



Republic of Uganda

Ministry of Water and Environment

INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT

**PROPOSED LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND
SANITATION FACILITIES IN LUGALA RURAL GROWTH CENTRE, IN BANDA SUB
COUNTY, NAMAYINGO DISTRICT**



**ENVIRONMENTAL AND SOCIAL IMPACT
STATEMENT**

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LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
DED	Detailed Engineering Design
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
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HC	Health Centre
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
EUWS	Eastern Umbrella of Water and Sanitation
NGOs	Non-Government Organization
OHS	Occupational Health and Safety
OPM	Office of the Prime Minister, Government of Uganda
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

ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commission for Refugees
UTM	Universal Transverse Mercator
VECs	Valued Environmental Components
WASH	Water, Sanitation and Hygiene
WCS	Wildlife Conservation Society

EXECUTIVE SUMMARY

THE PROJECT

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

Component 1 of the IWMDP supports implementation of water supply and sanitation in small-towns and rural growth centres in Uganda. Sub Component 1.1 will support activities designed to improve the sustainable provision of water supply and sanitation services in small towns and Rural Growth Centres (RGCs) in target districts in Uganda. The target districts are; namely Buyende, Kaliro, Namayingo, Mayuge, Jinja, Namutumba and Kamuli in Eastern Uganda; Mityana, Mubende, Kassanda, Kyankwanzi, Nakasongola, Rakai, Lyandonde, Sembabule, and Mukono in Central Uganda; and Kagadi, Kakumiro, Kiruhura, Kazo, Kisoro, Kyegegwa, Kyenjonjo in Western Uganda.

In Namayingo District, the project will implement a solar powered piped water supply system and build sanitation facilities in Lugala RGC, located in Banda Sub County and this is therefore the focus of this ESIA.

PROJECT JUSTIFICATION

Lugala Rural Growth Centre (RGC) was selected among the emerging amalgamation of small towns in Namayingo District, Eastern Uganda to benefit from the project due to the low levels of safe water (44%) and sanitation (23%) coverage compared to other locations in the district at 61% and 78.6%, as indicated in the Uganda Water Atlas, 2022 and the Namayingo Third District Development Plan (DDP III) 2020/21 – 2024/25, respectively. The RGC will therefore be supported with a large solar powered piped Water Supply System and two improved sanitation facilities. The proposed project will increase the availability of safe drinking water, reduce the distance people must travel to access safe WSS systems, secure water sources to ensure sustainable supply, and improve sanitary conditions at the household and community levels. Local communities will also benefit from catchment management activities focused on building capacity for modern land use management and improved agroforestry farming practices. The Project will also strengthen the resilience of the systems to water-related shocks. Service providers (Umbrella Water Authorities and the NWSC) and their staff will benefit from Technical Assistance (TA) and investments focused on strengthening their financial and operational performance. In addition, local communities and regional and local organizations will be empowered to identify, prioritize, and support investments in water-related infrastructure and services.

PROJECT LOCATION AND COMPONENTS

The project area comprises 8 villages; namely; Budala A, Buhima, Lugala Beach, and in Lugala Parish and Buchumba parishes respectively and parts of Buhima village also located in Lugala parish, Namake, Bukwoyo, Bunini, and Busiro in Buchumba Parish, Banda Sub County.

The main components of the proposed project will include water intake from Lake Victoria, water pumping mains to reservoir, elevated storage reservoirs on a steel tower, Solar Pumps, Solar Panels,

chlorine dosing units, pump motors, pump houses, distribution network, and service connections. The projects will also support construction of waterborne public toilets and water field offices in the project supported RGCs.

PURPOSE OF ESIA AND ITS PROCESSES

In pursuit of environmental sustainability and social equity, It is a statutory requirement by Uganda Government laws (Environmental Act No 5 of 2019) that development projects that are deemed to bear significant environment and social risks and impacts undertake a comprehensive Environmental and Social Impact Assessment. The purpose of such an assessment is to guide mandated agencies in reaching informed decisions on the most practical and appropriate way of achieving designated project objectives while promoting environmental quality, conserving natural resources, maintaining ecosystem health, and ensuring social equity and justice. The ESIA study was deliberately executed to accord all stakeholders on the Lugala RGC Piped Water Supply and Sanitations Systems (WSSS) project an opportunity to deliberate on the nature of the project and inform its design such that the project addresses current development constraints and vulnerabilities.

The purpose of this ESIA is to comply with the National Environmental and Social legal framework that govern the implementation of infrastructure development projects. This includes the National Environment Act specifically, Section 4 (j&k) of Schedule 5 of the National Environment Act 2019 which lists Utilisation of water resources and water supply involving construction of large-scale gravitational water schemes and support facilities of more than 1000 m³/day or where the ecosystem is fragile and sensitive among projects for which environmental and social impact assessments are mandatory. The ESIA has also been prepared to comply with the World Bank Environmental and Social Safeguard Policies and subsequent Operational Policies (OP) and Bank procedures (BP) specifically, OP/BP 4.01: Environmental Assessment, 4.04: Natural Habitats, 4.11: Physical Cultural Resources and 4.12: Involuntary Resettlement, which will be triggered during project implementation activities as documented in the IWMDP Environment and Social Management Framework (ESMF). The ESIA follows the procedures and requirements defined in the ESMF and the World Bank Group EHS Guidelines.

PROJECT DESCRIPTION

Lugala RGC water supply system will abstract 933.63 m³/day (58.35m³/h at 16 hours pumping regime) from Lake Victoria at GPS coordinates 600406.37 m E, 21542.63 m N in Lugala Beach village, Lugala parish, Banda Sub County. Raw water from the lake will then be transmitted through a 400 m transmission main to 980 m³/day Water Treatment Plant (WTP) at GPS coordinates 600076.00 m E, 21870.00 m N. Raw water at the WTP will be treated by aeration, coagulation, flocculation, sedimentation, and filtration before transmission for 3.5 Km to 296 m³ reservoir tank in Budalaa village at GPS Coordinates 598013.96 m E, 21878.05 m N, Lugala parish, Banda Sub County. At the water reservoir, water will be pumped to 15 m high steel tank to allow gravitational distribution of approximately 13.16 Km distribution network to the 8 project villages in Lugala and Buchumba Parishes within Banda Sub County. A total of 258 service connections shall be made in the initial year increasing to 1,888 in the ultimate year (2040).

The field water office will be located at Banda Sub County offices, located at GPS coordinates 599386.11 m E, 21643.39 m N in Buhima. The proposed sanitation facility will be at Lugala Beach landing sites (GPS Coordinates 600522.86 m E, 21974.52 m N), the location of the weekly market.

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

- a. Mobilisation and WSS design activities.
- b. Construction activities and installation of different water system infrastructure facilities.
- c. Water system operation and maintenance works.

STUDY METHODOLOGY

The preparation of this ESIA involved:

- a. Review of existing secondary information relevant to the project and this included national policies, laws, regulations as well as the World Bank Safeguard Policies to key out requirements for project implementation. The review process also established the institutional framework under which the project would be implemented.
- b. Field visits within the different project components' sites were undertaken to document existing baseline environmental and socio-economic aspects; and
- c. Socio-economic survey was conducted through a combination of approaches, and these included: review of literature, use of household survey questionnaires, stakeholder consultations, Focus Group Discussions and Key Informant Interviews. The socio-economic assessment covered household and individual characteristics, livelihood activities, socio-gender risks, and administrative set-ups near the different project sites. The views of several officials/persons that might be affected directly or indirectly by the proposed project were captured using a stakeholder consultation tool.

POLICY, LEGAL AND REGULATORY FRAMEWORK

The key policies and legislations applicable to the project include:

- i. The National Environmental Management Policy, 1994.
- ii. National Policy on HIV/AIDS and the World of Work, 2007.
- iii. Gender Policy, 2007.
- iv. The Uganda National Land Policy, 2013.
- v. National Policy on Elimination of Gender Based Violence, 2016.
- vi. The Uganda Forestry Policy, 2001.
- vii. The Constitution of the Republic of Uganda, 1995.
- viii. Uganda Vision 2040.
- ix. The National Environment Act, 2019.
- x. The Occupational Safety and Health Act, 2006.
- xi. The Land Act, Cap 227, of 1998.
- xii. The Local Governments Act, 1997.
- xiii. Public Health Act, Cap 281.
- xiv. The Water Act Cap, 152 1997.

- xv. The Employment Act, 2006.
- xvi. The Workers' Compensation Act, Cap. 225.
- xvii. The Road Act, Cap 358.
- xviii. The National Forestry and Tree Planting Act, 2003.
- xix. The Uganda Wildlife Act, Cap 200, 2000.
- xx. Labour Disputes (Arbitration and settlement) Act, 2006.
- xxi. Children Act Cap 59.
- xxii. The Environmental Impact Assessment Regulations, 1998.
- xxiii. The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations 2000.
- xxiv. The National Environment (Waste Management) Regulations, 1999.
- xxv. National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999.
- xxvi. The National Environment (Noise Standards and Control) Regulations, 2003.

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) and its implementation is guided by the 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.

Accordingly World Bank EHS Guidelines shall also apply .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.

ENVIRONMENTAL AND SOCIAL BASELINE

Biophysical Environmental conditions

Climate and weather: The project area experience tropical monsoon climate with monthly mean temperatures above 18 °C in every month of the year and a dry season. The area experiences extreme seasonal variations in monthly rainfall throughout the year. The project area experiences two rainy seasons. The first rainy season is from March to May followed by a less pronounced rainy season from September to November. The annual rainfall varies between approximately 1450 mm and 1565 mm (Figure 5-220). Spatially, rainfall is more concentrated in the North Eastern part of the project area, gradually reducing towards the South West.

Water resources and hydrology: Lugala RGC project area is drained to L.Victoria largest (surface water source in the district) in all directions . The water intake (source) for the project is Lake Victoria at Lugala Beach village in Lugala Parish, Banda Sub County.

Topography: The project area is gentle sloping with maximum and minimum elevations of 1126 m and 1215 m respectively. The average elevation above sea level of 1,180 m. It is well drained to either direction because it's surrounded by the arms of L. Victoria.

Geology and Geomorphology: The project area lies in the Lake Victoria Terrane (LVT) of the Tanzania Craton extends into the south-eastern corner of Uganda. The LVT comprises predominantly mafic metavolcanic rocks overlain by a unit composed of felsic metavolcanics and met sediments and several granitoids. The rock system is a basement underlined by the Nyanzian system that is rather complex and includes a variety of granites, gneisses, quartzite and small areas of other kinds of strong folded metamorphic rocks.

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

Air quality monitoring for pollutant gases such as SO₂, NO₂, VOCs and CO; and particulate matter were undertaken at two major receptor locations within the project area. In addition, baseline measurements for noise and vibration were undertaken in the same locations. All recorded results were analysed based on Nation and WHO Standard for the respective parameters and most of these were established to be within permissible levels according to WHO and National Validating Standards.

Water quality assessment was undertaken for in-situ and *ex-situ* measurements, water samples were picked from selected water source (Lake Victoria) and tested for different parameters such as Biochemical Oxygen Demand-BOD, primary production, coliform, oil, trace metals and some nutrients among others.

Vegetation: From all the surveyed sites, namely the water intake, WTP, location of the sanitation facility in Lugala Beach Village, the reservoir site in Budalaa village, field water office in Muhima village and the transmission and distribution routes in the 8 project villages, a total of one hundred, sixty-eight (168) individual species were recorded, from forty-two (42) families. Herbs or grasses recorded the highest individuals with two hundred, twenty-five (125) contributing 75%, followed by trees/shrubs with twenty-nine (29) representing 17%, and lastly liana with fourteen (14) species contributing only 8% of the species composition.

Fauna: Considerable anthropogenic modification of habitats has occurred in the project area. Subsistence agriculture with sedentary farmers has meant that crop cultivation is a significant feature of the landscape hence influencing fauna distribution within Lugala RGC project implementation area. Anthropogenic activities have impacted negatively on the flora of most areas of the proposed project activities which also affects the fauna that depend on the flora for food, cover, and shelter. And as such, the survey recorded 13 species of butterflies, only 2 species of dragonfly, 8 species of amphibians, species of reptiles, 48 species of birds.

SOCIO-ECONOMIC BASELINE

Study Area: The study covered Lugala RGC in Banda Sub County, in Namayingo district. The study area included 8 beneficiary villages within the core project area (distribution and source / water catchment).

Population & Demographics The district has a total population of 215,443 people of which 109,140 are females and 106,303 males according to the 2014 National population and housing census. The fertility rate lies at 7.8 children per woman. Namayingo is a multi-lingual community comprising of the Samia as the majority, Basoga, Japadhola, Bagishu, Baganda, Jaluo, Bakenye, Bagwere, and Itesots.

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

- 1) Compact or Nucleated settlements - this is common in Lugala landing site in Lugala Beach where large number of dwellings are constructed very close to each other on the lower side, near the beach line.
- 2) Linear settlements along roads
- 3) Dispersed or dotted settlements with dwelling located far apart and often within a village landscape, as observed in source area.
- 4) Informal settlements - these are illegal dwellings often in restricted and/or prohibited areas such as wetlands and 100-meter buffer zone of Victoria shorelines.

Water Access in Health Centres: Within Lugala RGC, only one health facility (Busiro Church of God HC III) has access to piped water (1 PSPs) provided by The Safe Water Project.

Water access in Schools: In all the schools, the major water source are Lake Victoria, 3 functional RWHTs and PSP by The Safe Water Project in two schools.

Capacity of RWHTs: The total water tank capacity in the 3 schools is 30,000 liters serving a school population of 1,583 learners as shown in Table 4 below.

Average distance to water source: The average distance to an open water source (Lake Victoria) for is less than 150 meters.

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

Ethnicity: The project area is ethnically heterogeneous, and a number of tribes were established to exist in the area. Basamia were the most predominant representing 71.9% followed by Basoga 11.1%, Jaluo 7.2%, Bagisu 3.9% Itesot at 3.3% and Banyole (0.8 %). This implies that Samia, Lusoga and Lumasaba should be the languages used for communication in regard to the project. Other tribes recorded in the project area during the survey included; Japhadhola, Banyole, Bagwere.

Health Care: Data from the field survey indicate that 54.2% of the respondents used Privately run clinic /drug shop to access medical healthcare services, 22.2% used health centre II, 15% Community Health Centre and 8.5% health centre III.

Land Tenure: Customary Land tenure system is the most predominant for both female and male headed households in the project area. Survey results indicated that the majority (75.8%) were landowners, 22.9% tenant Kibanja owners on customary land and licensee and Squatters (0.7%).

Interms of land acquisition, most of female and male headed households acquired land through inheritance and the patterns of land holding by gender remained customary tenure. This might present a challenge at the stage of compensation/paying some easement fees, especially for Kibanja owners because there is likelihood of Project Affected Persons (PAPs) claiming ownership of land which is not rightfully theirs.

Occupation and livelihoods: The survey findings indicate that 75% (183 out of 244) of the respondents depend on subsistence farming and fishing. In non-fishing areas, the dominant crop farming practice are cereal growing especially maize, rice, beans, sorghum. The animal husbandry practices include poultry and livestock such as cattle, goats, sheep. Other farming practices include aquaculture and apiculture. There are other agricultural value chains-based activities such as secondary agro-processing (grain milling, bulking); In terms of other occupations.

STAKEHOLDER ENGAGEMENT

The stakeholder engagement mechanisms employed during this study included information sharing meetings with the stakeholders, focus group discussions and key informant interviews. Project information was disclosed in relevant local languages and in a manner that is accessible and culturally appropriate. Meetings were also held with disadvantaged and vulnerable groups affected by the project such as, women, PWDs, youth, elderly, among others.

The target stakeholder groups included,

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

Officials from MoWE, Namayingo District Local Government, Banda Subcounty, Lugala and Buchumba Parishes and the beneficiary villages local community members were consulted, and their views incorporated in this ESIA Report.

ALTERNATIVES ANALYSIS

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 Lugala 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 933.63 m³/day and the quality of the water. Ground water and surface water options were considered. Surface water option was preferred as it meets 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 is 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.

PROJECT IMPACTS

The proposed implementation of the Solar-powered WSSS Project under Lugala RGC will have positive impacts such as improved access to clean and safer water, creation of employment opportunities, skills transfer, creation of market for local goods and services, enhanced sanitation, hygiene and public health in the project area (8 villages in Lugala and Buchumba Parishes in Banda Subcounty, Namayingo District). On the other hand, project implementation works under Lugala RGC will trigger negative impacts such land uptake, loss of vegetation, loss of livelihoods among the water vendors, waste generation, dust nuisance, noise, occupational health, and safety amongst others (See Table 0-1 below). The assessment revealed that the water transmission and distribution pipe networks will be within the existing access roads reserves to ensure minimal land uptake, loss of property such as crop gardens among others thus minimal need for compensation and resettlement activities. Consequently, the overall anticipated impacts will be minimal.

Table 0-1: Summary of Impacts

Impact	Level of significance	
	Before Mitigation	After mitigation
Pre-construction phase		
Social Anxiety	Minor	Minor
Construction phase		
Loss of Land and Displacement of Economic Activities	Moderate	Minor
Disturbance and degradation of wetland ecosystems	Moderate	Minor
Vegetation clearance	Minor	Negligible
Potential Loss of Fauna	Minor	Negligible
Potential introduction of Invasive Plant Species	Minor	Negligible
Soil erosion and Sedimentation	Moderate	Minor

Impact	Level of significance	
	Before Mitigation	After mitigation
Risk of increasing the spread of HIV-AIDS and other venereal diseases	Moderate	Minor
Risk of Sexual exploitation and abuse of community members by project workers	Moderate	Minor
Risk of Gender Based Violence and Family / Marriage Breakdown	Moderate	Minor
Risk of Non-Payment of Workers, Suppliers and Subcontractors	Moderate	Negligible
Liability for loss of life, injury or damage to private property	Major	Minor
Impacts relating to construction materials extraction and transport	Moderate	Minor
Nuisance of construction waste	Moderate	Minor
Poor Sanitation at the construction site and auxiliary facilities	Minor	Negligible
Air Quality Impacts due to Vehicular Emissions	Moderate	Minor
Risk of Accidents due to traffic and moving equipment	Minor	Negligible
Noise and Vibration Impacts	Minor	Negligible
Occupational Health and Safety Risks	Moderate	Minor
Operation phase		
Decrease in Water Resources	Negligible	Negligible
Solid Waste Generation	Moderate	Minor
Land Pollution, Waste and Drainage Problems	Moderate	Minor
Increased Cost Per unit / Reduced Affordability	Moderate	Minor
Loss of Livelihood by Water Vendors	Moderate	Minor
Occupational Health and Safety Risks	Moderate	Minor
Risk of Sexual exploitation and abuse of community members by project workers	Moderate	Minor

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

ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The proposed Environment and Social Management and Monitoring Plan specifies mitigation measures and monitoring actions with time frames, specific responsibilities assigned, and follow-up actions defined in order to check progress and the resulting effects on the environment and affected communities by the implementation of the proposed Lugala RGC WSSS project activities. Monitoring will begin immediately and will continue throughout all project implementation phases. One important aspect of monitoring will be to assess the level of implementation of mitigation measures and its effectiveness as suggested, and where they are found lacking, appropriate new actions to mitigate any adverse effects will be undertaken.

The developer will use the this ESIA report to ensure that the contractor develops and implements the Contractor's Environmental and Social Management Plan. This plan will be overarching document that contains general Control Statements for management of various impacts such as air quality, solid waste, and hazardous materials, water quality and ecosystems, noise and vibration control, erosion control, waste excavation and disposal and occupational health and safety, traffic, labour force, grievance redress and so on. The implementation of the mitigation measures and the occurrence of impacts shall be monitored on a daily, weekly, monthly, and quarterly basis depending on the aspect. The implementation of the and performance of the mitigation measures will be reported in the Contractor's monthly ESHS reports.

