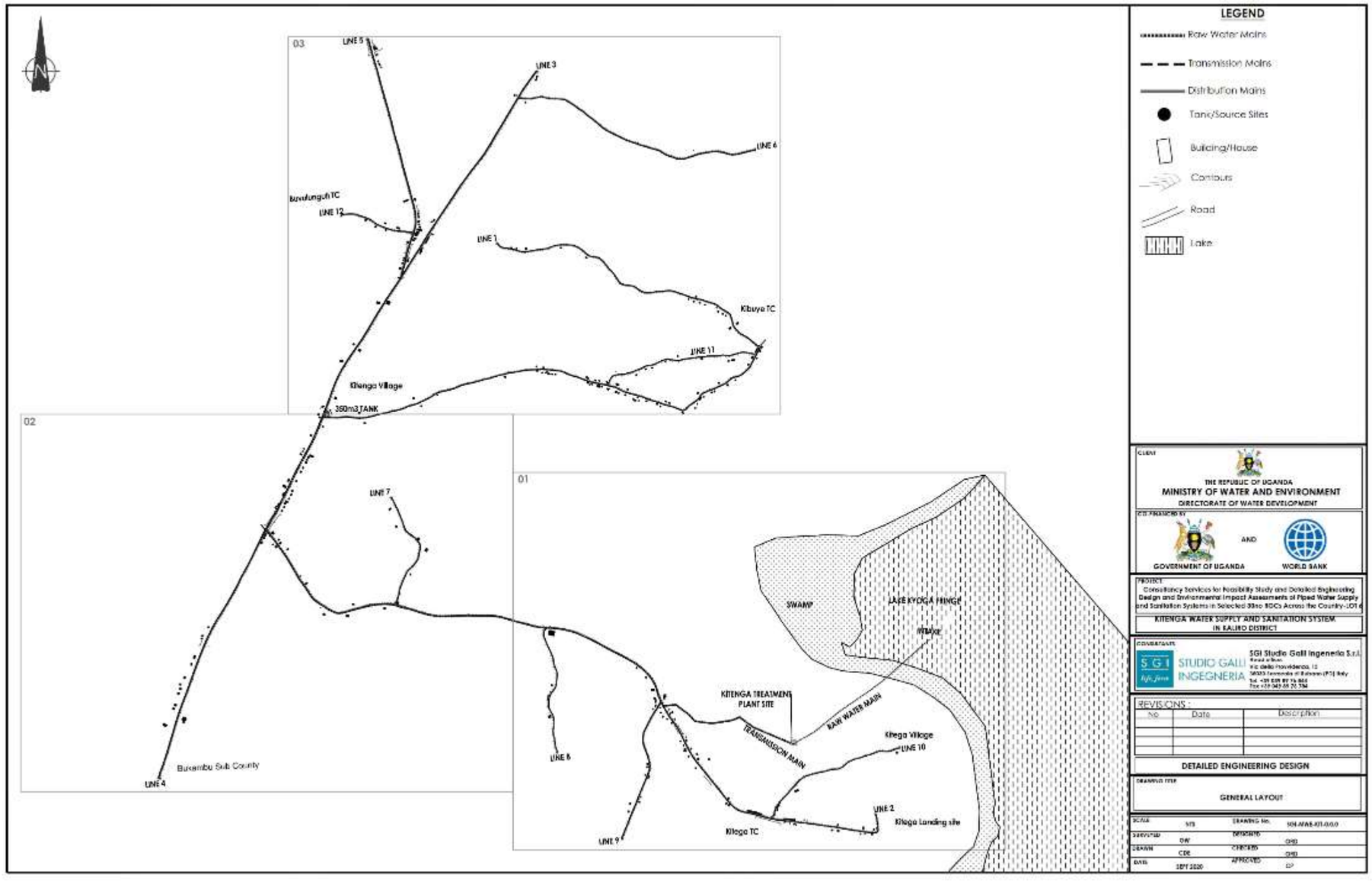
xiv. Indicate the estimated cost of the project evidenced by a certificate of valuation of the capital investment of the project, issued by a qualified and registered valuer in accordance with Regulation 18(1) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.

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


03
LINE 5
LINE 3
LINE 4
Bwafungafi TC
LINE 12
LINE 1
Kibuye TC
LINE 11
Kitenga Village
350m3 TANK
02
LINE 7
Buwambo Sub County
LINE 4
01
SWAMP
LAKE KYOGA FRINGE
INTAKE
KITENGA TREATMENT PLANT SITE
RAW WATER MAIN
TRANSMISSION MAIN
LINE 8
Kitega Village
LINE 10
LINE 2
Kitega Landing site
Kitega TC
LINE 9
LEGEND
Raw Water Mains
Transmission Mains
Distribution Mains
Tank/Source Sites
Building/House
Contours
Road
Lake
THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
AND
GOVERNMENT OF UGANDA
WORLD BANK
Consultancy Services for Possibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 38no RGCs Across the Country - LOT 6
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT
SGI Studio Galli Ingegneria S.r.l.
STUDIO GALLI INGEGNERIA
REVISIONS
No
Date
Description
DETAILED ENGINEERING DESIGN
GENERAL LAYOUT
SCALE
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DRAWING No.
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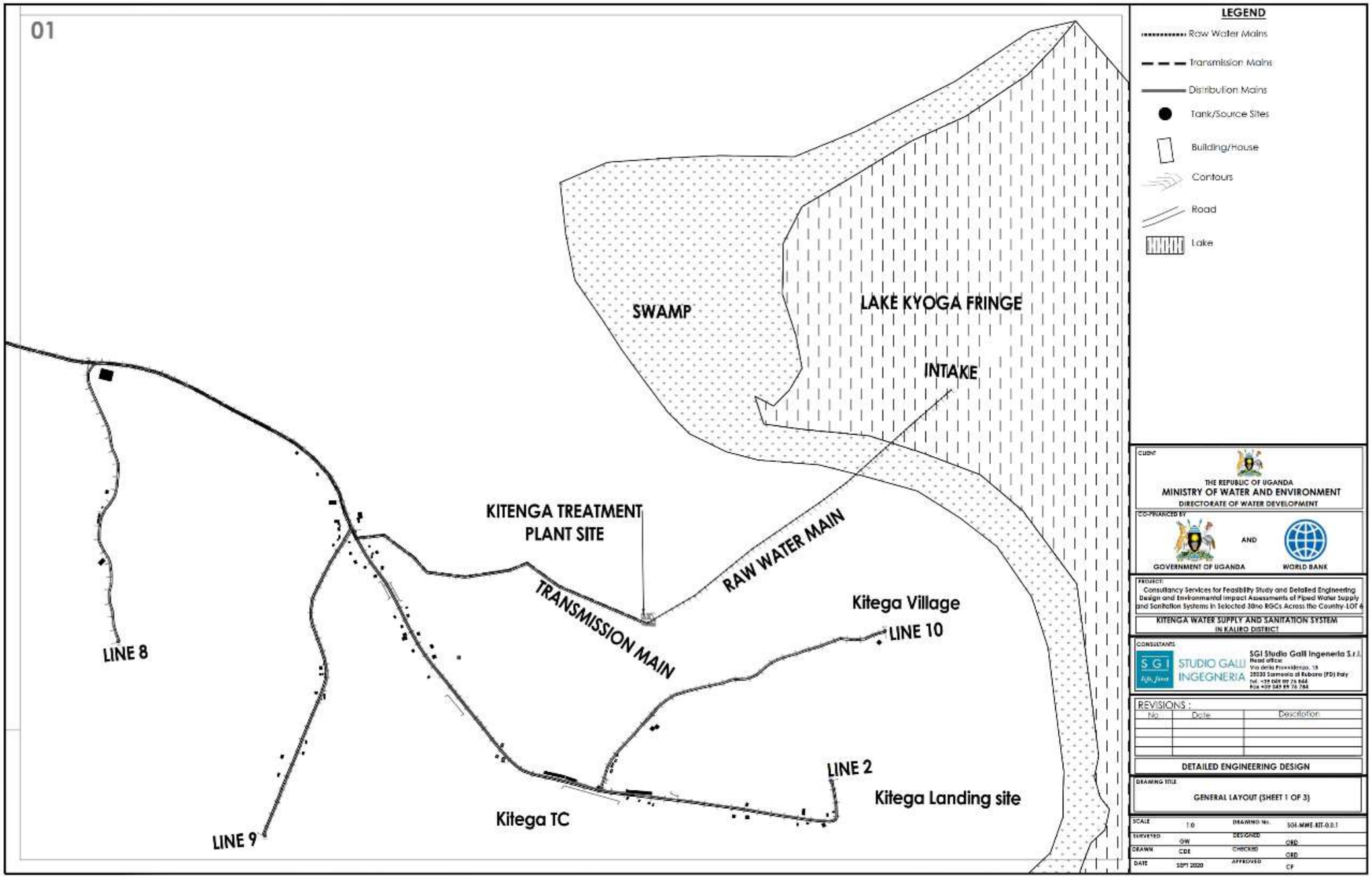
01
SWAMP
LAKE KYOGA FRINGE
INTAKE
KITENGA TREATMENT
PLANT SITE
RAW WATER MAIN
TRANSMISSION MAIN
Kitega Village
LINE 10
LINE 8
LINE 9
LINE 2
Kitega Landing site
Kitega TC
LEGEND
Raw Water Mains
Transmission Mains
Distribution Mains
Tank/Source Sites
Building/House
Contours
Road
Lake
CLIENT
THE REPUBLIC 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 6
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT
CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
Head office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784
REVISIONS :
No.
Date
Description
DETAILED ENGINEERING DESIGN
DRAWING TITLE
GENERAL LAYOUT (SHEET 1 OF 3)
SCALE
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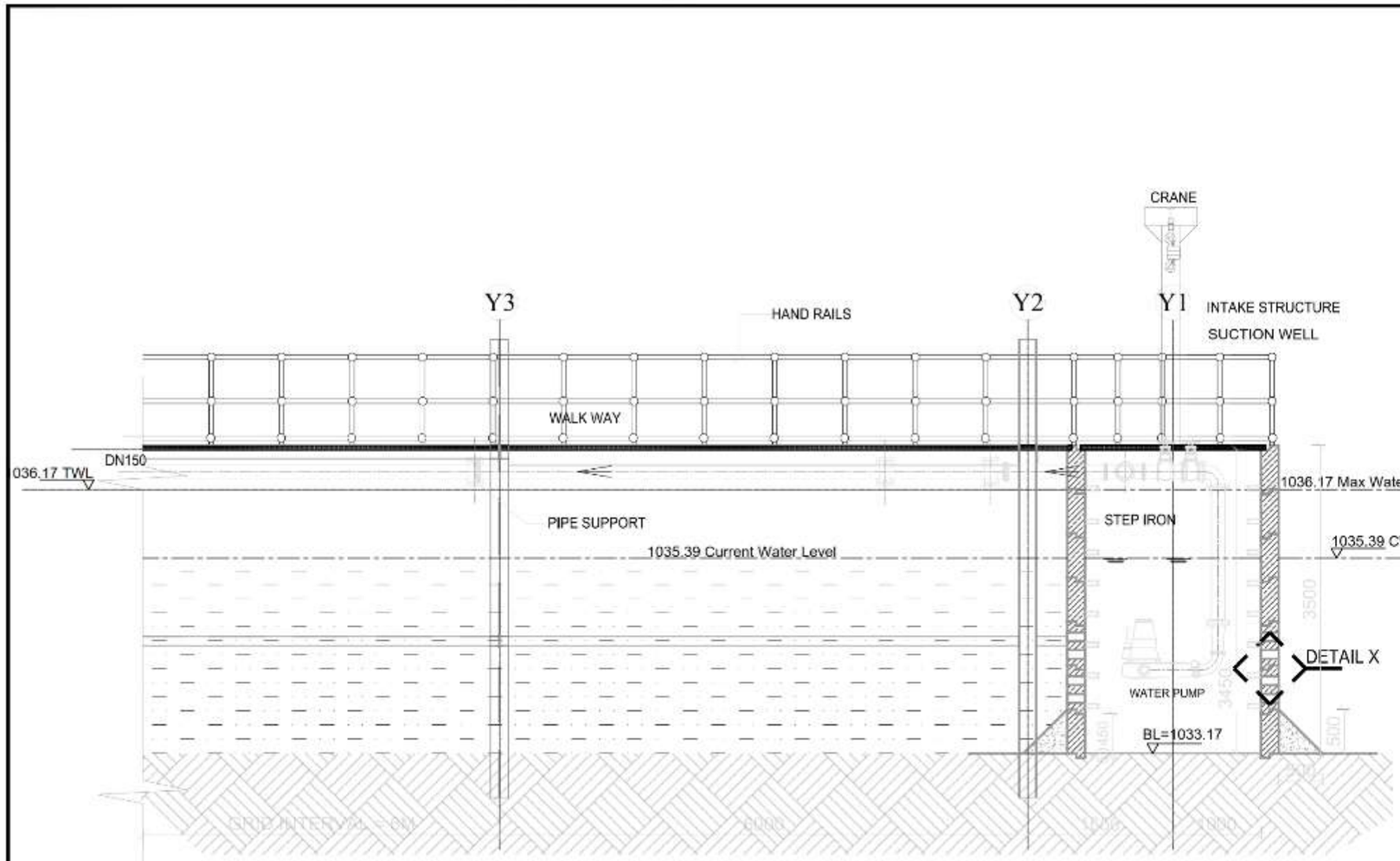

SECTIONAL C-C SCALE, 1:50

NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

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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 8
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
INTAKE STRUCTURE
SECTION C-C

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-WT-1.1.2
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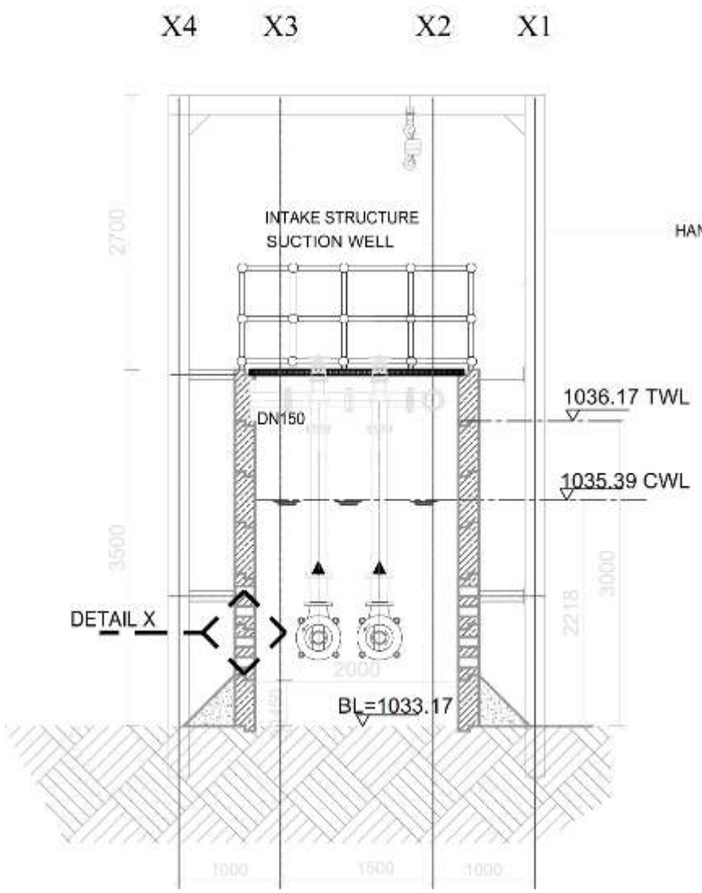
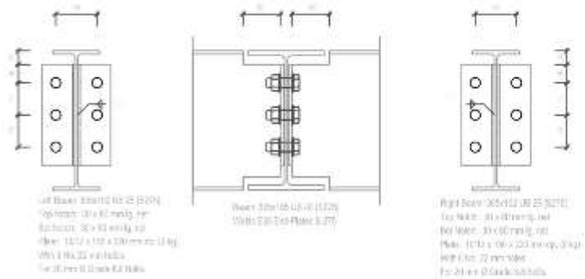
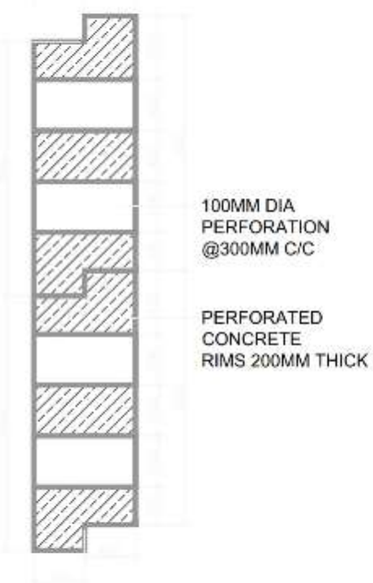


SECTIONAL B-B SCALE, 1:50



BEAM TO BEAM FLEXIBLE END PLATE CONNECTION DETAIL 02 & DETAIL 04

DETAIL X Scale 1:10



100MM DIA
PERFORATION
@300MM C/C

PERFORATED
CONCRETE
RIMS 200MM THICK

NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

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 8

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
INTAKE STRUCTURE
SECTION B-B, DETAIL 03 & 04 AND DETAIL X

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KIT-1.1.5
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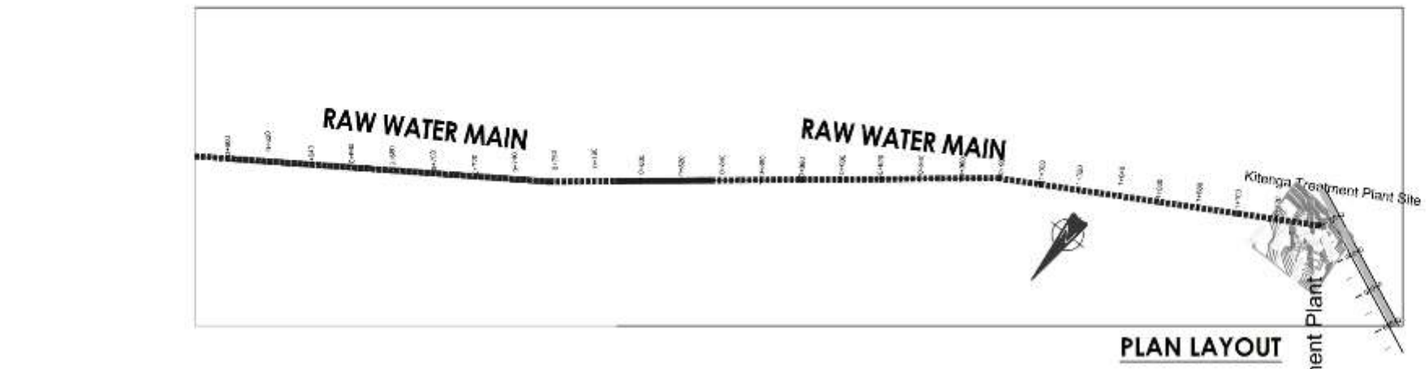
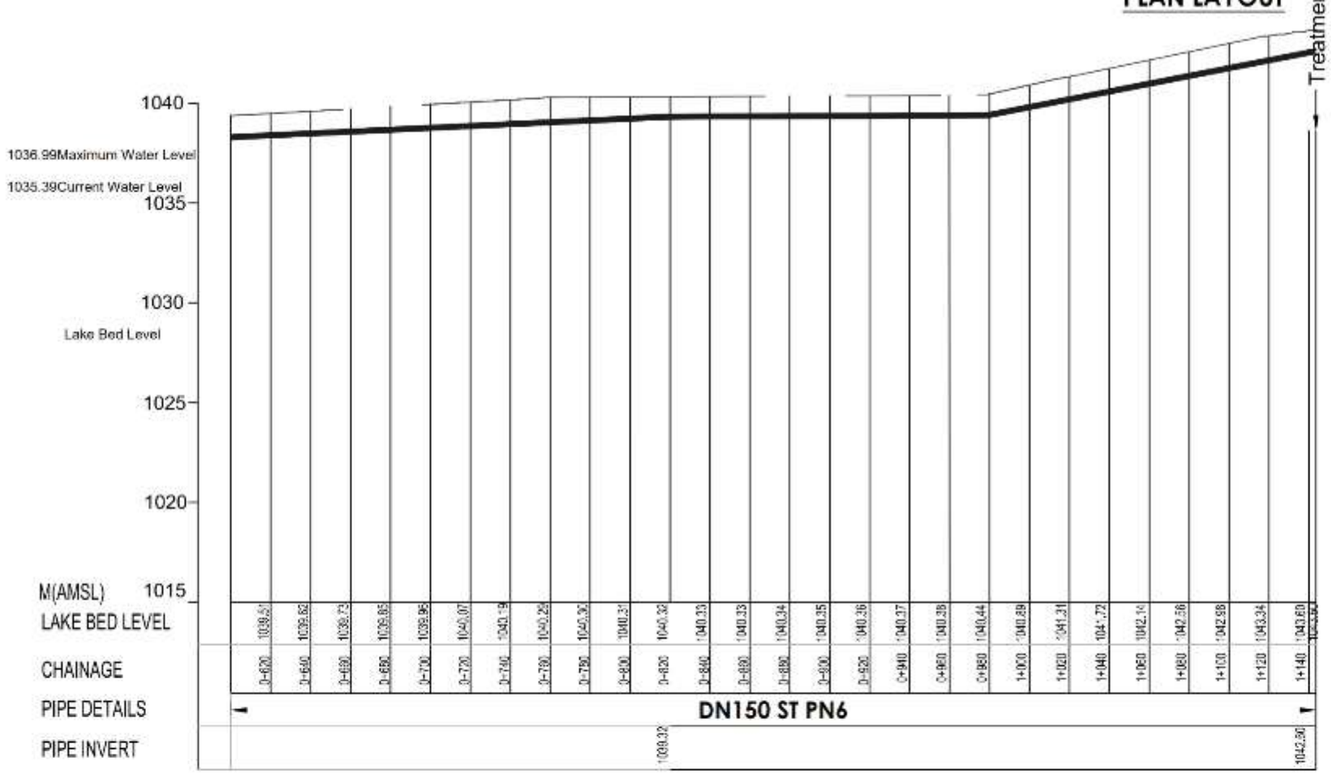
DATE	SEPT 2020	APPROVED	CP



PLAN LAYOUT



LONGITUDINAL PROFILE

NOTES

1. All dimensions are in millimetres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/MWE/KIT/0.0.0
4. For Standard details see sheets as follows

Level Indicator	Sd 220
Outfall Chamber	Sd 116
Marker Post	Sd 117
Thrust Blocks	Sd 118
Pipe beddings	Sd 121

5. All valves, hydrants and washout locations are identified by marker post in positions.

LEGEND

- Water pipeline
- Ground Level
- Building/House
- Contours
- Road
- DAV Double Orifice Air Valve
- WO_2 Type 2 Washout
- (10) Node detail No. 101

Vertical Scale: 1:250 (0, 8.0, 16.0 Metres)
Horizontal Scale: 1:2500 (0, 80, 160 Metres)

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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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingegneria S.r.l.
Head office: Via della Provvidenza, 15 35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

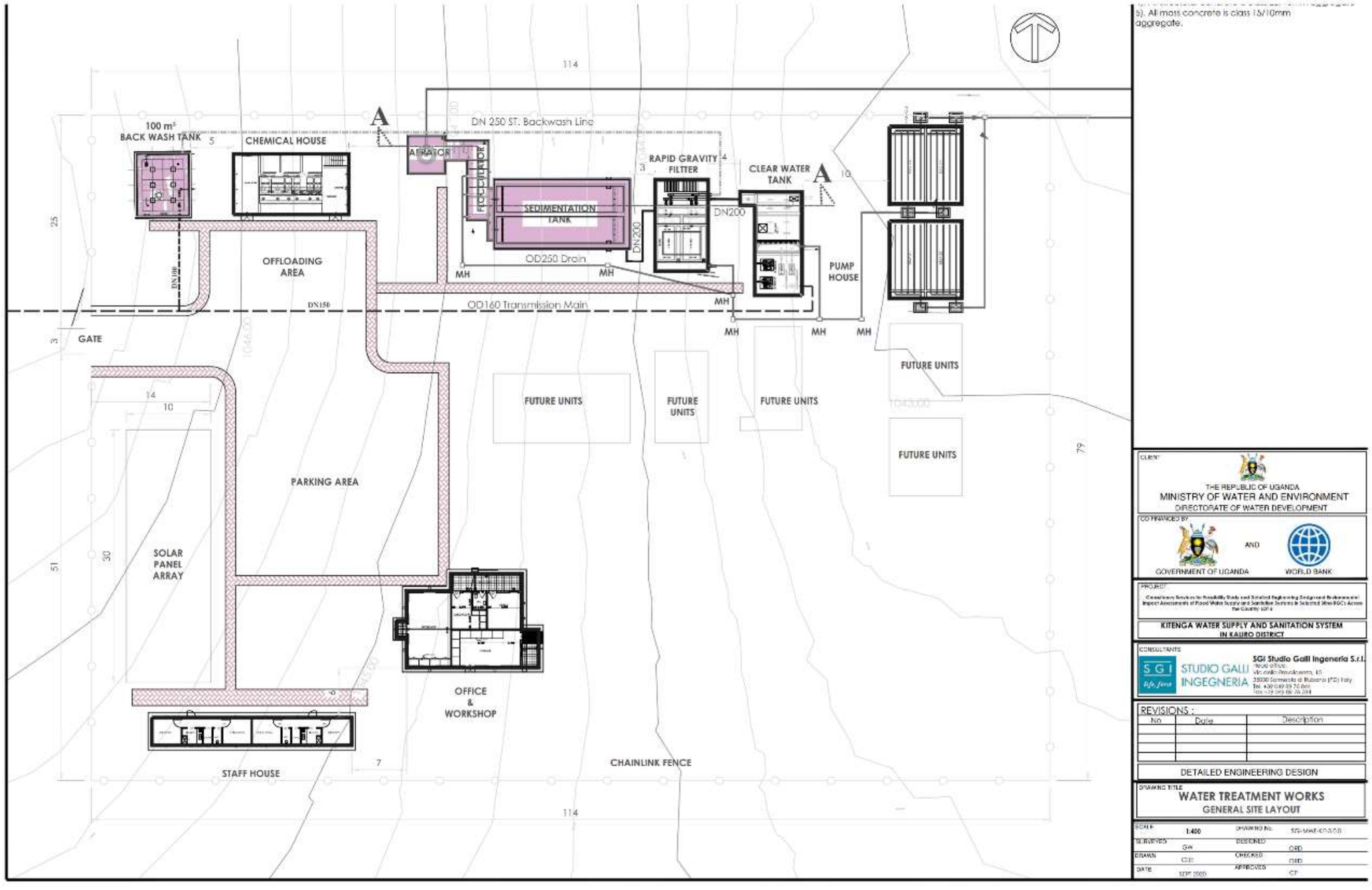
REVISIONS :