Commitments

- a)** The developer shall implement the mitigation measures stipulated in the ESMMP. The same shall be extended or included in any contract entered into with any contractors/ sub-contractors.
- b)** The developer together with the District Environment Officers, Officials from NEMA, and other relevant Government agencies and departments shall carry out monitoring to ensure that the recommended mitigation measures in addition to ESIA conditions of approval and other relevant ESHS requirements are complied with.
- c)** Annual Environmental and Social Audits of the proposed Lugala RGC Solar Powered Water Supply and Sanitation Systems Project will be carried according to the NEA regulations 2020.

RECOMMENDATION AND CONCLUSIONS

As part of the recommendations, the design should consider extending water supply to Bugoya Trading center which already has an existing pipe water network that was redered redundant due to hard water from borehole. Secondly, the deisgn of the toilet facilities should provide for two stances where each stance should be allocated to Female and Male PWDs. In addition, the design should consider upgrading the access road to water intake and treatment sites.

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

1 INTRODUCTION

1.1 BACKGROUND

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

1.2 PROJECT COMPONENTS

According to the project ESMF, the IWMDP is 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, this particular study is for component 1: Small-town and Rural Water Supply and Sanitation i.e., sub component 1.1: Water supply and sanitation in small towns: Water supply and sanitation infrastructure to rural and urban communities and supporting source protection measures to ensure sustainability of water supplies and protection.

This sub component covers RGCs in the districts of Buyende, Kaliro, Namayingo, Mayuge, Jinja, Namutumba and Kamuli in Eastern Uganda; Mityana, Mubende, Kassanda, Kyankwanzi, Nakasongola, Rakai, Lyandonde, Sembabule, and Mukono in Central Uganda; and Kagadi, Kakumiro, Kiruhura, Kazo, Kisoro, Kyegegwa, Kyenjojo in Western Uganda.

This particular ESIA is for the proposed solar powered piped water supply and sanitation system in Lugala RGC, Banda Sub County, Namayingo District The components of this system are described in Section 2.3.

1.3 PROJECT JUSTIFICATION

Uganda has experienced two decades of economic growth, leading to large population movements from rural areas to informal settlements around urban centers known as small towns and rural growth centres¹. High population growth stresses the existing water and sanitation services. Currently, over seven million Ugandans lack access to safe water and 28 million do not have access to improved sanitation facilities by 2020 (UNICEF, 2018²). Furthermore, due to disparities in access to safe water in Uganda, urban people living in poverty pay as much as 22 percent of their income to access water from water vendors (Water.org, 2022³). Spending such a high percentage of earnings on water reduces overall household income, limiting opportunities to build savings and break the cycle of poverty.

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)

Sanitation coverage poses another significant challenge. The United Nations Joint Monitoring Program (WHO, 2021⁴) reports that only 28 percent of the urban and 17 percent of the rural populations have access to individual improved sanitation facilities (UNICEF, 2018⁵). Sewerage coverage is less than 7 percent in large towns and negligible in small towns (WHO, 2021). Low sanitation coverage, unimproved on-site sanitation facilities, inadequate wastewater treatment and poor fecal sludge management are among the key factors that hamper Uganda from meeting global Sustainable Development Goal 6 (Ensure access to water and sanitation for all).

The proposed IWMDP water supply and sanitation infrastructure will be implemented as part of the strategy to improve access to clean water, improved sanitation and hygiene in small towns and rural growth centres in Eastern Uganda, specifically Lugala Centre RGC in Namayingo District. Lugala Rural Growth Centre (RGC) was selected among the emerging amalgamation of small towns in Namayingo District, Eastern Uganda to benefit from the project due to the low levels of safe water (44%) and sanitation (23%) coverage compared to other locations in the district at 61% and 78.6%, as indicated in the Uganda Water Atlas, 2022 and the Namayingo Third District Development Plan (DDP III) 2020/21 – 2024/25, respectively.

The proposed project implementation will increase the availability of safe drinking water, reduce the distance people must travel to access safe WSS systems, secure water sources to ensure sustainable supply, and improve sanitary conditions at the household and community levels. Local communities will also benefit from catchment management activities focused on building capacity for modern land use management and improved agroforestry farming practices. The Project will also strengthen the resilience of the systems to water-related shocks. Service providers (Umbrella Water Authorities and the NWSC) and their staff will benefit from Technical Assistance (TA) and investments focused on strengthening their financial and operational performance. In addition, local communities and regional and local organizations will be empowered to identify, prioritize, and support investments in water-related infrastructure and services.

1.4 PROJECT CATEGORIZATION

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

Other considerations that guided the categorization included:

- a) Social impacts intrinsic to the project implementation works will be of short-term in nature and will be localized and can readily be mitigated through implementation of mitigation measures which will be outlined in the ESMP.
- b) Possible instances of land acquisition will be minimal and restricted to areas for project auxiliary sites such as reservoir tanks, water treatment plants, transmission and distribution infrastructure, sanitation facilities and field offices to be acquired by GoU through MoWE;
- c) In addition, the planned IWMDP and subprojects implementation activities falls under the category projects under Schedule 5 of the National Environment Act 2019 requiring mandatory ESIA to be undertaken before its implementation i.e. *“Utilization of Water Resources and Water Supply involving construction of large-scale gravitational water schemes and support facilities of more than 1000 m³/day or where the ecosystem is fragile and sensitive”*.

1.5 PURPOSE AND OBJECTIVES OF THE ESIA

1.5.1 PURPOSE

In pursuit of environmental sustainability and social equity, it is a statutory requirement by Uganda Government laws (Environmental Act No 5 of 2019) that development projects that are deemed to bear significant environment and social risks and impacts undertake comprehensive Environmental and Social Impact Assessment. The purpose of such an assessment is to guide mandated agencies in reaching informed decisions on the most practical and appropriate way of achieving designated project objectives while promoting environmental quality, conserving natural resources, maintaining ecosystem health, and ensuring social equity and justice. The ESIA study was deliberately executed to accord all stakeholders on the Lugala Centre RGC Piped Water Supply and Sanitations Systems (WSSS) project an opportunity to deliberate on the nature of the project and inform its design such that the project addresses current development constraints and vulnerabilities.

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

1.5.2 OBJECTIVES OF THE ESIA

In line with legislative requirements of Uganda, and the World Bank Safeguard Policies, the ESIA objective is to identify and assess potentially negative and positive environmental and social risks and

impacts of all phases of the project. The ESIA process is also to identify measures to avoid, minimize or mitigate the potential negative environmental and social impacts, and to enhance the identified benefits to the local community and the environment.

Additionally, the ESIA process is intended to inform the project of an Environmental and Social Management Plan (ESMP) to mitigate any potential negative impacts, enhance benefits and establish ongoing monitoring activities. The specific objectives of the environmental and social impact study were to:

- i. Describe the Policy, Legal and Regulatory Frameworks
- ii. Provide a baseline description of bio-physical and socio-cultural environment of the project area.
- iii. Determine social risk assessment and identification of existing referral pathways including but not limited to gender issues, inclusion of vulnerable groups , stakeholder engagement and labour influx, including social conflict, Gender Based Violence (GBV), Violence against children (VAC), HIV/AIDS, community health and safety, economic and physical displacement among others;
- iv. Analysis of proposed alternatives identified during the feasibility study;
- v. Conduct evidence based and participatory consultations with project stakeholder groups, including potentially affected persons, ensuring their views and comments are documented and taken into consideration.
- vi. Determine, analyse, and evaluate potential (positive and negative) environmental and social impacts (direct, indirect and cumulative impacts) likely to result from the proposed Lugala Centre RGC Piped Water supply and Sanitations Systems (WSSS) project implementation activities.
- vii. Identify feasible and cost-effective mitigation measures for the impacts identified.
- viii. Prepare an Environmental and Social Management Plan (ESMP) and other relevant management plans to guide environmental and social management of the project during implementation;
- ix. Develop chance finds procedures to facilitate the handling of any unknown or known physical cultural resources, recommend grievance redress mechanism to facilitate the handling of any complaints that may arise during project implementation; and
- x. Propose recommendations to ensure overall environmental and social sustainability of the project.

1.6 ESIA PROCESS

ESIA for the Lugala Centre RGC Solar Powered WSSS 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).

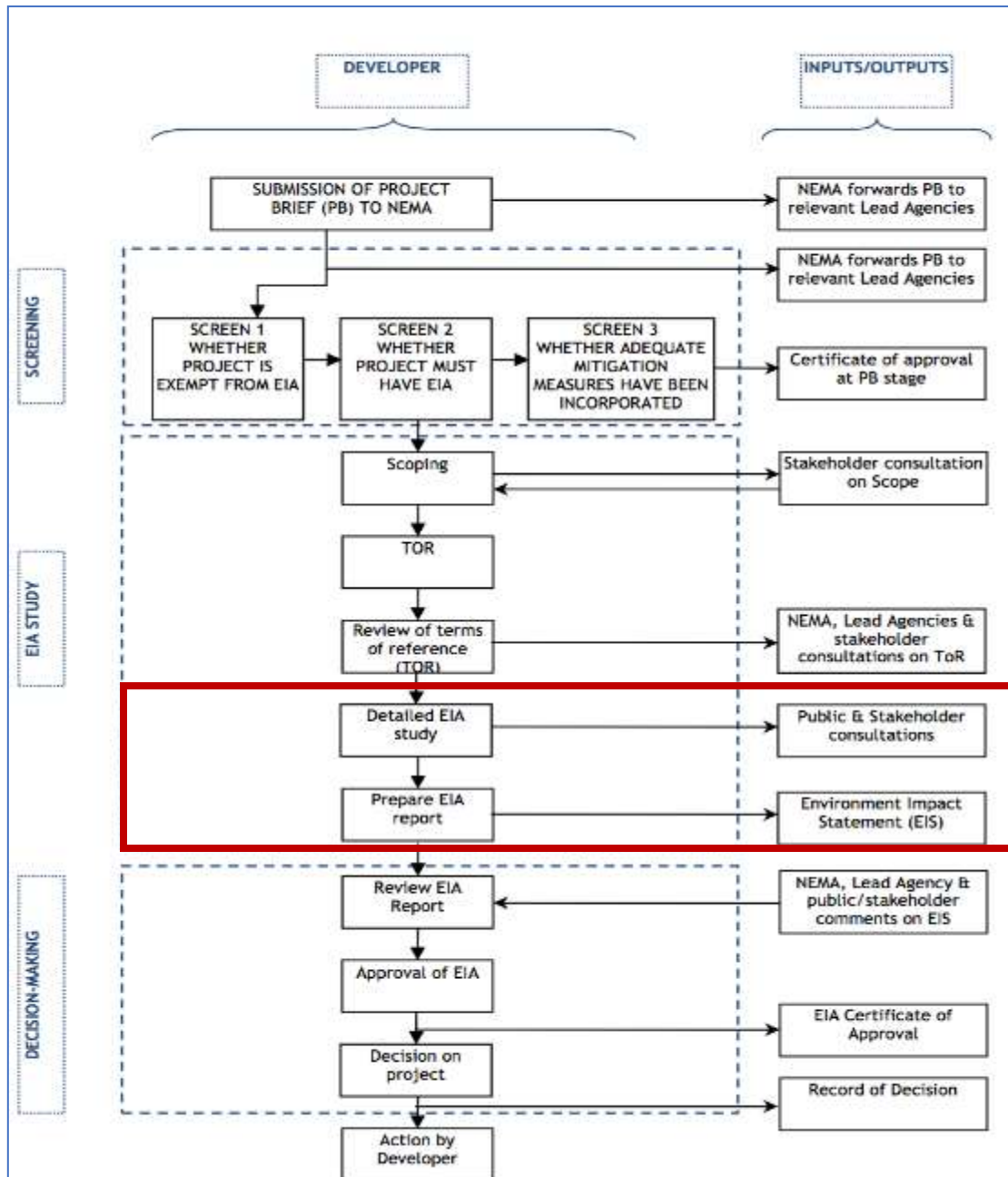


Figure 1-1 :ESIA Process in Uganda according to ESIA Reference Manual, NEMA, June 2002

- (a) **Screening:** The proposed the Lugala Centre RGC Large Solar Powered WSSS project was screened to preliminarily establish its key potential environmental and social impacts and the level of environmental and social assessments that would be required. The project falls under Schedule 5 of the National Environmental Act 2019 which require mandatory assessments to be conducted before implementation.
- (b) **Scoping:** This was the first step in the ESIA, and it was determining the scope/extent of work to be undertaken in assessing the likely environmental and social impacts of the proposed project. This process entailed literature review, site reconnaissance visits which was conducted in the project area from (14th- 22nd February 2022), consultative meetings with relevant agencies and stakeholders including project affected persons (PAPs) and with the local leaders to obtain their views and comments on the project and the ESIA studies. This culminated in the preparation of a Scoping Report, which was submitted to NEMA in keeping

with EIA practice and procedures. The NEMA conditions of approval of the terms of reference for this ESIA and how they have been incorporated in the study are included in **Annex A** of this report. **Detailed ESIA study and information collection:** Upon completion of the Scoping study and approval (Annex A), detailed field investigations and consultations were undertaken, leading to the preparation of this Environmental Social Impact Assessment Report.

(c) 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 STRUCTURE OF THE ESIA REPORT

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

Table 1-1: Report structure

Section	Content
Technical Summary	The Executive Summary presents a summary of the project and its activities, ESIA study methods, key findings and impacts as well as proposed mitigation measures.
Chapter 1	Covers project introduction with brief background, the Lugala RGC Solar Powered WSSS project works, justification, categorization of the Project and ESIA process.
Chapter 2	Has information on the description of the project, its location, project parameters and proposed activities to be undertaken during its phases.
Chapter 3	Has principally, information on the methodologies employed during the ESIA study.
Chapter 4	Outlines the key policy, legal/regulatory, institutional framework and international guidelines and conventions relevant to the planned project.
Chapter 5	Presents biophysical and Socioeconomic baseline information of the project area
Chapter 6	Presents information of public consultation and stakeholder engagement processes, the outcomes of such meetings and Grievance Redress Mechanism.
Chapter 7	Has information on the project alternatives, a comparison of the options and their significance.
Chapter 8	Has details of the project anticipated environmental and social impacts Analysis, enhancement and their mitigation measures as well as the Environmental and Social Management Plan (ESMP).
Chapter 9	This section presents the Environmental and Social Monitoring Plan.
Chapter 10	Has Commitment, Recommendations and Conclusion
	References
	Annexes and their details.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

Lugala Centre RGC is located in Banda Parish, Banda Sub- County, Namayingo District. The sub-county is bordered by Biyinja and Mutumba Sub-counties to the North and West, Busia District to the East and Lake Victoria to the South. The district is also bordered by Bigiri District to the North and West, Busia to the East and Lake Victoria to the South. The RGC is located at the shores of Lake Victoria approximately 19 km by road from Namayingo District headquarters along the Namayingo-Lugala road. The project main components will be located at GPS coordinates and villages indicated in Table 2-1 below.

Table 2-1: Location of Main Project Components

No.	Component	UTM, 36N	Village	Parish
1	Intake	600406 m E, 21543 m N	Lugala Beach	Lugala
2	Water Treatment Plant (WTP)	600076 m E, 21870 m N	Lugala Beach	Lugala
3	Reservoir Tank	598013 m E, 21878 m N	Budalaa	Lugala
5	Water field office	599386 m E, 21643 m N	Buhima	Lugala
4	Sanitation facility 1	600523 m E, 21974 m N	Lugala Beach	Lugala

The proposed piped water supply system and sanitation facility project will cover 8 villages in 2 parishes of Lugala and Buchumba in Banda Sub- County – Namayingo District (Table 2-2Table 2-3).

Table 2-2: Project Villages under Lugala Centre RGC

SUB COUNTY	PARISH/WARD	VILLAGES
Banda	Lugala	Budala A
		Buhima
		Lugala Beach
		Sidende
	Buchumba	Namake,
		Bukwoyo,
		Bunini,
		Businoho

The location of the project is shown on a map in Figure 2-1 below.

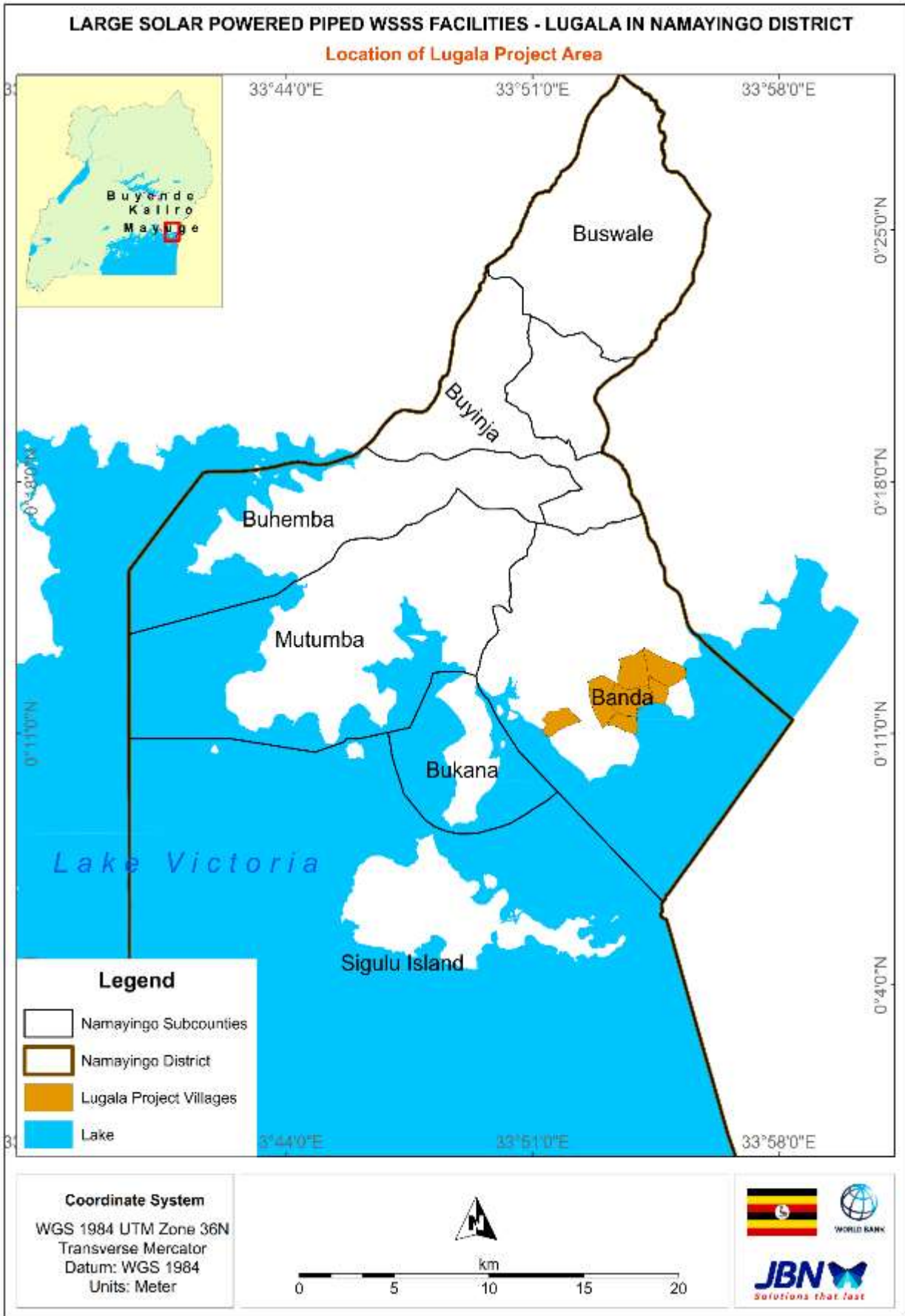


Figure 2-1: Location of Lugala Centre RGC project area

2.1.1 AREA OF INFLUENCE

To understand potential impacts of this type of project, its area of influence is to be divided into the Direct Impact Area (DIA) and the Indirect Impact Area (INDIA). DIA is the area that will receive primary impacts resulting from project activities and these will include:

- a. Water transmission and distribution pipe network infrastructure sites
- b. Establishment sites for the support infrastructure activities,
- c. Material extraction areas and spoil disposal sites

Much as the project implementation works will be undertaken within the designated and duly acquired pieces of land especially for the subproject facilities including siting raw water intake, construction of the water treatment plant and installation of pumping infrastructure, construction of storage reservoir tank, construction of a distribution network for the project and establishment of new consumer connections. The direct impact areas will majorly be the 8 villages of Lugala and Buchumba parishes in Banda Subcounty where the above project activities will be implemented.