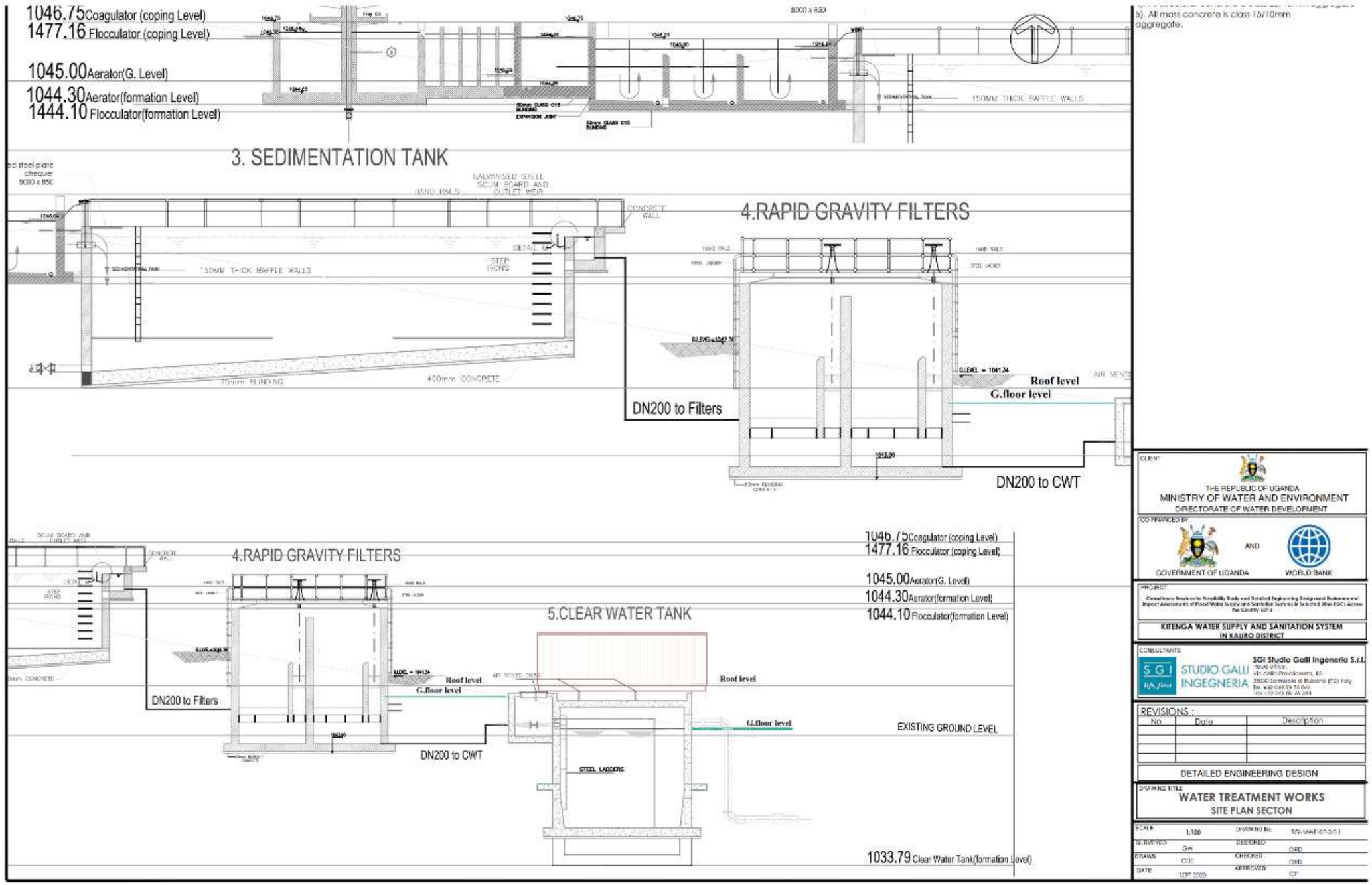
No	Date	Description

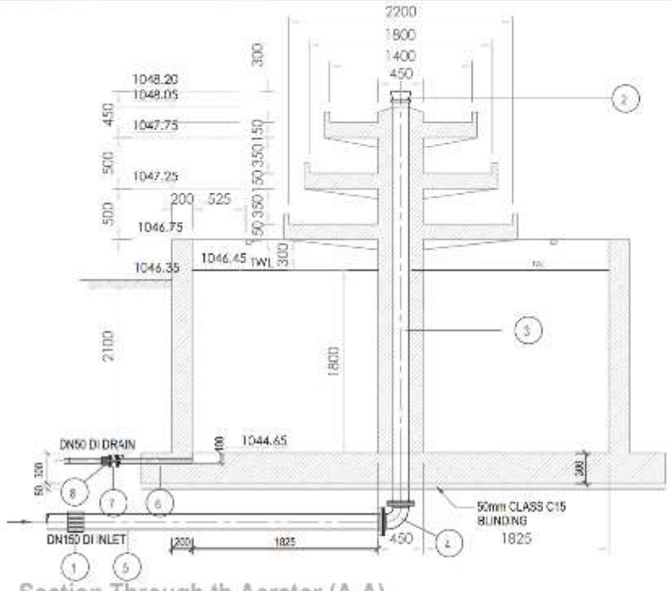
DETAILED ENGINEERING DESIGN

DRAWING TITLE
RAW WATER MAIN 1
CH 0+600.00 - CH 1+200.00

SCALE	1:2500	DRAWING No.	SGI-MWE-KIT-2.1.1
SURVEYED	GW	DESIGNED	OBD
DRAWN	CDE	CHECKED	OBD
DATE	SEPT 2020	APPROVED	CF

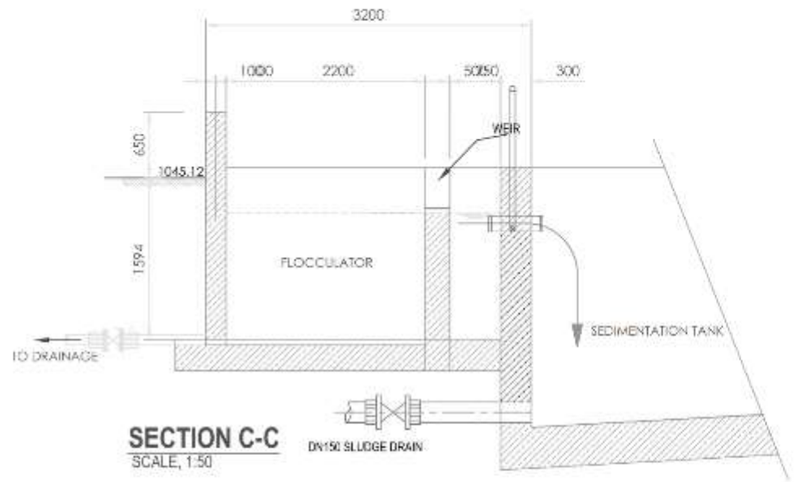

100 m³
BACK WASH TANK
CHEMICAL HOUSE
A
AERATOR
FLOCCULATOR
SEDIMENTATION TANK
RAPID GRAVITY FILTER
CLEAR WATER TANK
DN 250 ST. Backwash Line
DN200
OD250 Drain
MH
OFFLOADING AREA
DN100
DN150
OD160 Transmission Main
PUMP HOUSE
GATE
FUTURE UNITS
PARKING AREA
SOLAR PANEL ARRAY
OFFICE & WORKSHOP
STAFF HOUSE
CHAINLINK FENCE
5). All mass concrete is class 15/10mm aggregate.
CLIENT
THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
CO FINANCED BY
AND
GOVERNMENT OF UGANDA
WORLD BANK
PROJECT
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT
CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA
REVISIONS :
No
Date
Description
DETAILED ENGINEERING DESIGN
DRAWING TITLE
WATER TREATMENT WORKS
GENERAL SITE LAYOUT
SCALE 1:400
DRAWING No.
SURVEYED GW
DESIGNED ORD
DRAWN CDS
CHECKED ORD
DATE SEPT 2020
APPROVED CF


1046.75 Coagulator (coping Level)
1477.16 Flocculator (coping Level)
1045.00 Aerator(G. Level)
1044.30 Aerator(formation Level)
1444.10 Flocculator(formation Level)
3. SEDIMENTATION TANK
150MM THICK BAFFLE WALLS
4.RAPID GRAVITY FILTERS
DN200 to Filters
DN200 to CWT
Roof level
G.floor level
5.CLEAR WATER TANK
EXISTING GROUND LEVEL
1033.79 Clear Water Tank(formation Level)
5). All mass concrete is class 15/10mm aggregate.
THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT
GOVERNMENT OF UGANDA
WORLD BANK
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT
SGI Studio Galli Ingeneria S.r.l.
REVISIONS :
No
Date
Description
DETAILED ENGINEERING DESIGN
WATER TREATMENT WORKS
SITE PLAN SECTON
1:100



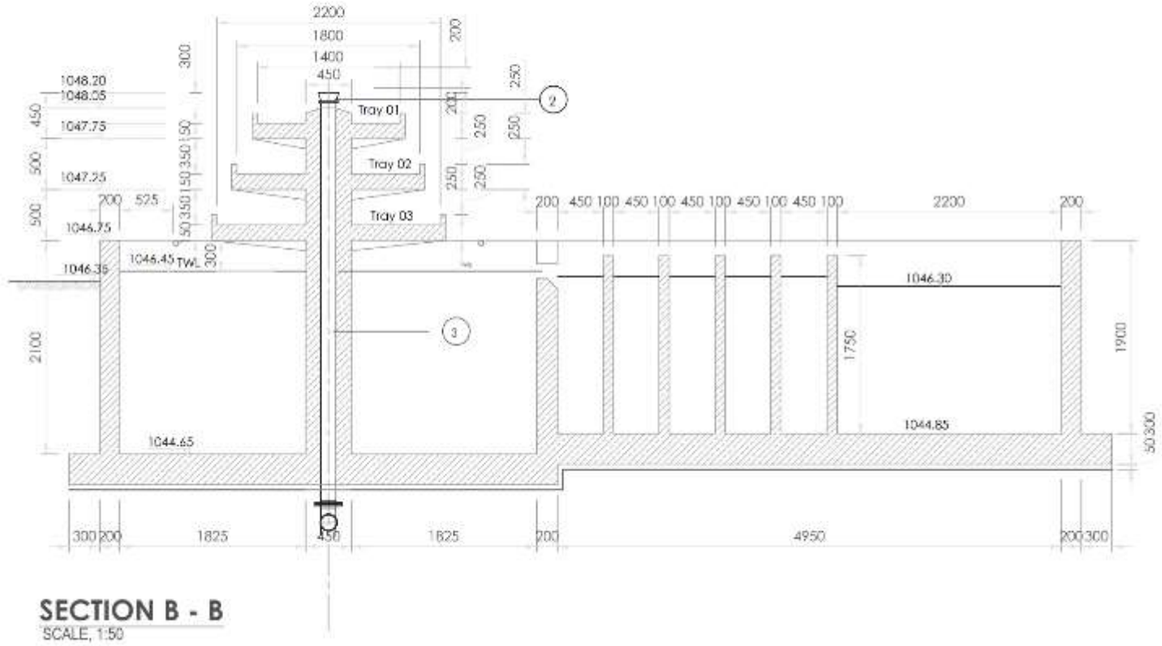
Section Through th Aerator (A-A)

SCALE, 1:50



SECTION C-C

SCALE, 1:50



SECTION B - B

SCALE, 1:50

NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All leves in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

PIPE FITTING SCHEDULES

1. 1 No DN150 flanged adaptor.
2. 1No. bell mouth flanged adaptor.
3. 1No. DN150 double flanged pipe, length not exceeding 4.0m.
4. 1No. DN150 90° flanged bend.
5. 1No. DN150 double flanged pipe, length not exceeding 2.5m
6. 1No. DN50 double flanged pipe, length not exceeding 1.0m.
7. 1No. DN50 flanged gate valve.
8. 1No. DN50 flanged adaptor.

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.

REVISIONS :

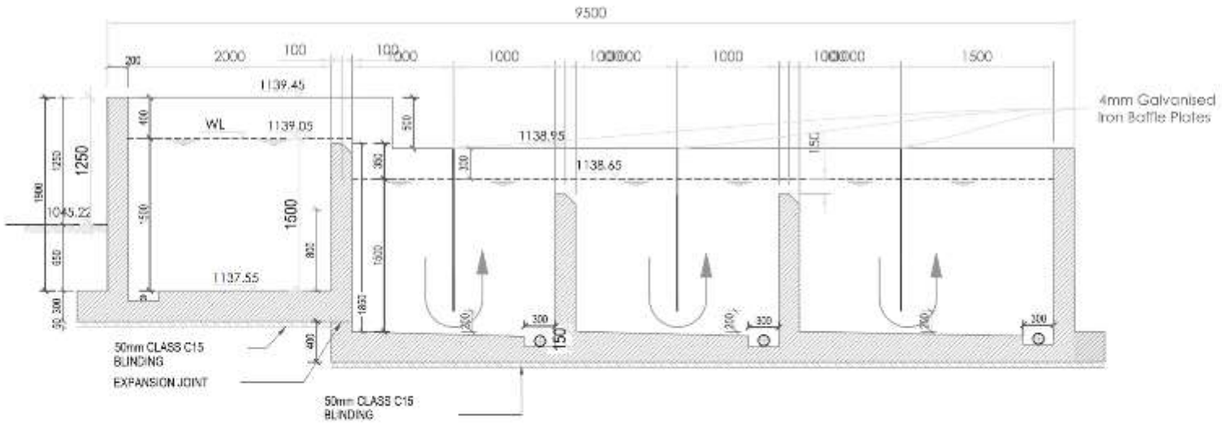
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

AERATOR, COAGULATOR & FLOCCULATOR
SECTION A-A, B-B & C-C

SCALE	1:50	DRAWING No.	SGI-MWE-KR-3.1.1
SURVEYED	GW	DESIGNED	GBD
DRAWN	CDE	CHECKED	GBD
DATE	SEPT 2020	APPROVED	CP



SECTION THROUGH THE FLOCCULATOR(D - D)

SCALE, 1:50

4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

PIPE FITTING SCHEDULES

1. 1 No DN150 flanged adaptor.
2. 1No. bell mouth flanged adaptor.
3. 1No. DN150 double flanged pipe, length not exceedir 4.0m.
4. 1No. DN150 90° flanged bend.
5. 1No. DN150 double flanged pipe, length not exceedir 2.5m
6. 1No. DN50 double flanged pipe, length not exceeding 1.0m.
7. 1No. DN50 flanged gate valve.
8. 1No. DN50 flanged adaptor.

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

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAUSO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.

STUDIO GALLI INGEGNERIA

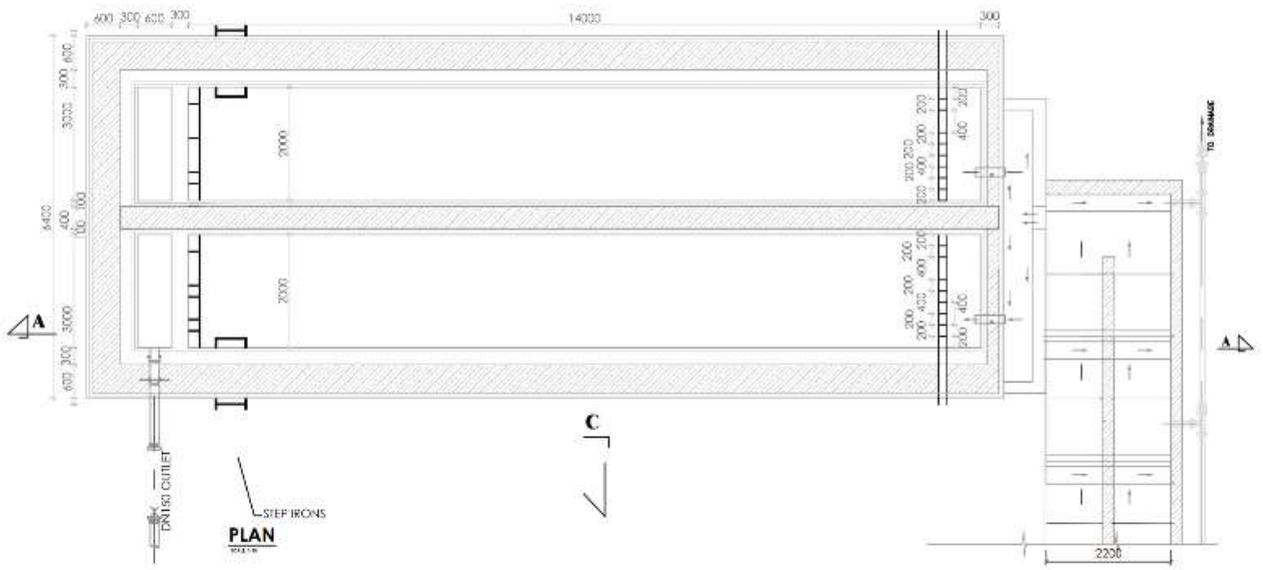
REVISIONS :

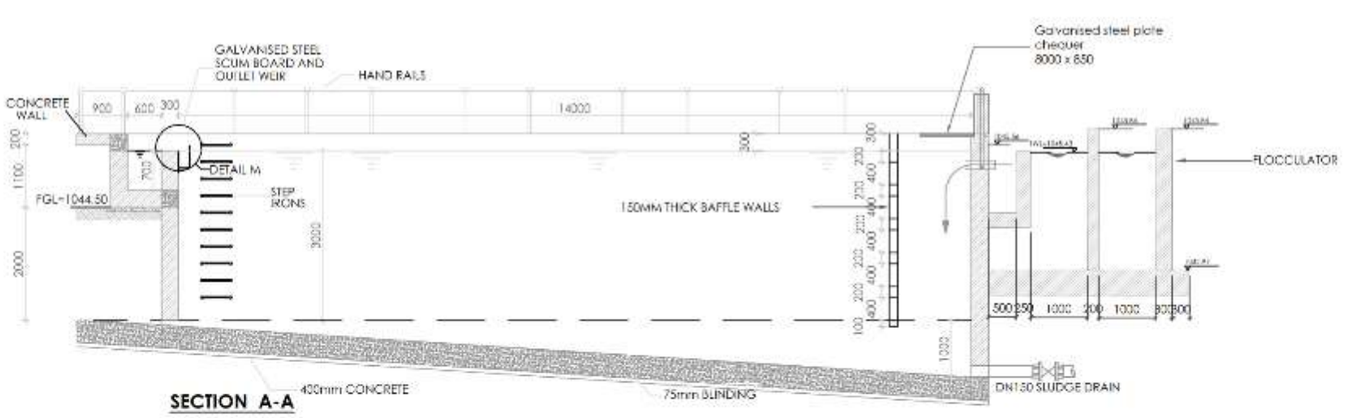
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
AERATOR, COAGULATOR & FLOCCULATOR
SECTION D-D

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KIT-D 1.2
SURVEYED	GW	DESIGNED	GBD
DRAWN	CDS	CHECKED	GBD
DATE	SEPT 2020	APPROVED	CP





NOTES

1. All dimensions are in mm unless stated otherwise.
2. The depths are indicative, actual depth of pipe will be determined in the field.
3. All levels are in metres above sea level.
4. All Structural concrete to be CLASS 25/10.
5. All Mass Concrete to be CLASS 20/10.

CLIENT

THE REPUBLIC OF UGANDA
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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

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

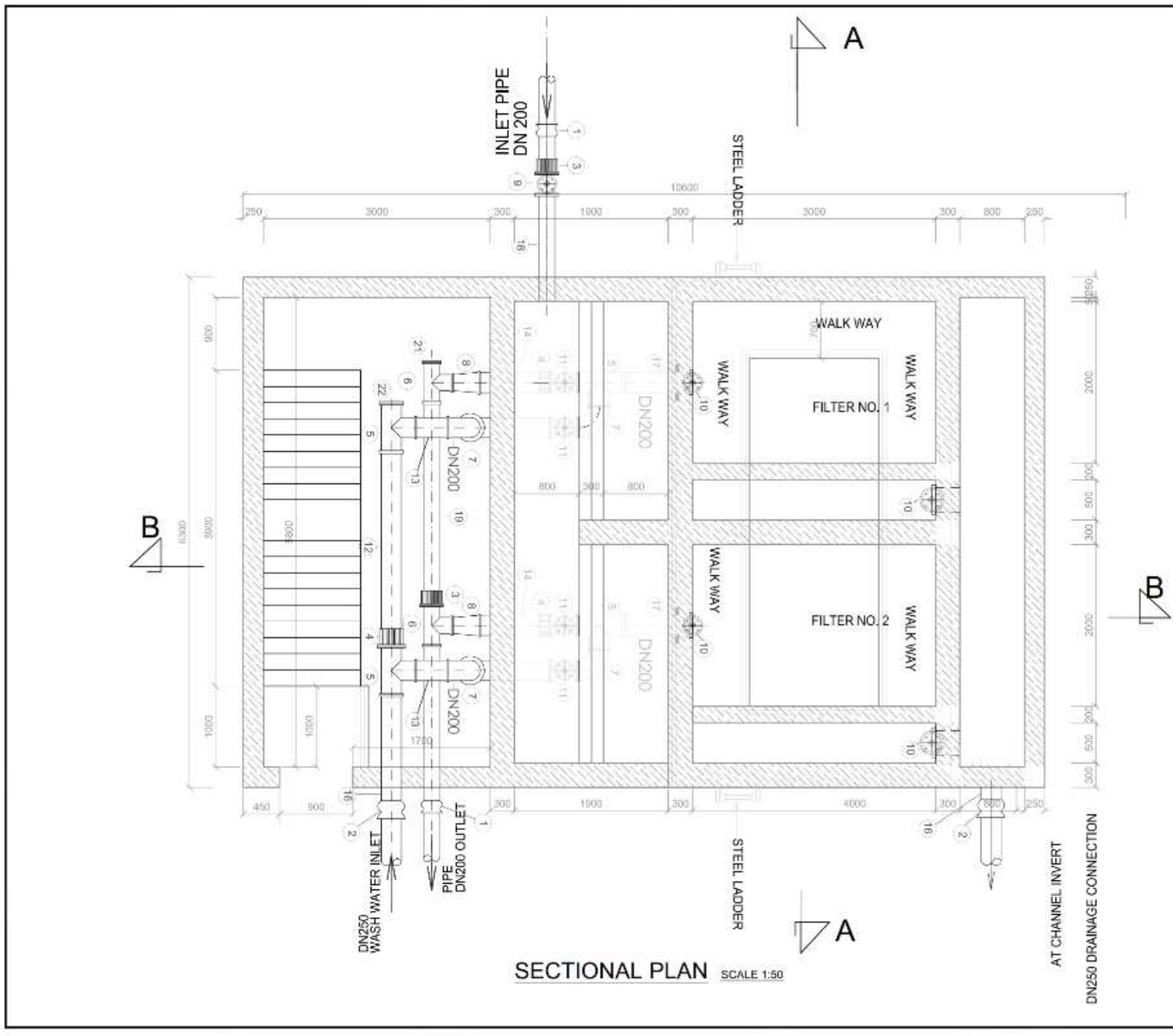
SGI Studio Galli Ingegneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :		
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
SEDIMENTATION TANK
SECTIONAL PLAN AND SECTION A-A

SCALE	AS SHOWN	DRAWING NO.	SGI KWE KIT 3.2.0
SURVEYED	CW	DESIGNED	OPO
DRAWN	CDF	CHECKED	OPO
DATE	SEPT 2020	APPROVED	CP



NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

PIPE FITTING SCHEDULE

1. 2No. DN200 max coupling
2. 2No. DN250 max coupling
3. 2No. DN200 max flanged adaptor
4. 3No. DN250 max flanged adaptor
5. 4No. DN250/200 all flanged Tee
6. 4No. DN200/200 all flanged Tee
7. 6No. DN200 all flanged 90° bend
8. 2No. DN250/200 all flanged Taper
9. 1No. DN200 all flanged gate valve
10. 4No. 200x200 penstocks
11. 4No. DN200 flanged gate valve
12. 1No. DN250 flanged/spigot pipe length ne 3m
13. 2No. DN200 all flanged pipe length not exceeding 1.5m
14. 2No. DN200 flanged/spigot pipe length ne 1.2m
15. 2No. DN200 all flanged pipe length ne 3m
16. 1No. DN250 flanged/spigot pipe with puddle flanged, ne 2m
17. 2No. DN200 all flanged pipe with puddle flanged, length ne
18. 1No. DN200 flanged/spigot pipe with puddle flanged, ne 2m
19. 2No. DN200 flanged/spigot pipe length ne 3m
20. 1No. DN200 flanged/spigot pipe with puddle flanged, ne 3m
21. 1No. DN 200 blank flange
22. 1No. DN250 blank flange

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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 30no RGCs Across the Country-LOT 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT

CONSULTANTS
SGI Studio Galli Ingegneria S.r.l.
STUDIO GALLI INGEGNERIA

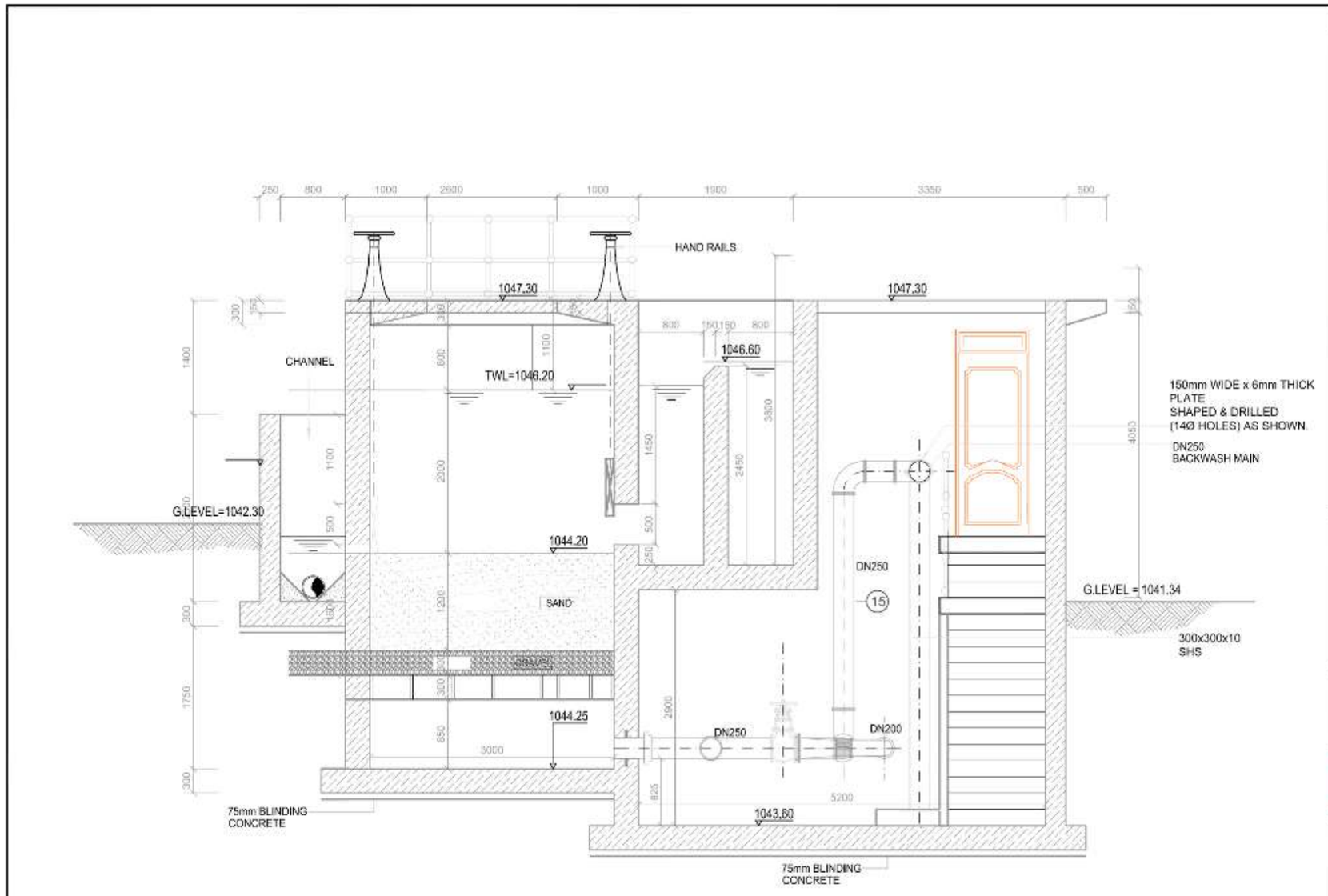
REVISIONS :

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
RAPID GRAVITY FILTER
SECTIONAL PLAN

SCALE	1:50	DRAWING No.	SGI-MWE-KIT-SLS.D
SURVEYED	CW	DESIGNED	OBD
DRAWN	CDE	CHECKED	OBD
DATE	SEPT 2020	APPROVED	CP



SECTION B-B SCALE 1:50

NOTES

1). All dimensions in milimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

PIPE FITTING SCHEDULE

1. 2No. DN200 maxi coupling
2. 2No. DN250 maxi coupling
3. 2No. DN200 maxi flanged adaptor
4. 3No. DN250 maxi flanged adaptor
5. 4No. DN250/200 all flanged Tee
6. 4No. DN200/300 all flanged Tee
7. 6No. DN200 all flanged 90° bend
8. 2No. DN250/200 all flanged Taper
9. 1No. DN200 all flanged gate valve
10. 4No. 200x200 penstocks
11. 4No. DN200 flanged gate valve
12. 1No. DN250 flanged/spigot pipe length ne 3m
13. 2No. DN200 all flanged pipe length not exceeding 1.5m
14. 2No. DN200 flanged/soigot pipe length ne1.5m
15. 2No. DN200 all flanged pipe length ne 3m
16. 1No. DN250 flanged/spigot pipe with puddle flanges, ne 2m
17. 2No. DN300 all flanged pipe with puddle flanged, length ne
18. 1No. DN200 flanged/spigot pipe with puddle flanges, ne 2m
19. 2No. DN200 flanged/soigot pipe length ne 3m
20. 1No. DN200 flanged/spigot pipe with puddle flanges, ne 3m
21. 1No. DN 200 blank flange
22. 1No. DN250 blank flange

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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 8
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

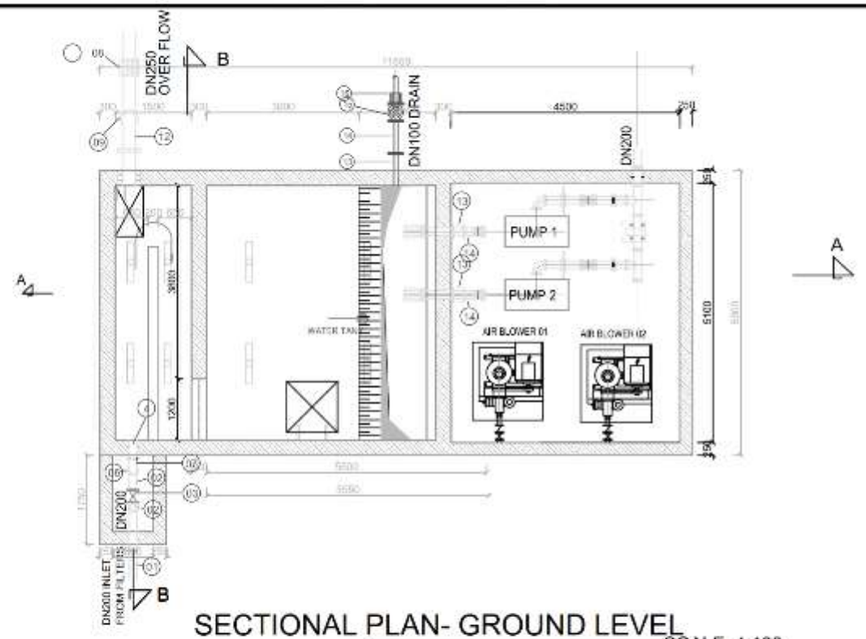
REVISIONS :

No	Date	Description

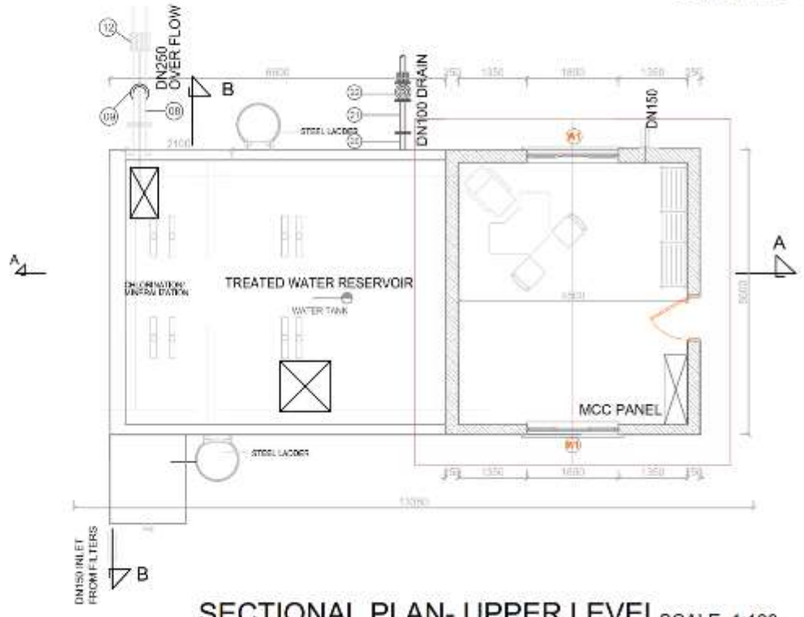
DETAILED ENGINEERING DESIGN

DRAWING TITLE
RAPID GRAVITY FILTER
SECTION B-B

SCALE	1:50	DRAWING No.	SGI-KWSS-RGF-SEC-7
SURVEYED	GW	DESIGNED	DRD
DRAWN	COC	CHECKED	DRD
DATE	SEPT 2020	APPROVED	CP



SECTIONAL PLAN- GROUND LEVEL SCALE, 1:100



SECTIONAL PLAN- UPPER LEVEL SCALE, 1:100

NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

PIPE FITTING SCHEDULE

1. 1 No DN200 inlet from filter.
2. 2No. DN200 flanged adaptor.
3. 2No. DN200 90° flanged bend.
4. 1No. DN200 double flanged pipe, length not exceeding 2.5m.
5. 1No. DN200 double flanged pipe, length not exceeding 1.5m.
6. 1No. DN200 flanged gate valves.
7. 1No. DN200 double flanged pipe, length not exceeding 1.0m.
8. 1No. DN250 double flanged pipe, length not exceeding 1.5m.
9. 1No. DN250 90° flanged bend.
10. 1No. DN250 double flanged pipe, length not exceeding 2m.
11. 1No. DN250 90° flanged bend.
12. 1No. DN250 flanged adaptor.
13. 1 No. DN100 flanged pipe, length not exceeding 1.0m.
14. 1 No. DN100 double flanged pipe, length not exceeding 1.0m.
15. 1 No. DN100 flanged gate valves.
16. 1 No. DN100 flanged adaptor.
17.

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingegneria S.r.l.
Head office
Via della Provvidenza, 13
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 344
Fax +39 049 89 72 764

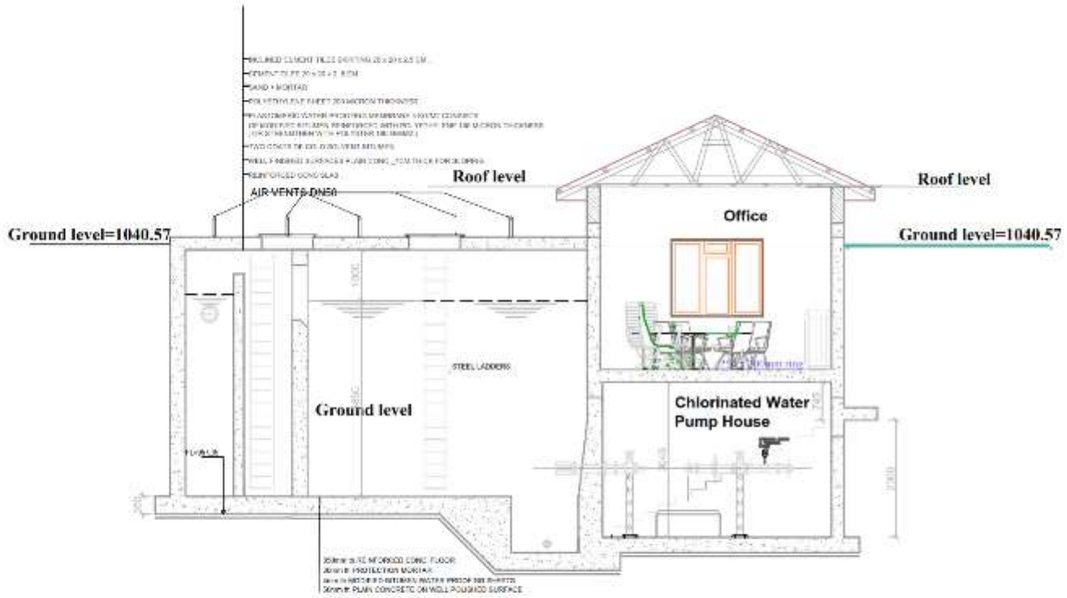
REVISIONS :		
No	Date	Description

DETAILED ENGINEERING DESIGN

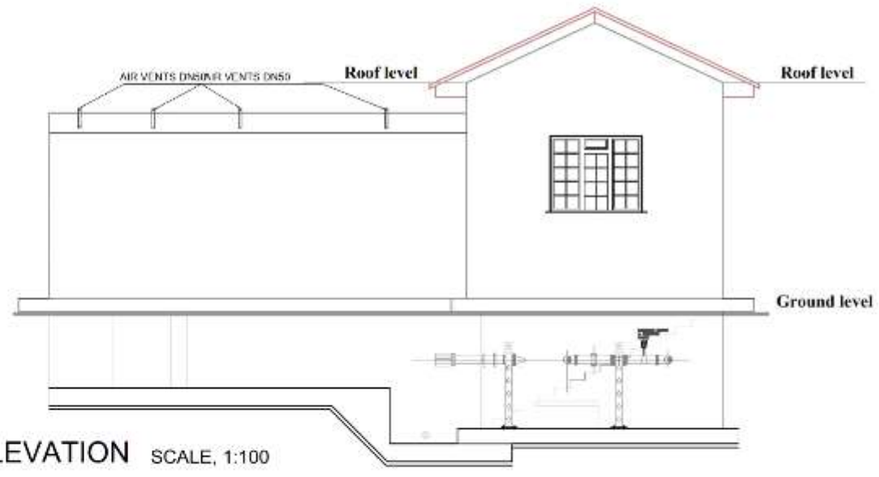
DRAWING TITLE

CLEAR WATER TANK + PUMP HOUSE
SECTION PLAN GROUND LEVEL& UPPER LEVEL

SCALE	1:100	DRAWING No.	SGI-WW6401-S-A1-0
SURVEYED	GW	DESIGNED	OBO
DRAWN	EDP	CHECKED	OBO
DATE	SEP 2020	APPROVED	CP



SECTION A-A SCALE, 1:100



FRONT ELEVATION SCALE, 1:100

NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

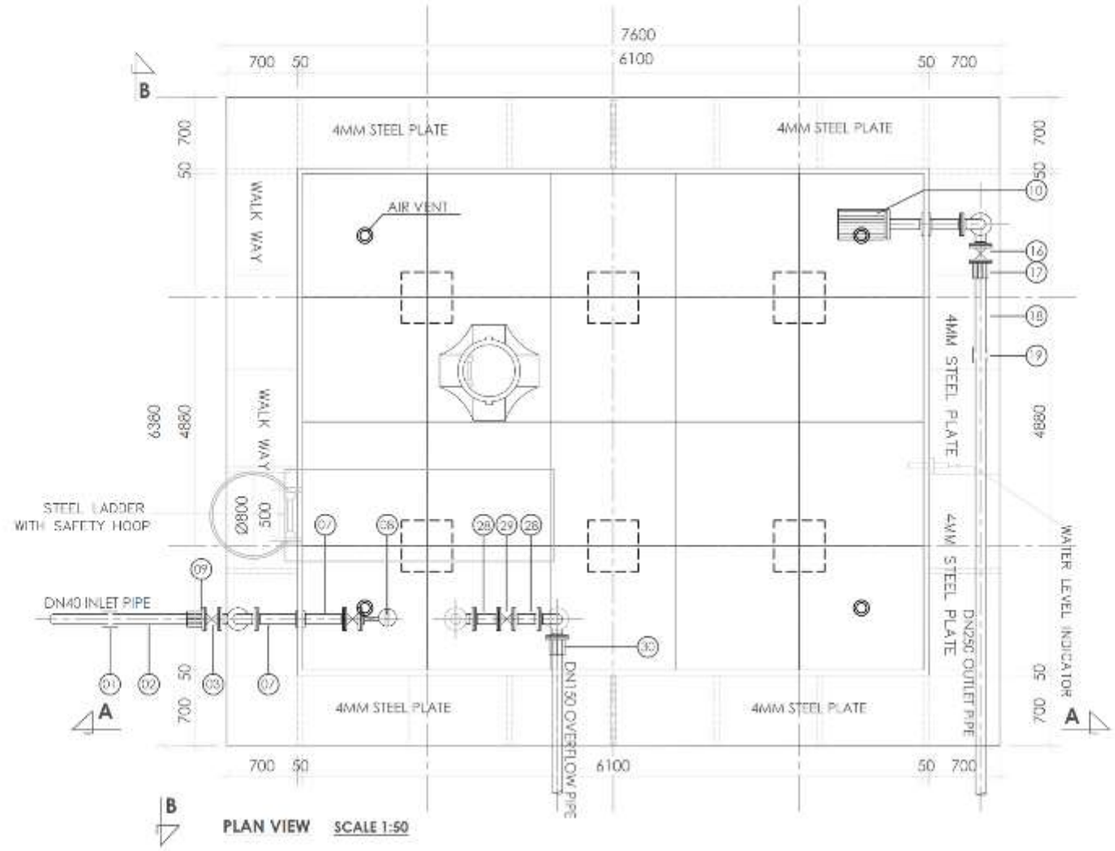
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

CLEAR WATER TANK + PUMP HOUSE
SECTION A-A & FRONT ELEVATION

SCALE	1:100	DRAWING No.	SGI-KWE-KIT-3.4.1
SURVEYED	GW	DESIGNED	CBD
DRAWN	CDE	CHECKED	CBD
DATE	SEPT 2020	APPROVED	CP



PLAN VIEW SCALE 1:50

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.

PIPE FITTING SCHEDULE

1. 1No.DN100 Victaulic Johnson or Similar 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. 1 No.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,Maxi type or similar.
10. 1No.DN250 Flanged Outlet Pipe Strainer.
11. 2No.DN250 Double Flanged Pipe not exceeding 0.6m.
12. 1No.DN250 All Flanged 90° bend.
13. 2No.DN250 Double Flanged Pipe not exceeding 6.0m.
14. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
15. 1No.DN250 All Flanged Duck foot 90° bend.
16. 1No.DN250 Flanged Gate Valve.
17. 1No.DN250 Flanged Adaptor,Maxi type or similar.
18. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
19. 1No.DN250 Victaulic Johnson or Similar Coupling.
20. 1No.DN150 Flanged Bell Mouth.
21. 1No.DN150 Double Flanged Pipe not exceeding 2.8m.
22. 1No.DN100 Double Flanged Pipe not exceeding 2.0m.
23. 1No.DN150/100 All Flanged Tee.
24. 2No.DN150 Double Flanged Pipe not exceeding 6.0m.
25. 1No.DN150 All Flanged Duck foot 90° bend.
26. 1No.DN150 All Flanged Pipe with puddle flange n.e 2.0m.
27. 1No.DN150 All Flanged 90° bend.
28. 1No.DN150 Double Flanged Pipe not exceeding 0.4m.
29. 1No.DN150 Flanged Gate Valve.
30. 1No.DN150 Flanged Adaptor,maxi type or similar.

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 33no RGCs Across the Country-LOT 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
Head Office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

STUDIO GALLI INGEGNERIA

REVISIONS :

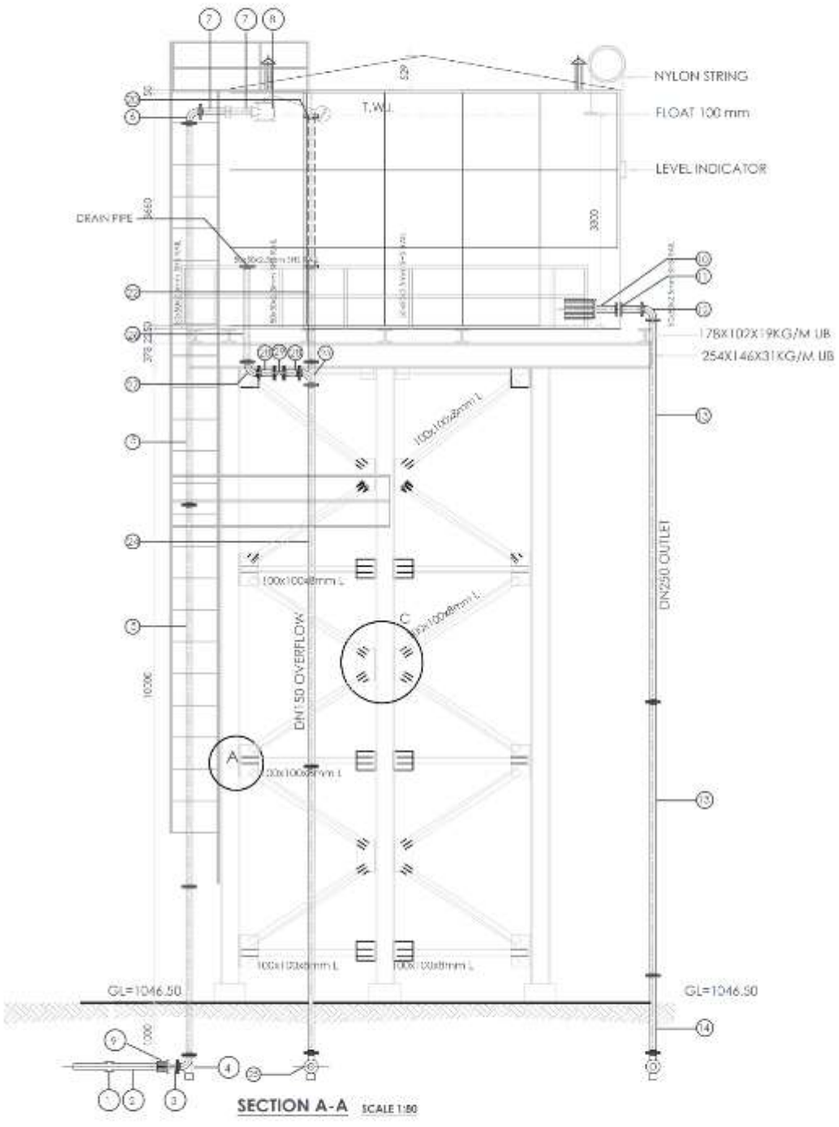
No	Date	Description

DETAILED ENGINEERING DESIGN

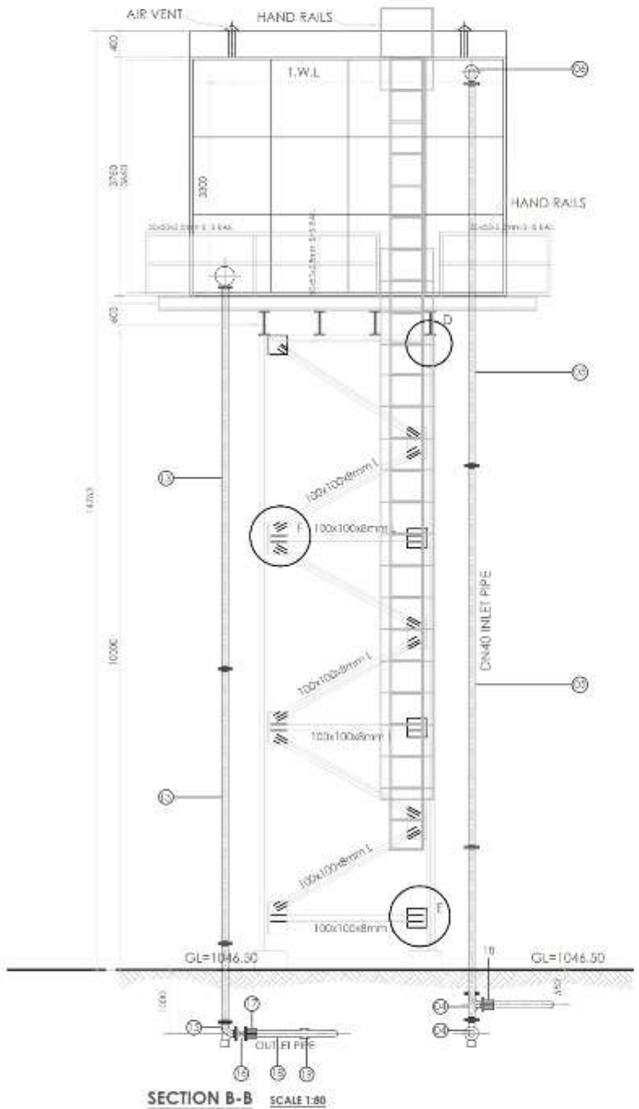
DRAWING TITLE

BACK WASH TANK
PLAN VIEW

SCALE	1:50	DRAWING No.	SGI-MWE-KIT-7.5.2
SURVEYED	GIN	DESIGNED	DBD
DRAWN	CDE	CHECKED	DBD
DATE	SEPT 2020	APPROVED	CP



SECTION A-A SCALE 1:50



SECTION B-B SCALE 1:50

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.

PIPE FITTING SCHEDULE

1. 1No.DN100 Viking Johnson or Similar 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,Maxi type or similar.
10. 1No.DN250 Flanged Outlet Pipe Strainer.
11. 2No.DN250 Double Flanged Pipe not exceeding 0.6m
12. 1No.DN250 All Flanged 90° bend.
13. 2No.DN250 Double Flanged Pipe not exceeding 6.0m.
14. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
15. 1No.DN250 All Flanged Duck foot 90° bend.
16. 1No.DN250 Flanged Gate Valve.
17. 1No.DN250 Flanged Adaptor,Maxi type or similar.
18. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
19. 1No.DN250 Viking Johnson or Similar Coupling.
20. 1No.DN150 Flanged Bell Mouth.
21. 1No.DN150 Double Flanged Pipe not exceeding 2.8m.
22. 1No.DN100 Double Flanged Pipe not exceeding 2.0m.
23. 1No.DN150/100 All Flanged Tee.
24. 2No.DN150 Double Flanged Pipe not exceeding 6.0m.
25. 1No.DN150 All Flanged Duck foot 90° bend.
26. 1No.DN150 All Flanged Pipe with puddle flange n.e 2.0m.
27. 1No.DN150 All Flanged 90° bend.
28. 1No.DN150 Double Flanged Pipe not exceeding 0.4m.
29. 1No.DN150 Flanged Gate Valve.
30. 1No.DN150 Flanged Adaptor,Maxi type or similar.

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingegneria S.r.l.
STUDIO GALLI INGEGNERIA

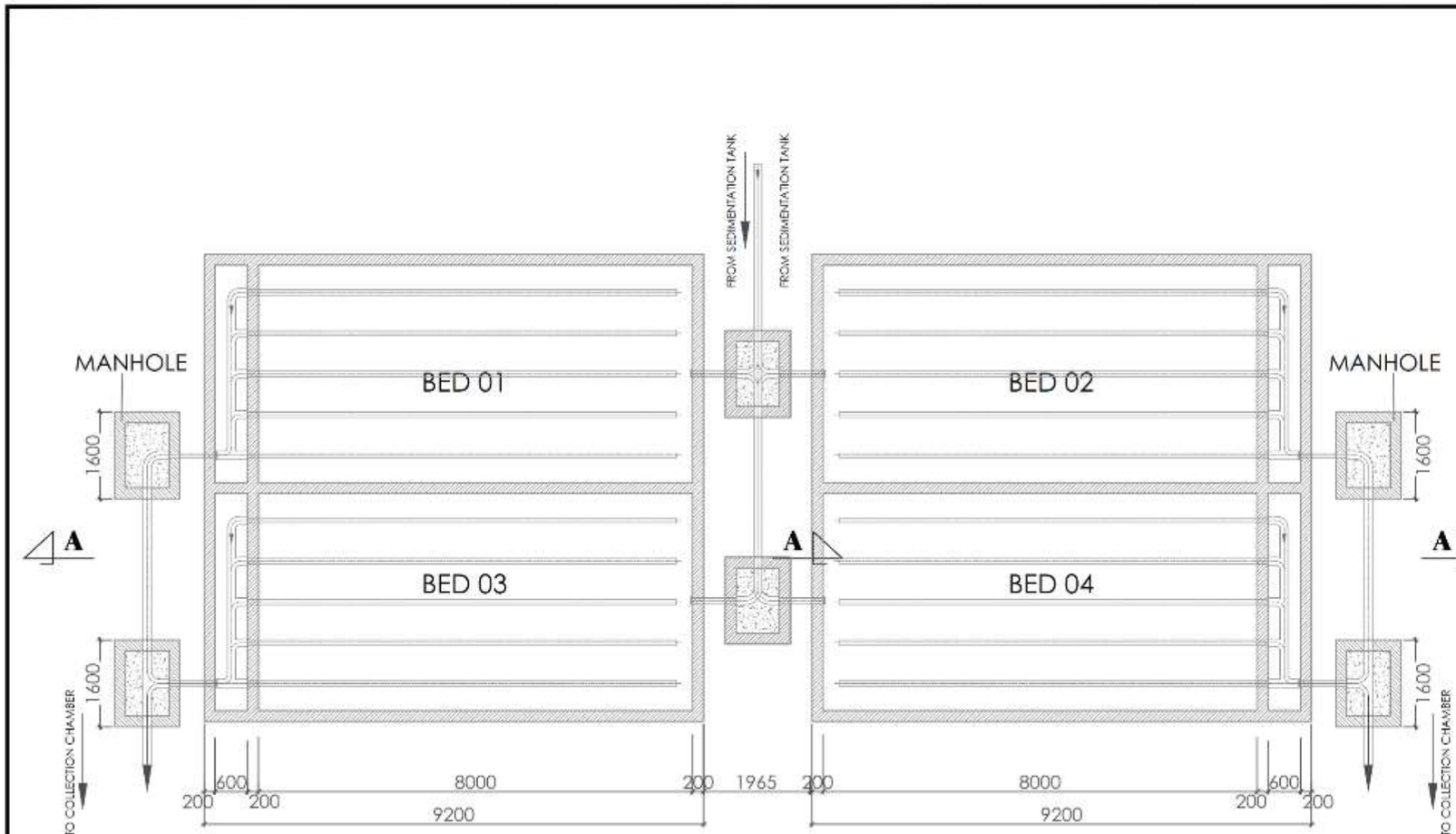
REVISIONS :		
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

BACK WASH TANK
SECTION A-A AND B-B

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-BT-2.5.1
SURVEYED	DPI	DESIGNED	DBD
DRAWN	CDE	CHECKED	DBD
DATE	SEPT 2020	APPROVED	CP



TOP PLAN SCALE, 1:100

NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All levels in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
Head office:
Via della Providenza, 15
35030 Sorravalle di Rubano (PD) Italy
Tel. +39 049 52 76 844
Fax +39 049 89 76 784

STUDIO GALLI INGEGNERIA

REVISIONS :

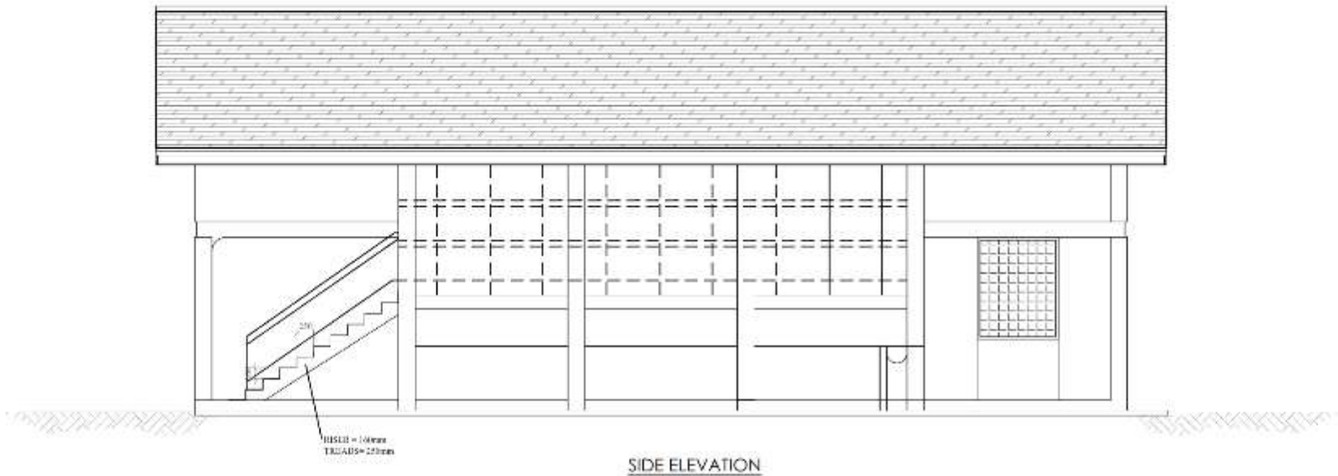
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

SLUDGE DRYING BED
TOP PLAN

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-07-3.6.6
SURVEYED	GW	DESIGNED	GBD
DRAWN	CDE	CHECKED	GBD
DATE	SEPT 2020	APPROVED	GP



NOTES

1). All dimensions in millimetres unless otherwise indicated
2). All leves in metres above sea level
3). Structural details are not included
4). All structural concrete is class 25/10mm aggregate
5). All mass concrete is class 15/10mm aggregate
6). For Site Layout, see Dwg. MWE/LOT1/BUS/W/1.0.0

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

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

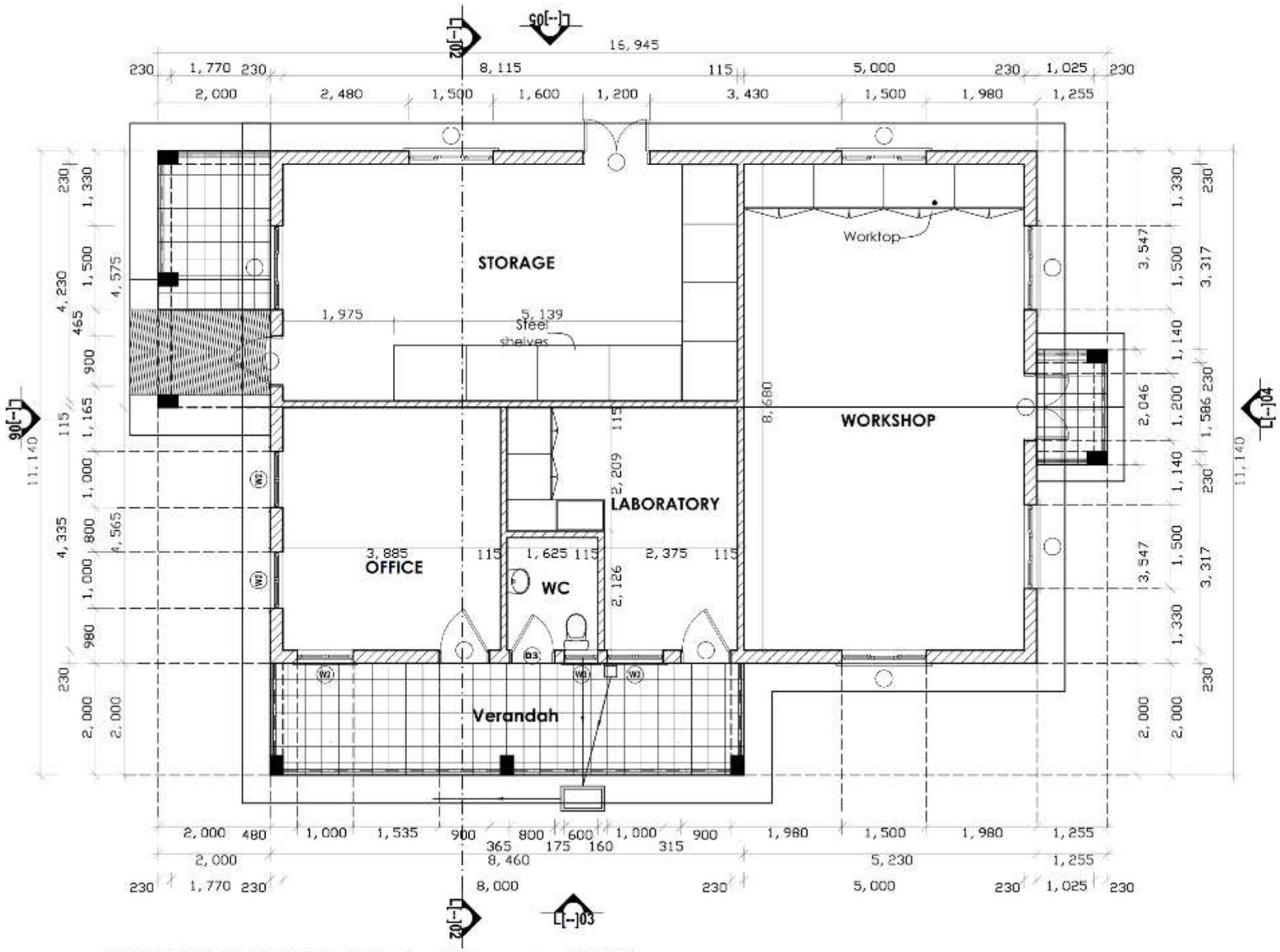
REVISIONS :