The Direct Impact Areas especially around specific sites for raw water intake, establishment of water treatment plant facilities, pump houses, reservoir tanks and transmission/distributions need to exercise caution especially during project implementation activities bearing in mind the need to minimize:

- a. land take concerns among the project area communities.
- b. disruption farming operations (especially crop gardens and impacting on sources of livelihoods) especially along the transmission lines.
- c. impact on properties and other economic activities.

Some of the areas where the minimization of impact zone has to be undertaken include Direct Impact Areas for material source areas and along haulage routes. The Direct Impact Area is the zone in which all project construction activities have to be concentrated and to avoid any transgressions away from the designated DIA during construction, the contractor is required to mark off disturbance zones before bush clearing and excavations commence. This action will serve to restrict civil works and related operations within the designated DIA.

The proposed piped water supply system and sanitation facility project will cover 8 villages in 2 parishes of Lugala and Buchumba in Banda Sub- County – Namayingo District (Table 2-3).

Table 2-3: Project Villages under Lugala Centre RGC

SUB COUNTY	PARISH/WARD	VILLAGES
Banda	Lugala	Budala A, Buhima, Lugala Beach, Sidende
	Buchumba	Namake, Bukwoyo, Bunini, Businoho

On the other hand, the Indirect Impact Area (INDIA) refers to areas that will receive off-site secondary and sometimes tertiary impacts associated with project activities. The spatial dimension of the INDIA cannot be designated as a uniform dimension from project alignment. Project effects will be registered within the selected/designated sites for establishment of different project facilities infrastructure including the water distribution and transmission lines, and employment opportunities created by the project may accrue to casual laborers originating from Banda subcounty and adjacent areas. Most

social impacts including sexual exploitation and abuse of minors (SEA), GBV, Child and forced labour, HIV/AIDS, prostitution, and narcotic substance abuse may be spread through a wider location. Further risks may include exclusion of vulnerable groups such as people with disabilities, the elderly, women and youth from enjoying/ accessing project benefits, poor stakeholder engagement leading to lack participation or understanding of the project.

2.2 DESIGN CRITERIA

Lugala RGC WSS was designed based on a 20-year design period, starting with the initial year 2019 up to the ultimate year 2040. The projected population to be served by the water supply system by ultimate year is 17,400 people. The Maximum Day Demand (MDD) over a 16-hour pumping regime, which depict the daily water consumption by domestic and nondomestic consumers are 934 m³. 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 Lugala RGC.

Table 2-4: Projected water demand in the project area

Lugala RGC						
Served	2019	2020	2025	2030	2035	2040
Population.	8,329	8,626	10,281	12,251	14,600	17,400
Domestic	225	233	278	331	394	470
Government/Institution	31	32	38	46	55	65
Industry/Commercial	19	20	23	28	33	40
Unaccounted for Water (UFW)	69	71	85	101	121	144
Maximum Day Demand (MDD)	447	463	552	657	783	934

Source: MWE, feasibility Study and Design Report, 2019

2.3 PROPOSED 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.

Under the sanitation component, one waterborne public toilet will be constructed.

2.3.1 WATER SUPPLY SYSTEM

Lugala RGC water supply system will abstract 933.63 m³/day (58.35m³/h at 16 hours pumping regime) from Lake Victoria at Lugala Beach village, Lugala parish, Banda Sub- County. Raw water from the lake will then be transmitted through a 400 m transmission main to 980 m³/day 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 296 m³ reservoir tank in Buhima village, Lugala parish, Banda Sub- County. At the water reservoir, water will be pumped to 15 m high steel tank to allow gravitational distribution of approximately 13.16 Km distribution network to the 8 project villages in Lugala and Buchumba Parishes within Banda Sub- County. A total of 258 service connections shall be made in the initial year increasing to 1,888 in the ultimate year (2040). The project thematic designs is shown in Figure 2-2 below, specifications of project components in Table 2-5 and technical drawings of the project components attached as Annex 2.

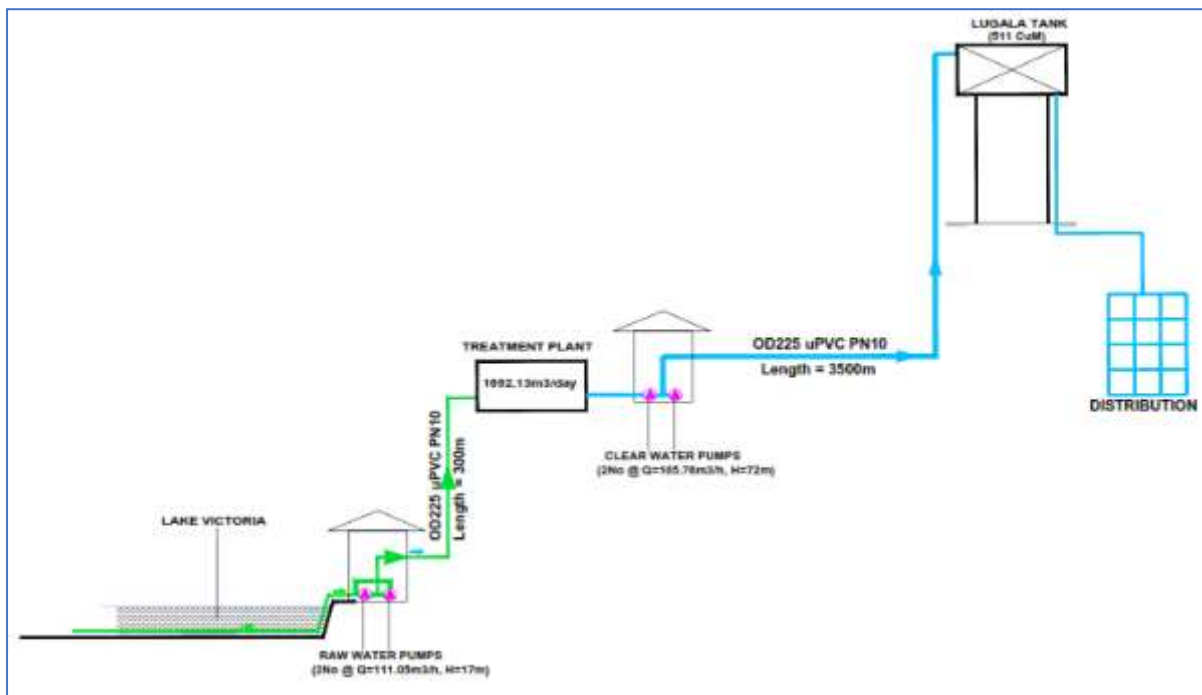


Figure 2-2: Lugala Centre RGC general water supply system thematic designs

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

No.	Parameter	Description
1	Water source	Lake Victoria
2	Water demand (Ultimate Year)	934 m ³ /day
	Water demand (Phase 1)	933.63 m ³ /day
3	Raw water transmission - Length	400 m (DN150 DI PN 6)
	Raw water transmission - Capacity	0.963 m ³ /s
4	Water Treatment Capacity	657.39 m ³ /d
	Water Treatment Methodology	Aeration, coagulation, flocculation, sedimentation and filtration
5	Primary Power Source	Solar Power (150No. of mono crystalline PV Solar panels rated at 280pW 12 Volts DC)
	Secondary Power Source	HEP (100kVA 3 phase transformer)
6	Treated water Transmission – length	2.645 Km (OD160 uPVC PN10)

No.	Parameter	Description
	Treated water Transmission capacity	0.987 m ³ /s
7	Reservoir Capacity	296 m ³
	Reservoir Tower Height	15 m
8	Treated Water Distribution Length	13,160 Km
9	Service Connections - Ultimate Year	1,888
	Service Connections - Phase 1	258

(Source: Lugala 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.

2.3.1.1 WATER SOURCES AND INTAKE

Lugala RGC water supply system will abstract water 400m offshore of from Lake Victoria in Lugala Beach Village (Figure 2-3).



Figure 2-3: Raw water abstraction point for Lugala Centre RGC

The project will abstract 933.63 m³/day of raw water from L. Victoria in Laugala Beach Village to meet the average day demand for Lugala RGC of **934** m³/day by 2040. Lake Victoria contains about 2,750 cubic kilometres (2.2 billion acre-feet) of water. The proposed project water abstraction is negligible compared to the Lake storage capacity.

The proposed type of intake is an Intake Well. The intake structure shall be formed from DN200 precast reinforced concrete rings to accommodate the raw water pumps (Figure 2-4). A walkway will

be provided to the intake point from the shores and will be made of steel columns and an open grid decking (Figure 2-5). A DN 150 ST raw water pumping main shall be fixed to the walkway. The electrical switchgear for the pumps will be housed in a weather proof and burglar proof console at the deck. The treatment plant will be located adjacent to the intake.

Water will be abstracted directly from the lake via a submersible pump. It is crucial that the intake is located as far from the bank as possible into the lake. If not, the bank mud that is stirred up by the waves would be sucked in by the intake pipe. To this end, an access bridge will be constructed extending into the lake depending on the high and low water levels.

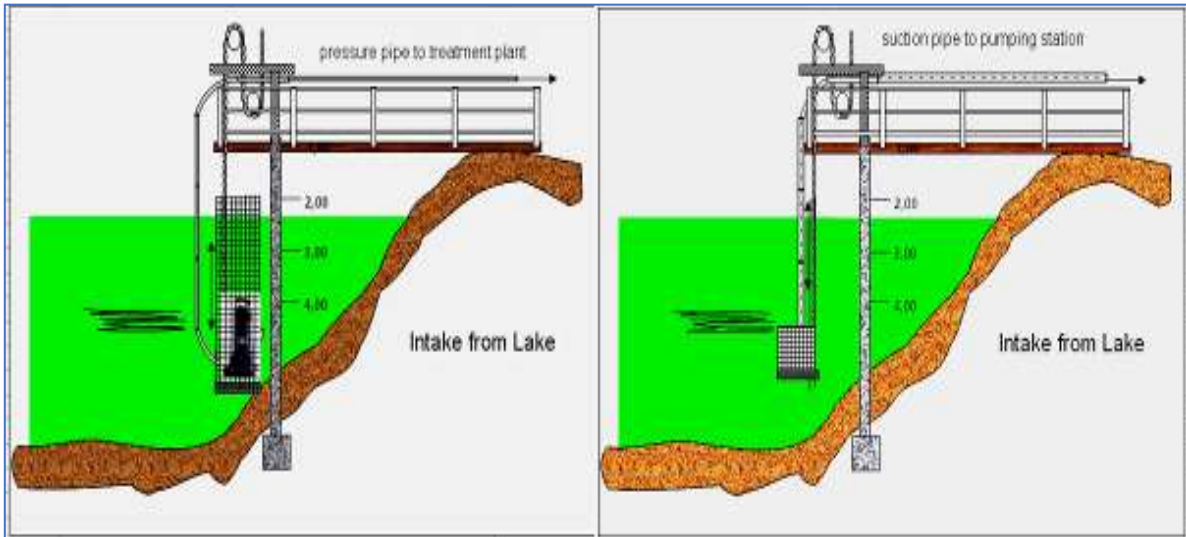


Figure 2-4: Proposed raw water intake structure



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.

2.3.1.2 RAW WATER TRANSMISSION MAINS

The Raw Water Transmission main will be DN150 DI PN 6 from the intake to the mixing chamber. The total length will be 400m. The main will have the capacity to deliver 62m³/hr. The water velocity is acceptable as it is within the range of 0.75-2.5 m/s and the surge pressures are also acceptable.

2.3.1.3 RAW WATER PUMPS

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. There will be a local control point and power supply will be from the water treatment plant. The proposed pumping head is based on 2030 demand because pumps have an economic life of 10 years and have to be replaced after. The energy calculations are for 8 pumping hours for each power source. Solar energy and HEP have been proposed to run the system for 8 years each in order to meet the demand in the ultimate year.

2.3.1.4 WATER TREATMENT PLANT

The total capacity of the Water Treatment Plant is 657.39 m³/d (43.14 m³/hr) inclusive of 5% plant use and is sized for the maximum day. The plant will operate for 16 hours per day in the ultimate year of 2030. According to the draft Detailed Engineering Design report for Lugala RGC WSS (MWE, 2021), the water treatment plant will comprise the following treatment units; Screening (pre-chlorination and aeration), rapid mixing, coagulation, flocculation, sedimentation, filtration and disinfection as shown in Figure 2-6 below and further described in the sub sections that follow.

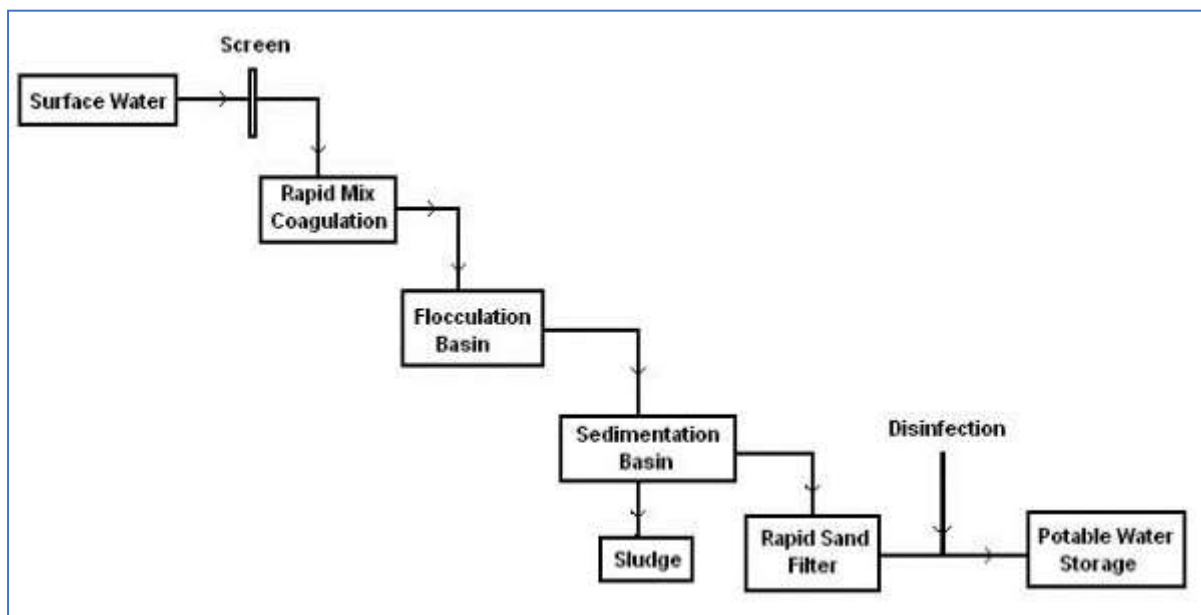


Figure 2-6: Water Treatment Process flow

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

2.3.1.4.1 PRE-CHLORINATION

Pre-chlorination is proposed before aeration to remove algae and odour etc. from the raw water. Removal of algae is required as it should not clog the treatment units.

2.3.1.4.2 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. Gravity type Cascade aerator is

proposed. In this type of aerator, the water flows down the steps in the form of thin sheets and provides a large water surface area creating agitation.

2.3.1.4.3 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).

2.3.1.4.4 COAGULATION

Coagulation is the widely used process to remove the substances producing turbidity in water. 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. Coagulation should be carried out within the optimum pH range for the particular water. The selection of type and dosage of the chemical coagulant must be made by experimentation, most commonly with jar tests. Commonly used coagulants include those which are iron or aluminum-based, lime, and polymers. 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 coloured surface waters and in lime soda softening to improve settling.

2.3.1.4.5 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 must 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.

2.3.1.4.6 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 (also called sedimentation tanks or clarifiers). 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 banks of small square shaped tubes

(commonly called tube settlers) or plates (commonly called plate settlers), inclined at 45° to 60° angles from horizontal.

2.3.1.4.7 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. Natural silica sand is the common filtering medium, but crushed anthracite coal is also widely used. The size and depth of sand used must be decided initially in the design of gravity rapid filters as these parameters affect a number of important features of plant design. 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. These filters are effective for raw or coagulated waters with turbidity as high as 10 NTU and are approximately 90 percent efficient in the removal of applied bacteria.

2.3.1.4.8 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 must 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 are 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.

2.3.1.4.9 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.

2.3.1.4.10 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.

2.3.1.4.11 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.

2.3.1.4.12 TREATED WATER PUMPING STATION AND PUMPING MAIN

The Pumps will be horizontal centrifugal pumps with soft starters and will have a common DN150mm suction main and will responsible in pumping water to the reservoir tank. A Tee piece shall be installed along the transmission main from which the backwash tank shall be supplied using a DN100 pipe connected to the tap off point. A pressure reducing device shall be installed on the backwash line section after the tap off so as to reduce/shave off 60m of head. All the pumps Suction Pipes have been set at 825mm below the Bottom Water Level of the Clear Water Tank and hence will be flooded inlets to avoid the need for priming the pumps.

2.3.1.5 TREATED WATER TRANSMISSION

The treated water transmission main will be DN150 ST PN10 delivering water from the treatment plant to the reservoir a distance of 3.5km. The main will have the capacity to deliver 58m³/hr. The design details are indicated in Table 2-6 below. It can be seen that the velocity is acceptable as it is within the range of 0.75-2.5 m/s and the surge pressures are also acceptable.

Table 2-6: Treated Water Transmission Design

Parameter	Clear Water Pumping Main
Demand- 2040 (m³/day)	933.63
Treatment Plant Use (5%) (m³/day)	0.00
Total Amount of Water Abstracted (m³/day)	933.63
Hours of Pumping (hr)	16
Efficiency (%)	60.0%
Required Delivery (m ³ /hr)	58.35
Required Delivery (m ³ /s)	0.0162
Pump Installation Level (m amsl)	1137.199
Inlet Level (m amsl)	1177.066
Static Lift (m)	39.9
Hazen Williams Coefficient, C _{wh} (C)	140
Pipe Details	OD160 uPVC PN10
Pipe Diameter ND (mm)	144.60
Pipe Diameter ND (m)	0.145
Velocity (m/s)	0.987
Flow in Pipe (m ³ /s)	0.0162
Length of Pipe (m)	2645
Friction Loss (m)	17.8

Parameter	Clear Water Pumping Main
Fittings losses - 10% (m)	1.8
Total Friction Loss (m)	17.8
Total Head (m)	59.5
Head Used (m)	60
Power (kW)	15.9
Source: Project Estimates	

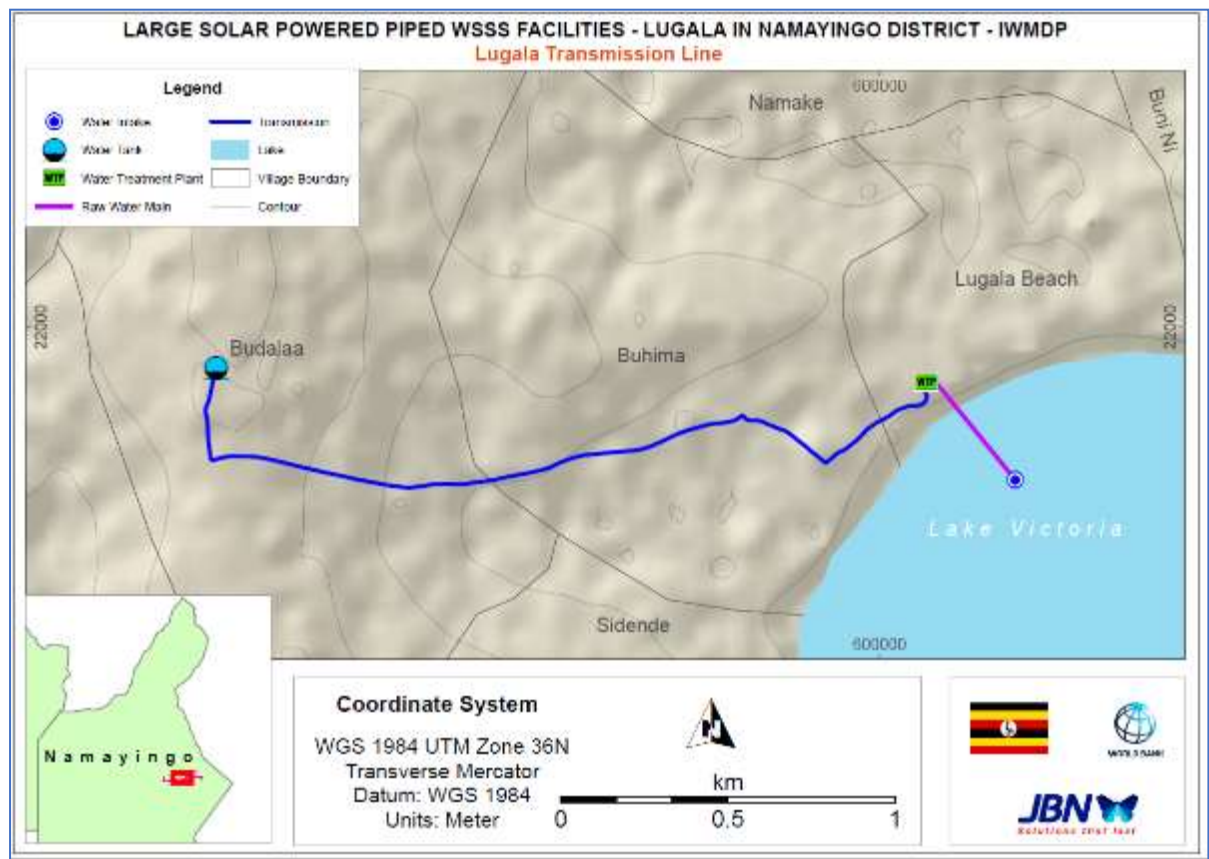


Figure 2-7: Lugala RGC Transmission Network Model

2.3.1.6 WATER STORAGE RESERVOIR

The required storage capacity has been computed as 30% of the maximum day demand and is therefore 280m³. A 296m³ main reservoir has been adopted since the 280m³ tank size does not exist in the market. This new tank represents a storage capacity of 30% in the ultimate year maximum day demand. The reservoir's storage capacity at various stages of the design period is reflected in Table 2-7 below.

Table 2-7: Reservoir Storage Capacity

Item	Lugala RGC Storage
------	--------------------

	2019	2020	2025	2030	2035	2040
MD Demand- m ³ /day	447	463	552	657	783	934
Storage Capacity (m ³)	296	296	296	296	296	296
Hours of Storage	16	15	13	11	9	8
Storage Capacity (%)	66%	64%	54%	45%	38%	32%
Source: Project Feasibility Report						

Due to the topography of the project area and the high pressures experienced in the far reaches of the distribution network, it is recommended to place the reservoir tank on a 15m high steel tower. The reservoir will be made of square cold pressed steel panels of length 1.22m and shall be provided with inlet, overflow, outlet, and drain pipe work.

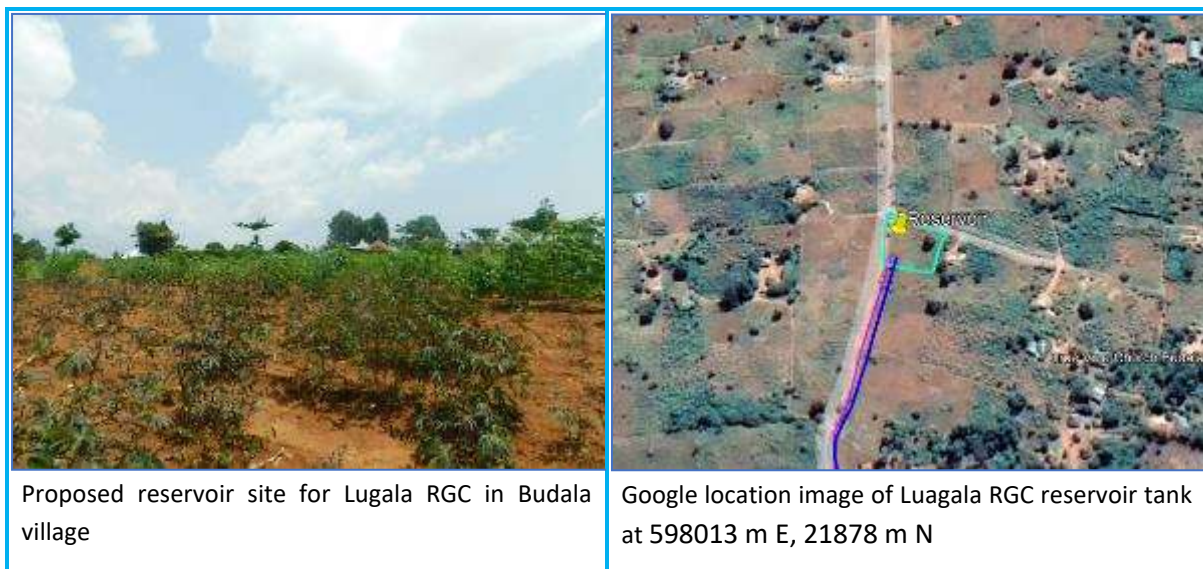


Figure 2-8: Proposed location of Lugala RGC water reservoir in Budalaa Village

The main concepts adopted for the reservoirs are pressed steel reservoir tanks erected on steel towers to allow adequate gravitational pressures on the distribution network to distribute water to far reaches of the network based on the topographical nature of the project areas. The proposed site for establishment of the water reservoir for Lugala RGC is in Budala Village.

2.3.1.7 DISTRIBUTION

The distribution network will be fed by gravity from the reservoirs. The transmission corridor will be gained by use of existing public roads and proposed access roads (Figure 2-9), as the pipes will be buried in the road reserves. A total of 1,888 No. service connections are to be made in Lugala RGC by the ultimate year 2040. For the initial year of the project, 258 service connections are planned, 215 of which will be household level connections, 43 public tap stands/Kiosks.

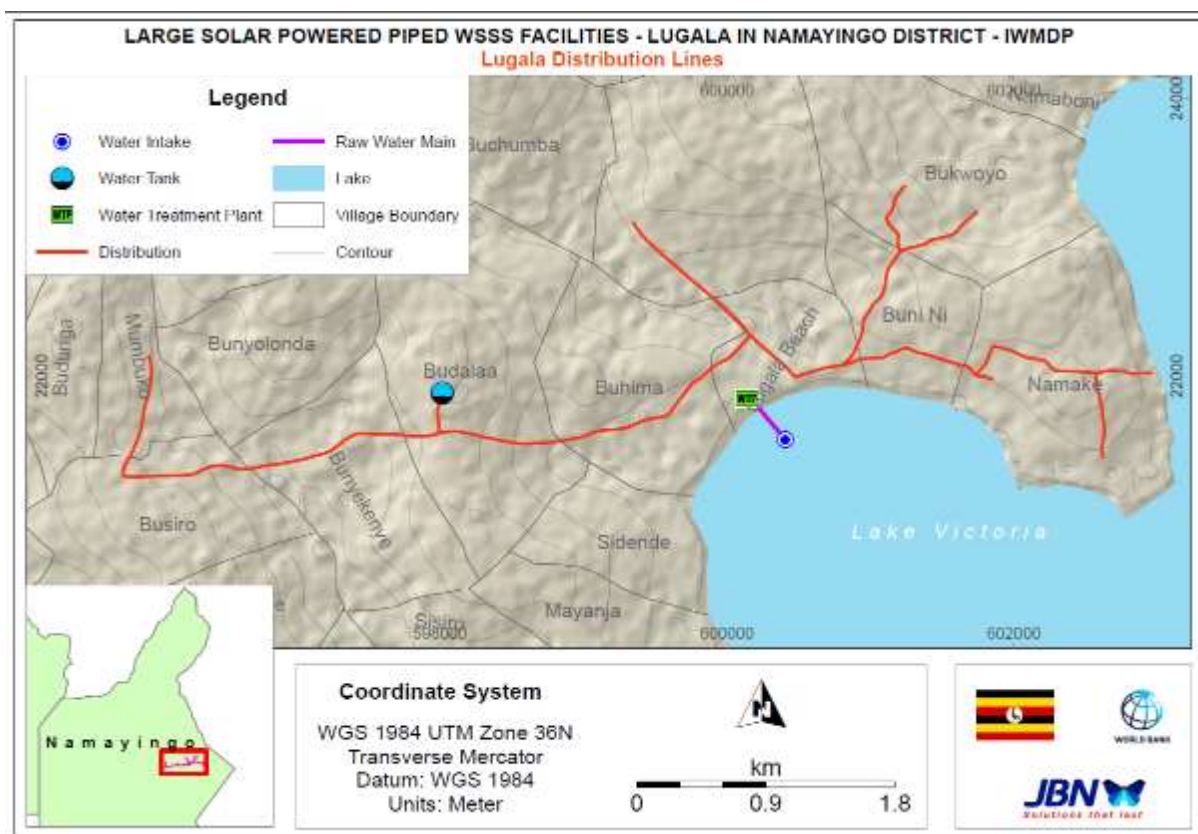


Figure 2-9: Lugala RGC Distribution Network Model

2.3.1.8 ENERGY AND POWER OPTIONS

According to the feasibility report, the power supply option agreed to power the pumps and treatment plant energy requirements is solar power augmented by Hydro-electric power (HEP). The characteristics of the power requirement of the pump are indicated in Table 2-8 below.

Table 2-8: Pumps, Power Requirements and options

Component	PARAMETERS								
	Head (m)	Flow (m ³ /hr)	Power (kW)	Required Motor Size KW	Available Motor (kW)	kVA	Total power (KVA)	Amperage (A)	Starting KVA
Raw Water Pumps	12	43.1	2.4	1	2.7	3.0	1	3.75	3.75
Backwash Pump	15	16.4	1.1	1	1.3	2.0	1	2.50	2.50
Clear Water Pump	71	41.1	13.2	1	15.2	16.0	1	20.00	20.00
SOLAR POWER OPTION									
Component	Solar Panels No. (1x280pW)				Solar Panels area (m ²)				
Raw Water Pumps	12				7.27				
Backwash Pump	8				4.85				
Clear Water Pump	63				38.18				
Other WTP Pumps and Structures	67				40.61				
Source: Project Feasibility Report									

Solar energy and HEP have been proposed to run the system for 8 years each in order to meet the demand in the ultimate year. Lugala Beach landing site is connected to the national electricity grid. The project will extension of HEP power for a distance of 1.5km from Lugala Beach landing site, to the pump at the WTP.

2.3.1.9 ACCESS ROADS AND PIPELINE ROAD CROSSINGS

Access to all the project components will be gained through existing public roads, given their convenient location in close proximity to the existing road network. Access to the intake and WTP will be through an existing access to a sand mine along L. Victoria near Lugala Beach. This access road approximately 0.7km may require upgrading. The transmission line will run along a community access road traversing Buhima and Budalaa villages. The distribution lines will also run along community access roads in the 8 project villages.



Figure 2-10: Part of the Access Road to the intake and WTP sites in Lugala Beach Village



Figure 2-11: Part of the access road to the reservoir site in Budalaa Village

From the WTP, the transmission line will cross a community access road in Budalaa Village (road crossing (RC) 1). The Distribution line will make seven road crossings along community access roads as indicated in Table 2-9 and

Figure 2-12 below. Project works at road crossings have potential to disrupt traffic if not well planned and executed. Apart from the road crossing in Lugala Beach Village, which is a trading centre, there are no settlements near the road crossings.

Table 2-9: Road crossings

No.	Road	Coordinates (UTM, 36N)	Village	Remark
RC 1	Budalaa – Muhimala	599584 m E, 21724 m N	Budalaa	Road at crossing surrounded by bushy land. Only disruption of traffic anticipated
RC 2	Muhima – Lugala	599584 m E, 21724m N	Muhima	Road at crossing surrounded by gardens. Only disruption of traffic anticipated
RC 3	Muhima – Banda-Lugala beach access road (T-junction)	600154 m E, 22290 m N	Lugala Beach	Road at crossing surrounded by bushy land. Only disruption of traffic anticipated
RC 4	Lugala Beach TC	600476 m E, 22000 m N	Lugala Beach	Road at crossing surrounded by houses and shops. Disruption of traffic and access to houses anticipated

RC 5	Lugala – Bukwoyo	600805m E, 2076 m N	Lugala Beach	Road at crossing surrounded by bushy land. Only disruption of community traffic anticipated
RC 6	Lugala- Bukwoyo road	601206 m E, 2892 m N	Bukwoyo	Road at crossing surrounded by bushy land. Only disruption of community traffic anticipated
RC 7	Bunini-Nakame	602576 m E, 2022 m N	Nakame	Road at crossing surrounded by bushy land. Only disruption of community traffic anticipated
RC 8	Budalaa – Busiro	595795 m E, 1280 m N	Busiro	Road at crossing surrounded by bushy land. Only disruption of community traffic anticipated

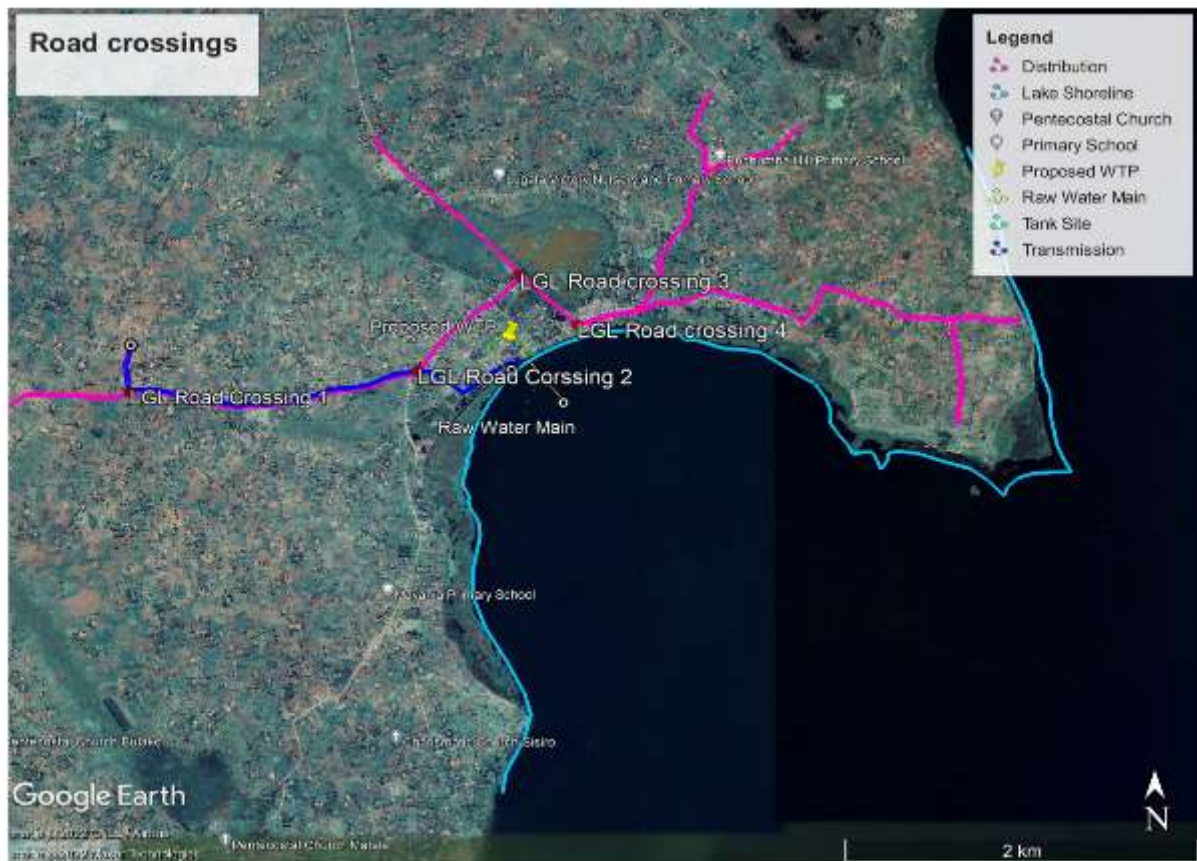


Figure 2-12: Transmission and distribution road crossings



Figure 2-13: Major Road crossings by the transmission and distribution pipelines in Lugala RGC

2.3.1.10 FIELD WATER OFFICE

According to the preliminary designs and project feasibility report, Lugala RGC will have a water office block to aid the day-to-day running of the water supply and sanitation system. The office block will be a host to a store, general office and front desk, Manager's office, Accounts office, overseer and plumber's office, sanitary facilities among others as indicated in the Figure 2-14 below.

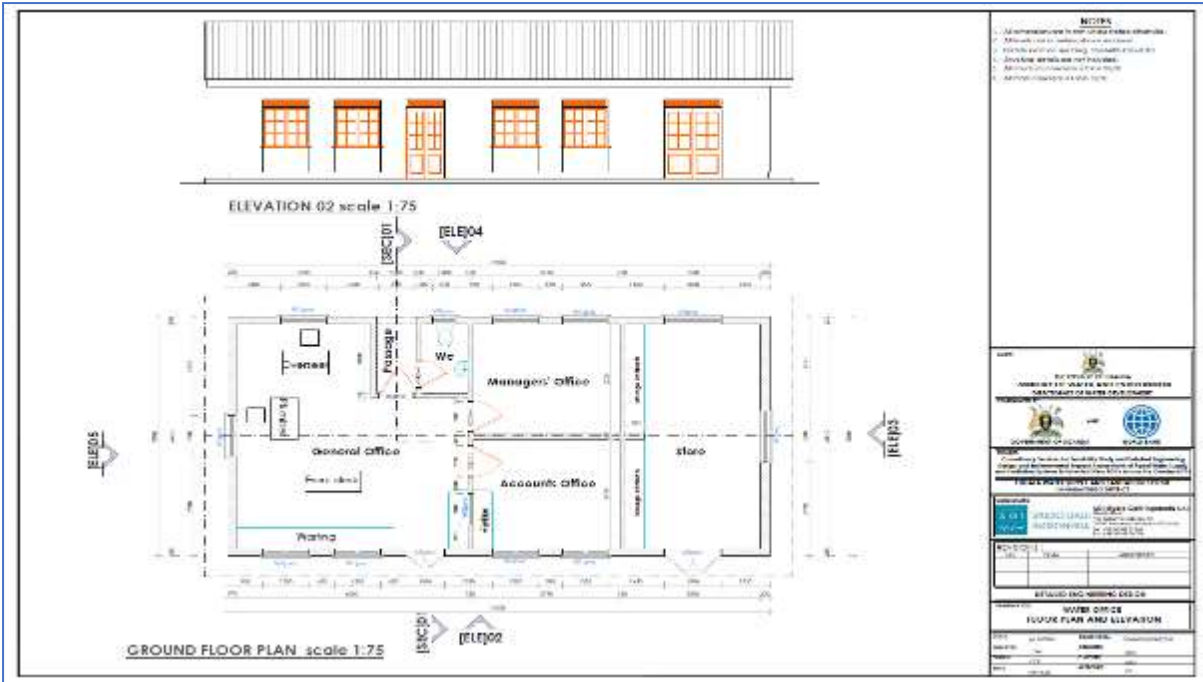


Figure 2-14: Proposed water office block layout plans

The field water office will be located at Banda Sub County offices, located at GPS coordinates 599386.11 m E, 21643.39 m N in Buhima, Lugala Parish, Banda Sub County.