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
CHEMICAL HOUSE
SECTIONAL PLAN & ELEVATION

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KIT-3.7.0
SURVEYED	GW	DESIGNED	GSD
DRAWN	CDE	CHECKED	GSD
DATE	SEPT 2020	APPROVED	GP



GROUND FLOOR PLAN [L--]01 scale 1:100

2). All levels in metres above sea level

3). Structural details are not included

4). All structural concrete is class 25/10mm aggregate

5). All mass concrete is class 15/10mm aggregate

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

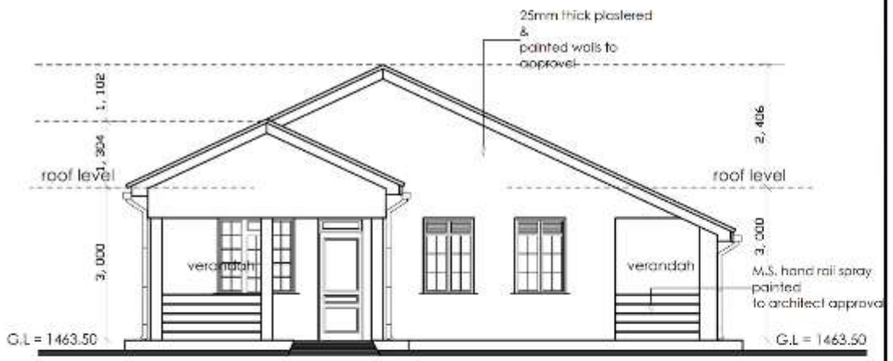
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
WORKSHOP & OFFICE
GROUND PLAN

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KIT-3.5.0
SURVEYED	EPK	DESIGNED	OBD
DRAWN	CDE	CHECKED	OBD
DATE	SEPT 2020	APPROVED	CP

ELEVATION L[--]04 scale 1:100



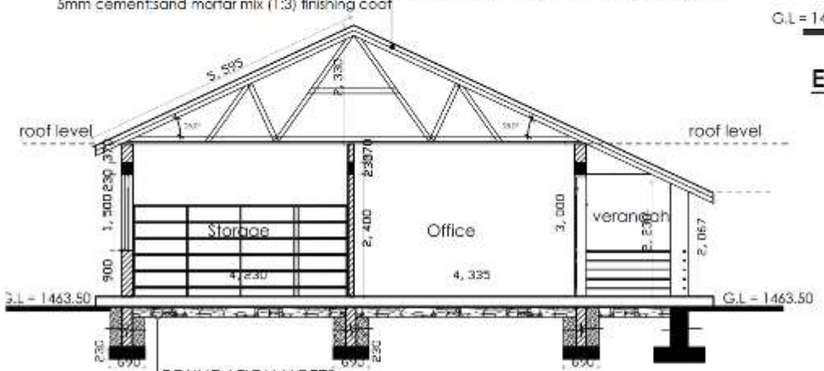
ELEVATION L[--]06 scale 1:100

CEILING NOTES

100 x 50mm Blanderings & ceiling joist @1n
tie beam AT 600mm c/c
15mm thick cement:sand mortar mix (1:3) on
Stretched emi
5mm cement:sand mortar mix (1:3) finishing coat

ROOF NOTES

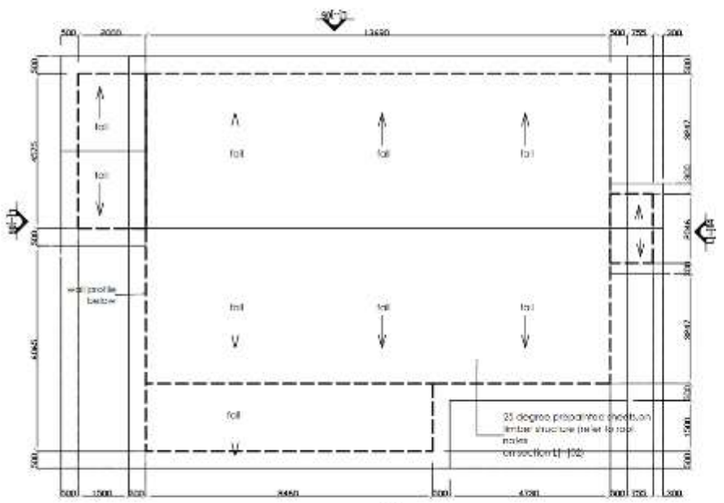
Roof pitch 25°
pre-painted roofing sheets on
75 x 50mm purlins on
150 x 50mm Rafters at 1800mm c/c with
150 x 50mm struts and ties on
150 x 50mm Tie Beam on
150 x 75mm Wall plate
Fascia and Barge boards are to be 225 x 25mm



FOUNDATION NOTES

100mm high skirting (mahogany) on
floor finish as specified on
25mm thick cement screed on
150mm thick concrete floor slab mix(1:3:6)12mm agg on
200mm thick well compacted & approved hardcore filling on
Consolidated murram
690 x230mm concrete strip foundation slab mix(1:3:6)19mm agg in
Well levelled and rammed trenches whose depths are to be determinrd on site
Levels are to be checked before ground breaking

SECTION L[--]05 scale 1:100



ROOF PLAN [L--]07 scale 1:150

2). All levels in metres above sea level

3). Structural details are not included

4). All structural concrete is class 25/10mm aggregate

5). All mass concrete is class 15/10mm aggregate

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingegneria S.r.l.
STUDIO GALLI INGEGNERIA

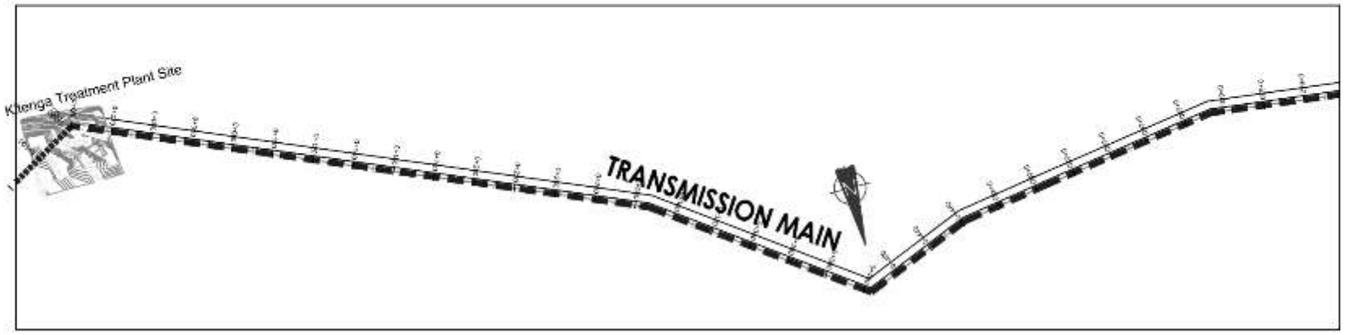
REVISIONS :

No	Date	Description

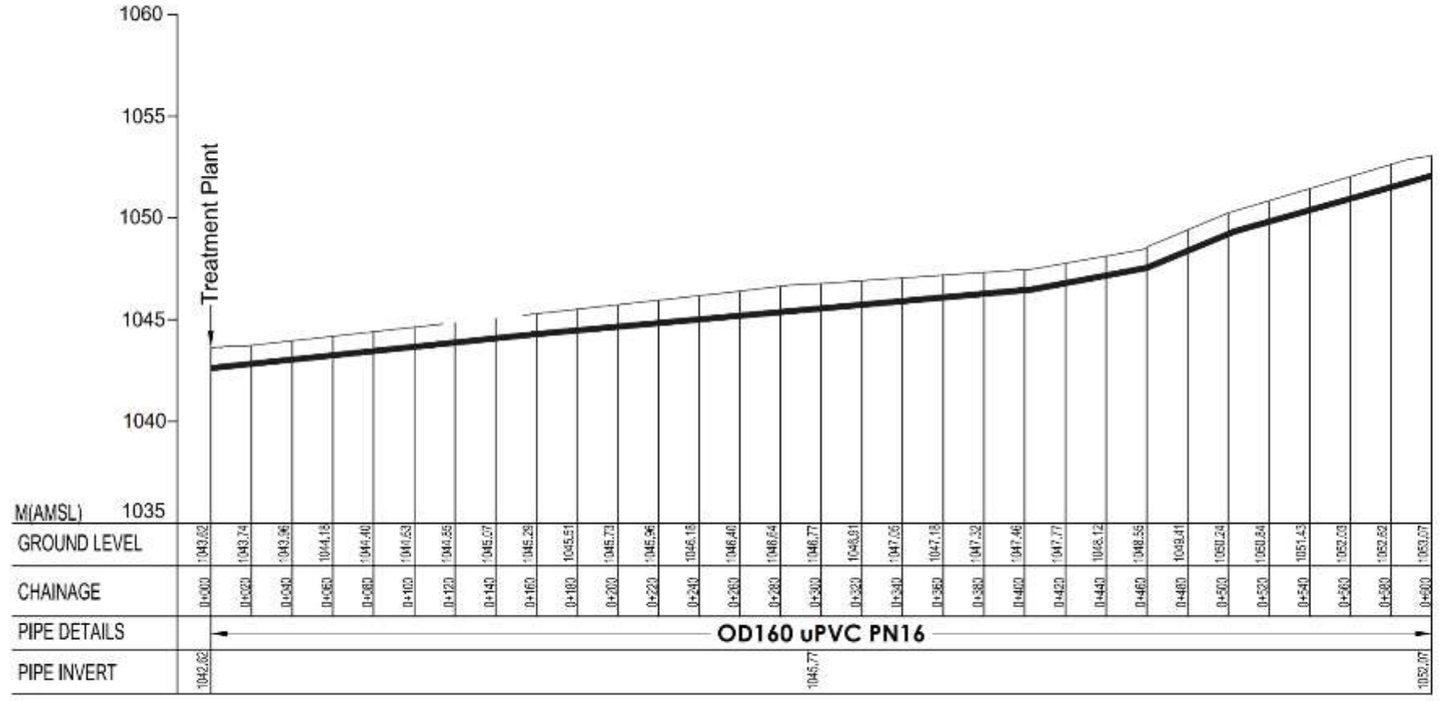
DETAILED ENGINEERING DESIGN

DRAWING TITLE
WORKSHOP & OFFICE
ELEVATION L[--]04 & 06 & SECTION

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KIT-3.6.2
SURVEYED	EPK	DESIGNED	CBD
DRAWN	CDE	CHECKED	CBD
DATE	SEPT 2020	APPROVED	CP



PLAN LAYOUT



LONGITUDINAL PROFILE

NOTES

1. All dimensions are in millimetres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/MWE/KIT/0.0.0
4. For Standard details see sheets as follows

Level Indicator	Sd 220
Outfall Chamber	Sd 116
Marker Post	Sd 117
Thrust Blocks	Sd 118
Pipe beddings	Sd 121

5. All valves, hydrants and washout locations are identified by marker post in positions.

LEGEND

- Water pipeline
- Ground Level
- Building/House
- Contours
- Road
- DAV — Double Orifice Air Valve
- WO_2 — Type 2 Washout
- (10) — Node detail No. 101

Vertical Scale: 0 8.0 16.0 — 1:250 Metres
Horizontal Scale: 0 80 160 — 1:2500 Metres

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

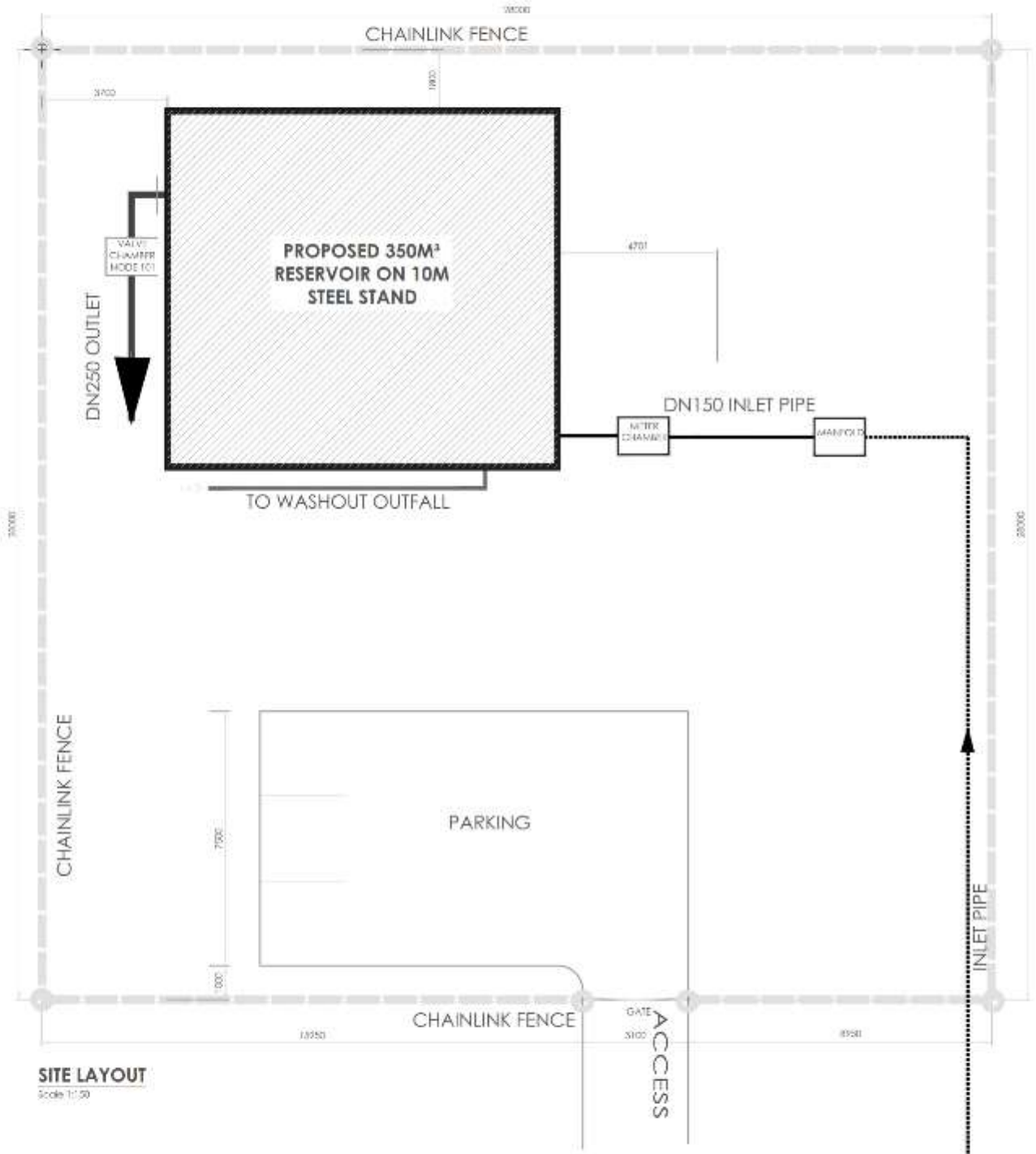
CONSULTANTS
SGI Studio Galli Ingegneria S.r.l.
Head office:
Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 788

REVISIONS :		
No.	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
TRANSMISSION MAIN 1
CH 0+000.00 - CH 0+600.00

SCALE	1:2500	DRAWING No.	SGI-MWE-KIT-2.1.0
SURVEYED	GW	DESIGNED	OBD
DRAWN	CDE	CHECKED	OBD
DATE	SEPT 2020	APPROVED	CF



SITE LAYOUT

Scale 1:50

NOTES

1. All dimensions are in mm unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg: SGI MWE KIT 0.0.0
4. Structural details are not included.
5. All structural concrete is Class 25/10.
6. 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 Assesments of Piped Water Supply and Sanitation Systems in Selected Stand RGCs Across the Country-LOT 5

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAURO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
Head office
Via delle Providenze, 15
Tel. +39 049 87 76 544
Fax. +39 049 89 76 584

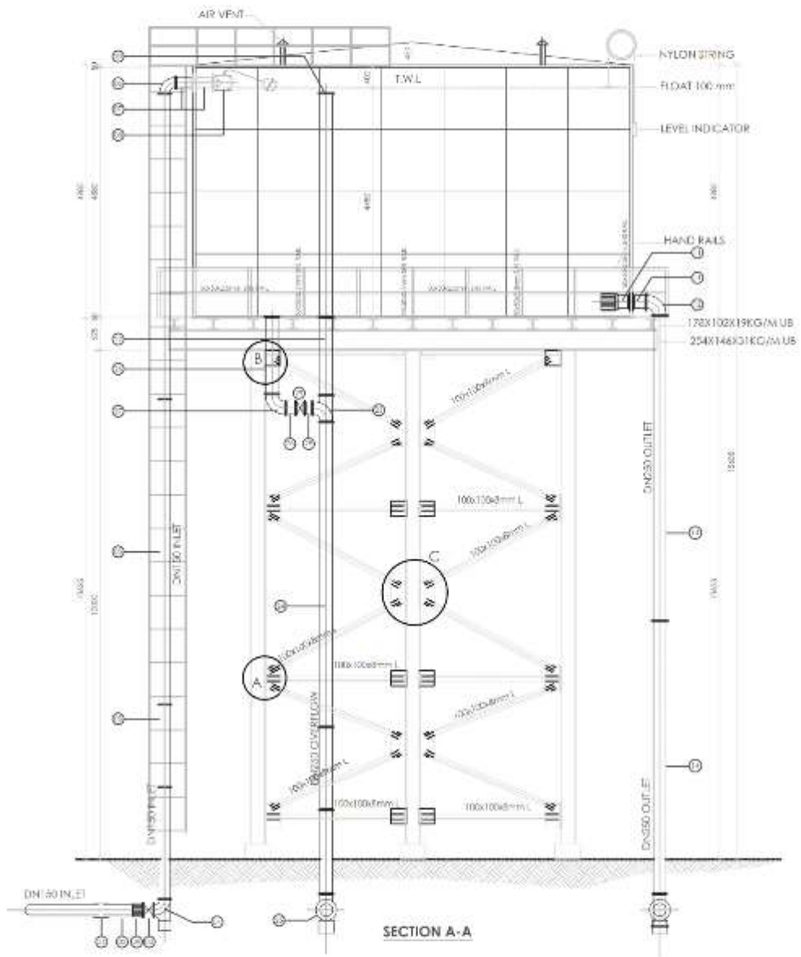
REVISIONS :		
No	Date	Description

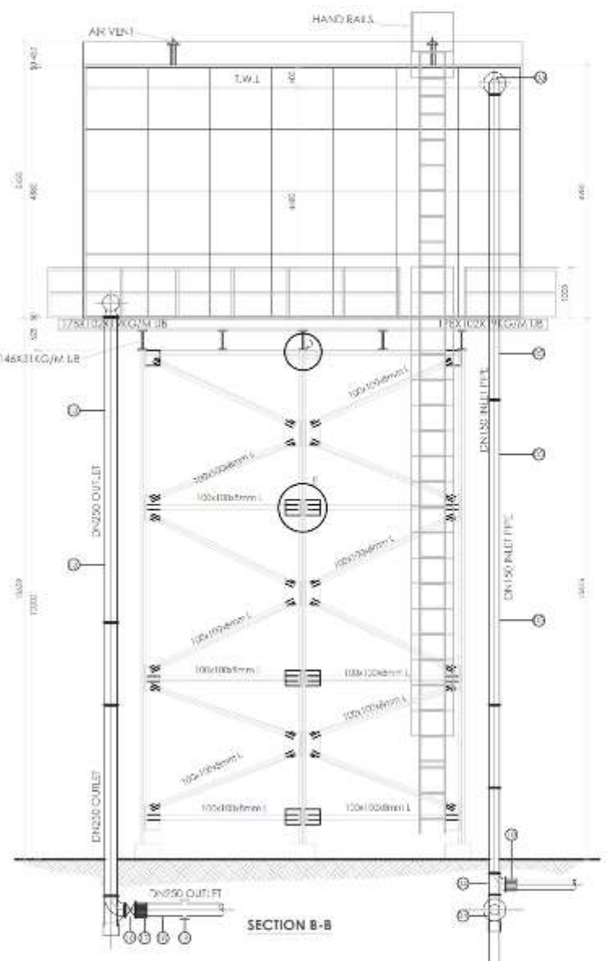
DETAILED ENGINEERING DESIGN

DRAWING TITLE

350M³ RESERVOIR TANK
SITE LAYOUT PLAN

SCALE	1:50	DRAWING No.	SGI-MWE-KIT-0.0.0
SURVEYED	GW	DESIGNED	DBD
DRAWN	CDE	CHECKED	DBD
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. For Site location see Dwg. SGI-MWE-K1-0.0.3
4. Structural details are not included.
5. All structural concrete is Class 25/10.
6. All mass concrete is Class 15/10.

PIPE FITTING SCHEDULE

1. 1No.DN150 Coupling.
2. 1No.DN150 Pipe not exceeding 2.0m.
3. 1No.DN150 All Flanged Gate Valve.
4. 1No.DN150 All Flanged Duck foot 90° bend.
5. 3No.DN150 Double Flanged Pipe not exceeding 6.0m.
6. 1No.DN150 All Flanged 90° bend.
7. 2No.DN150 Double Flanged Pipe not exceeding 0.6m.
8. 1No.DN150 Flanged Ball Float Valve.
9. 1No.DN150 Flanged Adaptor,Maxi type or similar.
10. 1No.DN150 Flanged Outlet Pipe Strainer.
11. 2No.DN250 Double Flanged Pipe not exceeding 0.6m.
12. 1No.DN250 All Flanged 90° bend.
13. 2No.DN250 Double Flanged Pipe not exceeding 6.0m.
14. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
15. 1No.DN250 All Flanged Duck foot 90° bend.
16. 1No.DN250 Flanged Gate Valve.
17. 1No.DN250 Flanged Adaptor,Maxi type or similar.
18. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
19. 1No.DN250 Coupling.
20. 1No.DN250 Flanged Bell Mouth.
21. 1No.DN250 Double Flanged Pipe not exceeding 2.8m.
22. 1No.DN250 Double Flanged Pipe not exceeding 2.0m.
23. 1No.DN250/100 All Flanged Tee.
24. 2No.DN250 Double Flanged Pipe not exceeding 6.0m.
25. 1No.DN250 All Flanged Duck foot 90° bend.
26. 1No.DN250 All Flanged Pipe with puddle flange n.e 3.0m.
27. 1No.DN250 All Flanged 90° bend.
28. 1No.DN250 Double Flanged Pipe not exceeding 0.4m.
29. 1No.DN250 Flanged Gate Valve.
30. 1No.DN250 Flanged Adaptor,Maxi type or similar.

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingegneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

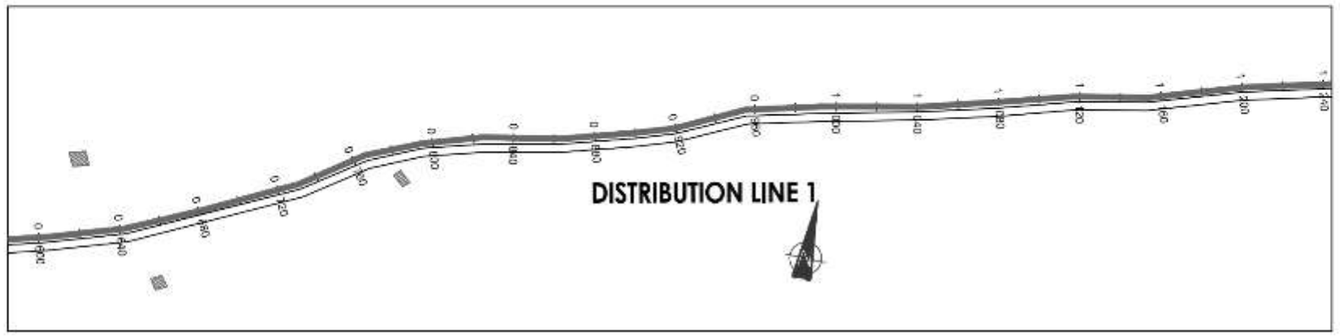
No	Date	Description

DETAILED ENGINEERING DESIGN

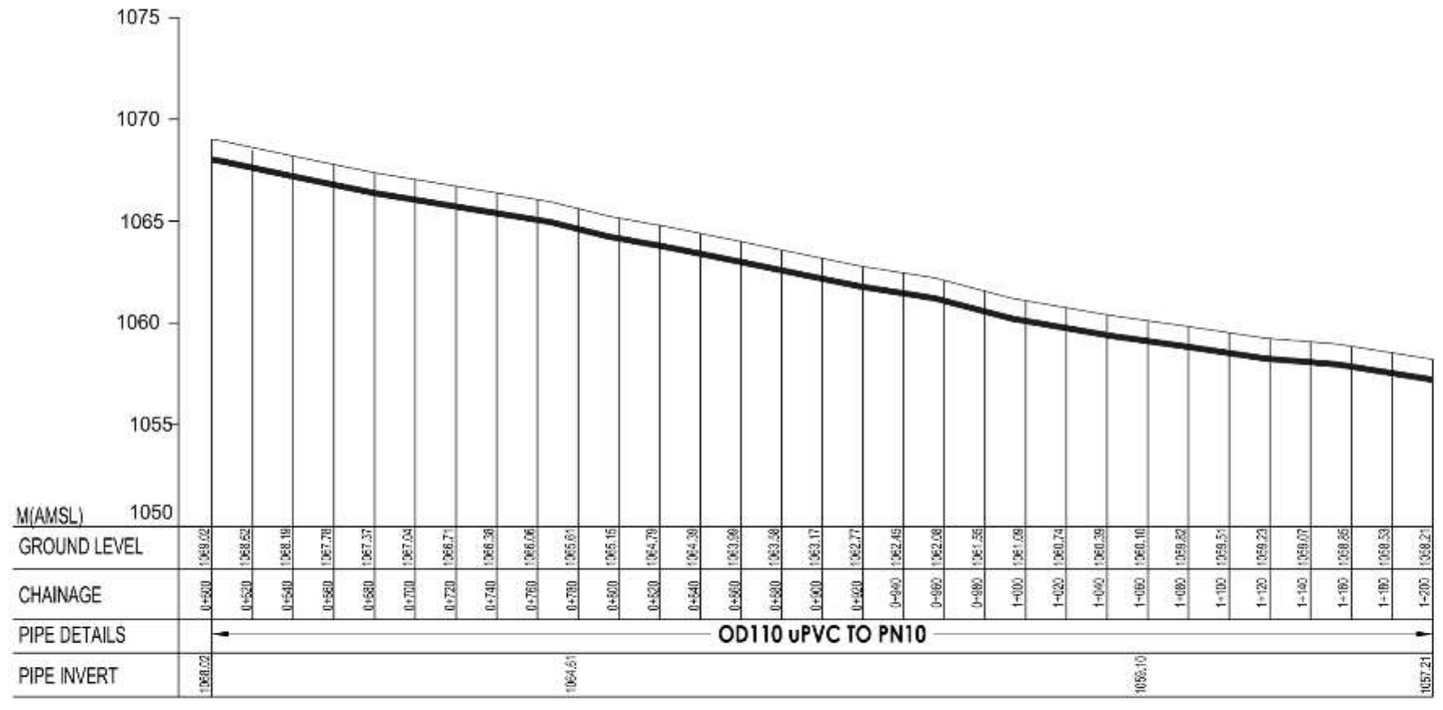
DRAWING TITLE

350M³ RESERVOIR TANK
SECTION A-A AND B-B

SCALE	1:100	DRAWING No.	SGI MWE KIT 5.1.2
SURVEYED	GIN	DESIGNED	GSD
DRAWN	CSS	CHECKED	DND
DATE	SEPT 2020	APPROVED	CP



PLAN LAYOUT



LONGITUDINAL PROFILE

NOTES

1. All dimensions are in millimetres unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI/MWE/KIT/0.0.0
4. For Standard details see sheets as follows

Level Indicator	Sd 220
Outfall Chamber	Sd 116
Marker Post	Sd 117
Thrust Blocks	Sd 118
Pipe beddings	Sd 121

5. All valves, hydrants and washout locations are identified by marker post in positions.

LEGEND

- Water pipeline
- Ground Level
- Building/House
- Contours
- Road
- DAV — Double Orifice Air Valve
- WO_2 — Type 2 Washout
- (10) — Node detail No. 101

Vertical Scale: 1:250 (0, 8.0, 16.0 Metres)
Horizontal Scale: 1:2500 (0, 80, 160 Metres)

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 6
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingegneria S.r.l.
Head office: Via della Provvidenza, 15, 35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 76 844
Fax +39 049 89 76 784

REVISIONS :

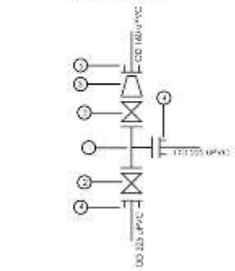
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
DISTRIBUTION MAIN 1
CH 0+600.00 - CH 1+200.00

SCALE	1:2500	DRAWING No.	SGI-MWE-KIT-6.1.1
SURVEYED	GW	DESIGNED	OBD
DRAWN	CDE	CHECKED	OBD
DATE	SEPT 2020	APPROVED	CF

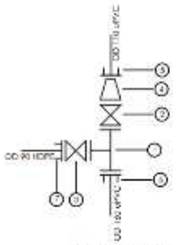
NODE KIT N01



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	200/200	1	10
2.	CI FLANGED GATE VALVE	200	2	10
3.	CI FLANGED TAPER	200/150	1	10
4.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN200XDO225	2	10
5.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	1	10