2.3.2 SANITATION FACILITIES

Two (2No.) 6 stance water borne toilets have been proposed for the Lugala RGC as indicated in the Figure 2-15 below. Each sanitation facilities will be gender disaggregated, with a 1000 litre water storage tank for the hand washing facility 1No. Stance will cater for both men and women with physical disabilities.

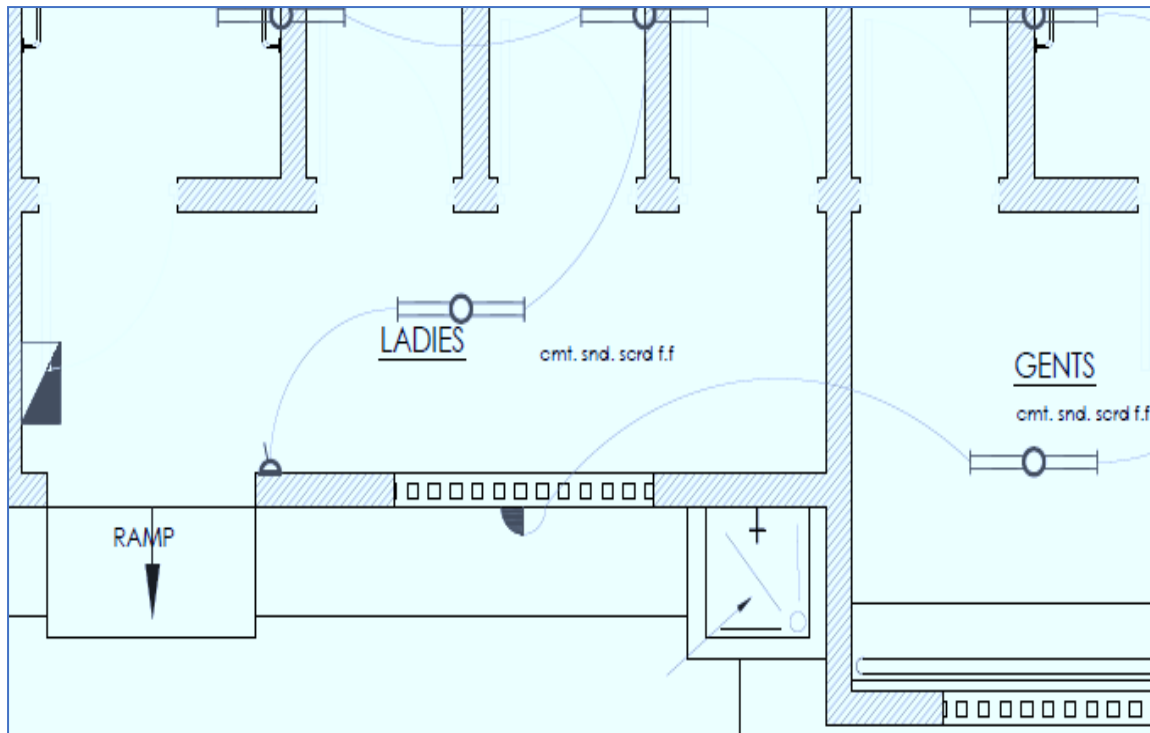


Figure 2-15: Layout of Proposed Public Water Borne Toilet

The proposed sanitation facility will be at Lugala Beach landing sites (GPS Coordinates 600522.86 m E, 21974.52 m N), the location of the weekly market in Lugala Parish, Banda Sub County.

2.4 PROJECT IMPLEMENTATION PHASES

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

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

2.4.1 CONSTRUCTION PHASE

This will involve preparation of different project facilities sites involving vegetation clearance, site excavations and levelling for foundational and civil works and subsequent installation different infrastructure equipment such as water distribution pipes, reservoir tanks, solar water pump facilities among others. Major civil works will be undertaken for establishment of Water Treatment Plant, water offices and sanitary public toilets. Similarly, major excavation works will be undertaken for establishment of foundational works for the WTP, water distribution pipes trenches among other water supply system facilities infrastructure.

2.4.1.1 CONSTRUCTION MATERIALS AND EQUIPMENT

Materials such as sand, gravel, aggregates and cement will be required for the construction of the intake, water treatment plant, anchoring of water transmission pipes in some location, construction works at the reservoir and water kiosks. These materials are available within Banda Sub County and for some such as cement can be purchased from Namayingo District town, about 19 Km from the site. However, the contractor shall be required to acquire these materials from legally existing and authorized/licensed sources.

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

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

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

2.4.1.2 HUMAN RESOURCE

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

Others workers on the project will include both skilled and non-skilled workers, who will be sourced by the contractor according to his manpower needs. On average, an estimated 20-30 workforce are anticipated to constitute the key staff members of Contractor and supervising engineer on the project. These will typically include civil engineers, Environmentalist, Sociologist a, Health and Safety officer, Site Nurse, architects, site supervisor, foremen, equipment operators, administrators and support staff and about 50 - 100 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.

2.4.1.3 AUXILIARY FACILITIES

Secondary facilities associated with implementation activities of the proposed solar-powered water supply and sanitation systems and support facilities under Lugala RGC will include materials stockpile areas, workshops, equipment parking/storage yards, temporary site stores and sanitary facilities, site clinic etc. Additionally, it will be necessary for the contractor to establish workers camp to provide accommodation for experts that might come from outside the project area as well as project offices for the contractor and supervising consultants. The facilities shall all be temporarily acquired and established by the contractor in consultation with the local government with approval of the supervising consultant/MWE/NEMA and local leadership. The identification, selection, construction,

operation and decommissioning 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 or project brief and approvals shall be secured. The key permits shall include ESIA permits, workplace registration, development permit, occupational permits, wetland use permits amongst others. 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.

2.4.1.4 WASTE HANDLING AND DISPOSAL

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

2.4.2 OPERATION PHASE

2.4.2.1 WATER SUPPLY SYSTEM

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

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

- m) Keep records of the operation of the water supply system - both physical and technical,
- n) Ensures that all accounts are audited, and
- o) Set and publish Tariff & Charges.

2.4.2.2 SANITATION FACILITIES

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

- A monthly fee being charged to the residents within the locality of the public toilet who would wish to use it, while the non-residents paying 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 fecal sludge disposed of at the waste stabilization ponds in Iganga Town, the closest town with the required facilities.

2.4.2.3 LABOR FORCE

The EUWS will employ a system manager, an accountant, a receptionist/secretary, plumbers, meter readers, and attendants/guards (Table 2-10). 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 2-10: Permanent roles during operation phase

Position	Number of workers required
Manager	1
Accounts Officer	1
Secretary	1
Plumbers / Technicians	3
Meter Readers	4
Operators (WTP)	2
Intake Attendants / Guard	6
Total	18
DED	

2.5 PROJECT DECOMMISSIONING

At the end of the project implementation works period, the contractor shall ensure restoration of the disturbed natural sites within the different project components site premises through environmental rehabilitation, backfilling and restoring topsoil and natural re-grassing to restore the sites to their near original natural state. The decommission phase will focus on removal and site restoration of

temporarily facilities at the two sites such as the temporarily workers' shelter, workshop and equipment parking/storage yards, construction material holding/stockpile yards among others. All these works must be cleared by the supervising consultant from Ministry of Water and Environment and representatives of local leadership in the project area.

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

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

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

2.6 PROJECT PROPONENT AND COST ESTIMATES

2.6.1 PROJECT PROPONENT

Directorate of Water Development,
Ministry of Water and Environment,
Plot 3-7, Kabalega Crescent Road,
P.O. Box 20026, Kampala.

2.6.2 PROJECTED INVESTMENT COST

The project has a Capital Investment Cost Estimate of Ugx. **8,164,868,547** (Eight Billion One Hundred Sixty-Four Million Eight Hundred Thousand Eight hundred forty-seven) as shown in the valuation certificate (annex j).

3 ESIA STUDY METHODOLOGY

3.1 INTRODUCTION

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

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

3.2 KICK-OFF MEETING

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

3.3 DOCUMENT REVIEW

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

- i. National Development Plan III 2020/2021-2024/2025,
- ii. Ministry of Water and Environment Annual Sector Review Report 2021,
- iii. UBOS Statistical Abstract 2021,
- iv. Project documents which included:
 - ❖ Project Draft Feasibility Study and Draft Preliminary Engineering Design Report for the Lugala Rural Growth Centre Water Supply System and Sanitation Report, (2019);
 - ❖ ESMF for Integrated Water Management and Development Project,
 - ❖ Uganda – IWMDP Project Appraisal Document-PAD No. P163782,
 - ❖ Uganda - IWMDP Project Implementation Manual, 2018,
 - ❖ Uganda - IWMDP Environmental and Social Framework 2018 for the Integrated Water Management and Development Project N^o: P163782,
 - ❖ Uganda - IWMDP Resettlement Policy Framework 2018, and
 - ❖ Detailed Design Lugala Rural Growth Centre Water Supply System and Sanitation Report, 2021.
- v. Namayingo District Development Plan,
- vi. World Bank Operational Policies (OPs),

- vii. Uganda Poverty Assessment Report (2014),
- viii. IFC Environmental Health and Safety Standards for Water and Sanitation 2007,
- ix. National Environment Act 2019,
- x. National and Namayingo District statistics as contained in UBOS Abstracts of 2014, 2016 and 2017,
- xi. Project Appraisal Document (PAD) for Integrated Water Management and Development Project,
- xii. The Water Act, and accompanying regulations [Water Resources Regulations (1998), Waste Discharge Regulations (1998), the Water Supply Regulations (1999), Sewerage Regulations (1999),
- xiii. 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,
- xiv. The National Red List for Uganda 2016, published by Wildlife Conservation Society,
- xv. The International Union for Conservation of Nature (IUCN) Red List of threatened species 2019, and
- xvi. Biodiversity Inventory Reports for Central Forest Reserves by Forest Department 1996.

3.4 BASELINE DATA COLLECTION AND SURVEYS

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

3.4.1 PHYSICAL ENVIRONMENT

3.4.2 WATER QUALITY ANALYSIS

3.4.2.1 IDENTIFICATION OF THE SAMPLING POINTS

A reconnaissance survey of the project area to appreciate the existing water resources, their location in view of the proposed project components, and how they may be affected by the project guided the selection of the water sampling point. 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 potential point-source pollution discharge point associated with the project components.

3.4.2.2 FIELD AND LABORATORY WATER QUALITY MEASUREMENT/ANALYSES

Water quality assessment was done through water sample collection for laboratory analysis of parameters. An ex situ measurement, a water samples was picked from a point in close proximity to

the intake site (Figure 3-1) on L. Victoria, stored in cooler boxes (for easy transportation and preservation) and tested for different parameters at Ministry of Water and Environment Analytical Laboratories in Entebbe (Results attached as Annex 3). The sample was delivered to the laboratory within 24 hours from the time of its withdrawal from the field. Water quality parameters that were analysed in the laboratory included; turbidity, pH, Electrical Conductivity (EC), total dissolved solids (TDS), total hardness (CaCO₃), fluoride, sulphates, chlorides, nitrate (N), Nitrites (N), Manganese, total iron and E.Coli.

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



Figure 3-1: Water sampling collection point

3.5 NOISE, AIR QUALITY AND VIBRATION ASSESSMENT

Baseline measurement of noise, air quality and vibration were undertaken at the 2 locations within the project area from 14th-18th February 2022. The baseline measurements sites were selected considering the sensitivity of receptor to noise and air pollution, and vibration impact.

3.5.1 CRITERIA FOR SELECTION OF SAMPLED SITES

During the ESIA studies, the selected receptors for noise, air quality and vibration assessment were purposively sampled based on professional judgement and other factors. As part of the ESIA studies, the consultant undertook a drive through the proposed sites of the different project components (water source, reservoir tank, water treatment plant, sanitary toilet facilities, pump house, and along the distribution/transmission lines) to ascertain the number, distribution of the sensitive receptors and their distance from the different project components sites. The selection of location and number

of points was guided by the project area topography, which is mainly characterized by flat terrain. Furthermore, the selection of sampling points in the detailed ESIA was guided by the provisions of the National Environment (Noise standard and Control) Regulations, 2003 which defines noise limits for various land uses zones i.e. commercial (urban centres, health units), mixed land use (residential areas, farmlands, schools and administrative units) and industrial zones, therefore, the sampling points were selected to represent the above land uses.

In light of the above, the selected receptors for noise, air quality and vibration assessment were clustered according to Table 3-1 and then randomly sampled within the project area. The sampled sensitive receptors were:

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

Table 3-1: Air quality, Noise and Vibration Sampling Points

Location	Date and Time	Coordinates
Lugala Landing Site	17/02/2022; 10:59am-12:39pm	0598043 E, 0021617 N
Budala Trading Centre	17/02/2022; 14:44pm-15:14pm	0533930 E, 0136545 N

3.5.2 MONITORING OF PARTICULATE MATTER AND GASES

Ambient air quality monitoring for a range of parameters was undertaken at locations with sensitive receptors where pollution impacts including dust nuisance will likely be a major concern. These were selected as suitable for future monitoring during the project implementation phases. Two sites were sampled within Lugala RGC project area i.e. Lugala landing site and and Budalaa Trading centre. The sites represent the following land uses and receptors as shown inTable 3-2 below.

Table 3-2:Selected points for baseline air quality monitoring

No.	Location	GPS Coordinates 36N	Key land use and receptor
1	Lugala Landing Site	0598043 E 0021617 N	This represents areas with sensitive receptors such as the lake shore, landing site, weekly market, shops and households to noise, vibrations, and air pollution.
2	Budala Trading Centre	0533930 E 0136545 N	This represents the general public as well as the business community that often is concerned about dust that stains goods hence decreasing their value well as exposure to high noise levels and associates public health and social inconvenience impacts.

3.5.3 AIR QUALITY MEASUREMENT PROCEDURE

Air quality monitoring was undertaken using the Portable Aeroqual S500 Monitor to establish the baseline values for PM_{2.5}, PM₁₀, NO₂, SO₂, VOCs and CO by simply swapping the particulate matter (PM) sensor head for the gas sensor head of choice (Figure 3-2). The Aeroqual monitor was placed on

a tripod stand 1.2m above the ground, switched on, allowed 3 minutes of zeroing and 7 minutes of stabilizing readings. The monitor was then set to start data logging at a frequency of five (5) minutes for 7-12 hours per site. The data was then downloaded on a PC using Aeroqual S500 V6.5 Software and analyzed. The software generates mass concentration graphs and also provides minimum (min), average (ave) and maximum (max) values for each parameter logged.



Figure 3-2: Air quality monitoring at different sections in selected points of the project area

3.5.4 NOISE MEASUREMENTS

Ambient noise measurements were undertaken at selected receptors (homesteads and Trading centres) within the project area for Lugala RGC. A duly calibrated Casella CEL-633B Environmental & Occupational Noise Meter was used for the assessment. The CEL-633B instrument provides SPL, Integrating and Octave band noise measurements compliant with the following international standards:

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

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

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

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

- d. LAFmin – the minimum Sound level with 'A' Frequency weighting and Fast Time weighting constant.
- e. LAlmin – the minimum Sound level with 'A' Frequency weighting and Impulse Time weighting

Set-up and Measurement

The instrument was first calibrated using Acoustic sound level calibrator type CEL-251 for sound level meter at 114.0 dB (A) for every point measured (Figure 3-3). The equipment was then placed on a tripod stand (1.2 m high) from ground. It was switched on and the run mode set up. The instrument has an initialization screen that displays for approximately 10 seconds and then the measurement screen is displayed and ready for use. The equipment does simultaneously recordings for all noise functions it completes and also makes periodic or cumulative data measurements, and stores acquired data on a repeating interval of time. The equipment was left to log noise readings at an interval of 30 minutes and the results were later downloaded to a computer for analysis using the Casella Insight software. The execution of measurements was conducted entirely in the absence of rain and strong wind conditions. In total, 2 acoustic measurements of 6-hour duration each, were undertaken within the two selected sensitive receptors in the project area.

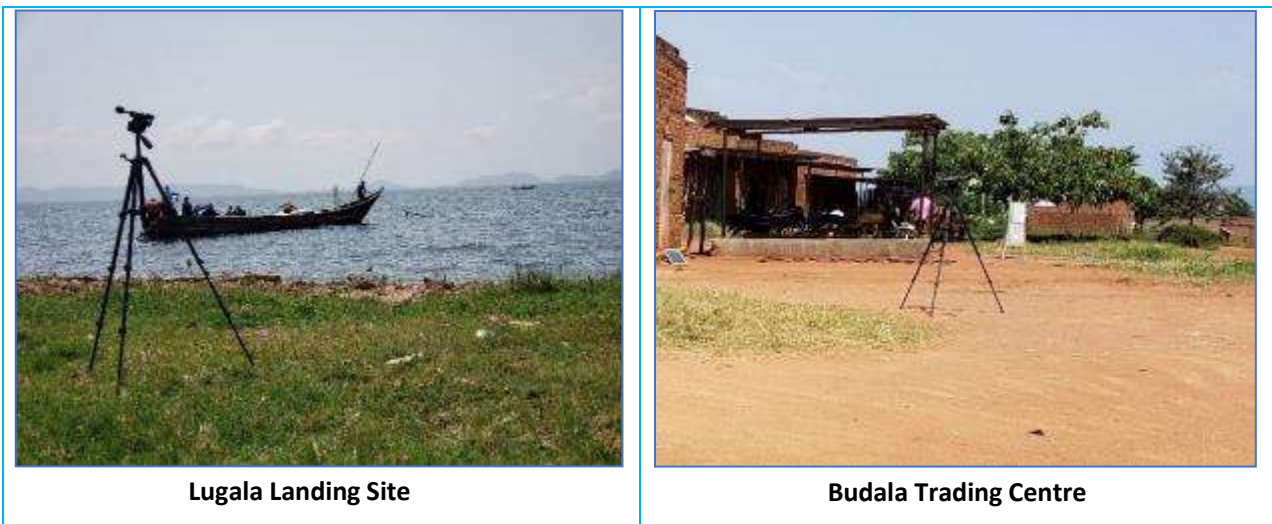


Figure 3-3: Set up for noise measurements at points Lugala RGC project area

3.5.5 VIBRATIONS

Vibrations measurements were undertaken at randomly selected site in Table 3-1 using **Exttech SDL800: Vibration Meter/Datalogger** (Figure 3-4). The SDL800 measures and logs vibration data using a remote vibration sensor with magnetic adapter on 47.2"(1.2m) cable. It offers a wide frequency range of 10Hz to 1kHz with basic accuracy of $\pm (5\% + 2 \text{ digits})$. The machine continuously logs vibrations data using a SD memory card, which allows user to easily transfer collected data to a PC for further analysis as an Excel format. The distance from the point of measuring and the vibration source (project component sites) was measured and recorded. The machine was connected to a 6-inch nail using the magnetic adapter and the nail mounted into the ground near the building where vibrations were being measured. The machine was switched on and allowed 1 minute to settle, it was then set to start logging data at a frequency of 5 minutes. The peak particle velocity (PPV) was measured in mm/s.