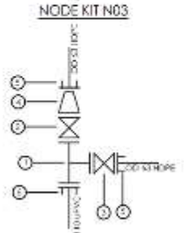
NODE KIT N02



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	100/100	1	10
2.	CI FLANGED GATE VALVE	100	1	10
3.	CI FLANGED GATE VALVE	80	1	10
4.	DI FLANGED TAPER	100/100	1	10
5.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDO110	1	10
6.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	1	10
7.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XDO90	1	10

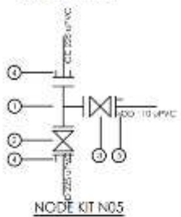
NODE KIT N03



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	100/50	1	10
2.	CI FLANGED GATE VALVE	100	1	10
3.	CI FLANGED GATE VALVE	50	1	10
4.	DI FLANGED TAPER	100/50	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN50XDO63	2	10
6.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDO110	1	10

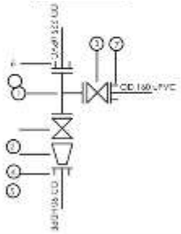
NODE KIT N04



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	200/100	1	10
2.	CI FLANGED GATE VALVE	200	1	10
3.	CI FLANGED GATE VALVE	100	1	10
4.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN200XDO225	2	10
5.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDO110	1	10

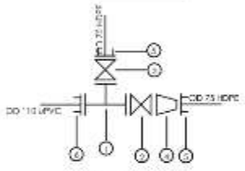
NODE KIT N05



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	200/150	1	10
2.	CI FLANGED GATE VALVE	200	1	10
3.	CI FLANGED GATE VALVE	150	1	10
4.	DI FLANGED TAPER	200X150	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XDO90	1	10
6.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN200XDO225	1	10
7.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	1	10

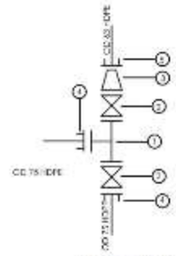
NODE KIT N06



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	100/65	1	10
2.	CI FLANGED GATE VALVE	100	1	10
3.	CI FLANGED GATE VALVE	65	1	10
4.	DI FLANGED TAPER	100/65	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN65XDO75	2	10
6.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDO110	1	10

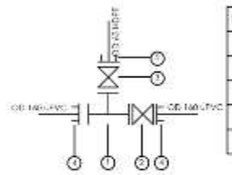
NODE KIT N07



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	ALL FLANGED TEE	65/65	1	10
2.	CI FLANGED GATE VALVE	65	2	10
3.	DI FLANGED TAPER	65/50	1	10
4.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN63XDO75	2	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN50XDO63	1	10

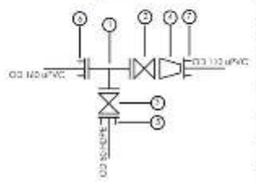
NODE KIT N08



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	150/50	1	10
2.	CI FLANGED GATE VALVE	150	1	10
3.	CI FLANGED GATE VALVE	50	1	10
4.	DI FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	2	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN50XDO63	1	10

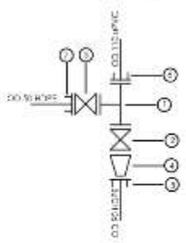
NODE KIT N09



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	150/80	1	10
2.	CI FLANGED GATE VALVE	150	1	10
3.	CI FLANGED GATE VALVE	80	1	10
4.	DI FLANGED TAPER	150/100	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XDO90	1	10
6.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN100XDO110	1	10
7.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	1	10

NODE KIT N10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	CI ALL FLANGED TEE	200/150	1	10
2.	CI FLANGED GATE VALVE	200	1	10
3.	CI FLANGED GATE VALVE	150	1	10
4.	DI FLANGED TAPER	200/150	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	1	10
6.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN200XDO225	1	10
7.	ALL FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN150XDO160	1	10

LEGEND

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

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
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Fax +39 (0)438 76 780

STUDIO GALLI INGEGNERIA

REVISIONS :

No.	Date	Description

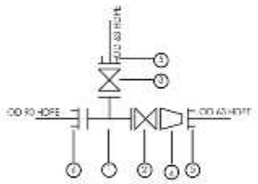
DETAILED ENGINEERING DESIGN

DRAWING TITLE

PIPE NODE DETAILS

SCALE	NTS	DRAWING No.	SGI-KWC-IET-7.0.0
SURVEYED	GW	DESIGNED	DRD
DRAWN	CDE	CHECKED	DRD
DATE	SEPT 2020	APPROVED	CP

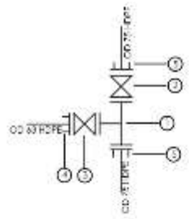
NODE KIT N11



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	80/50	1	10
2.	DI FLANGED GATE VALVE	80	1	10
3.	DI FLANGED GATE VALVE	50	1	10
4.	DI FLANGED TAPER	80/50	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XOD63	2	10
6.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XOD90	1	10

NODE KIT N12



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	DI ALL FLANGED TEE	65/50	1	10
2.	DI FLANGED GATE VALVE	65	1	10
3.	DI FLANGED GATE VALVE	50	1	10
4.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XOD63	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAXI TYPE OR SIMILAR)	DN80XOD75	1	10

NODE KIT N13, 14, 15, 16, 17, 18, 22

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	80	1	10

NODE KIT N19,20

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	60	1	10

NODE KIT N2, 23

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	80	1	10

LEGEND

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
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Tel. +39 049 89 75 844
Fax +39 049 89 70 784

REVISIONS :

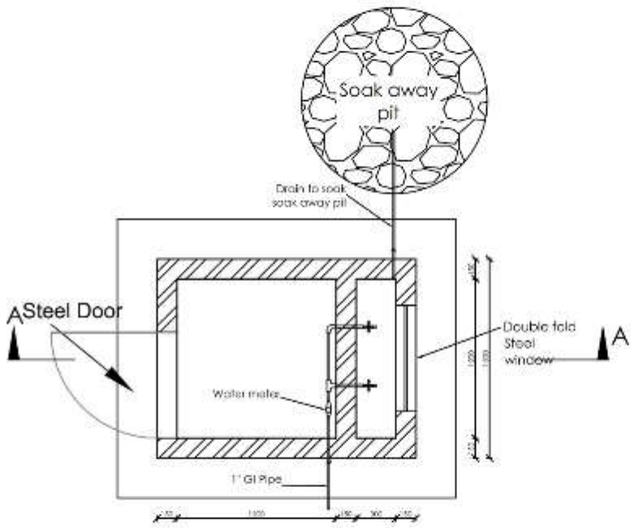
No	Date	Description

DETAILED ENGINEERING DESIGN

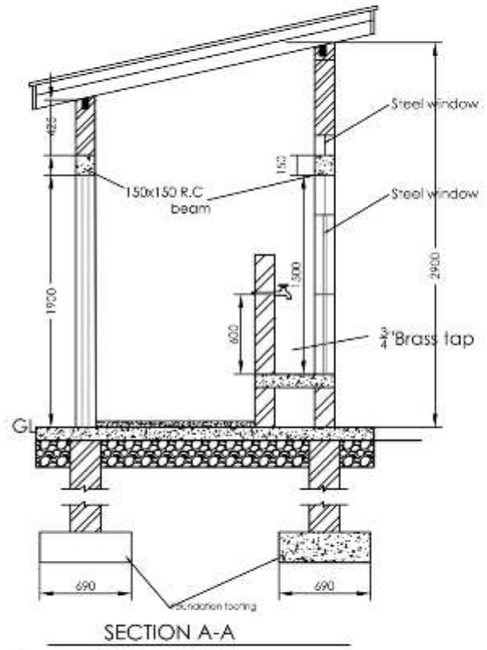
DRAWING TITLE

PIPE NODE DETAILS

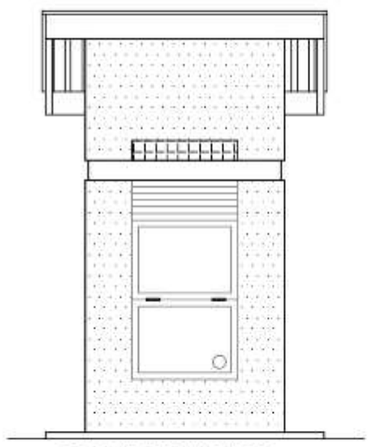
SCALE	NTS	DRAWING No.	SGI-MWE-KT-7.0.1
SURVEYED	GW	DESIGNED	DMG
DRAWN	LDE	CHECKED	DMG
DATE	SEPT 2020	APPROVED	GP



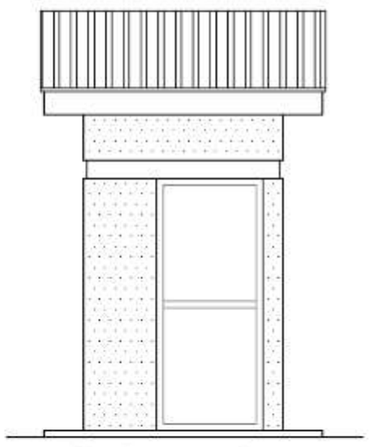
GROUND PLAN



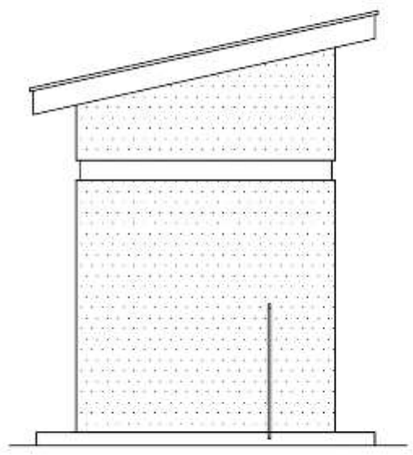
SECTION A-A



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

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 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS

SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

No	Date	Description

DETAILED ENGINEERING DESIGN

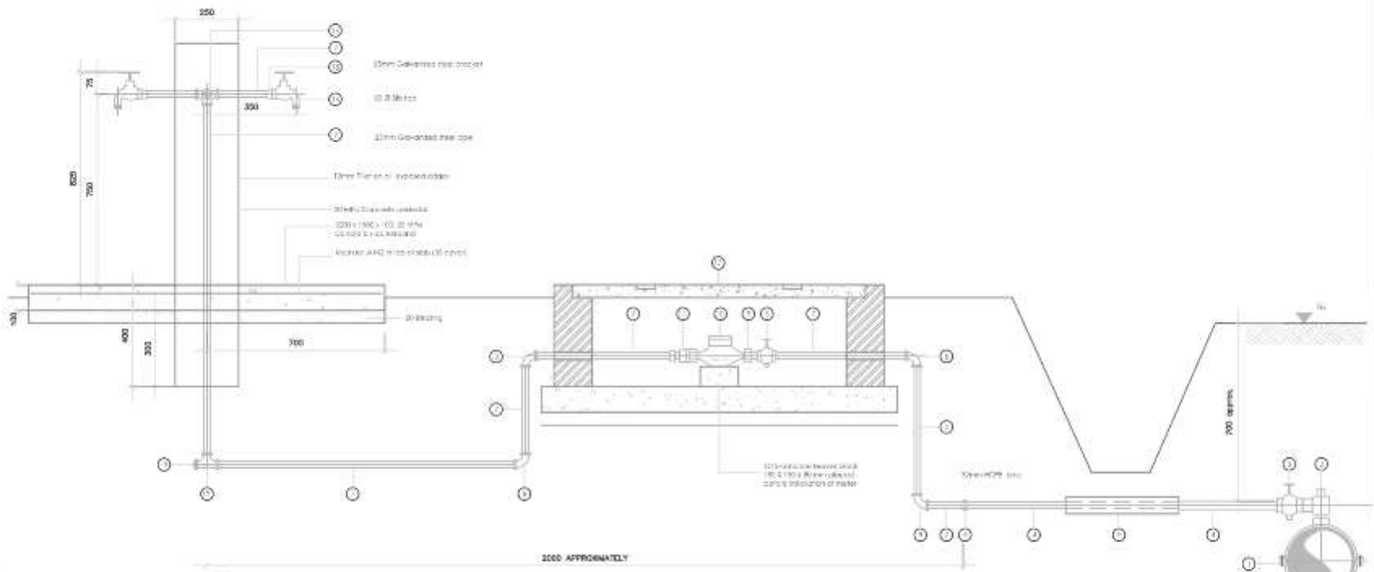
DRAWING TITLE

TYPICAL WATER KIOSK
PLAN, SECTIONS AND ELEVATIONS

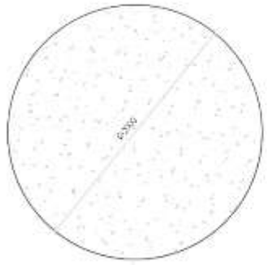
SCALE	AS SHOWN	DRAWING No.	SGI-M/WE-KIT-S.0.0
SURVEYED	GW	DESIGNED	OBO
DRAWN	CDF	CHECKED	OBO
DATE	SEPT 2020	APPROVED	DT

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	STOP TAP	1
4	32mm HDPE PIPE PIECE	1
5	1.0m GMS S. SLEEVE	1
6	32mm Ø - 32YE/25mm ØGMS COUPLING	1
7	25mm Ø GMS PIPE PIECE	15
8	25mm Ø GMS KT BEND	2
9	MALE THREADED CONNECTOR	1
10	25mm Ø WATER METER	1
11	25mm Ø ADJUSTING COUPLING	1
12	25mm Ø GMS EQUAL TEE	3
13	25mm Ø P.VC	1
14	25mm Ø GMS TEE	1
15	25mm GALVANIZED STEEL BRACKET	6
16	BIB TAP	6
17	METER CHAMBER	1

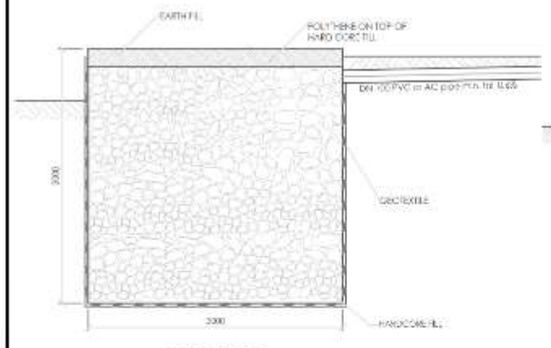


WATER MAIN TO STANDPIPE CONNECTION SECTIONAL ELEVATION



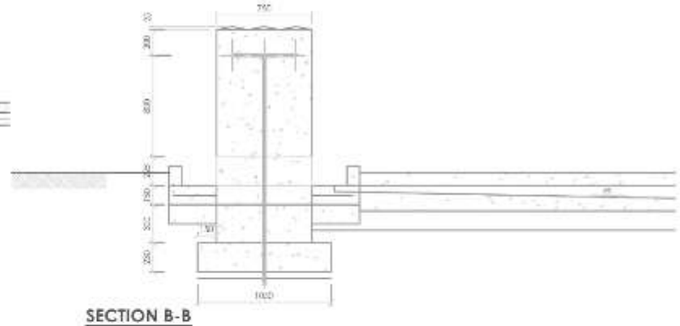
C

SECTION B-B



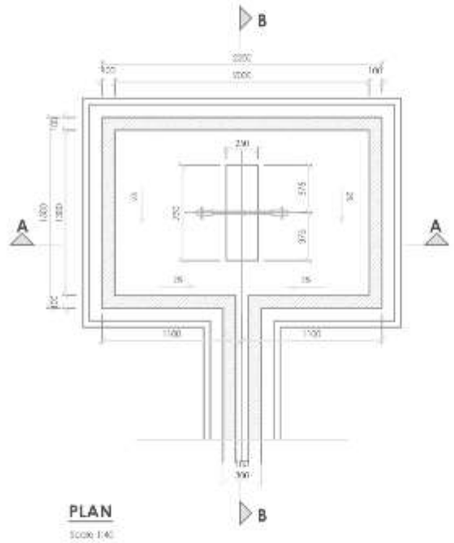
SECTION C-C

SOAKAWAY



SECTION B-B

STANDPIPE



PLAN

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 RGCs Across the Country-LOT 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KAJIRO DISTRICT

CONSULTANTS

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Via della Provvidenza, 10
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tel. +39 (0)11 93 76 666
fax +39 (0)11 93 76 744

STUDIO GALLI INGEGNERIA

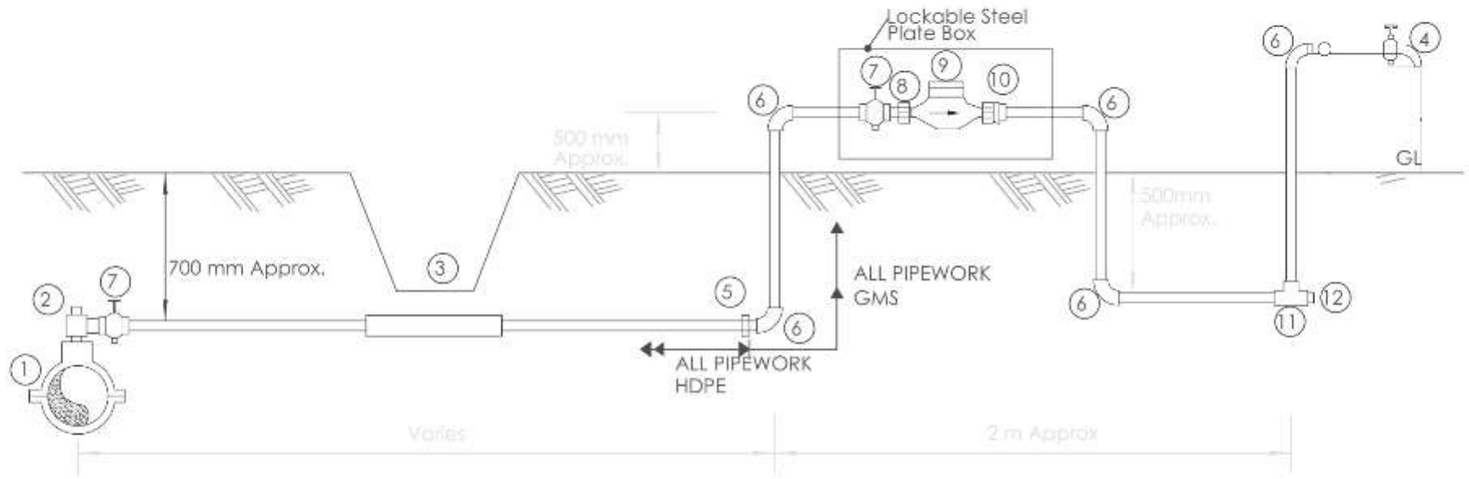
REVISIONS :		
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

TYPICAL STAND POST
PLAN AND SECTION

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KT-9.0.0
SURVEYED	GW	DESIGNED	OBD
DRAWN	CDE	CHECKED	OBD
DATE	SEPT 2020	APPROVED	CP



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

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 50no RGCs Across the Country-LOT 8

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

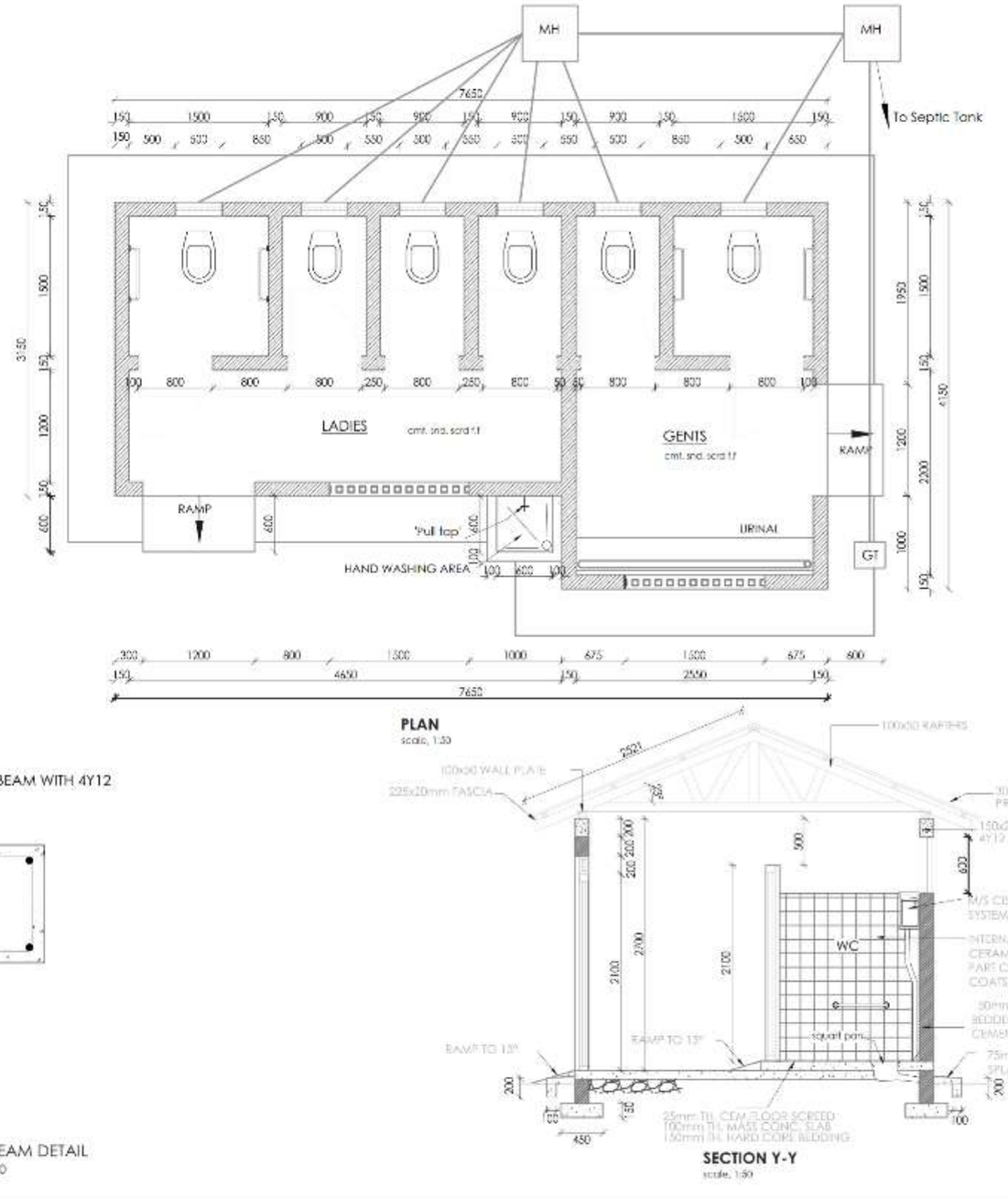
REVISIONS :

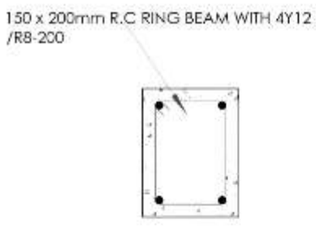
No	Date	Description

DETAILED ENGINEERING DESIGN

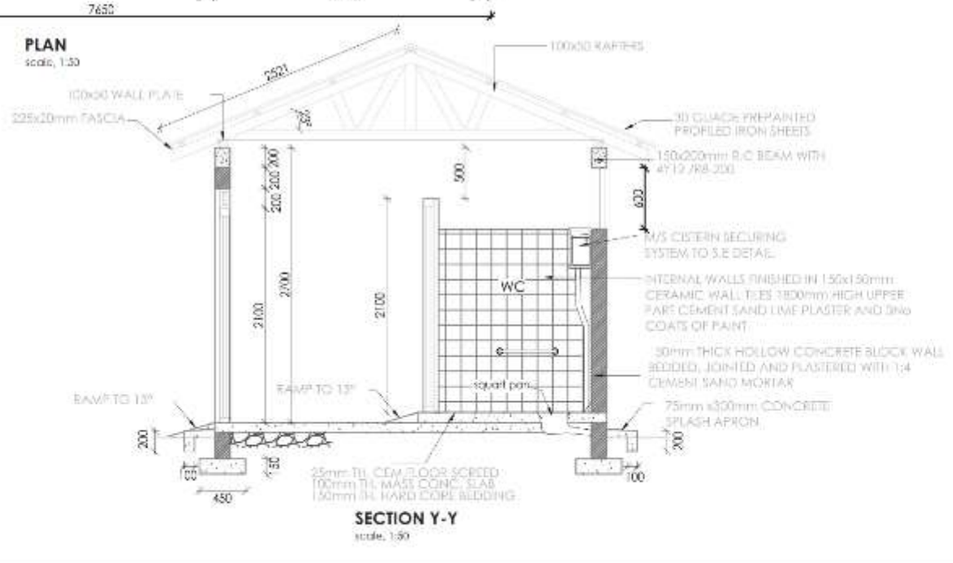
DRAWING TITLE
TYPICAL YARD CONNECTION
PLAN AND SECTION

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-07-11-030
SURVEYED	GW	DESIGNED	CBK2
DRAWN	CDE	CHECKED	CBK2
DATE	SEPT 2020	APPROVED	CP





RING BEAM DETAIL
scale, 1:10



SECTION Y-Y
scale, 1:50

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 80no RGCs Across the Country- LOT 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

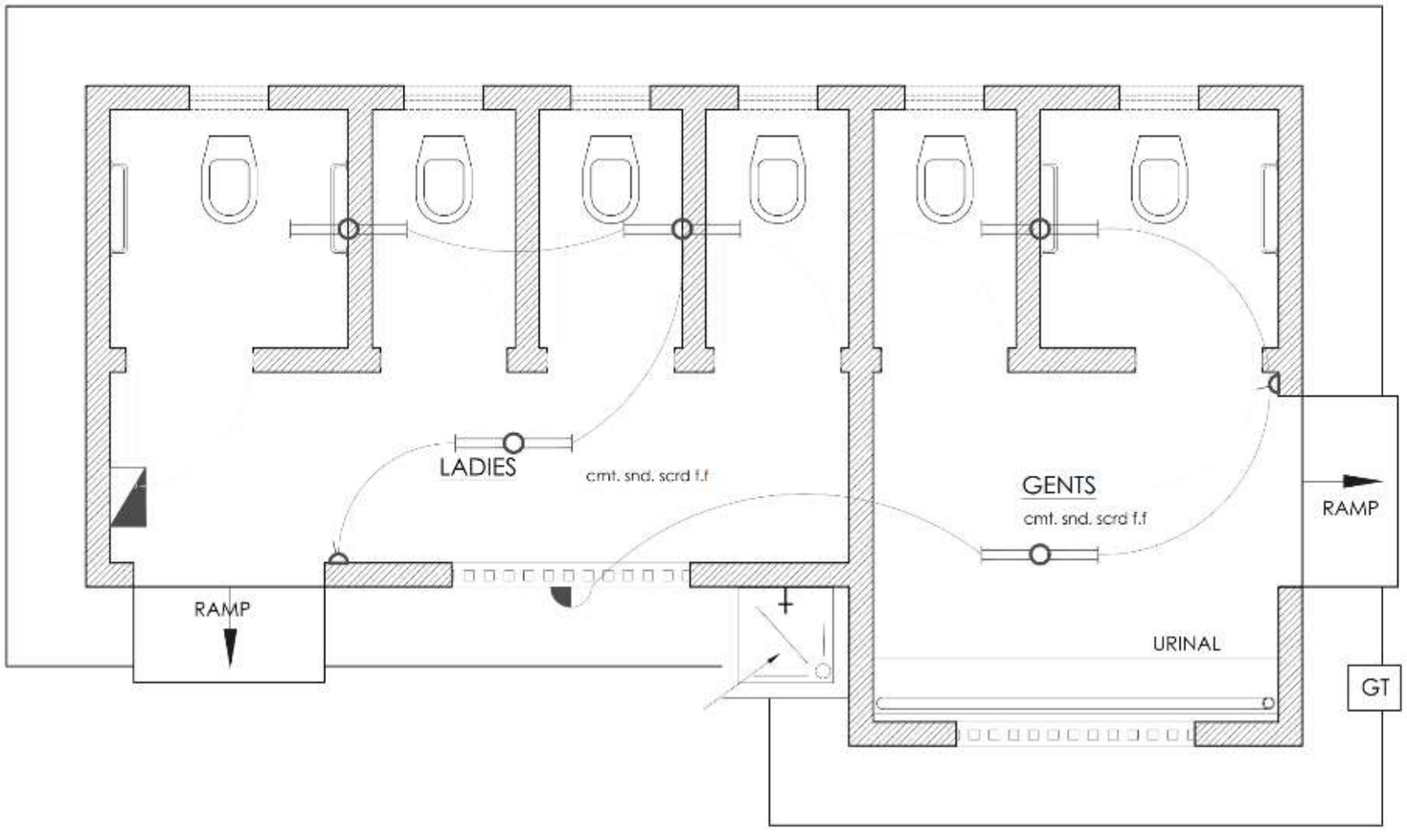
REVISIONS :

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
PUBLIC TOILET
PLAN, SECTION AND RING BEAM DETAIL

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KIT-11-D1
SURVEYED	GW	DESIGNED	DKO
DRAWN	LDA	CHECKED	DKO
DATE	SEPT 2020	APPROVED	CP



PUBLIC TOILET PLAN

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 50no RGCs Across the Country-LOT 6

KITENGA WATER SUPPLY AND SANITATION SYSTEM
IN KALIRO DISTRICT

CONSULTANTS

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Via della Provvidenza, 15
35030 Sarmeola di Rubano (PD) Italy
Tel. +39 049 89 75 544
Fax +39 049 89 76 706

REVISIONS :

No	Date	Description

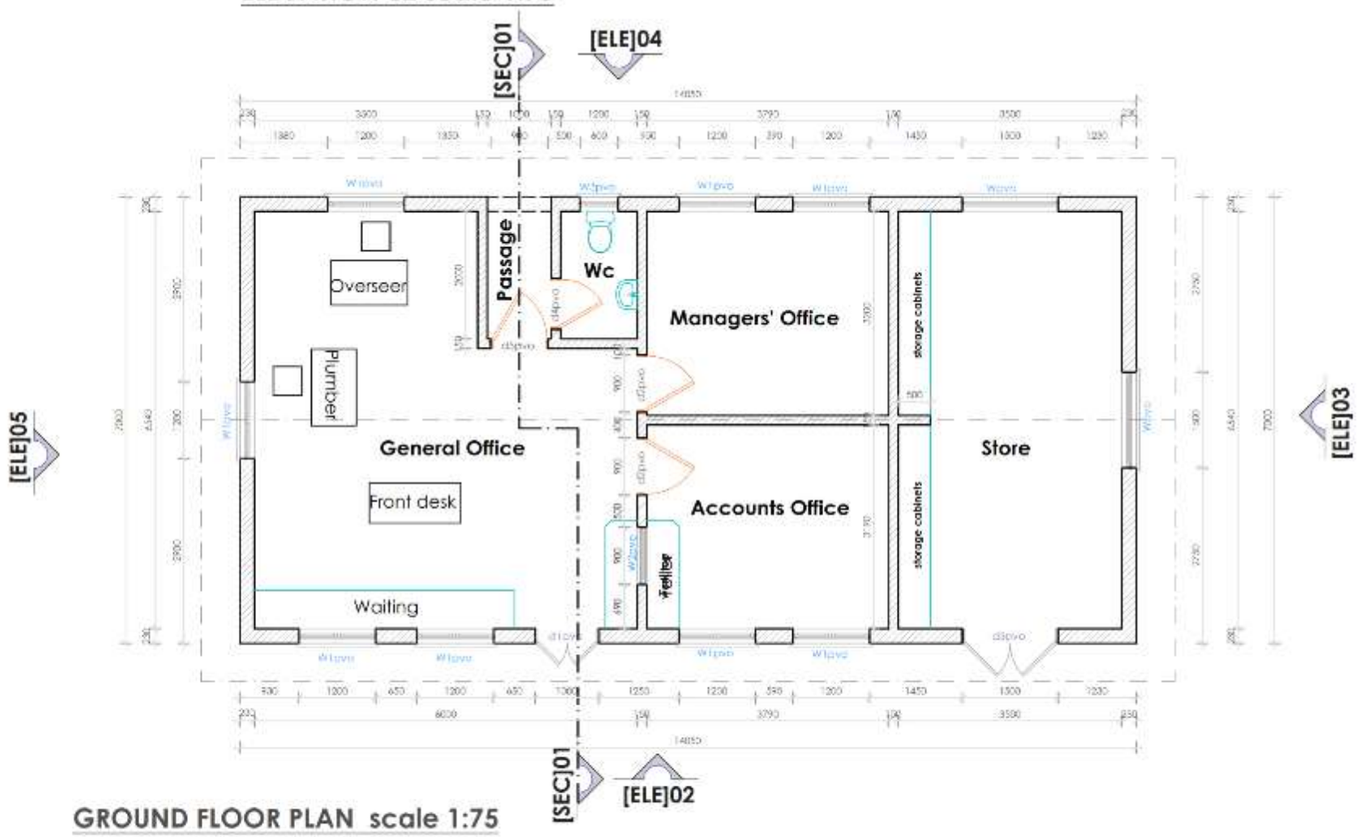
DETAILED ENGINEERING DESIGN

DRAWING TITLE

TYPICAL PUBLIC TOILET
ELECTRICAL LAYOUT

SCALE	NTS	DRAWING No.	SGI-MWE-KITI-11 D.D
SURVEYED	CW	DESIGNED	DRD
DRAWN	EDE	CHECKED	DRD
DATE	SEPT 2020	APPROVED	DP

ELEVATION 02 scale 1:75



GROUND FLOOR PLAN scale 1:75

NOTES

1. All dimensions are in mm unless stated otherwise.
2. All levels are in metres above sea level.
3. For Site location see Dwg. SGI MWE KIT 0.0.0
4. Structural details are not inclouded.
5. All structural concrete is Class 25/10.
6. All mass concrete is Class 15/10.

CLIENT
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 6
KITENGA WATER SUPPLY AND SANITATION SYSTEM IN KALIRO DISTRICT

CONSULTANTS
SGI Studio Galli Ingeneria S.r.l.
STUDIO GALLI INGEGNERIA

REVISIONS :

No.	Date	Description

DETAILED ENGINEERING DESIGN

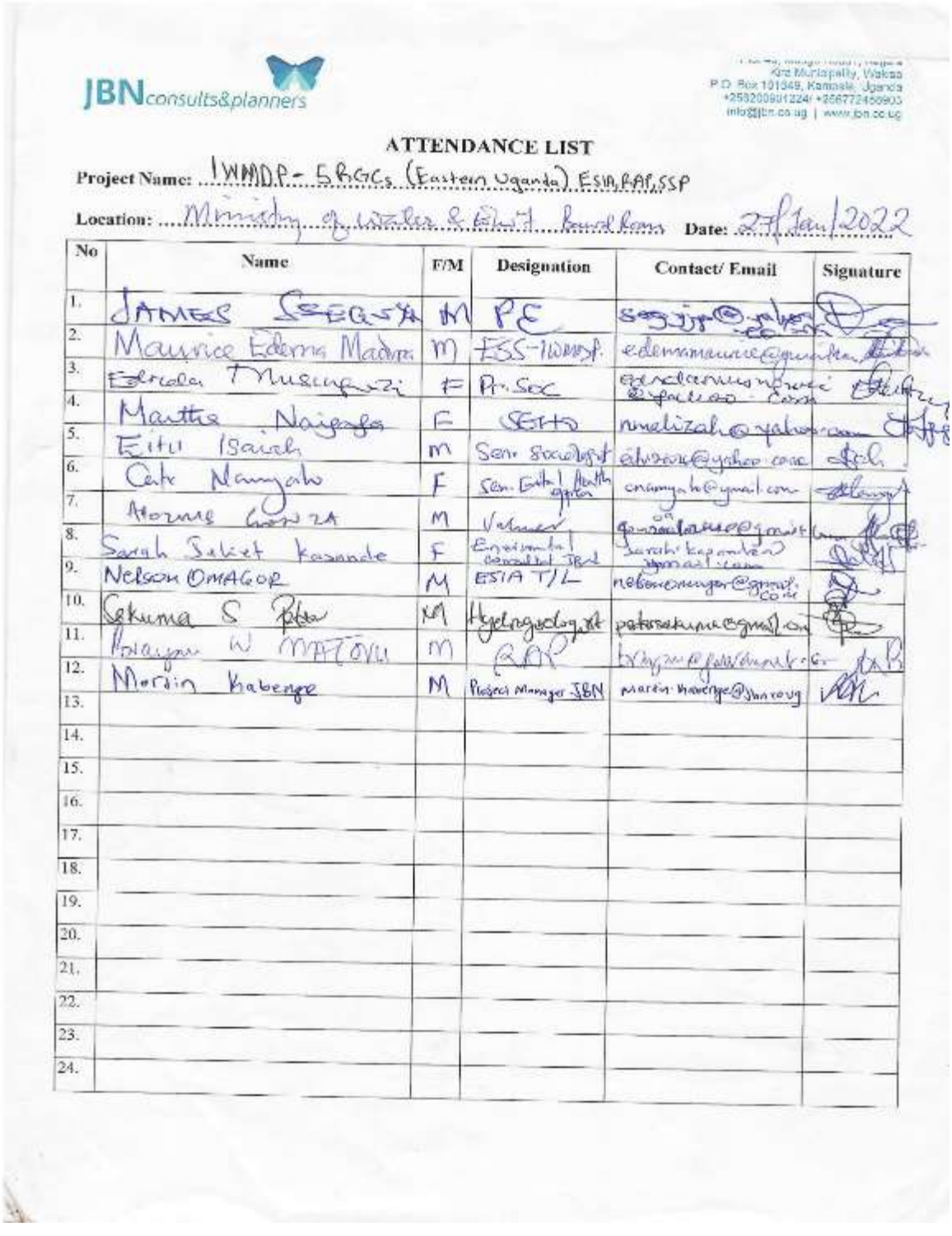
DRAWING TITLE
WATER OFFICE
FLOOR PLAN AND ELEVATION

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-KT-12.0.0
SURVEYED	GM	DESIGNED	GMJ
DRAWN	LDS	CHECKED	GMJ
DATE	SEPT 2020	APPROVED	CF

ANNEX C: SAMPLE SIZE DETERMINATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

ANNEX D: PARTICIPANT LISTS AND MEETING MINUTES



JBN consults&planners

Kira Municipality, Wakiso
P.O. Box 101349, Kampala, Uganda
+256200901224/ +256772456903
info@jbn.co.ug | www.jbn.co.ug

ATTENDANCE LIST

Project Name: IWMDP - 5 RGCs (Eastern Uganda) ESIA, RAP, SSP

Location: Ministry of Water & Environment Boardroom **Date:** 27/Jan/2022

No	Name	F/M	Designation	Contact/ Email	Signature
1.	JAMES SSEGUYA	M	PE	ssegjjr@yahoo.co.uk	
2.	Maurice Ederna Madra	M	ESS-IWMDP	edernamaurice@gmail.com	
3.	Edrada Musinguzi	F	Pr. Soc	edradamusinguzi@yahoo.com	
4.	Martha Najega	F	SESHO	nmelizah@yahoo.com	
5.	Eitu Isaiah	M	Sen. Sociologist	eisaiah@yahoo.com	
6.	Cate Namyalo	F	Sen. Environmental Health officer	cnamyalo@gmail.com	
7.	Morris Ssozi	M	Valuer		
8.	Sarah Suket Kasande	F	Environmental Consultant JBN	sarah.kasande2@gmail.com	
9.	Nelson OMAGOR	M	ESIA T/L	nelsonomagor@gmail.com	
10.	Sekuma S Peter	M	Hydrogeologist	peterssekuma@gmail.com	
11.	Kalanzi W Moses	M	RAP	kalanzimoses@gmail.com	
12.	Morrin Kabenge	M	Project Manager JBN	morrin.kabenge@jbn.co.ug	
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					

ATTENDANCE LIST

Project Name: KIMDP - SRGC (Eastern Uganda)

Location: Kaliro District

Date: 08/12/2022

No.	Name	~~Contact~~ Designation	Email / Contact	Signature
01	BIGIRWA KARISA Ernest	DCAO	bigirwakarisa@gmail.com	
02	Bilay Joseph	RDC	0773167654	
03	Adhanja David	SCE - Water	0777066136	
04	Ivan Moses Okeni	Health & Safety Specialist	Ivan.okeni@kiruyi.ug 0777181064	
05	Nangunga Harriet	In charge	0758542747	
06	JUMIRE NELSON	SPSWO	0706911390	
07	SABAGABO JEHOSAFAT	DH-1	0752 308051	

ATTENDANCE LIST

Project Name: KIMDP - SRGC (Eastern Uganda)

Location: Kaliro District

Date: 08/12/22

No.	Name	~~Contact~~ Designation	Email / Contact	Signature
08	Cate Nangolo	SE/O	cnangolo@gmail.com 0775-175104	
09	Mauttie Naigaga	Com. Coord/FP	nwalizah@yahoo.com 0704012556	
10	Kasande Sarah J.	Consultant SBC Consult/FP	Sarah.kasande@gmail.com 0772765589	

JBN

ATTENDANCE LIST

Project Name: SRGC Kaben Uganda - Kitenga RGC - Kalaa District

Location: Hoto Bukamba Sub County - Kalaa District. Date: 19/07/2022

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	TUGUTONKUNO MOSES	M	VCHP L C III Bukamba RGC	0774211050		
2.	Timothy Joseph Baka	M	BACAO	0704782713		
3.	NTEGEKA CHARLES	M	P. Chief	0771603640		
4.	KAKUNGULU ALEX	M	PARISH CHIEF	0705831949		
5.	Bawalame Moses	M	V/C Tourism	0772834329		
6.	NAHIGOBI SUZAN	F	Dist Production	0774384554		
7.	MUJESI AMIRAH	F	S.P. W.C	0788896143		
8.	AKUMU MANGEZIU	M	Cultural L	0783174806		
9.	MENYA ROSE	M	Catholic Representative	0751944755		
10.	KISUBO JAMES	M	OLC Bukamba	0771566269		
11.	KURUA SSA	M	MALE P/COUNCILLOR	0778726049		
12.	LEGESI SOSI	M	EHA BUKAMBA	0788540116	Sosilegesi@gmail.com	
13.						

JBN

ATTENDANCE LIST

Project Name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES - KITENGA RGC

Location: BUKAMBA SUB COUNTY - KALAA DISTRICT. Date: 19/07/22.

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	MBALUNYA MOSES		member	—		
2.	NAZURI JAFINA			—		
3.	MUGERI RICHARD			0773123871		
4.	NEEZA CHRISTOPHER			0783665270		
5.	LYAMA WILSON			0783161453		
6.	TABENWA RUTH			0776045173		
7.	NAMUBIRU CECILIA			—		
8.	Kitawu Amisi		//	—	—	—
9.	KAMA FAROUK		//	0777898365		
10.	TIBAMWENDA MOSES			—		
11.						
12.						
13.						

JBN
Solutions that last

ATTENDANCE LIST

Project Name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES- KITENGA EGC

Location: BUKAMBA SUBCOUNTY KALIRO DISTRICT Date: 05/10/2022

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	Kalimunza Muzafa	M	member	0786451997		
2.	AZALIYA MOSES	M	"	0786199153		
3.	Swaibu Ikaumya	M		0779559729		
4.	Kainya Steven	M		0785060797		
5.	NYANGA GEORGE	M		0788732182		
6.	LATIF TOLA	M		—		
7.	NAMUYINGO JUSTINE	F		0786117818		
8.	BABI Margret	F		0732127626	0772124266	
9.	Waryenbo Ecalement	M		0761654479		
10.	Kaweesa Jackson	M		0784499954		
11.	Kagande Eric	M		0787191365		
12.	MPANGA PAUL	M		0776873713		
13.	Kaweesa William	M		0760131253		

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Solutions that last

ATTENDANCE LIST

Project Name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES- KITENGA EGC

Location: KISI VILLAGE BUKAMBA SUBCOUNTY KALIRO DISTRICT Date: 05/10/2022

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1	Kaweesa Michael			0777916960		
2.	Muyingo Moses			0778970570		
3.	KAWANGUZI Moses			0775087749		
4.	Bell Beeine			0778903760		
5.	GALOIRE KOSIA			0774565724		
6.	TUMUSIIME FREDRICK			0781585564		
7.	YEKOSANI WOIRE			0788591271		
8.	NAISIKO Hamet			0786444617		
9.	Bagonza Martin			0774442095		
10.	Mulwanza Waqid			0751157777		
11.	KISIRA YOWERI			0776232998		
12.	Bikumbi Yokana			0786478632		
13.	WaSanza adam			0779466644		

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 03/05/2022

Location: BUKAMBA SUBCOUNTY, KAGIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE / WMP.

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
HUSANA KILSON	✓		KIBUYE	FARMER	0775172516	
MUKEMBO ROAGERS	✓		KIBUYE	FARMER	0778044028	
DONGO IDI	✓		MWAITI	FARMER	0771862514	
MUNYOLI JACKSON	✓		Kibuye	FARMER	0779934909	
MUSOKA SAMUSADI CALEB	✓		Kibuye	FARMER	0773341374	
MUKABYO BOSCO	✓		Kibuye	FARMER	0771561135	
BYAMUKAMA MIDREK	✓		Kibuye	FISHER	0783419031	
MUNANGA MUZAFARU	✓		Kibuye	FARMER	0785815523	
BEN BUNYAN	✓		Kibuye	farmer	0[illegible]	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 03/05/22

Location: BUKAMBA SUBCOUNTY, KAGIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES- KITEGA RGC.

Proponent: WMP / MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
WALWASA GREG	✓		Lwamba B		0770539334	
IKOONA SAMUEL	✓		Kyamba B		0782524575	
Kasusa John	✓		Lwamba B		0775916604	
WAIGULO STEPHEN	✓		Kibuye		0771445944	
WAMBI PETER	✓		Lwamba B		0777729150	
BATIRAMALA MOSES	✓		Lwamba B		0783378783	
NAMBOWA Immaculate		✓	Lwamba B		0757568210	
BWEESE Calvin	✓		Lwamba		0779071234	
KAMEME JEA	✓		Lwamba		0788875139	
NAIGAGA SUZAN		✓	Lwamba		0[illegible]	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMF			Environmental Audit	
	RPF			RAP	
	ESIA	✓		Other (specify)	

Date: 03rd/05/2022.
Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES.
Proponent: MWE / WUMOF.

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
MULONI MICHEAL	✓		KIBUYE	member	0772320477	
MAGEMESO HAMIDU	✓		KIBUYE	"	0779703477	
KASENKE JAMES	✓		KIBUYE	"	0773531484	
MUTIBWA BUMALI	✓		KIBUYE	"	0704486133	
BAZILIO RICHARD	✓		KIBUYE		0781832737	
BWEZE MOSES	✓		KIBUYE	"	0777178552	
MULINDI ABEL	✓		KIBUYE		0776641211	
WASWA ALAN	✓		KIBUYE		0772/0745739[illegible]	
BWOOMA ASHRAFU	✓		KIBUYE		0781791404	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMF			Environmental Audit	
	RPF			RAP	
	ESIA	✓		Other (specify)	

Date: 22nd/5/2022
Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES.
Proponent: WUMOF / MWE.

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
KIGOMA GRACE	✓		BUKAMBA	chairman	0783917448	
GISAENGI EDITH		✓	BUKAMBA	Secretary	—	
MUGABE FRANK	✓		Bukamba	Builder	0705178448	
NAMUGANGA ROSE		✓		Farmer	—	
NAMAGEMBE [illegible]		✓	"	Farmer	0777283303	
NAMUGUMYA [illegible]		✓		[illegible]		
MAMBEDE [illegible]	✓		Bukamba	Fisherman	0772/748[illegible]	
SSEMAKULA MUZAMIRU	✓		BUKAMBA	Fisherman	0789592968	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMP			Environmental Audit	
	RPF			RAP	
	ESIA	✓		Other (specify)	

Date: 02/12/2022

Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY & SANITATION FACILITIES

Proponent: MWE / UWASP

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
MAGEZI WILLIAM	✓		KITEGA		0783433786	
BIRALI MUSANA	✓		KITEGA		0771853435	
MIREMBE Lydia		✓	KITEGA		0778698883	
GUNJA AMOS	✓		KITEGA		0774155335	
MOOBI JAKUBU	✓		KITEGA		0742022652	
TUSUBIRA RICHARD	✓		KITEGA		0771693377	
MANGOBI JUSTINE		✓	KITEGA		0772920769	Justine
BABIRYE MARIAM		✓	KITEGA			babirye
KIMSU ALEX	✓		KITEGA		0751594513	
DODOVICO DAVID	✓		KITEGA		0783116284	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMP			Environmental Audit	
	RPF			RAP	
	ESIA	✓		Other (specify)	

Date: 02/12/22

Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES - KITENGA RAC

Proponent: MWE / UWASP

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
NAMULOAD GULAINA		✓	Lwamba	member	0771455548	
BAKIDEWA GEOFREY	M		Lwamba		0784926220	
KURMYA MUSA	M		LWAMBA	member	0775942-8183	
MWASA MICHAEL	M		Lwamba	Member	0780787590	
MABUTI MICROS	M		LWAMBA	MEMBER	0775606172	
BAMLESE DAVID	M		LWAMBA	MEMBER	0787361269	
MUSIRABAN FRED BALMULA	M		LWAMBA	member	0799945906	
Hamza Kateto	M		Lwamba	Member	0741879871	
MUSLIMAMU GODFREY	M		LWAMBA	MEMBER	0771869110	
NABIRYE SYLVIA		✓	LWAMBA	MEMBER	0776441363	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 03/05/22

Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT.

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES- KITENGA RGC.

Proponent: MHEI UMBRI.

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
BAMUKA AGGREY	✓		LWAMBA	MEMBER	0761485521	
MUSAGALA ALICE		✓	LWAMBA	MEMBER	0777918041	
MARINO ROBERT	✓		LWAMBA	MEMBER	0772065047 0706451942	
Muanga Jawari	✓		Lwamba	Member	0781586298	
WAKKO JOSEPH	✓		LWAMBA	MEMBER	0787265401	
Kabirwa Dawas	✓		Lwamba	Member	0772854592	
PAUL KIZIRI MANDARO	✓		LWAMBA	MEMBER	0785820609	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 02/05/22

Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT.

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES- KITENGA RGC

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
Mutaloya CISSY		✓	Kitenga		0782162794	
WINIFRED JAMES	✓	✓	Kitenga		0775842280	
Sabula Rashid	✓		Kitenga		0773292811	
Fred Bodiano	✓		Kitenga	member	0776519471	
Kahuta Hassan Isa	✓		Kitenga		07	
Kapia RIDAM	✓		Kitenga		0739294282	
Waiswa RAMADHANI	✓		Lwamba	Member	0771066792	
Namukose Mariam		✓	Lwamba	member	0761493964	
Namwase Irene		✓	Lwamba	Member		
MUGENI COLLINE		✓	Lwamba	member	0719323662	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 02/05/2022

Location: BUKAMBA SUBCOUNTY / KAGIRO DISTRICT – KITENGA KAGA

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
MUBIRIGO BASHIR	✓		Kitenga		–	
NKUMA ABASA	✓		Kitenga		–	
TITO MULWA	✓		Kitenga	0754	0751928422	
Akiiki Mugoshi	✓		Kitenga		0776777611	
NALWANGA MATHIAS	✓		KITEGA		0772322807	
NKGEMTI BOSCO	✓		KITEGA		0776807561	
MUKASA PATRICK	✓		KITEGA		0782816097	
APOLOT DINAH		✓	KITENGA		0771051542	
AKAMBA SALIM	✓		KITENGA		0783413452	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 03/05/2022

Location: BUKAMBA SUBCOUNTY KAGIRO DISTRICT – 1

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
BODIA IRENE		✓	Kitega		0780570779	
MUZAMIRU SEGUJA			KITENGA		0775754614	
EID TIZOMU	✓		Kitenga		0775761515	
KYAKA ALOSIC	✓		Kitenga		0785090536	
JUMA MOMBWE	✓		KITEGA			
NKOBI JORAM	✓		KITEGA		0785990014	
PELE SIMON	✓		KITEGA		0772854545	
KYOMUKA TEKO	✓		KITEGA		0775611903	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 02nd Jul 2022

Location: BUKANGA SUBCOUNTY, KAMIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY & SANITATION FACILITIES - KITENGA RGC

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
MALINZI CHRISTOPER	✓		NABUSIGA	Member	0779664203	
ZAMU MARIA	✓		NABUSIGA	"	0773724166	
Byarugaba Josephus	✓		NABUSIGA	"	0789331648	
MULOOGI GEOFREY	✓		Bukunya	"	—	
Bateganya MUSA	✓		Nabusiga		0708049689	Musa
Nagaga Sharifa		✓	Nabusiga		0779856251	
MASINO HASAN	✓		Nabusiga		0798823109	
MUTOOKE DENIS	✓		Bunene		0785120980	Mutooke
NANTAYA WILLIAM	✓		Bukunya		—	William
NAMAGANDA RIHANNA		✓	Bukunya		0786381705	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 02nd Jul 2022

Location: BUKANGA SUBCOUNTY, KAMIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES- KITENGA RGC

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
MUKAYA YUNAS	✓		KITENGA	FARMER	0775606220	
MUYINDI [illegible]	✓		KITENGA	FARMER	0774711516	
Nsubuga IDRIS	✓		KITENGA	RETAIL SHOP	—	
TABIGWA SAZIRAH		✓	KITENGA	FARMER	0787001166	
MUKUMBA MOSES	✓		KITENGA	FARMER		✓
BWINZA ROBERT	✓		KITENGA	FARMER		
NAMPIM VENICE	✓		KITENGA		0776199421	
MBAGUMMA MUNIRU	✓		KITENGA		0760300986	
NAMUSWA GASTINE		✓	KITENGA		0778439965	
NAMAGANDA LOY		✓	KITENGA			

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 03rd/05/2022

Location: BUKAMBA SUBCOUNTY, KAGIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES.

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
BITINZIKA JANET		✓	KIGINA		0786969264	
MUWANGUZI AYUB	✓		KIGINA		0740426847	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):				
	ESMF		Environmental Audit	
	RPF		RAP	
	ESIA	✓	Other (specify)	

Date: 03rd/05/2022

Location: BUKAMBA SUBCOUNTY KAGIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
AMIGOLE CATIN	✓		Kibuye		0773028019	
Maaka Ali	✓		Kibuye		0786671154	MAKA
TIBAMWEKA BENJAMIN	✓		Kibuye		0760487602	
BINKANDIDA FRED	✓		Kibuye		0774266489	
BWIAMUZE MALIK	✓		Kibuye		0774211013	
MUTINGO HALIA	✓		Kibuye		0779058586	
BIAMSI AJUA	✓		Kibuye		0775547008	Byamsi Ajua
GOLOOBA JUMAH	✓		Kibuye		0754689485	
KASIRA KASURI	✓		Kibuye		0781757189	
BAKUUYA BADIRU	✓		Kibuye		0777218152	

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ATTENDANCE LIST

Project Name: WATER SUPPLY & SANITATION FACILITIES- KITEGWA RGC KAGADI DISTRICT

Location: KITEGWA RGC - KAGADI DISTRICT

Date:

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	BASEKE BADRU	M	Kanabi A	0779540519		
2.	MUTESI RAMLA	F	Kanabi A	0773758914		MUTESI
3.	KISAKYE HARRIET	F	Kanabi A	-		
4.	KOLINA NABWIRE	F	Kanabi A	-		
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						

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ATTENDANCE LIST

Project Name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Location: BUKAMBA SUB COUNTY, KAGADI DISTRICT

Date: 05/05/22

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1	RONALD WANCYASYA	M	FARMER	07		
2.	RUDIGO AKANKU	M	FARMER	0752589132		
3.	BALABA MUSANA	M	FARMER/Fishing			
4.	BARIGEYA MOSIAH	M	FARMER			
5.	MUZA KIRUBAKI	M	FARMER			
6.	ULIKE3221 SUSAN	F	FARMER	0771265349		
7.	NAKIBUL MARIAM	F	FARMER			
8.	SAMUWA William	M	FARMER	0778883764		
9.	SEKABIRA YAKUB	M	FARMER	0771848313		
10.	KITIMBWA PAUL	M	FARMER			
11.	NSOBA JUNIOR	M	Farmer/Fishing	0779495855		
12.	SARAH KIIZA	M	Farmer	0782390998		
13.	KAGANDA ANTHONY	M	Farmer/Boda	0762109308		

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMF			Environmental Audit	
	RPF			RAP	
	ESIA			Other (specify)	

Date: 8/08/2022

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
NAMUGGA SYLVIA		F	[illegible]	[illegible]	—	—
NAMULEGE CATHERINE		F	[illegible]	[illegible]	.	[illegible]
SOLAR CREW MALITONU	M		[illegible]	[illegible]	—	RA
[illegible]	M		[illegible]		075[illegible]	
Kisomi Mark	M		[illegible]	BUSINESS	0782623869	[illegible]

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMF			Environmental Audit	
	RPF			RAP	
	ESIA			Other (specify)	

Date: 8/08/2022

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
KUSEKIRE Margret Mawid	✓		KIBUYE		0785117130	[illegible]
Bagezi Anthony	✓		KIBULE		0777485806	[illegible]
BKIIRE FRED	✓		KIBULE		0753743557	[illegible]
MuSobya Robert	✓		KIBUYE		—	[illegible]
NEZITA JOSEPH	✓		KIBUYE		—	[illegible]
BIRUMA PHIONA		✓	KIBUYE		—	
MUGISI FAITH		✓	KIBUYE		—	[illegible]

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):

ESMF			Environmental Audit	
RPF			RAP	
ESIA ✓			Other (specify)	

Date: 8/08/2022

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:		Gender M	Gender F	Village	Designation	Contact (Tel/email)	Signature/ initial
IRZIKA	KEEFA	✓		Bukyanga		0773625189	
SSOMGOLE	RUBOGO	✓		Nakibungulya		0772631758	
KISEKKA	Peter	✓		Bukira		0784902306	
MUWUMA	Ahmet		✓	Kitegya		0774789423	
Mahirabe	Justine		✓	Nakibungulya		0785507443	
TUSAMWANDA	KILBER	✓		Nakibungulya		0773955976	
Tumbuza	Alone	✓		Nakibungulya		0774570878	
NAGWERE	MONY		✓	"		0702923233	
MUKISA	JOSHUA	✓		Nakibungulya		0781894041	
NAMUGERE	ZAINA		✓	Kibuye		0773719929	