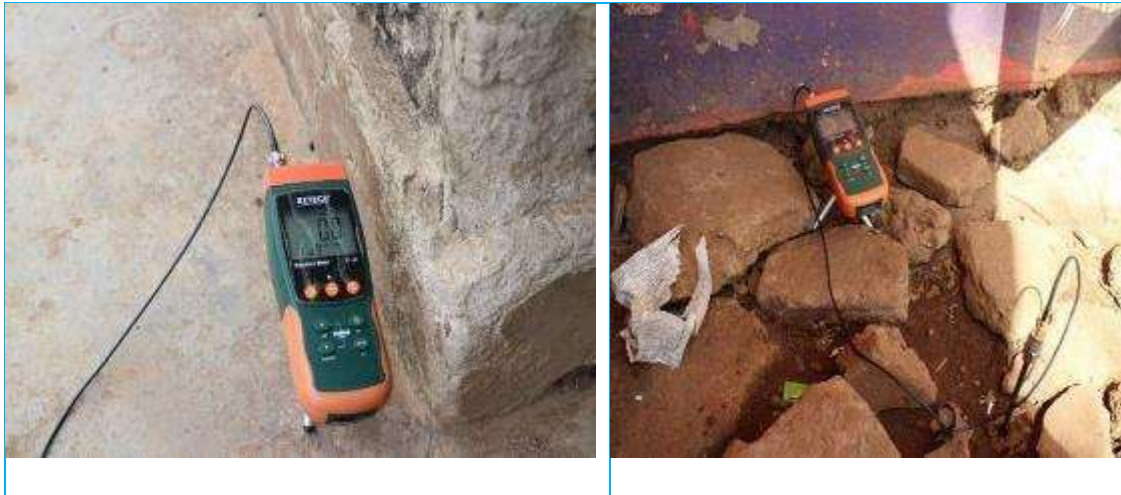


Figure 3-4: Field measurements for vibrations

3.6 BIODIVERSITY ASSESSMENT-FAUNA

Fauna assessments were undertaken within the proposed project area especially along the proposed water distribution/transmission lines as well as proposed site, namely the WTP, reservoir, water office and sites for sanitary facilities.

3.6.1 VEGETATION SURVEY

To study the vegetation structure and composition in the planned project sites was done through a combination of methods such as; field observations, and plots were used. Plots were set near the intake at the WTP site, Reservoir site and along the proposed Transmission and Distribution lines. 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 3-3: Vegetation cover classes

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

3.6.1.1 APPROACH AND PROCEDURES

The systematic sampling technique was operationally more convenient for this work, as it ensures that each unit has equal probability of inclusion in the sample. In this method of sampling, the first unit was selected with the help of random numbers and the remaining units are selected automatically

according to a predetermined pattern. Plots were laid within the limits of 30m alternating along the proposed Transmission and Distribution routes bearing in mind the road effect but within the limits of thirty meters (30m) from the road centre (**Figure 3-5**).

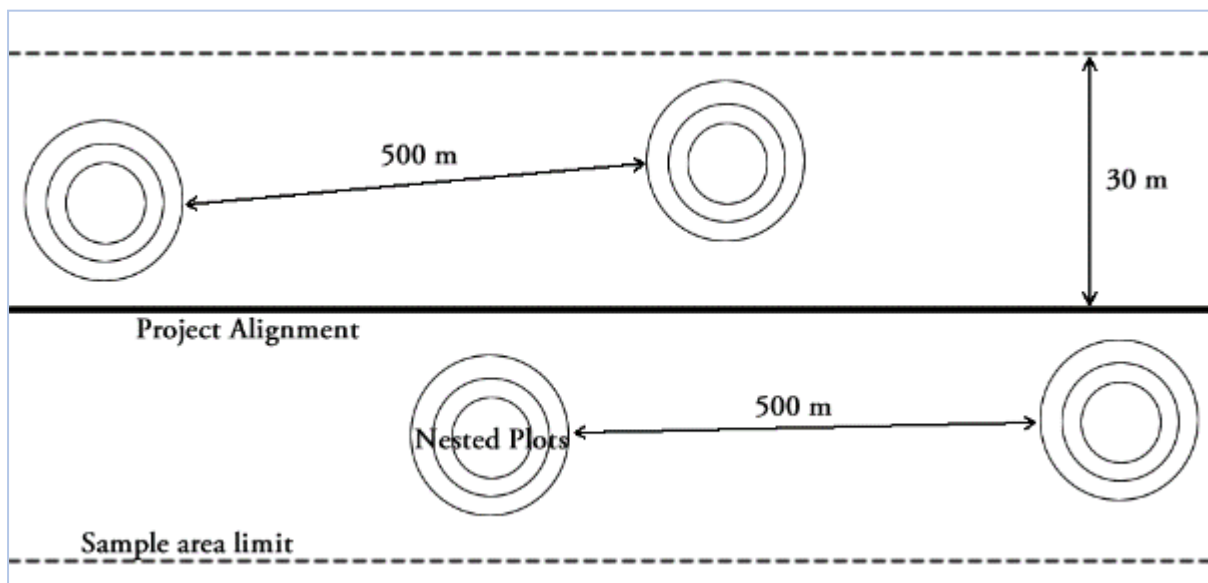


Figure 3-5: Illustration of the flora sampling technique

3.6.1.2 SAMPLING

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

3.6.1.3 OPPORTUNISTIC RECORDS

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

3.6.1.4 VOUCHER SPECIMENS

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

3.6.1.5 ANALYSIS

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

3.6.2 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 reservoir site and along the transmission lines, the project water offices and proposed sites for the sanitary facilities.

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 reservoir site and along the transmission 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

3.6.2.1 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.

3.6.2.2 FIELD SURVEYS AND LOCAL CONSULTATIONS

During the field visit (14th-18th February 2022), the fauna specialist consulted the community members. The purpose of these consultations was to document information on fauna which the fauna specialist may not be able to get during field sampling. Discussions with the community members revolved around faunal groups / species that occur in and along the project alignment. Detailed field findings from consultations are provided under Section 5.3.3. The species indentified from consultation are noted as reported.

3.6.2.3 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.

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

3.6.2.3.1 BUTTERFLIES

Butterflies were surveyed using Pallard's sweep net method (Gall, 1985; New, 1991; Warren, 1992; De Vries 1997) along established transects within a radius of 500 m of sampling point. The method was used to document the butterfly species richness, as well as estimate their relative abundance. The

choice of this method was informed by its time-efficiency and the fact that the negative effects associated with handling of individuals are avoided (Nowicki, P *et al.*, 2008).

At each of the sampling points, transects of 10 m wide and 100 m 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 individual fauna species sighted within the 10m width. Sampling was conducted during warm/sunny weather (13-17°C) and between 9am-5pm.

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

Collected data was analyzed by,

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

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

3.6.2.3.2 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 during warm/sunny weather. Each sampling event was conducted between 09:00h to 17:00h time and lasted about 1 hour at each sampling point. All dragonflies that were flying or be perched within 5m of transect routes were recorded. All flying species were easily detected within the project area and an aerial net was swept through the vegetation to elicit a flight response from less conspicuous, resting individuals. Same amount of sampling effort (time given to searches) was applied at each site.

3.6.2.3.3 HERPETOFAUNA (AMPHIBIANS AND REPTILES)

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

i. Visual Encounter Surveys (VES): The method involves moving through a habitat watching out for, and recording surface-active herpetofauna species. VES was complimented by visual searches, by examining under logs, leaf litter, in vegetation, and crevices. Species encountered were recorded and where possible photographed.

ii. Audio Encounter Surveys (AES): This method uses the species-specific calls / vocalizations / sounds / advertising calls made by breeding males. The identity of the amphibian species heard calling and their numbers were counted and recorded.

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

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

Reptiles were identified using (Schiøtz, 1975, 1999; Stewart, 1967) while amphibians were identified using Channing and Howell (2006) and information was collected on relative species abundance, distribution and richness. Data analysis was done by 1) 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.

3.6.2.3.4 AVI-FAUNA (BIRDS)

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

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

Main Category	Sub-Category with Codes		Descriptions
Forest Birds	FF	Forest specialists	Forest interior birds
	F	Forest generalists	Normally breed in the forest or fragments but may occur outside the forest
	f	Forest visitors	Non-forest birds

Aerial	AA	Aerial feeders	Species feeding on the wing
Water Birds	W	Water specialist	Restricted to wetlands or open water
	w	Water generalist	Often found near water
Grassland	G	Grassland specialist	Characteristic of open grasslands
	g	Grassland generalist	May be found in grassland habitats but also able to utilize woodland and forested habitats.
Migrants	A	Afrotropical	Species migrating within Africa
	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, and (2) determining the species conservation status using IUCN 2019 published Red List of threatened species as well as use of the 2016 National Red List for Uganda published by Wildlife Conservation Society.

3.6.2.3.5 MAMMALS

The mammals were surveyed using three main methods:

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

The surveys were mainly limited to the identification of medium and large sized mammals. Small mammals were included if sighted. Nocturnal mammals were excluded since the survey was conducted during day light hours. Mammal identifications were based on Kingdon (1974), Delany (1975) and Kingdon *et al.* (2013). The conservation status of the encountered mammal species was ascertained using the 2019 version of the IUCN Red List of Threatened Species.



Figure 3-6: Some of the project areas survey for fauna species diversity

3.7 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.

3.7.1.1 SAMPLING PROCEDURES

Study Area & Population: The study covered 8 core villages of the project; namely; Kitete B, Nakibengo A, Nakibengo B and Kiwambya that make up Lugala RGC with a study population of 8,626 aggregated in 1,597 households (UBOS, 2021). **Sample Size:** A sample size of 153 respondent households was covered representing 50% of determined sample using Morgan and Krejcie (1970) Sample Size Determination as shown in Table 3-4 and Appendix C.

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

Study Area / RGC	Parishes	Population to be served (2020)	No. of HH in the Lugala RGC (N)	Sample Size (S)
Lugala RGC	Lugala and Buchumba	8,626	1,597	153

(Source: UBOS, 2020)

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

Sampling Plan: A representative study sample using a two (2) stage stratified sampling method was used. In the first stage, it involved identifying and sub dividing beneficiary villages and non-beneficiary areas, and the second stage it involved identifying respondent household members, Key Informants and groups (Table 3-5).

Table 3-5: Stratified sampling method

Sampling Methods	Adult Female	Adult Male	Total	REMARKS
Probability (random) sampling methods				
a) Stratified random	152	149	301	This sampling methods overlaps in all the others.
b) Simple random	156	145	301	
Non-probability (non-random) sampling methods				
c) Purposive sampling				Applied after stratified sampling
Widow / Widower	24	36	60	
d) Cluster sampling	88	36	124	Applied after stratified sampling

3.7.1.2 DATA COLLECTION INSTRUMENTS

- 1) Survey Questionnaire: The consultant applied Survey Questionnaire to collect baseline data on socio-economic characteristics that include water, sanitation & hygiene, among others. Analysed data had corresponding GPS Coordinates which were stored in GIS Database for detailed GIS mapping and analysis.
- 2) Using Digital Tools (KOBO COLLECT): The structured questionnaire was converted, validated, loaded and aggregated them into a digital form called KOBO COLLECT FORM. The form was loaded and uploaded on mobile devices (smart phones or tablets), used to collect the data. This process increases efficiency, minimize errors and ensures timely collection and analysis of data.
- 3) Qualitative tools - Consultative meetings discussion guides; Focus Group Discussion (FGD) guide; Key Informant Interview (KII) guide; Direct Observation checklist; Photography guide; Document Review Checklist.
- 4) Participatory Learning & Action (PLA) tools - Transect walks / drives; Timeline & Trend Analysis; Seasonal calendar; Pairwise Ranking.



Table 3-6: Training in sampling and data collection

3.7.1.3 DATA ANALYSIS METHODS

Data was analysed using

- a) Thematic Analysis for qualitative findings obtained from FGDs, KIIs, etc;
- b) Statistical Analysis using Ms Excel for quantitative findings obtained using KoboCollect. All Likert Type Data was analyzed by determining the frequencies and percentages.

Data Quality Management

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

3.7.1.4 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.

3.7.2 STAKEHOLDER AND PUBLIC CONSULTATIONS

In this ESIA, the process of stakeholder engagement involved:

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

- f. reporting to stakeholders

In order to adequately appreciate the views and concerns of stakeholders with regard to the proposed the Lugala RGC Large Solar Powered WSSS project, a wide range of persons and groups within the local communities, government, and other interested parties were identified and consulted. The Consultant employed consultative approaches including group discussions with community members targeting women, other vulnerable groups such as elderly and youths, business people and local leaders, and interviews with key informants such as Government officers in order to capture their views and concerns with regard to the implementation of the proposed project.

3.7.2.1 STAKEHOLDER IDENTIFICATION

Stakeholders are individuals and Organisations potentially affected by the project (directly or indirectly), or who have an interest in or influence on the project and its impacts, either positive or negative. For this project, a list of key stakeholders was identified and assessed through stakeholder mapping. A number of stakeholders, important to this project were identified and analyzed in respect to location, interest, mandate, influence and vulnerability; and including level of literacy and potential mode of engagement. This criterion is explained below.

- a. The location criterion was used in respect to proximity to the proposed project components sites. All the 8 villages and community members where the project implementation activities will be undertaken were considered as primary stakeholders using this criterion.
- b. Interest criteria was used in analysis to refer to the level of concern and significance to the project sites and proposed project.
- c. Mandate refers to consideration for the level of directive reasonability the stakeholder has in respect to the project or the affected project sites. This is usually considered together with influence which implies the ability or powers to influence encourage or discourage project activities.

Vulnerability refers to levels of susceptibility that compromise or makes a stakeholder unable to meaningfully participate in planned stakeholder engagements or equitably benefit from other project activities or outcomes such as the inability to attend meetings, interpret messages, among others. This can be a function of literacy, age, gender, physical barriers, relation to land tenure, income and livelihood activities. Thus, vulnerable groups included women, elderly, PWDs and youths.

- 1.

3.7.3 STAKEHOLDER CONSULTATION AND ENGAGEMENT PROCESSES

Stakeholder engagement comprised consultations with district local government officials of Namayingo District, together with the Sub County officials of Banda Sub County, the security agencies (police) and other interested parties. Notifications for the meetings at district level were made through the district CAO at respective districts while the lower-level meetings were through Sub County chiefs and these were made one (1) week prior to engagements through telephone communication and following up with an introductory letter introducing the consultants.

After consultations with the district technical and political wings together with the sub-county officials and local council leader in the project area, plans were made with the respective villages to organize engagements with communities. Therefore, to disclose the project and obtain views of different community members meetings. Stakeholders engaged are represented in Table 3-7, shown in Figure

3-7 below and participant lists attached as Appendix 6-. The key issues raised /finding from consultation is presented under section 6.2.3.

Table 3-7: Engaged Stakeholders

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
4 th February 2022, 5 th May 2022	Namayingo District Technical and Political Teams	Chief Administrative Officer, District Water Officer, District Health Inspectors, District Natural Resources Officer, District Community Development Officer, District Chairperson, Resident District Commissioner Representative, District Education Officer District Engineer OC CID	Namayingo District Education Office Board room	11	1	12
17 th February 2022, 4 th May 2022	Banda Town Council Technical and Political Teams	Local Council III Chairperson, Mayor Banda TC, SAS, Community Development Officer, Secretary for Production, Secretary for Health and education, Agriculture Officer, AVO, Parish chief (06), SCO, GISO Banda TC, TI Agent, Fisheries Officer, Plumber EUWS, OC Police,	Banda Town Council Headquarters	19	7	26
4 th May 2022	Lugala Beach village	Community members	Lugala Trading Centre	50	36	86
4 th May 2022	Banda Trading village	Community members	Banda Trading centre	22	10	32
	Uganda National Roads Authority -	Head of Design – Roads and Bridges	UNRA Head Quarters	2	0	2
	Ministry of Gender Labour	Directors: Occupational Safety and Health	MGLSD Head quarters	2	0	2

Date	Stakeholder	Designations	Venue	Gender		Total
				M	F	
	and Social Development					
8 th June 2022	DWRM and DWM	Water officers, Water quality, Wetlands Department	MWE headquarters	15	8	23
Total				117	59	176



Meeting with Namayingo District Officials on 5th February 2022



Meeting with Banda Sub County officials on 17th February 2022



Community engagement through Community radio in Lugala trading centre on 5th May 2022



Community engagement through Community radio in Lugala trading centre on 5th May 2022



Community engagement in Lugala beach on 17th February 2022



Community engagement in Lugala beach on 5th May 2022



Community engagement in Budala village on 5th May 2022



Community engagement in Buhima village on 5th May 2022



Meeting In-charge Lugala HCII on 5th May 2022



Meeting with Head master Banda Secondary School on 5th May 2022



Meeting UNRA HOD at UNRA on 25th March 2022



Meeting MGLSD on 17th May 2022



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

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

4 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

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

4.1 NATIONAL POLICY AND LEGAL FRAMEWORK

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

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

N°.	Policy	Brief description and its key provisions	Relevance in the Project
01.	The National Environment Management Policy, 1994	The overall policy goal is sustainable development, which maintains and promotes environmental quality and resource productivity for socio-economic transformation. One of the key principles guiding policy development and implementation include the need to conduct and ESIA for projects that are likely to have potential impacts on the environment.	The developer has undertaken an ESIA for the proposed project, for which this ESIS has been prepared.
02.	Uganda Vision 2040	Uganda’s Vision is “to have a transformed Ugandan Society from a peasant to a modern and prosperous Country within 30 years”, from 2010. For the country to achieve its Vision 2040, it is necessary to increase access to appropriate and adequate sanitation as well clean and safe water.	. In the provision of the proosed water and sanitation facilities, the ESIA has indented positive and negative impacts and has proposed appropriate enhancement and mitigation measures in the implementation of these facilities.
03.	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 and affirmative action. The policy objectives amongst others are to: a. Guide the planning processes, affirmative action, and implementation of programmes and allocation of resources to all stakeholders. b. Guide the establishment of legal, policy and institutional frameworks of all stakeholders.	Discrimination and stigmatization, which acts as a barrier for marginalized and other groups of people in the project area to accessing employment and support opportunities will be eliminated throughout all project implementation phases. This entails equitable access to services by workers employed at the project.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		<ul style="list-style-type: none"> c. Provide a framework for assessing responsiveness of programmes and activities to equal opportunities, in redressing any imbalances therein. d. Empower marginalized and vulnerable groups for their full participation in all development processes. e. Enhance capacity of implementing agencies to provide quality services with a view to monitoring compliance with affirmative action and the constitutional provisions. 	
04.	The National Environment Health Policy 2010	This policy establishes the environmental health priorities of the Government of Uganda and provides a framework for the development of services and 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.	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 health and safety among others.
05.	The National Policy on Conservation and Management of Wetland resources 1995	The overall goal of this policy is to maintain an optimum diversity of uses and users and consideration of other stakeholders when using wetland resources. The objectives of this policy include; establishing the principles by which wetland resources can be optimally used now and in future; to end practices, which reduce wetland productivity; maintaining the biological diversity of natural or semi natural wetlands; maintaining wetlands functions and values; and integrating wetlands concerns into the planning and decision making of other sectors. This policy outlines guidelines for wetland resource developers.	<p>There are a few wetlands in the project area that could be traversed by the water distribution/transmission pipe network.</p> <p>Proposed project activities have to adhere to this policy requirements and undertake proper impact assessment to ensure that the implementation works of the solar-powered water supply and sanitation project under Lugala RGC in Namayingo District avoid or adequately mitigate adverse impacts on the wetland ecosystems</p>

N°.	Policy	Brief description and its key provisions	Relevance in the Project
			within the project area. Efforts will be accorded towards ensuring protection/conservation of wetlands traversed by any of the implementation activities of the different project components.
06.	The National Water Policy, 1999	The objective of the policy is to provide guidance on development and management of the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs, with full participation of all stakeholders and mindful of the needs of future generations.	The contractor under the supervision of MoWE will undertake routine monitoring of all surface water sources especially Lake Victoria among the other community water sources, to prevent their contamination by project activities in line with this policy.
07.	National Policy on Elimination of Gender Based violence, 2016	The policy emphasizes early intervention to prevent re-victimization of and long-term effects for girls, including interpersonal violence, sexual coercion, alcohol and drug abuse and mental health problems, Reporting cases of violence against children immediately.	The contractor in liaison with district officials (especially District Community Development off Officer) implement a number of initiatives to guard against/prevent cases of Gender Based Violence relating to project implementation activities.
08.	The Uganda National Land Policy, 2013	The land policy addresses the contemporary land issues and conflicts facing the Country. The vision of the policy is: “Sustainable and optimal use of land and land-based resources for transformation of Ugandan society and the economy” while the goal of the policy is: “to ensure efficient, equitable and sustainable utilization and management of Uganda’s land and land-based resources for poverty reduction, wealth creation and overall socio-economic development”.	Minimal land acquisition is expected according to the project design and feasibility studies. Land acquisition processes have been initiated especially for establishment of different project components such as Water treatment plant, pumphouse, reservoir tanks, water source area and sanitary toilet facilities among others. Thus, any aspects of the project implementation relating to land acquisition and compensation will be addressed as guided by this policy. Similarly in

N°.	Policy	Brief description and its key provisions	Relevance in the Project
			line with OP/BP 4.12 where the project triggers land acquisition or restriction on land use, whether permanent or temporary), MoWE will offer affected persons compensation at replacement cost, and other assistance as may be necessary to help them improve or at least restore their standards of living or livelihoods.
09.	National Policy on HIV/AIDS and the world of work, 2007	The policy obliges developing entities to mainstream HIV/AIDS interventions to their planned development interventions.	The contractor will institute structures with human and financial capacity to undertake HIV/AIDS sensitization and prevention of new infections among the project workers and local community throughout all the project implementation phases in line with the provisions of this policy.
10.	Uganda Gender Policy 2007	The Uganda Gender Policy mandates the Ministry of Gender, Labor and Social Development and other line Ministries to mainstream gender in all sectors.	The contractor will be encouraged to adopt an equal opportunity employment policy and to incorporate gender aspects and considerations in the recruitment process for both skilled and non-skilled labour force as far as applicable during the project lifecycle.
11.	The National HIV/AIDS Policy, 2004	Section 3.4 of the policy talks about Impact mitigation at individual to community level. The policy aims at providing psychosocial and economic support to all those infected and directly affected by HIV & AIDS. The epidemic has severe short- and long-term effects on various population categories on development efforts at household,	The contractor in liaison with different district relevant offices such as DCDO, District HIV/AIDS Focal Personnel among others will ensure mainstreaming HIV/AIDS interventions into project plans and activities.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		community, sector, and national levels. The impact on the labour force in the various sectors in communities and households affects productivity, household income and savings. Objective of this section in the policy is to minimize the socio-economic consequences of HIV & AIDS on the population and promote involvement of the infected and affected in the development efforts. Subsection I under Policy Strategies it specifically requires workplace policies in both public and non-public formal and informal sectors to be appropriately reviewed to cater for HIV&AIDS prevention & care issues in the workplace.	
12.	The National Policy for Older Persons 2009	<p>The Policy promotes and contributes to the attainment of the development goals. This policy informs other policies, programmes and sectoral plans. It will provide a framework for:</p> <ul style="list-style-type: none"> ▪ Enhancing the recognition of the roles, contributions, and potentials of older persons in the development process. ▪ Strengthening the informal and formal community-based support systems and actions for older persons dignity. ▪ Promoting actions that encourage older persons to pass knowledge to the younger generation. ▪ Guiding, coordinating, and harmonizing interventions for older persons by stakeholders; and ▪ Promoting research on issues of older persons. 	The Policy seeks to assure older persons that their concerns are national concerns and they will not live unprotected, ignored or marginalized. The goal of the Policy is the wellbeing of older persons. It aims to strengthen their legitimate place in society and help older persons to live the last phase of their life with purpose, dignity, and peace. The contractor will undertake the proposed project works for Lugala RGC with caution in residential areas especially with the noise levels and air quality which have the main effect on the elderly.
13.	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	With limited skills characteristic of most PWDs, accessing employment is a major challenge. Most potential employers do not give chance to PWDs

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		<p>disability. This is in recognition that PWDs can perform to their full potential given the same conditions and opportunities irrespective of their social, economic, and cultural backgrounds. The Policy is to guide and inform the planning process, resource allocation, implementation, monitoring and evaluation of activities with respect to PWDs concerns at all levels.</p>	<p>to compete for employment even where they have the necessary qualifications and experience. During recruitment of workers to be employed in proposed implementation of solar-powered water supply and sanitation project under Lugala RGC, there are PWDs who will apply for some jobs, the contactor should at least give chance to some PWDs who can compete for those jobs.</p>
14.	The National Orphans and other Vulnerable Children's Policy 2004	<p>The Policy focuses on full development and realization of rights of orphans and other vulnerable children. The policy objectives amongst others provides for:</p> <p>Access to basic and essential services for vulnerable children and their families.</p> <p>interventions that benefit orphans and other vulnerable children are mobilized and efficiently utilized; and</p> <p>capacity enhancement of duty-bearers for orphans and other vulnerable children in the provision of essential services.</p>	<p>Families living with orphans and other vulnerable children often lack resources to cater for their needs. Therefore, interventions like the contractor carrying out Corporate Social Responsibility (CSR) through provision of scholastic materials, food and education to needy children in the area will enhance coping mechanisms of the affected households and communities will be promoted.</p>
15.	National Policy on Elimination of Gender Based violence, 2016	<p>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.</p>	<p>The contractor in liaison with district officials (especially District Community Officer-DCDO) will undertake initiatives to do away with Gender Based Violence-GBV cases relating to project implementation activities.</p>
Legislations			

Nº.	Policy	Brief description and its key provisions	Relevance in the Project
01.	The Constitution of the Republic of Uganda, 1995	The Constitution requires that the project to be implemented without endangering human health and the environment.	The proposed project works under Lugala RGC in Namayingo District will be undertaken while ensuring safe and healthy environment is maintained as provided for in the Constitution.
02.	The National Environment Act 2019	The Fourth and Fifth Schedules of the Act lists projects to be considered for ESIA. Schedule 4 listed projects requires Project Briefs (ESMPs) to be prepared whereas Schedule 5 lists projects for Mandatory detailed ESIA including Scoping. Specifically, this project falls under Section 4 (j&k) of Schedule 5 of the National Environment Act 2019 which lists Utilisation of water resources and water supply involving construction of large scale gravitational water schemes and support facilities of more than 1000 m ³ /day or where the ecosystem is fragile and sensitive, for which Mandatory ESIA is required.	The proposed solar-powered water supply and sanitation project under Lugala RGC in Namayingo District falls under Schedule 5 for projects which require mandatory ESIA's before implementation, as such, the need to conduct this study.
03.	The Land Acquisition Act, 1965	This Act provides for acquisition of land after its valuation and along approved procedures which ensure adequate, fair and timely compensation to the landowners. The Act requires that adequate, fair and prompt compensation is paid before taking possession of land and property. Dispute arising from the compensation to be paid should be referred to the court for decision if the Land Tribunal cannot handle.	The key consideration regarding this Act in the project is to ensure landowners affected by the project are adequately and timely compensated.
04.	The National Environment (Mountainous and Hilly Areas Management) Regulations, 2000.	Every landowner or occupier shall while utilizing land in a mountainous and hilly area shall amongst others, observe all necessary measures for sustainable management of such ecosystems as prescribed by these Regulations.	There are no major hills within the proposed project area for implementation of proposed project activities under Lugala RGC in Namayingo District. However, in areas where the project activities especially transmission/distribution lines traverse an elevated landscape, appropriate

N°.	Policy	Brief description and its key provisions	Relevance in the Project
			measures will be implemented to curb soil erosion, deposition and siltation incidences.
05.	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.	This is a relevant Act to the proposed solar-powered water supply and sanitation project under Lugala RGC in Namayingo District. Different provision of this act will be implemented during the establishment and operations of the different proposed project components.
06.	The Uganda Wildlife Act, Cap 200, 2000	In order to support sustainable utilization of wildlife for the benefit of the people of Uganda, the purpose of the Act among others is to provide for the conservation of wildlife throughout Uganda so that the abundance and diversity of their species are maintained at optimum levels commensurate with other forms of land use.	There is no wildlife of conservation concerns in areas of proposed solar-powered water supply and sanitation project under Lugala RGC in Namayingo District. However, measures will be undertaken to ensure protection of any wildlife resources encountered during works.
07	Penal Code Act, 1950, Cap 120, Amended in 2007	The Act was enacted in 1950 and amended to include Amended by Anti-Terrorism Act, 2002 (Act 14 of 2002, Amended by Penal Code (Amendment) Act, 2007 (Act 8 of 2007), mended by Anti-	Implementation of the proposed project (the contractor, MWE, consultants, etc...) should follow provisions in the Penal Code Act to avoid

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		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.	committing offences in Lugala RGC that require application of the Act. In cases where offences are committed, the Law should be allowed to take its course.
08.	The Historical Monuments Act, 1968	The Act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical and traditional interest and for other matters connected therewith.	Some cultural sites or objects of significance to indigenous communities might be encountered/affected during project implementation.
09.	The Public Health Act, Cap 281	Under this Act, the Minister may cause to be made such inquiries as he or she may see fit in relation to any matters concerning the public health in any place. When such a directive is made, the person directed to make the inquiry shall have free access to all books, plans, maps, documents and other things relevant to the inquiry and shall have in relation to witnesses and their examination and the production of documents similar powers to those conferred upon commissioners by the Commissions of Inquiry Act, and may enter and inspect any building, premises or place, for the purpose of inquiry.	For the construction of workers camps, the provisions of this Act will be relevant for inspection of the project machinery/equipment and project workers work conditions. Project implementation activities will take all possible mitigation measures to make sure that, all impacts to human and environment are avoided and where not possible or in case of accident, there will be compensation.
10.	The Water Act Cap, 152 1997	The Act provides for the use, protection and management of water resources and supply in Uganda. The Water Resources Regulations of 1998 established under this Act stipulates a requirement to apply for a permit to construct, own, occupy or control any works on or adjacent the land as per Regulation 10.	Any disposal of waste shall need to be in line with the waste discharge regulations; proper management of fuel/oil spills is essential for minimizing chances of water contamination.
11.	Traffic and Road Safety Act, Cap.361	Section 119 of the Traffic and Road Safety Act stipulates that every person who uses, parks or stands a motor vehicle, trailer or	The contractor will ensure that all project machinery (equipment and raw materials haulage fleet) observe traffic and road safety procedures

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		engineering plant on any road carelessly or without reasonable consideration for other persons using the road commits an offence.	including observing minimum speed limits, routine maintenance and observing road signs among others.
12.	The Occupational Safety and Health Act, 2006	The Occupational Safety and Health Act of 2006 makes provisions for the health, safety, welfare and appropriate training of persons employed in workplaces.	The employer (contractor) must protect the health and safety of all project workforce by providing them with all requisite PPEs, safety training, clean and healthy work environment, sanitary conveniences, washing facilities, First Aid facilities, clean drinking water, and meals among others throughout the project implementation phases in accordance with this act.
13.	The Land Act, Cap 227, of 1998 (as amended)	The Land Act, Cap 227 of 1998 provides for the tenure, ownership and management of land. Under Section 44 the Government or the local government shall hold land in trust for the people and protect natural lakes, ground water, natural streams, wetlands and any other land reserved for ecological purposes for the common good of Ugandans.	Land acquisition will be undertaken for most of the project components under the Lugala RGC and therefore, a due procedure for land acquisition and compensation will be followed in line with this Act.
14.	The Employment Act, 2006	This Act provides for matters governing individual employment relationships in terms of circumstances of provision of labor. It is quite explicit on matters of forced labor that, no one should be forced to work, there should be no discrimination with regard to recruitment process, and it prohibits sexual harassment in employment. It also Act provides for matters of grievance settlement and issues of payment of wages and salaries.	This Act is relevant in that, it addresses matters of engagement of workers and their rights while at work. The contractor shall adhere to the provision of this Act for all project-related recruit of workforce.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
15.	The Workers' Compensation Act, Cap. 225	The Act outlines matters of compensation for injuries and accidents as well as the responsibility of employees to take care of their health and safety while on the project.	The Lugala RGC solar-powered water supply and sanitation facilities project implementation activities are expected to employ many people depending on their skillsets and need. The Act seeks to safeguard the workers and ensure that they are appropriately compensated in case of injuries resulting from project implementation activities.
16.	The Prohibition of Burning of Grass Act, 1974	Section (2) of this Act prohibits the burning of grass by any person in all areas of Uganda.	During project implementation works, the contractor must not engage in biomass disposal through burning unless otherwise expressly authorized by NEMA, MoWE or DEOs.
17.	Children Act Cap 59	The Act defines a child as a person below the age of 18. It lists the right for children to be with their parents, circumstances under which they should not, foster care and adoption procedures as well as mandates of local authorities and roles of community.	Child labor is to be prohibited during project implementation activities i.e. no employment of children below 18 years for project implementation activities.
18.	Domestic Violence Act 2010	The Act provides for the protection and relief of victims of domestic violence; provides for the punishment of perpetrators of domestic violence and also spells procedures and guidelines to be followed by the court in relation to the protection and compensation of victims of domestic violence as well as matters relating to cases of domestic violence in general.	This act gives guidance to the contractor and their workers on how to handle cases of domestic violence.
19.	Traffic and Road Safety Act Cap 361, 1998	The Act provides for administration, registration and licensing of motor vehicles, driving permits, licenses for public service, private omnibus and goods vehicles, use of motor vehicles, control of traffic, enforcement, and information on the national roads and safety	This Act gives guidance to management of safety during project implementation works. The relevant licenses shall be obtained for the contractor vehicles especially material haulage

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		council.	fleet and other equipment that will be used during project implementation.
20.	The Survey Act, 1964	Section 23 of the Act also points out compensation for injury done by clearance during the act of survey. For the purpose of the topographic survey of the project area this act will be relevant in this project. With regard to compensation the Act stipulates as follows: “Where any demand for compensation is made as a result of the clearance of any boundary or other line , a Government surveyor shall, as soon as conveniently may be, inspect any trees, fences, or standing crops which are alleged to have been cut down or damaged, and , if he or she shall consider that any compensation should be paid, shall pay or tender to the owner of the trees, fences or standing crops the amount of compensation which in his or her opinion should be allowed for them”.	In instance where the MoWE finds it necessary to undertake land survey for this project implementation works, the process will be guided by the Act and conducted by a registered surveyor authorized by the commissioner for surveys in Ministry of Lands, Housing and Urban Development.
21	The Local Government Act, 1997	The Act provides for decentralization and devolution of government functions, powers and services from the central to Local Governments and sets up the political and administrative functions of local governments. The Local Governments are responsible for the protection of the environment in their respective areas of jurisdiction. Local Governments shall be consulted on projects to be located within their jurisdiction and on matters that affect their environment. Local government structures are important for mobilising support for the project as well as monitoring its social-environmental impacts both during construction and operation phases.	At the District Level, the District Environmental Officers, District Water Officer, District Engineer and Community Development Officers in the respective areas of project implementation will participate in monitoring the projects to ensure that mitigation measures are adequate and advice or point out additional compliance requirements following their inspections. The District Land Boards and Lands Officers will provide guidance on issues of compensation or land acquisition.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
22	Access to Information Act, 2005	Provides for the right to access to information pursuant to Article 21 of the constitution	ESIA has to 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 and Standards			
01.	The Environmental Impact Assessment Regulations, 2020	The National Environment Management Authority (NEMA) issued Environmental Impact Assessment Regulations, S.I. N°. 13/2020) for conduct of EIAs, which are now part of the Environmental Legislation of Uganda. The actual implementation of the EIA process remains a function of the relevant line ministries and departments, the private sector, NGOs and the general	The developer and the contractor have undertaken this ESIA study with particular focus on the content specified within the First Schedule of these Regulations.
02.	Water Resources Regulations, 1998	The Regulations apply to motorized water abstraction from boreholes or surface watercourses or diverting, impounding or using more than 400m ³ of water within a period of 24 hours. Part II, Regulation 3 requires a water permit for operation of motorized water pump from a borehole or waterway.	Water needs for different aspects of project implementation activities including water source, construction activities and workers' camp domestic water requirements will be met through water abstraction from both surface and ground water sources within the project area. The Contractor will be required to abide by provisions of this law in regard to abstraction of water to be used for project implementation works and at associated project facilities such material yards, workers' camps among others.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
03.	The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations 2000.	These Regulations guides on the development procedures to be followed where developments are to be undertaken in wetlands, riverbanks and lakeshores.	The proposed project activities for Lugala RGC Solar-powered water supply and sanitation activities may traverse a number of wetlands and rivers/streams; and it's likely that project implementation activities will to a certain extent affect these resources. Guided by these regulations, the contractor will adopt and implement appropriate mitigation/offset measures to minimize, avoid or prevent impacts on these resources.
04.	Draft National Air Quality Standards, 2006	Considering that construction equipment and machinery are powered by diesel/ gasoline engines, pollutants such as CO ₂ , NO _x , SO _x , VOC and particulates are expected to be emitted. The draft National air quality standards provide the following regulatory limits for these emissions.	A number of proposed project activities such as material haulage, material extraction of both murrum and stones, construction works among others will likely impact on the local ambient air quality. Guided by provisions of these standards, the contractor will adopt appropriate measures to minimize, mitigate and prevent air quality deterioration resulting from project implementation activities.
05.	The National Environment (Waste Management) Regulations, 2020	<p>A person who generates waste, a waste handler or a product steward shall, in compliance with the environmental principles set out in section 5 of the Act:</p> <ol style="list-style-type: none"> a. apply measures in the management of waste to prevent harm to human health and ensure safety of human beings b. Apply measures in the management of waste to prevent pollution, harm to biological diversity and contamination of the wider environment by waste. 	Certainly, waste will be generated during project implementation activities especially from contractor facilities such as camps, material yards, among others. The contractor guided by these regulations will ensure that all generated wastes throughout all project implementation phases are appropriately managed/disposed of.