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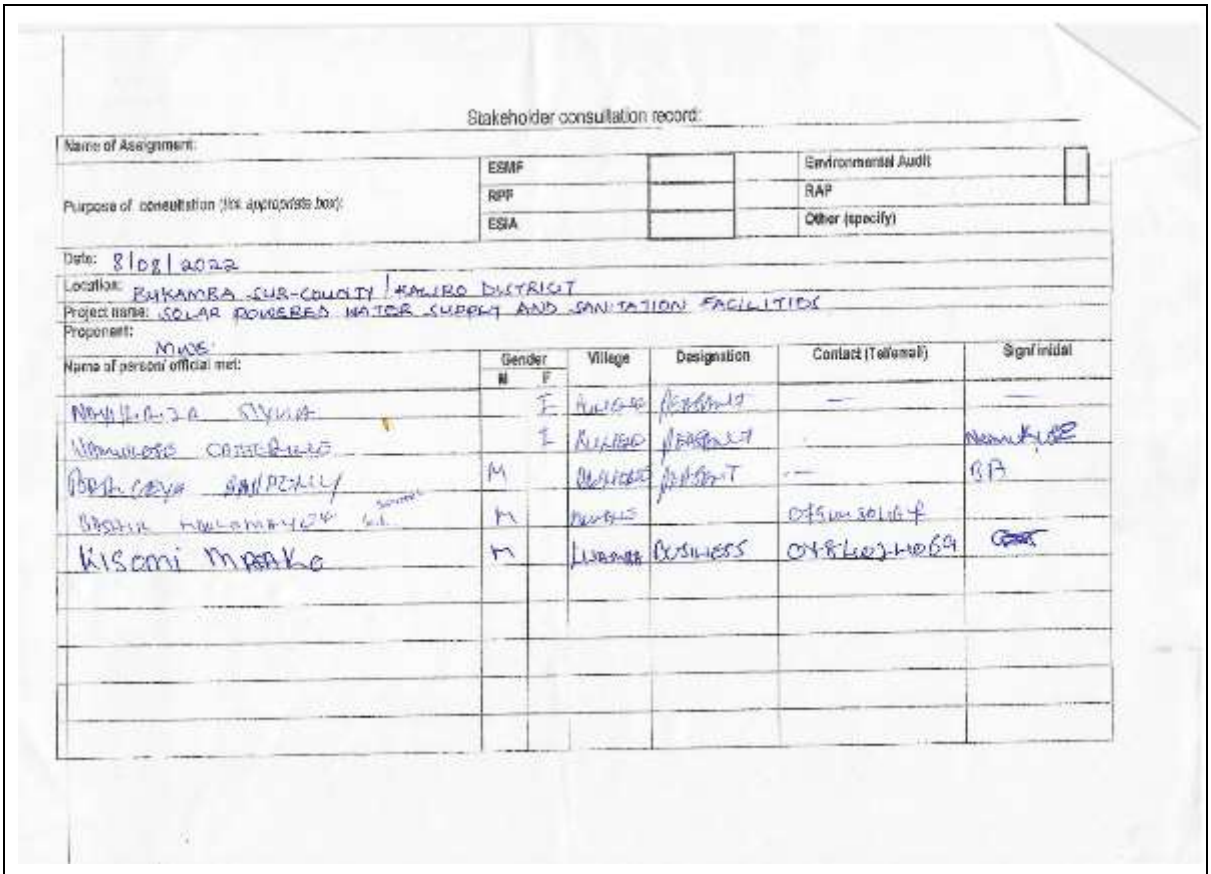
ATTENDANCE LIST

Project Name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Location: BUKAMBA SUB-COUNTY, KALIRO DISTRICT

Date: 08/08/22

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1.	RONALD WAKISAMBYA	M	FARMER	07		
2.	RUSIGO ARABU	M	FARMER	0752589132		
3.	BALABA MUWAYA	M	FARMER/Fishing			
4.	BARIGEYA POSIANO	M	FARMER			
5.	MUZA OKIRIBARI	M	FARMER			
6.	NUWAGIRA GILBERT	F	FARMER	0771255349		
7.	NANKYA MARGRET	F	FARMER			
8.	SSABUNA WILLIAM	M	FARMER	0778883764		
9.	SEKAGIRA YAKUB	M	FARMER	0772848313		
10.	KITUUMA PAUL	M	FARMER			
11.	NSOBA JUNIUS	M	Farmer/fishing	0779948588		
12.	SASIRA WILLIAM	M	Farmer	0780396996		
13.	WAGWANDA ANTHONY	M	Farmer	Bodo 0762109508		



Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):

ESMF			Environmental Audit	
RPF			RAP	
ESIA			Other (specify)	

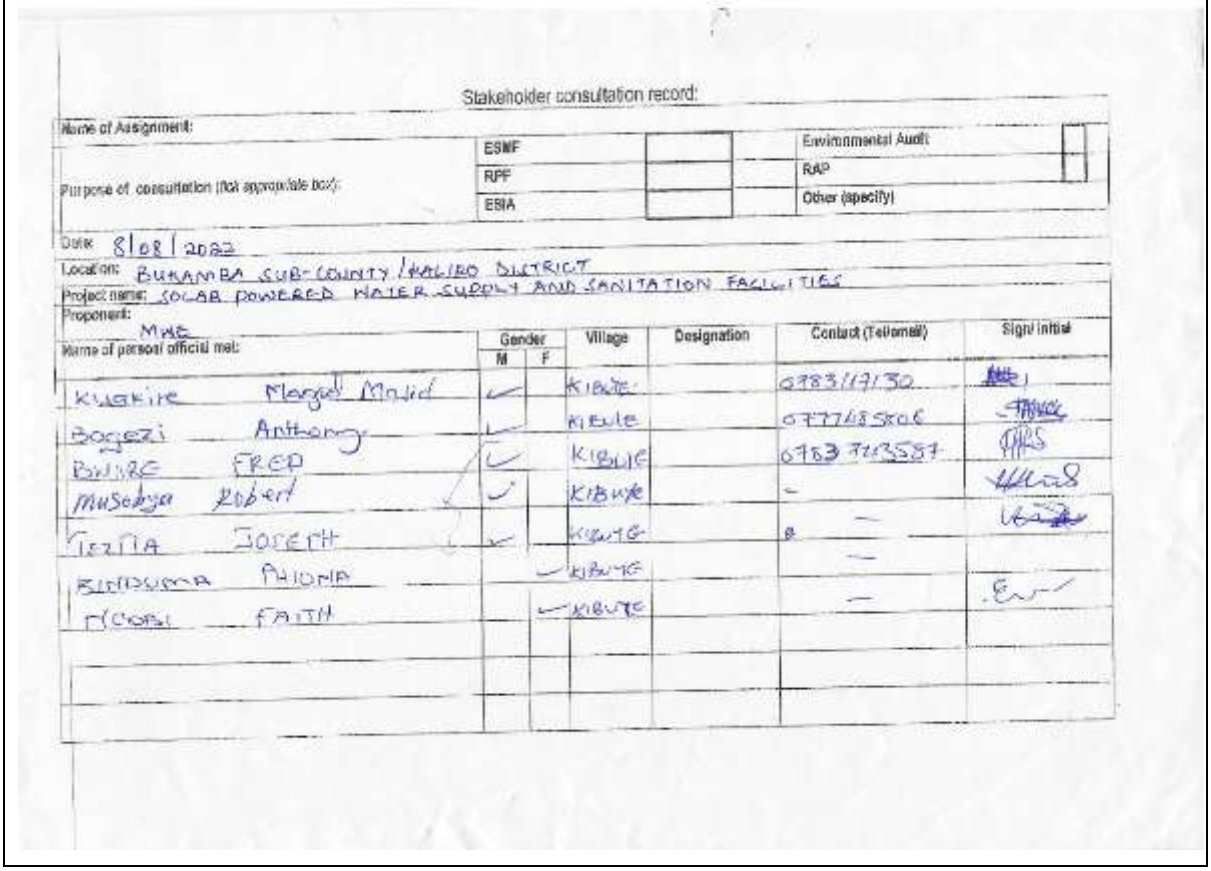
Date: 8/08/2022

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
NAMUKOZA SYLVIA		F	KALIRO	ASSEMBLY	—	—
NAMUGOOS CATHERINE		F	KALIRO	ASSEMBLY		
BBAALE COSMAS SAMPEZILLY	M		KALIRO	ASSISTANT	—	
BBOSA MUKAMAYOMBE	M		KALIRO		075[illegible]30164	
KISOOMI MARKO	M		KALIRO	BUSINESS	0785623-40869	



Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):

ESMF			Environmental Audit	
RPF			RAP	
ESIA			Other (specify)	

Date: 8/08/2022

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ initial
KWEKIRE Margret Majid	✓		KIBUYE		0783117130	
BOGEZI Anthony	✓		KIBUYE		0777685806	
BWIRE FRED	✓		KIBUYE		0783 7[illegible]3587	
MUSOKYA Robert	✓		KIBUYE		—	
TEZIRA JOSEPH	✓		KIBUYE		—	
KIRUNDA AMONA		✓	KIBUYE		—	
NYONI FAITH		✓	KIBUYE		—	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):

ESMP			Environmental Audit	
RPF			RAP	
ESIA ✓			Other (specify)	

Date: 8/08/2022

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
Tezika Keefa	✓		Kinyinya		0773625189	
Emmanuel Rukasso	✓		Nakibungulya		0772631758	
Kiwekela Peter	✓		Bwira		0774902309	
Murungi Annet		✓	Kitegera		0774684231	
Atubirube Justine		✓	Nakibungulya		0789850743	
Tusiimwakaha Hilbert	✓		Hakibungulya		0773953976	
Tuhebaze Mone	✓		Nakibungulya		0774570895	
Nakimbugwa Monic		✓	"		0710232333	
Mukisa Joshua	✓		Nakibungulya		0781840447	
Namugere Zaina		✓	Kibuye		0773792920	

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ATTENDANCE LIST

Project Name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES.

Location: BUKAMBA SUBCOUNTY, KALIRO DISTRICT

Date: 08/08/22

No.	Name	Gender M/F	Designation	Contact	Email	Signature
1	NAMULONDO CODE.	F	FARMER.			
2	BWERAMASO STEVEN	M	Fishing Farmer	0702082945		
3	NAKUGA JENIFER	F	Farming	0770794316	0770793816	
4	NALUBOWA JENINA	F	FARMING	—		
5						
6						
7						
8						
9						
10						
11						
12						
13						

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMF			Environmental Audit	
	RPF			RAP	
	ESIA	✓		Other (specify)	

Date: 8/08/2023

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES

Proponent: MWE

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
BIBI SAMUEL	✓		Nyamba		0775437081	Bibi
NGIRWE MARKO	✓		"		0776598180	
MUTESI JOWERIA		✓	"		0785556173	
NANTALE BISHA		✓	"		0752692746	
NARA YEEKO	✓				0779525783	
NABIRYE SOFIA		✓			0779263756	
MUTAKI LAZARO	✓				0782065173	
Fiona Binuma		✓			0774350216	
Galiwwa Samson	✓				0784428866	
TEZIKYA PAUL	✓				0778708408	

Stakeholder consultation record:

Name of Assignment:

Purpose of consultation (tick appropriate box):					
	ESMP			Environmental Audit	
	RPF			RAP	
	ESIA	✓		Other (specify)	

Date: 8/08/2023

Location: BUKAMBA SUB-COUNTY / KALIRO DISTRICT

Project name: SOLAR ~~WATER~~ POWERED WATER SUPPLY AND SANITATION FACILITIES (

Proponent:

Name of person/ official met:	Gender M	Gender F	Village	Designation	Contact (Tel/email)	Sign/ Initial
NAMUESIGE PALASI	✓		NYAMBA	FARMER	—	
NAKAGALE KENETH	✓		NYAMBA	RESIDENT	0760-733491	
NAKAGGA JESCA		✓	NYAMBA	RESIDENT	0783683116	
NAKOMBA ZAINA		✓	"	RESIDENT	—	
PALASI AGGREY	✓				0783683116	
KATUNE CHILIMBWILINO		✓			—	
NAKITOBOLO RUBIGWA		✓		Resident	—	
Nakamanda Goretti	✓			Resident	—	
Nambi Sarah	✓			Resident		
NAMALE JANNETT		✓		Resident	0711868409	

Emerging Issues from Stakeholders

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
Kaliro District Officials on 4th February 2022 at Kaliro District – Water office boardroom	Water supply is a major constraint in Kaliro district. Access to safe water in Bukamba Sub-County stands at 14 % far below the national average of 66%. Most communities, although near Lake Kyoga, still require improved access to water and proper sanitation. The population in Kitenga, the rural growth centre chosen for the solar powered piped water supply is growing at a fast rate. The town has public facilities such as schools, health centres that require consistent access to safe water and improved sanitation to function properly.	The project will contribute to improved access to safe water and improved sanitation in Bukamba subcounty. The project will prioritise connection of public institutions such as schools and health centres within Kitenga RGC to improve access to safe water for public facilities.
	The project should prioritize access to water in relation to safety, accessibility and sustainability of the water systems provided. The choice of the surface water source should consider consistent yield all year round as most water sources in the district dry up during dry seasons. Additionally, the proposed water sources should be tested for salinity and/or hardness, which are common characteristics of water sources in Kaliro District.	Water quality assessment for project water source was undertaken to ascertain the quality. Results of water quality assessments indicate that water from the proposed Kietnga RGC source falls within the Maximum Permissible levels for Drinking Water Standards (DEAS12:2018) for natural portable water for total hardness ($CaCO_3$) and soluble salts (Manganese and Total Iron) – see **Section 5.2.7**.
	The Ministry of Water and Sanitation should ensure that the project is executed to the highest level of quality as some public projects deliver substandard work.	The proposed project will be assigned a supervising consultant to ensure that project works are conducted to the highest level of quality as prescribed in the project's Bill of Quantities. The Client will also propose other quality

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
		assurance guidelines in line with World Bank bidding and project completion requirements.
	Local labour should be prioritized for both skilled and unskilled work available on the project.	The Contractor will be required to recruit as much as possible, labour from within Kitenga RGC. All the unskilled labour will be recruited locally, while semi-skilled and skilled labour, priority will be given to qualified members of the community in Kitenga RGC.
	Consultants and contractor should ensure that workers are well paid and in time to avoid issues of resolving project issues that delay completion of works.	The consultants and contractor will be bound by project bidding documents to have in place systems that enable proper handling of workers according to Uganda National Labour Laws, and the World Bank Safeguards in relation to recruitment and management of labour.
Kaliro District CAO, District Planner, District Environment Officer on 24th February 2022 at Kaliro District	The project should include a component of sensitization of communities on their roles and responsibilities to improve ownership of the project.	The ESIA team conducted a comprehensive stakeholder consultation and has developed a Stakeholder Engagement Plan (SEP) as well as ESMPs. Community engagement guidelines are included in the project ESMP
	The intake area for Kitenga RGC piped water system is affected by floods during the rainy season and low water levels during the dry seasons.	Water demand and quality assessments were undertaken during the project feasibility phase. The selected project intake was selected based on its ability to provide adequate water by quality

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
		and volume for the proposed project. A water treatment plant will be constructed near the intake to
	There is low pit latrine coverage especially at landing sites in Bukamba parish. Communities around fishing villages practice open defecation in the Lake. A limited number of households with sanitation facilities own the temporary structure that fills up in a shorter period and can be destroyed by harsh weather conditions such as strong winds, storms, and flooding.	The project proposed to construct 2No. 6 stance water borne public toilets complete with 4No. Single Stances, 1No. Urinal, 2No. disabled people equipped stances, shower facility; complete with hand washing facilities. The location of these facilities will be determined by local leaders in the RGC.
	Washing of hands as a hygiene and sanitation practice after visiting a sanitation facility, and before and after eating is very low among the communities in Kitenga RGC.	The proposed public sanitation facilities in Kitenga RGC will be equipped with complete with hand washing facilities. The Local authorities in Kitenga RGC should create awareness on the proper usage of handwashing facilities to increase adoption of the practice among residents of the RGC.
	There is rampant environmental degradation. For instance, at the location of the proposed intake, communities are burning lakeshore vegetation and cutting trees to create space for agriculture. In the entire Bukamba Sub County and Kaliro District, natural vegetation is cleared for extensive sugarcane growing. The district has almost lost all the natural vegetation to agriculture with the most impact felt where sugar cane plantations are established. Natural trees and shrubs are also cut for firewood and charcoal burning. Th major trees affected are fruit trees, especially mangoes and	The project will develop a source protection plan to ensure protection of the water resources for the Kitenga RGC. The plan will include recommendations and actions that propose protection of the environment and roles and responsibilities of different stakeholders to ensure adoption and functionality of the plan. Such recommendations may include planting of

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	jack fruits. Other trees species are getting depleted such as Omukunyu, Omukonge, Omukosi, Omusita, Edaha, Gasiya, Muvule	trees, educating communities, and supporting communities to adopt energy saving stoves.
Resident District Commissioner on 2nd May 2022	Bukamba is one of the most population explosive sub counties in Kaliro. It's predominantly occupied by Balamogi, Bakenye, Iteso, Baruli, among others. Due to high numbers of immigrants from Teso land, Pallisa, and immigrants from main land Busoga region. However, the sub county has inadequate water resources. In most cases, residents share water sources with animals and walk long distances to access water	Noted
	There are common cases of thefts, superstition and land conflict, among the community and such can affect the project especially workers may fear to be in the area.	Sensitization of the workers coupled with collaboration with LCs and faith-based organization to address such fears.
	Due to disparities in water access in Bukamba Sub County, residents pay as much as UGX 500 (Five hundred Shillings) to access one jerrycan of borehole water from water vendors. Spending such a high amount of earnings on access to water reduces overall household income, limiting opportunities to build savings, thus a vicious cycle of poverty	Water tariffs will be harmonized before onset of project operations.
District Natural Resource/Senior Environment Officer on 2nd May 2022	The Sub County is known to have poor/harsh weather conditions with long dry spells and poor rainfall distribution. This has caused cutting down of trees including fruit trees for charcoal to provide a form of livelihood.	These actions can have impact on water source, hence there is a Source Protection plan preparation in the project.
	There are rampant cases of vegetation clearance being replaced with sugarcane growing. Therefore, the project should incorporate tree planting especially around	Tree planting will be incorporated in the project to mitigate climate change.

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	the abstraction, water office and reservoir areas and encourage client to plant more trees.	
	Air and noise pollution from the project construction phase could result to respiratory illness and social irritations, respectively. The impacts associated with air and noise pollution should therefore be addressed in the project.	Measures to address noise and air pollution are inbuilt in the ESMP and it is to be observed by the contractors.
	The Occupational and Community Health and Safety protocols should be well followed by the contactor when implementing the project Gender equality and equity should be exercised most especially in employment procedures. Women should be given a chance to get some jobs to boost their financial status and standard of living.	The project will have measures to mitigate OSH during its operations as well as mainstream gender in its set up and operations.
District Health Inspector on 2nd may 2022	The district has a problem of high-water table and the soil profile is mostly sandy, therefore precautionary measures should be taken to when constructing sanitary facilities to avoid ground water contamination	The project design is to plan for the project infrastructure based on the settings in the area.
	Bukamba Subcounty has recently registered to have a high population growth rate therein, being over populated beyond the available health resources Nawampiti Health Centre III to serve the communities. Nawampiti Health Centre III offers medical services that are limited to OPD and In-patient, maternity (Antenatal, Family planning, post-natal care, HCT. The in-patient department has got 5 beds, the facility has 29 beds in total. The facility has a borehole installed at the compounds and RWHS at the Maternity and OPD. The community uses the same borehole with the facility.	To avoid conflict with the communities over health and related facilities, the project will have its modest health facility to cater for the workers as well as arrange its own water supply.
	Malaria is the most prevailing illness in the subcounty. This is mainly because the area is a wet land having breeding grounds, including but not limited to slums,	Malaria incidence can affect workforce hence, malaria control measures will be mainsteamed

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	stagnant water, and sugarcane plantation close to homes. Other diseases include; Diarrhea, intestinal worms (consuming unboiled water), typhoid, Common colds (RTI), TB, Upper and lower respiratory infections, Pneumonia, among others.	into the project in terms of providing mosquito nets as well as medication through project health facility.
	The district has no ambulance services except one provided by area Member of Parliament. The ambulance operates at the patients cost. This has increased mortality cases in life threatening situations such as accidents due to difficulties in making referrals.	There will be a framework of collaboration in the delivery of emergency medical responses through an MoU with nearby Health Centre IV or, Iganga District Referal Hospital.
	Due to the high numbers of people living in trading centres such as Kibuye, Buvulunguti, Kitenga; there are high cases of STDs/STIs like HIV/AIDS, Syphilis, Gonorrhoea, Candidiasis, and Hepatitis B due to the life style of excessive drinking of local brew such as waragi malwa/ajono and **(enguuli)** which exposes them to uncontrolled indulgences.	Such medical cases can be attended in the project health facility and others can be refered to neaby health units in the district.
District Community Development Officer on 2nd May 2022	The Consultant should inform the cultural leaders and community councillors about the project because community members trust their local leaders and find out what to give back to people.	The project has a stakeholder engagement plan which is going to be operationalized involves sensitization and mobilization and it will address this concern.
	The contractors should consider the local community/ immediate beneficiaries during recruitment to create a rapport; however, children below 18 years and at school should not be considered for employment opportunities. Local area leaders can identify workers for the project.	Working with the local leaders during recruitment but maintaining independence in terms of final decisions on the subject for obejectivity.

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The extension of clean water in the communities will contribute to the development of area, especially in education and health sectors. The district has on-going programmes such as; the Youth livelihood Project that supports the youth with initial capital to start up projects (Poultry, Produce buying and selling) and welding training. Uganda Women Entrepreneurship Programme (UWEP) for women between 18-60 years. These form groups about 10-15 members and are given loans for development funds between 8-12 million. This has helped to improve the livelihood of the people	The project is set to address this and it is one of the reasons for ensuring the project is implemented.
District Education Officer on 2nd May 2022	The district has 7 government aided primary schools and 12 privately aided primary schools with 6560 enrolled pupils. The district will have its first government secondary aided school (Bukamba Seed SS) located in close to Bukamba Subcounty offices. The school is under the finishing stages construction and will cover Bulamogi Northwest and other areas expected to register between 700-1000 students. The distribution design for water supply should incorporate the Bukamba Seed S.S so as the school can access clean water for the students and teachers.	Noted
MoGLSD on 17th May 2022	**Land acquisition:** For water supply system issues, land will have to be secured especially for intake, WTP, reservoir and along transmission and distribution networks. ➢ 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
	Permits and approvals ➢ All certification from concerned ministries and authorities i.e.; Directorate of water resources etc., should be acquired.	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	➢ Site layout plans and architectural designs for solar powered piped water system and all that is entailed therein, should be submitted to the ministry for approval. Additionally, geotechnical survey/ study reports on bearing ratio to hold the pipes should be submitted	
	Design considerations: ➢ 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: ➢ 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: ➢ 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
	➢ 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)	
	Pollution and environment management: ➢ 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: ➢ The vulnerable groups should be planned for especially during the design of sanitary facilities	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	➢ 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.	
	Employment: ➢ 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
Bukamba Sub County officials on 11th February 2022 in relation to Kitenga RGC	The selected contractor for the proposed project should have a code of conduct for employees to guide interaction with communities during the construction phase to avoid unethical community engagement such as sexual relations, misconduct, and gender-based violence.	The contractor will be required by the client to operationalise a community engagement management plan and a grievance redress mechanism to ownership and implementation of an environmental and social code of conduct for its employees on the project.
	The communities will form committees to handle any grievances or issues that may arise on the project both during the construction and operation phases of the project.	The ESIA has proposed a grievance handling mechanism that proposes methods of handling complaints and grievances at all the levels of project implementation and management. A community grievance redress mechanism is included in the plan.

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The project should recruit labour from communities for available jobs during the construction phase to improve project ownership	The ESIA has assessed available jobs on the project and has made recommendations on employment of skilled and unskilled community members
	How much will a jerry can of water cost?	The project feasibility study (MWE, 2021) recommended a water tariff of USh 50 per 20 litres based on the ability of the consumers to pay five percent (5%) of their income to access safe water.
Bukamba Sub County officials on 24th February 2022 in relation to Kitenga RGC	What is the coverage of the proposed piped water system? Are there possibilities of extension of water to parishes not included in the plan?	The Kitenga RGC piped water supply system and sanitation facilities project will cover 16 villages in 2 parishes of Bukamba sub county, namely, Bukamba (Bukamba A, Bukamba B, Buvulunguti Centre, Kasuleta A, Kasuleta B, Lwamba Beeda, Kibuye B, Nabusira A, Nabusira B, Nakibungulya A, Nakibungulya B, Buvulumguti West, Buvulunguti East) and Nangala (Kanabi, Kisu A, Kitenga). The project will cover 47 percent (16 out of 34) core beneficiary villages that make up Bukamba Sub County. By distribution, 86.7 percent (13 out of 15) villages in Bukamba parish; 33.3% (3 out of 9) in Nangala parish.

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The selected contractor for the proposed project should have a code of conduct for its employees to guide interaction with communities during the project construction phase	Noted
	The communities will form committees and handle any grievances or issues that may arise on the project during both the construction and operation phases of the project.	Noted
	The project should engage communities for available jobs during the construction phase to improve project ownership	Noted
	Commonly asked questions were: 1. How much will a jerry can of water cost? 2. What is the coverage of the proposed piped water system? 3. Are there possibilities of extension of water to parishes not included in the plan?	Noted
Meeting with communities in Bunini, Lungonyora, and Kitenga villages on 24th February 2022	The current safe water coverage in the villages of Kitenga RGC is very poor. The available functional boreholes in the RGC yield saline water. For most of the residents, water for domestic use is therefore collected from the swamps along the shores of Lake Nakuwa. Therefore, extension of piped water to the villages of Kitenga RGC is anticipated to; • Improve the health of the whole community because tapped water is always clean and free from faecal waste contamination, • Improve on the family savings since less or no money will be required for the treatment of water related diseases; especially, Bilharzia, Diarrhoea and Malaria.	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	• Source of employment (casual jobs) for the youth during the project construction phase, • Reduce on the time women and children spend fetching water, therefore creating more time to attend to other tasks for women and more time at school for children. • Eliminate the risk of attacks from wild animals, such as; snakes and crocodiles, especially on the children and women who fetch water in Lake Nakuwa, • Eliminate the risk of drowning in flood water by women and children who fetch water from the Lake during the rainy season	
	The community members in the villages of Kitenga RGC anticipate high water connection fees to the homesteads and high costs of water at the Public Tap Stands. In comparison to neighbouring sub counties with piped water systems, the average amount charged per 20 litre jerrycan is Ugx.200. For residents in Bukamba Sub County, Ugx. 200 for a 20 litre jerrycan is considered expensive especially for big families with a higher daily water consumption rate.	The project feasibility study (MWE, 2021) recommended a water tariff of USh 50 per 20 litres based on the ability of the consumers to pay five percent (5%) of their income to access safe water.
	The residents of Kitenga village were more concerned about the payment process to access water from the piped water system.	
	Who will maintain the piped water 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). The Umbrellas organisation is under the Urban Water

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
		department of the Ministry of Water and Environment
	Will the project hire local labour during the construction of the project?	The ESIA has assessed available jobs on the project and has made recommendations on employment of skilled and unskilled community members
	The LC I Chairperson suggested that the residents of Kitenga village should be considered as the main stakeholders for the project specially to offer security for construction equipment and recruitment for available jobs on the project.	Noted
	Community members identified poor latrine coverage as a major hygiene and sanitation problem in Kitenga RGC. They noted open defecation as a common unhygienic practice among residents. They, therefore, expressed the need for a public toilet to be constructed at the landing site, where many people converge for trade and commerce daily from the neighbouring villages.	Noted
	Community members expressed the fear that during the project construction phase, crops would be destroyed by construction trucks and digging of trenches for the water pipe line.	A project Resettlement Action Plan has been conducted on the potential of the project to take land and crops that may be destroyed during the project construction phase. These crops will be valued and where applicable compensated. For crops destroyed by construction vehicles during construction phase of the project, the claimant can lodge a complaint with the grievance committee for such grievances to be settled.

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	Family conflicts was identified as a concern that may arise during the project construction phase. Contractors are likely to lure married women and young girls into sexual acts. On the same issue, the residents recommended continuous counselling and sex education of both workers, women, and children by both the contractors and the parents, respectively.	Continuous counselling and sex education of workers, women, and children by both the contractors and the parents, will be instituted.
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
	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

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	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 DWRM on 8th June 2-22	Develop Water Source Protection Plan and ensure that it is implemented during the commencement of the construction phase of the project through to implementation.	Noted
	The Water SPP should consider 3% of the total development and implementation budget (include in the BOQ) as stipulated in the guidelines	Noted
	Ensure to develop sanitation/ solid waste management plans and clearly indicate the appropriate dumping for fecal waste	Noted
	Assess and make recommendation on other water users around the water sources	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	Water supply should indicate the positive and negative impacts anticipated from providing piped water to small towns such as increased semi-urban population and pressure on socio-economic infrastructure	Noted, these impacts have been assessed in the impact section of this report
	The project is abstracting water from a wetland around Lake Kyoga. The project should consider the concept of payment for ecosystem services to the communities and the sub county and district of origin.	The concept will be explored in the source protection plan for Kitenga water source.
	Consider baseline water quality assessment and water quality monitoring after project establishment.	• Baseline water quality assessment was conducted at feasibility stage. • The ESIA conducted water quality assessments on surrounding water sources, mainly the lake in the vicinity of the project. • Water quality monitoring is a requirement under water supply and has been suggested under the water quality impact of this project.
	Coordinates of wetlands that are likely to be used/ affected	The intake and WTP will be located on L. Nakuwa in Nabusira Village at coordinates (126843.83 m N, 550367.45 m E and 125930.51 m N, 549167.88 m), respectively
Kitega Trading Centre on 2nd May 2022	The communities were also sceptical on how effective the project will be since often different people have approached them and promised water supply and none of the promises has been implemented.	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The people expressed concern on the quality of lake water used for drinking that has caused common cases of water borne related illnesses (typhoid, bilharzia) yet Nawampiti HC III has limited or no medication for such sicknesses.	Noted
	The nearest ground water source (borehole) is about 500m from Kitega trading centre, residents of Bukunya village raised concerns of having to trek over 1km or more to the borehole.	Noted
	Confirmed with the OC station Bukamba Sub County present in the meeting, women complained about assault and violence against them by the village boys on their way to collecting water from the lake.	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
	There are rampant cases of open defecation as reported by the local leaders and this is mainly practiced along the shores of the lake, which water is used domestically by majority of households.	Noted
	Therefore, commonly asked questions were: 1. How soon will the water supply process start? 2. Is the piped water going to be at a cost or free? If yes how much will be charge per jerrycan? 3. Will the community member be considered for job opportunities? 4. Are people's land going to be affected? If yes, will they be compensated?	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
Kibuye Trading Centre on 3rd May 2022	The project is welcome and appreciated However, they doubted its implementation since many politicians use similar project information to garner support for re-election into office.	Noted
	The borehole at the trading centre the serves four villages, however, it yields hard and saline water and needs servicing since the water pumped has rusted metal particles.	Noted
	More toilets or VIP latrines should be constructed in the area, as latrines are a challenge mostly in the villages that boarder the lake where the ground water table is too high	Noted
	There is no borehole in Lwamba village, the initial borehole broke down and the nearest water source is about 2Km in Buvulunguti village or to the surface water from the Lake. Lwamba village is therefore generally water stressed.	Noted
	In line provision of the sanitation facility, most residents confirmed that the majority do not have latrines especially in the trading centres and others use latrines owned by neighbouring households.	Noted
	In Kibuye, people use the same water source with animal, which is a challenge.	Noted
	Water should also be supplied to Nawampiti HCIII since during the dry season, the water levels of the borehole reduce, water is then bought from water vendors.	Noted
	Therefore, commonly asked questions were: 1. How soon will the water supply process start?	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	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. How much will be charged to extend water to an individual house?	
Kitenga Trading Centre on 8th May 2022	The community residents were happy about the project and raised an outstanding issue of limited access to safe water for domestic use and the current borehole has brown water emanating from rust.	Noted
	There concerns of whether the project will cover Kitenga Village it is the furthest village in the subcounty.	Noted
	The LC1 chairperson privately expressed concern on the rampant spread of HIV/AIDs and UTIs, cautioning the contractor to be more vigilant during project implementation	Noted
	The residents proposed the sanitation facility be constructed in Kitenga trading centre claiming that there are higher cases of open defecation due to limited latrine ownership at household level	Noted
	Some residents suggested that the implementation of the project should be done concurrent with repair and maintenance of the worn-out boreholes as some residents may not afford to pay to access piped water	Noted
	The LC1 also request that the community residents should offered casual labour and some of the residents are trained plumbers who may have the qualifications needed.	Noted
	Commonly asked questions were:	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	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. ow much will be charged to extend water to an individual house?	
Kisu village on 8th May 2022	The community residents were happy about the project and raised an outstanding issue of limited access to safe water for domestic use as their borehole broke down and they resorted to collection Lake water, which is not safe for domestic use.	Noted
	Some resident requested to have the water extended to their houses to prevent having to walk long distance in search for water.	Noted
	The women requested that the contract should consider them for job opportunities; for instance, in preparing food.	Noted
	Some women raised concerns on the quality of water that will be provided to them as the water will be treated with chemicals, and therein possessed a question on whether the chemicals won't affect their health and/or whether the water be used to prepare food?	Noted
	Some residents suggested that the implementation of the project be done concurrent with preparations of the worn-out boreholes as some of them may not afford piped water	Noted
	The LC1 also request that the community residents should offered casual labour and some of the residents are trained plumbers who may have the qualifications needed.	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	Commonly asked questions were: 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. How much will be charged to extend water to an individual house?	Noted
Kanabi village on 8th May 2022	The community residents were happy about the project and raised an outstanding issue of limited access to safe water for domestic use as there is one borehole that is used by many people, this would be a good supplement they said.	Noted
	The LC1 also request that the community residents should offered casual labour and some of the residents are trained plumbers who may have the qualifications needed.	Noted
	There are still emerging cases of open defecation especially among children	Noted
	The village 'Nabakyala' requested that the contractor introduce their team to the local leaders so that they can recognized in the society and promote the good rapport.	Noted
	There concerns of water fees that maybe high beyond the cost that can be paid by residents, so prices should be set according to people' standards.	Noted
	Commonly asked questions were: 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?	Noted

Stakeholder/ Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	3. Will the community member be considered for job opportunities? 4. How much will be charged to extend water to an individual house?	

ANNEX E: WATER QUALITY RESULTS

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 : Surface Water
Date received : 11th April 2022
Analysis Completion data : 14th April 2022

TEST RESULTS

Source Name		SW2 Lake Nakuwa	Drinking water standards (IDEAS 12 2018 Maximum permissible for Natural Potable Water)
Village		Kitenga	
Subcounty		Bukanda	
District		Kaliro	
Date Sampled		11-Mar-22	
Lab Identifier code		E51490	
Turbidity	NTU	11	25
pH	Units	7.23	5.5 - 9.5
Electrical Conductivity	µS/cm	285	2500
Total Dissolved Solids	mg/L	200	1500
Total Hardness as CaCO3	mg/L	78	600
Fluoride	mg/L	0.09	1.5
Sulphates	mg/L	8.9	400
Chlorides	mg/L	17	250
Nitrates as N	mg/L	0.25	10
Nitrites as N	mg/L	<0.002	0.003
Manganese	mg/L	<0.01	0.01
Total Iron	mg/L	0.11	0.5
E. Coli	CFU/100mls	TNTC	<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
NWQRL 14 APR 2022 NWQRL
NATIONAL WATER QUALITY REFERENCE LABORATORY ENTEBBE

Water Quality Management Department
Directorate of Water Resources Management
P O Box 19, Entebbe
Tel: 041-321342

PRINCIPAL ANALYST LABORATORIES
★ 14 APR 2022 ★
NATIONAL WATER QUALITY REFERENCE LABORATORY-ENTEBBE
Signature.....

ANNEX F- LIST OF PLANTS

S/N	Family	Species	Lwamba	Liferform	Status
1	Acanthaceae	Asystasia gangetica	1	Herb	LC
2		Dyschoriste radicans	1	Herb	LC
3		Hygrophila auriculata	1	Herb	LC
4	Alismataceae	Burnatia enneandra	1	Herb	LC
5	Aloaceae	Aloe dawei	1	Herb	LC
6		Cyathura achyranthoides	1	Herb	LC
7		Lannea schimperi	1	Tree	LC
8		Mangifera indica	1	Tree	LC
9	Apocynaceae	Cascabela peruviana	1	Shrub	Invasive
10		Periploca nigrescens	1	Herb	LC
11	Asteraceae	Ageratum conyzoides	1	Herb	LC
12		Bidens pilosa	1	Herb	Invasive
13		Chromolaena odorata	1	Shrub	Invasive
14		Conyza sumatrensis	1	Herb	LC
15		Melanthera scandens	1	Herb	LC
16		Pluchea dioscoridis	1	Herb	LC
17		Tridax procumbens	1	Herb	LC
18		Vernonia cinerea	1	Herb	LC
19		Xanthium strumarium	1	Herb	Invasive
20	Bignoniaceae	Markhamia lutea	1	Tree	LC
21	Capparaceae	Crateva adansonii	1	Liana	LC
22	Combretaceae	Combretum collinum	1	Tree	LC
23	Commelinaceae	Commelina benghalensis	1	Herb	LC
24		Commelina diffusa	1	Herb	LC
25	Convolvulaceae	Dichondra micrantha	1	Herb	LC
26		Ipomoea wightii	1	Liana	LC
27	Cyperaceae	Cyperus denudatus	1	Herb	LC
28		Cyperus difformis	1	Herb	LC
29		Cyperus dives	1	Herb	LC
30		Cyperus papyrus	1	Herb	LC
31		Cyperus rotundus	1	Herb	LC
32		Mariscus sumatrensis	1	Herb	LC
33	Dioscoreaceae	Dioscorea alata	1	Liana	LC
34		Dioscorea baya	1	Liana	LC
35	Ebenaceae	Diospyros abyssinica	1	Tree	LC

36	Euphorbiaceae	Euphorbia heterophylla	1	Herb	LC
37		Jatropha curcas	1	Herb	LC
38		Phyllanthus reticulatus	1	Herb	LC
39	Fabaceae	Acacia brevispica	1	Shrub	LC
40		Acacia polyacantha	1	Tree	LC
41		Acacia senegal	1	Tree	LC
42		Acacia sieberiana	1	Tree	LC
43		Albizia coriaria	1	Tree	LC
44		Albizia zygia	1	Tree	LC
45		Cassia hirsuta	1	Herb	LC
46		Cassia occidentalis	1	Herb	LC
47		Cassia siamea	1	Tree	LC
48		Desmodium tortuosum	1	Herb	LC
49		Indigifera spicata	1	Herb	LC
50		Indigofera arrecta	1	Herb	LC
51		Senna spectabilis	1	Tree	LC
52		Sesbania microphylla	1	Shrub	LC
53		Teramnus micans	1	Herb	LC
54		Tylosema fassoglensis	1	Liana	LC
55	Lamiaceae	Hyptis suaveolens	1	Herb	Invasive
56		Ocimum gratissimum	1	Herb	LC
57		Ocimum lamiifolium	1	Herb	LC
58	Malvaceae	Abutilon longicuspe	1	Herb	LC
59		Hibiscus diversifolius	1	Herb	LC
60		Pavonia procumbens	1	Herb	LC
61		Sida acuta	1	Herb	Invasive
62		Triumfetta rhomboidea	1	Herb	LC
63		Waltheria indica	1	Herb	LC
64	Meliaceae	Khaya anthotheca	1	Tree	EN
65	Moraceae	Artocarpus heterophyllus	1	Tree	LC
66		Ficus glumosa	1	Tree	LC
67		Ficus natalensis	1	Tree	LC
68		Ficus sycomorus	1	Tree	LC
69		Milicia excelsa	1	Tree	LC
70	Nyctaginaceae	Boerhavia diffusa	1	Herb	LC
71		Boerhavia repens	1	Herb	LC
72		Ludwigia leptocarpa	1	Herb	LC
73		Ludwigia stenorraphe	1	Herb	LC

74	Orchidaceae	Ansellia africana	1	Herb	VU
75	Palmae	Borassus aethiopicum	1	Tree	LC
76	Pinaceae	Pinus ssp	1	Tree	LC
77	Poaceae	Bothriochloa insculpta	1	Herb	LC
78		Brachiaria documbens	1	Herb	LC
79		Brachiaria scalaris	1	Herb	LC
80		Cynodon dactylon	1	Herb	LC
81		Cynodon nlemfuensis	1	Herb	LC
82		Digitaria abyssinica	1	Herb	LC
83		Digitaria ciliaris	1	Herb	LC
84		Echinochloa hapoclada	1	Herb	LC
85		Echinochloa pyramidalis	1	Herb	LC
86		Eriochloa fatmensis	1	Herb	LC
87		Leersia hexandra	1	Herb	LC
88		Panicum repens	1	Herb	LC
89		Paspalum notatum	1	Herb	LC
90		Paspalum scrobiculatum	1	Herb	LC
91		Phragmites mauritianus	1	Herb	LC
92	Polygonaceae	Oxygonum sinuatum	1	Herb	LC
93		Polygonum pulchrum	1	Herb	LC
94	Pontederiaceae	Eichhornia crassipes	1	Herb	Invasive
95	Proteaceae	Gravilea robusta	1	Tree	LC
96	Rhamnaceae	Maesopsis eminiii	1	Tree	LC
97		Ziziphus pubescens	1	Tree	LC
98	Rubiaceae	Bathidavia	1	Herb	LC
99		Mitracarpus virosa	1	Herb	LC
100	Simaroubaceae	Harrisonia abyssinica	1	Shrub	LC
101	Solanaceae	Solanum incanum	1	Herb	LC
102	Thelypteridaceae	Thelypteris confluens	1	Herb	LC
103	Typhaceae	Typha domingensis	1	Herb	LC
104	Verbenaceae	Clerodendrum umbellatum	1	Herb	LC
105		Lantana camara	1	Shrub	Invasive
106		Stachytarpheta indica	1	Herb	LC
107	Vitaceae	Cayratia ibuensis	1	Liana	LC

ANNEX G- RAP SUMMARIES

PROJECT LAND REQUIREMENTS

The Project has components which will require land acquisition. There will be both permanent land acquisition for some components and permanent land restriction (easements) as shown in the Tablebelow.

Table: Land Requirements for the Kitenga water supply and sanitation system

Project Component	Required Land	Important Notes
Water Intake structure on Lake Kyoga and Raw Pump House		
Water Treatment Plant	113.56metres X 78.84metres	Permanent land acquisition
Access road[22] to Water Treatment Plant	6-metre-wide road extension and 346.153 metres long	Permanent land acquisition
A raw water transmission main from the Intake to Water Treatment Plant	A total of 1.522km with a 3 meters easement corridor	• Approximately 0.274km of the proposed raw water pumping main in Nabusira A and Kitega A village lies 200m off the shoreline of Lake Kyoga and within its buffer zone as such MWE will have to obtain a permit from NEMA to construct the proposed raw water pumping main therein • Permanent Land Restriction (easement) in case of impact on private land • The pipe will be laid within the road reserve or on the sides of the access road
Reservoir site	30 metres X 30 metres	Permanent land acquisition
Transmission Pipe from WTP to Reservoir	A total of 5.024km with a 3 meters easement corridor	• Permanent Land Restriction (easement) in case of impact on private land

[22] The access road will be expanded to 6 metres. Therefore, the total land takes for access roads shall be determined upon completion of cadastral surveys

Project Component	Required Land	Important Notes
		• The pipe will be laid within the road reserve or on the sides of the access road
Distribution Pipe	A total of 24.250km with a 3 meters easement corridor	• Permanent Land Restriction (easement) in case of impact on private land • The pipe will be laid within the road reserve or on the sides of the access road
1No. Water Borne Public Toilet	10 metres X 10 metres	Permanent land acquisition

The land for the water treatment plant and reservoir site will be permanently acquired with a completed and registered land title processed in the names of MWE after all land rights have been fully compensated and acquired.

The transmission and distribution pipes will require an easement in which they will be trenched but also used as working spaces during construction, operation and maintenance phase of the Project. The land owners will retain their land but subject to following land use restrictions:

- No buildings or other structures can be constructed in the easement corridor
- Cultivation of seasonal crops can continue but not on top of the pipeline

As a result of the above restrictions, land use potential in the corridor is decreased which decreases the land value. It is this diminution (reduction in value) that is compensated.

THE SUMMARY OF LAND TAKE AND PAPS.

The table below is the summary of land take and the project Affected persons in the project area.

Table: Land tenure distribution in the Project

Land Tenure	No. of PAPs	Total % age
Customary	724	98.64%
Licensee	10	1.36%
Total	**734**	**100.00%**

Impacts resulting from the proposed construction of Piped Water Supply System and Sanitation Facility in the Rural Growth Centre of Kitenga in Kaliro District were carefully identified through a robust process of cadastral, asset, and socio-economic surveys as well as livelihood and vulnerability assessments carried out between 13 – 18 October 2022. A summary of impacts is shown in Tablebelow.

Table: Project impacts based on socio-economic, cadastral, and asset surveys

Impacts	Total
Total Land Affected (Permanent Acquisition & Restriction)	21.9661Acres
Permanent Land Affected (Water Treatment Plant, Reservoir Site and Public Toilet Site)	3.0046Acres
Permanent Land Restriction (Easement for Transmission and Distribution Pipes)	18.9615Acres
Total Number of Customary Landowners Affected	724
Permanent Land Affected (Water Treatment Plant, Reservoir Site and Public Toilet Site) of Customary Landowners Affected	3.0046Acres
Permanent Land Restriction (Easement for Transmission and Distribution Pipes) of Customary Landowners Affected	18.9615Acres
Total Number of Licensees (households) Affected	10
Physically Displaced Households (PAHs)	0
Physically Displaced Persons (PAPs)	0
Number of Affected Residential House Structures	0
Number of fences	4
Number of Affected Graves	0
Economically Displaced Households (PAHs)	0
Economically Displaced Persons (PAPs)	0
Number of Affected Crops and Trees	1,763
Number of Affected Commercial Structures	0
Number of Affected Public Institutional Properties (i.e., fences)	1

Source: Valuation Report

LAND ACQUISITION

PROJECT LAND ACQUISITION

The Kitenga Water Supply and Sanitation Project will require a permanent land take of 3.0046 acres and an easement corridor of 18.9615 acres as shown in Table below.

Table : Project land acquisition

Impact	Land Take (Acres)
Permanent Land Affected (Water Treatment Plant, Reservoir Site, Access Roads, and Public Toilet Site)	3.0046
Permanent Land Restriction (Easement for Transmission and Distribution Pipes)	18.9615
Total Land Affected in Acres	**21.9661**

Source: Valuation Report

Table: Project land takes per administrative unit

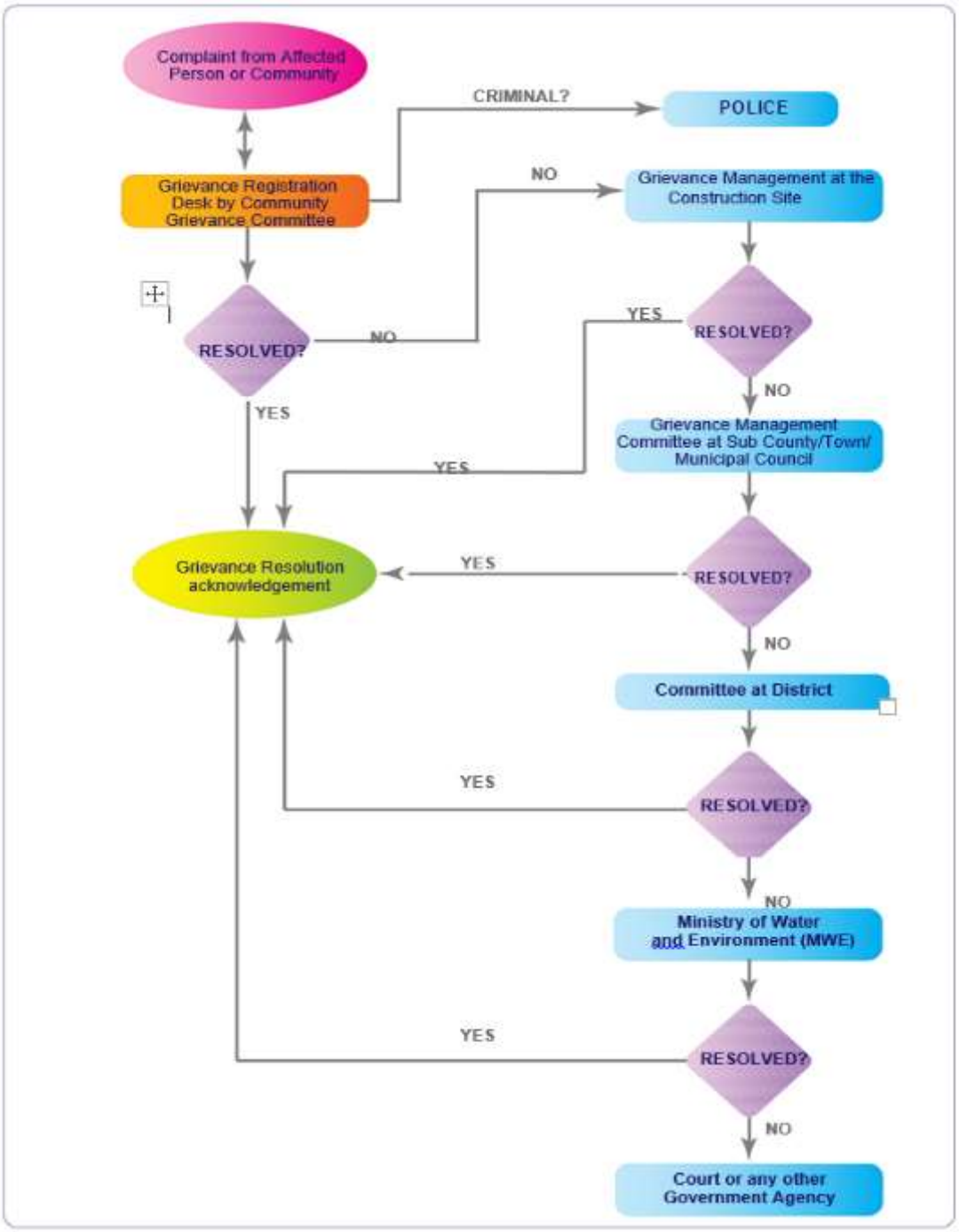
Subcounty	Parish	Village	#PAPs	Total Take (Acres)	Easement (Acres)	Total Size (Acres)
Bukamba	Bujugu	Kanabi B	4	0	0.0705	0.0705
		Kisu B	19	0	0.3991	0.3991
		Kitenga A	2	0	1.093	1.093
		Kitenga B	25	0	0.6047	0.6047
	Bukamba	Bukamba A	19	0	0.7175	0.7175
		Bukamba B	5	0	0.3089	0.3089
		Lwamba B	81	0	1.4709	1.4709
	Buvulunguti	Buvulunguti	49	0	1.1609	1.1609
		Buvulunguti East	76	0.2224	2.8668	3.0892
		Kibuye A	25	0	0.8957	0.8957
		Kibuye B	16	0	0.2614	0.2614
		Kibuye C	25	0	0.9078	0.9078
		Kibuye D	50	0	1.1458	1.1458
	Kitega	Bukunya B	17	0	0.3873	0.3873
		Kasuleta A	25	0	0.5418	0.5418
		Kasuleta B	57	0	0.881	0.881
		Kitega A	29	0	0.6441	0.6441
		Kitega B	14	0	0.2403	0.2403
		Nabusira A	102	2.7575	2.2352	4.9927
		Nabusira B	41	0	0.9657	0.9657
		Nakibungulya A	19	0	0.5073	0.5073
		Nakibungulya B	33	0	0.6558	0.6558
	Nawampiti	Lugonyola B	1	0.0247	0	0.0247
Total			**734**	**3.0046**	**18.9615**	**21.9661**

Source: Valuation Report

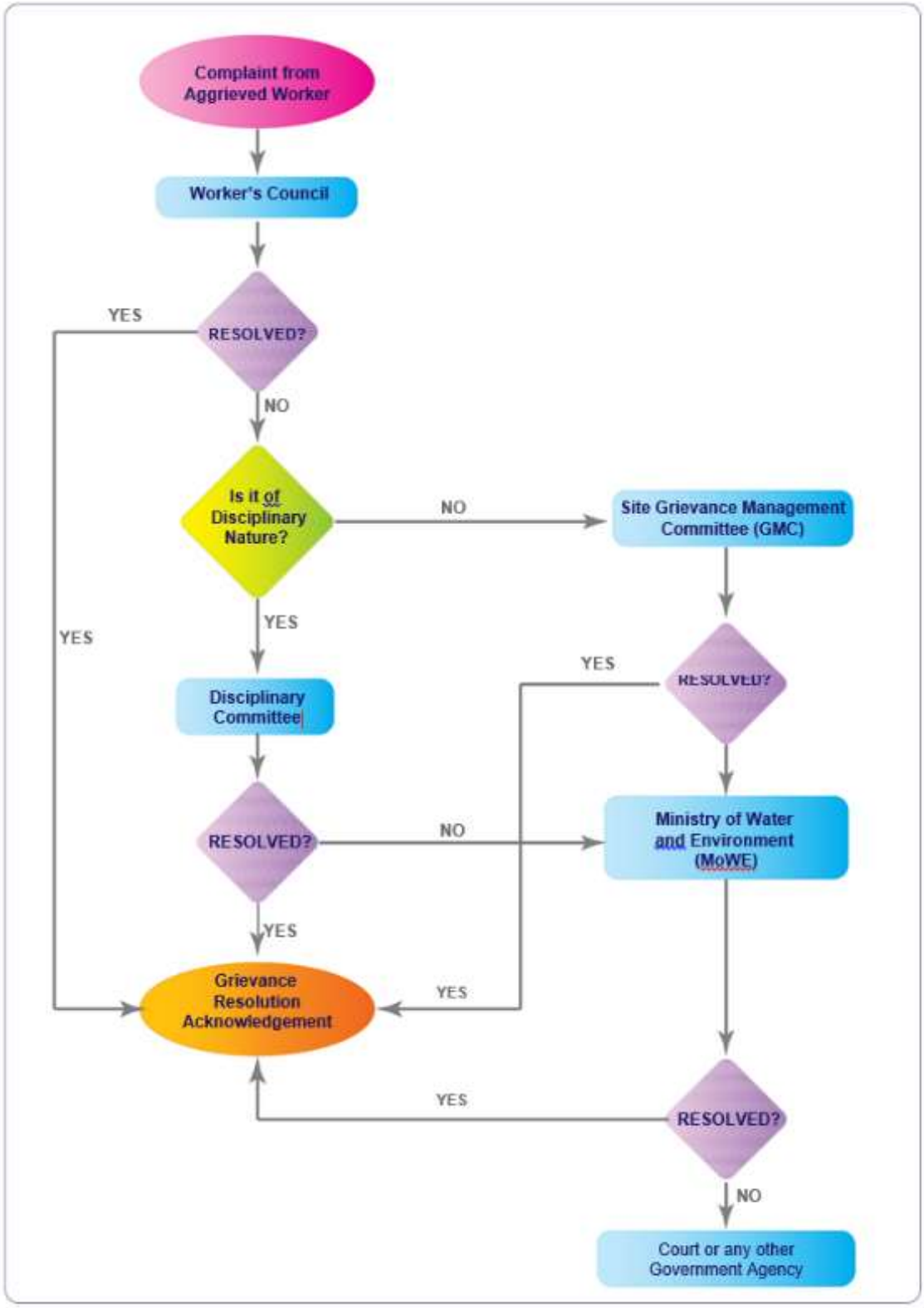
ANNEX H: VALUATION CERTIFICATE OF INVESTMENT.

ANNEX I: GRIEVANCE REDRESS MECHANSIMS 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 sūb-county level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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Subcounty Level GRC Reporting Template

District……..

Sub-county……..

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at sub county level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from sub county to district level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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District Level GRC Reporting Template

District .....

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No. of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at district level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from the district to national level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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National Level GRC Reporting Template

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No. of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at district level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from the district to national level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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REPORTING AND REFERRAL OF VAC, GBV AND OTHER SEXUAL RELATED CASES ON THE PROJECT.

Stakeholder	Action and support is to be provided	Where the case should be Referred?
VAC /GBV Victim	Reports to immediate persons like relatives, friends, peers, and other resourceful persons such as teacher, religious leaders, CSOs, LC, Police Makes a statement providing details on what happened, form of violence, perpetrator, any witnesses.	Immediately refer the case to LC and Police for recording and further investigation.
Community Persons including LCs, parents, guardians, Water user Committees, Project Management Committees, contractors' management teams, Grievance committees, Contractor's worker, Faith based member like church members, CSOs	Reports the case and perpetuator immediately to nearby Local Council, Contractor's supervisor, Probation Officer/ CDOs and Police for further action. 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. Follow-up the case with LCs, Police, health services and courts of law.	Refers the case to Police for further investigation.
Police	• 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 perpetuator to courts of Law for hearing and sentencing
Designated Medical Centre	• 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	• 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	• Hears the case, decides on support services to the child survivor or the parents of the child victim,	Commits the person

Stakeholder	Action and support is to be provided	Where the case should be Referred?
	• Sentences the perpetrator according to the existing laws regarding the case.	found guilty to serve his/her sentence and orders for any care and support to be provided to the victims
Prison	• Ensures that the person found guilty serves his/her sentence, • Person is rehabilitated.	Freed at the end of serving the sentence.
Contractors	Ensure workers are well screened for VAC&GBV before employment with involvement of LC and Police Ensure workers files and background information is on file for future references Ensure workers are trained in company policies specifically on VAC & GBV VAC & GBV Tool box meetings organized Ensure that there is a site clinic and medical service provider for workers and other victims on referral by the site clinic Have MoU with Police to expedite any investigations and trainings Create awareness to the communities on VAC & GBV risks and referral pathways Cooperate with law enforcement agencies and officials in detecting, investigations and managing VAC & GBV cases Provide any other relevant support to victims	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)	Monitors cases of any GBV/VAC allegations on the project Participate in GBV&VAC sensitizations to project workers and communities Provides technical guidance to contractors and communities on any referral pathway for a specific incident	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?
	Maintains a directory of services providers (Government and Civil Society Organizations) for survivors and victims Links victim and survivors for more support to existing service providers Follows up on the progress of judicial processes for the suspects	
MWE	Ensure that the Civil works contracts have strong penalties for contractors and workers involvement in VAC & GBV Provides effective orientation of contractors and their staff on safeguards management on the project Deploys dedicated service provider for VAC& GBV on the project sites Monitors VAC & GBV cases in the community and assesses any cases involving the contractors and their workers 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) Make follow up to ensure that all cases are judiciously managed Liaise with other MDAs to ensure appropriate actions to the VAC & GBV victims and offenders	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 perpetuator

Notes	Attach all the necessary supporting information or documents and remember to retain a copy for follow-up

S/N	Indicators	Details captured
1	Name of the alleged perpetrator (attach a photo) if available	
2	Sex	
3	Age (if known)	

4	Residence	
5	Marital status	
6	Contacts- telephone	
11	Consent or non-consent of the perpetrator on committing the act	
12	Previous incidents of violence committed by the alleged perpetrator	
13	Measures taken by the duty bearers and other stakeholders against the perpetrator	
14	Outcomes of the measures if any	
15	Recommended actions against the perpetrator	
16	Any other information found necessary	
17	Form compiled by: Name: ---------- Signature: ---------- Position:---------- Date:----------	Contact details: Tel:----------Email:----------