N°.	Policy	Brief description and its key provisions	Relevance in the Project
		<p>c. use best available technologies and best environmental practices to manage waste; and</p> <p>d. ensure resource efficiency</p> <p>(i) By the application of the waste management hierarchy and the control or minimization of the generation of waste to the greatest extent possible.</p> <p>(ii) by promoting proper cyclical use of resources; and</p> <p>By ensuring proper disposal of circulative resources not put into cyclical use.</p>	
06.	The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020	These regulations provide standards for effluent discharge. Schedules 2, 3 and 4 detail maximum permissible limits for regulated contaminants, which must not be exceeded before effluent is discharged into water or on land	Proposed project activities will certainly generate effluent waste. The contractor should employ appropriate measures to manage effluent waste generated by project activities especially ancillary facilities such as workers' camps, material yards, mechanical workshops, among others.
07.	The National Environment (Noise Standards and Control) Regulations, 2003	Part III Sec. (1) requires machinery operators to use the best practicable means to ensure that the emission of noise does not exceed the permissible levels.	Indisputably, implementation of proposed Lugala RGC and other associated activities will trigger noise generation. These standards shall however be applied to keep the noise levels in permissible limits as well as mitigating noise generation at the source.
08.	National Environment (Control of Smoking in Public Places) Regulations, 2004	According WHO, Secondhand smoke (SHS) is a human carcinogen for which there is no "safe" exposure level 1. To avoid public health risk from SHS, Uganda enacted this Regulations to regulate smoking in public places. Under this law, a public place is defined as, "any place to which members of the general public or segments of the	Requirements of these regulations should be fulfilled by the contractor through instituted structures especially within workers' camps, on site and other auxiliary project facilities to avoid exposure of workers to tobacco SHS and

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

4.2 INTERNATIONAL PROTOCOLS AND CONVENTIONS

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

Table 4-2: Summary of international protocols and conventions applicable to the proposed project

Protocol or Convention	Purpose
African Convention on the Conservation of Nature, 1968	Encourages individual and joint action for the conservation, utilisation and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.
United Nations Framework Convention on Climate Change (UNFCCC), 1992	The Convention requires parties to avoid adverse effects on the environment and adopt measures and policies to control carbon dioxide emissions in technologies, taking into account their common, yet differentiated responsibilities, as well as their specific national and regional development priorities, objectives and circumstances. They are required to take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimising adverse effects on the economy, on public health and on the quality of the environment of projects or measures undertaken by them to mitigate or adapt to climate change.
United Nations Convention to Combat Desertification (UNCCD), 1994	Binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007 with a view to <i>forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.</i>
Montreal Protocol for the Protection of the Ozone Layer, 1987	The protocol was designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. All of the ozone depleting substances controlled by the Montreal Protocol contain either chlorine or bromine (substances containing only fluorine do not harm the ozone layer). The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities

Protocol or Convention	Purpose
Stockholm Convention on Persistent Organic Pollutants, 2001	Protects human health and environment from Persistent Organic Pollutants that remain intact in the environment for long periods and can become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife, which can lead to serious health effects.
Strategic Approach to International Chemicals Management, 2006	Fosters sound management of chemicals and to ensure that by the year 2020, chemicals are produced and used in ways that minimise significant adverse impacts on the environment and human health.
International Labour Organisation Convention, 1998	Sets out basic principles and labour rights at work, based on international best practise.

4.3 WORLD BANK ENVIRONMENTAL AND SOCIAL SAFEGUARDS POLICIES TRIGGERED

During IWMDP Project Preparation, an ESMF and RPF were prepared that are guiding the preparation of this ESIA. Much as the World Bank in 2017 published its new Environmental and Social Framework which sets out standards designed to support sustainability in projects, IWMDP project was prepared and approved under the World Bank Safeguards Operational Policies (OP) hence, its implementation is guided by the Operational Policies

Table 4-3: Safeguards Policies triggered by the project

Safeguards Policies	Triggered?	Key provisions/requirements	Measures adopted
Environmental Assessment (OP/BP/GP 4.01)	Yes	The Project is Category B and therefore requires environmental and social assessment. Safeguards policy OP 4.01 has been triggered, given that the project will include civil works for the proposed Solar-Powered Water supply and Sanitation Project under Lugala RGC are associated with amongst others noise, dust, waste generation, materials sourcing, and	This Environment and Social Impact Assessment fulfils the requirements of this policy. The ESIA Report presents the potential social and environmental impacts associated with implementation of project activities and the appropriate enhancement for positive impacts and mitigation measures for negative impacts have been proposed.

		transport. These must be assessed, and mitigations identified.	
Natural Habitats (OP/BP 4.04):	No	The project is not anticipated to have a potential for significant adverse impacts on critical natural habitats or lead to significant conversion of natural habitats.	<p>The objective of this policy is to promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.</p> <p>Implementation of some project activities will traverse some ecosystem areas such wetlands, grasslands, shrubs, rivers/streams among others. The raw water intake from Lake Victoria at Lugala Beach could impact on the water ecosystem.</p> <p>This project has been designed to minimize any adverse impacts on natural habitats as a result of Water Supply System development/implementation activities while strengthening the management of vulnerable catchment areas.</p> <p>To attain the objectives of this policy, the ESIA study assessed the natural habitats in terms of their flora and fauna diversity and water quality. The risk of introduction of foreign material through dumping of wastes and introduction of invasive species will have to be mitigated by sensitization of workers and use of approved waste disposal areas. A comprehensive assessment of the condition of the natural habitats and impacts and their mitigation measures are outlined in this ESIA (ESMP).</p>

Forests (OP/BP 4.36):	No	The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services.	<p>This policy applies, among others, to projects that may or will have impact on the health and quality of forests. The policy requires Bank financed investments to address the potential impacts of projects to forests.</p> <p>There are no Forest Reserves in the project area hence no need for a Forest Management Plan.</p> <p>Although no forest will be affected, the project will put in place measures that enhance tree cover in the project area inline with the National forestry and tree planting guidelines.</p>
Physical Cultural Resources (OP 4.11)	Yes	The project implementation civil works may lead to accidental excavations of physical cultural resources especially along the transmission/distribution among other project components sites.	<p>Whereas there are no serious cultural properties along the proposed water transmission and distribution corridors like graves, shrines have been found above ground in the project area, chance finds of archaeological / paleontological value could be encountered during construction especially while trenching channels for the water transmission pipes. Hence there is a possibility this safeguard may be triggered by the project.</p> <p>A detailed procedural guideline in the Chance Finds Procedure to be developed shall be considered in the event that previously unknown heritage resources are exposed or found during project implementation works.</p> <p>When RAP studies are carried out, any physical cultural resources in the water transmission corridor will be enumerated as structures and all affected PAPs will be compensated for such structures to ensure that they are relocated in accordance with cultural norms of the affected people and society.</p>

Involuntary Resettlement (OP/BP 4.12)	Yes	The project will involve land acquisitions for sites planned for the water sources, reservoirs and sump/ booster station. Therefore, the project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons; and in particular, for this project, economic loss is possible.	Land acquisition procedure under this project will be thorough and undertaken through free and informed consent; and the potentially affected persons should have the right to refuse land acquisition or restrictions on land use that can result into displacement.
Indigenous Peoples (OP/BP 4.10)	No	The Bank recognizes that the identities and cultures of Indigenous Peoples are inextricably linked to the lands on which they live and the natural resources on which they depend. These distinct circumstances expose Indigenous Peoples to different types of risks and levels of impacts from development projects, including loss of identity, culture, and customary livelihoods, as well as exposure to disease.	No known Indigenous Peoples exist within the project area and therefore, this safeguard is not triggered or considered under the Lugala RGC in Namayingo District.
World Bank Policy on disclosure of Information	Yes	The Bank allows access to any information in its possession that is not on a list of exceptions. In addition, over time the Bank declassifies and makes publicly available certain information that falls under the exceptions. Notwithstanding the broad intent of this policy, the Bank reserves the right, under exceptional circumstances, to disclose certain information covered by the list of	The ESIA shall be disclosed both on World Bank Infoshop as well as the MWE/ NEMA Websites and copies distributed to Local Governments and disseminated to local communities through meetings and local radios.

		exceptions, or to restrict access to information that it normally discloses.	
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The World Bank has a number of sector based EHS guidelines below, many of which are applicable to various components of the proposed project namely:

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

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

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

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

4.4.1 WBG EHS GUIDELINES: WATER AND SANITATION

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

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

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

- a. Environmental issues associated with water and sanitation projects may principally occur during the construction and operational phases, depending on project-specific characteristics and components.
 - a. Drinking water – water withdrawal, water treatment, water distribution,
 - b. Sanitation – faecal sludge and septage collection, sewerage (Domestic wastewater discharges, Industrial wastewater discharges, Leaks and overflows), Wastewater and Sludge Treatment and Discharge (Liquid effluents, Solid waste, Air emissions and odours, Hazardous chemicals, Ecological impacts).

- b. Occupational Health and Safety during the construction and decommissioning of Water and Sanitation facilities. Occupational health and safety impacts associated with the operational phase of water and sanitation projects primarily include the following:
 - a. Accidents and injuries
 - b. Chemical exposure
 - c. Hazardous Atmosphere
 - d. Exposure to pathogens and vectors
 - e. Noise
- c. Community health and safety impacts during the construction of water and sanitation projects are discussed including;
 - a. Drinking Water – Water Intake (Water Supply Protection), Water Treatment (Drinking Water Quality and Supply, Hazardous Chemicals) and Water Distribution.
 - b. Sanitation – Wastewater and Septage Collection (Preventing sewerage system overflows, Preventing build-up of potentially toxic and explosive gases in the sewer), Wastewater and Sludge Treatment (Liquid effluents, Air emissions and odours, Physical hazards).

4.4.2 WBG EHS GUIDELINES: AIR EMISSIONS AND AMBIENT AIR QUALITY

4.4.2.1 GENERAL APPROACH

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

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

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

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

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

4.4.3 WBG EHS GUIDELINES: WASTE MANAGEMENT

4.4.3.1 GENERAL APPROACH

In relation to the proposed solar-powered water supply and sanitation project works under Lugala RGC, this guideline provides for construction waste generated by and throughout all implementation phases.

Large waste volumes will be generated especially at project/construction site, material holding/stockpile yards, site workshop and construction equipment parking lot, batching plant, temporarily contractor workforce shelters among others. The guidelines advocate for waste management planning where waste should be characterized according to composition, source, types, and generation rates. These guidelines call for implementation of a waste management hierarchy that comprises prevention, recycling/reuse, treatment, and disposal. The guidelines require segregation of *conventional waste* from *hazardous waste* streams. Examples of hazardous construction waste are waste oil from vehicles and machinery paint waste, thinners, and concrete wash water (e.g., from cleaning concrete mixers).

4.4.3.2 IMPLICATION FOR THIS PROJECT

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

4.4.4 WBG EHS GUIDELINES: HAZARDOUS MATERIALS MANAGEMENT

4.4.4.1 APPLICATION AND APPROACH

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

4.4.4.2 GENERAL HAZARDOUS MATERIALS MANAGEMENT

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

4.4.5 WBG EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING

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

- **Environment**

- a. **Noise and Vibration:** During construction and decommissioning activities, noise and vibration may be caused by the operation of material haulage fleet, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials, and people.
- b. **Air Quality:** Project will involve excavations and handling of construction materials such as aggregates, sand, cement among others and this could generate fugitive dust affecting adjacent

environs. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of construction waste.

- c. **Solid Waste:** During project implementation, non-hazardous solid waste generated at construction sites including domestic waste and other wastes such as wood and metals.
- d. **Hazardous Materials:** Fuel, lubricating oils and other forms of hazardous waste may be encountered.

- **Occupational Health and Safety**

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

- **Community Health and Safety**

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

- **Traffic Safety**

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

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

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

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

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.⁶

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 4-4 & Table 4-5 below.

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

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
Environmental Assessment (OP 4.01)	<ul style="list-style-type: none"> • National Environment Management Policy, 1994. • National Environment Act No.5 of 2019. • National Environment (Environmental and Social Assessment) Regulations, 2020. 	<ul style="list-style-type: none"> • Independent review is not specifically provided for under ESIA Regulations of Uganda and as a result, the review of ESIA's is commonly reviewed by government agencies; • In the EIA review process, there is no specific legal/regulatory framework that caters for examination of the quality of the ESIA reports. Only conditions of approval/reasons for non-approval of ESIA's are provided by NEMA; • There are no administrative mechanisms for appealing a decision taken on an EIA. 	The report has been Reviewed at MWE level. Further reviews are expected at WB level to ascertain the quality of the ESIA before submission to NEMA. (See Page (i) for Document Control).
Natural Habitats (OP 4.04) and Forests (OP 4.36)	<ul style="list-style-type: none"> • The Constitution 1995 as amended; • the National Environment Act No.5 of 2019; • The National Forestry and Tree Planting Act, 2003; <ul style="list-style-type: none"> • The Uganda Wildlife Act 2019; • The Land Act Cap 227; • The Fish Act Cap 197; 	There are general gaps which include lack of Regulations to implement the National Forestry and Tree Planting Act and the Wildlife Act.	Not applicable to this ESIA

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
	<ul style="list-style-type: none"> The Plant Protection Act Cap 31. 		
Physical Cultural Resources (OP 4.11)	<ul style="list-style-type: none"> The Constitution 1995 as amended The National Environment Act, 2019 The Historical Monuments Act, Cap 46 The Institution of Traditional or Cultural Leaders Act, 2011 	<ul style="list-style-type: none"> The legal framework is limited in scope. For example, it does not cover certain aspects such as the intangible heritage; There is no strong institution to regulate and manage heritage resources; The sites and monuments are not adequately maintained, documented and in addition, some of the antiquities are not collected; There is limited enforcement of the legal framework related to Physical Cultural Resources in Uganda because most developers and government officials do not understand the importance of conserving physical cultural resources. 	This ESIA included the Chance Find Procedures (9.7) to facilitate and assign responsibility for identification, handling and preservation of both tangible and intangible physical cultural resources during project implementation.
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.			The ESIA will adopt requirements in the new law on how to handle all aspects of culture, the tangible, intangible heritage on the project.

Table 4-5: Gaps between World Bank and Ugandan legislation applicable to OP 4.12 Involuntary Resettlement

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

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

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

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

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	<p>The Land Acquisition Act, however, makes provision for an enquiry whereby the affected person can make formal written claim and the assessment officer is obliged to conduct a hearing before making his award.</p>	<p>the planning, implementation, and monitoring of the resettlement program, especially in the process of developing and implementing the procedures for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanisms.</p>	<p>differences with the requirements of Bank policy.</p>	
<p>Grievance mechanism and dispute resolution</p>	<p>The Land Act, 1998 states that land tribunals must be established at all districts. The Land Act empowers the Land Tribunals to determine disputes and it provides for appeal to higher ordinary courts. The Land Acquisition Act provides for the aggrieved person to appeal to the High Court.</p>	<p>Establish appropriate and accessible Grievance Redress Mechanism.</p>	<p>GRC structures exist within the Local Councils of Governance in Uganda, but in most cases, they are dysfunctional and ineffective given the limited projects knowledge.</p>	<p>Grievance committees to be instituted within the procedure and will not replace the existing legal process in Uganda; rather it seeks to resolve issues quickly so as to expedite receipt of entitlements and smooth resettlement without resorting to expensive and time-consuming legal action. If the grievance procedure fails to provide a settlement, complainants can still seek legal redress.</p>

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
Calculation of compensation and valuation	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.

4.5 INSTITUTION ARRANGEMENT

The proposed implementation/establishment activities of a solar-powered piped water supply system and sanitation facilities project under Lugala RGC in Namayingo District will require coordination involving a number of national lead and regulatory agencies assisted by local district level sectoral Departments. Table 4-6 below presents a profile of relevant institutions for the implementation of the proposed project activities.

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

No	Institution	Mandate
1	Ministry of Water and Environment	The Ministry of Water and Environment (MoWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.
2	Directorate of Water Resources Management	The Directorate of Water Resources Management (DWRM) is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary water resources and peaceful cooperation with Nile Basin riparian countries. DWRM issued the water abstraction permits for the project and will monitor compliance to the conditions of the permits throughout the project's lifetime.
3	Wetlands Management Department	Wetlands Management Department (WMD) is mandated to manage wetland resources and its goal is to sustain the biophysical and socio-economic values of the wetlands in Uganda for present and future generations. WMD will issue wetland use permits for activities to be carried out in wetlands and monitor compliance to the conditions of the permit, so as to ensure sustainable utilisation of wetland resources.
4	National Environment Management Authority (NEMA)	The National Environmental Act establishes NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental management activities in Uganda. NEMA has a cross-sectoral mandate to oversee the conduct of ESIA through issuance of ESIA guidelines, regulations, and registration of practitioners. It reviews and approves environmental impact statements (EIS) in consultation with sectoral agencies. NEMA and the network of District Environment Officers will undertake third party monitoring compliance with project approval conditions during implementation and decommissioning.
5	Ministry of Gender, Labour and Social	The Ministry is responsible for ensuring workers are protected while at work and have good working conditions. The Ministry is also responsible for the welfare of workers including enforcing workplace laws and regulations, worker compensation and disputes, Child protection and management of Gender based violence.

No	Institution	Mandate
	Development (MoLGSD).	
6	Ministry of Lands, Housing and Urban Development	The Mandate is “To ensure a rational: sustainable and effective use and management of land and orderly development of urban and rural areas as well as safe, planned and adequate housing for socioeconomic development”. The MoLHUD, through the Office of the Chief Government Valuer, and the District Land Boards, will provide guidance on land acquisition and property valuation while undertaking the Resettlement Action Plan. MoLHUD will also issue certificates of titles for land purchased by and registered to the Government under this project.
7	Ministry of Works and transport (MoWT)	The mandate of MoWT is to develop and maintain the national roads network, advise Government on general roads policy and contribute to addressing of transport concerns, among others. Some of MoWT responsibilities include: management of the National Roads Network; maintenance and development of the national roads network; and establishing and maintaining road reserves among others. The project transmission line and distribution lines run along the road reserve of community access roads in Lugala beach Villages which are considered District roads under road categorization. Namayingo District will authorize construction of project components in the road reserve as well as provide guidance and supervision for the project contractor in constructing service ducts for the pipe crossing on roads.
8	Uganda Police	<p>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.</p> <p>The project will be implemented in Lugala Beach Village, Banda Sub County, Namayingo District. The police post at Banda Sub county will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Namayingo 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.</p>
9	Namayingo District Local Government	The 1997 Local Government Act provides for decentralization and devolution of government functions, powers and services from the central to Local Governments and sets up the political and administrative functions of local governments. The Local Governments are responsible for the protection of the environment in their respective areas of jurisdiction. Local Governments shall be consulted on projects to be located within their jurisdiction and on matters that affect their environment. Local government structures are important for mobilizing support for the project as well as monitoring its social-environmental impacts both during construction and operation phases. At the District Level, the District Environmental Officers, District Water Officer District Engineer and Community Development Officers in the respective areas of project implementation

No	Institution	Mandate
		will participate in monitoring the project to ensure that mitigation measures are adequate and advice or point out additional compliance requirements following their inspections.
10	Local Communities	These are the direct affected people. All project implementation impacts will be on communities especially those near areas earmarked for water transmission/distribution and establishment of other components such as the water source, water treatment plant, reservoir tank, water pump, sanitary toilets among others.

4.6 APPROVALS, PERMITS AND LICENSES

Several approvals and licenses will be required before commencement of certain construction activities. Securing of approvals requires preparation of the relevant documentation and payment of fees. This needs to be done during mobilization to ensure that all approvals are secured in a timely manner to avoid construction delays. It is important to ensure that all materials (sand and aggregates) are sourced from quarries, borrow pits and sand mines have relevant Environmental and Social Assessments carried out and approved by the World Bank and NEMA in compliance with environmental laws. For all auxiliary sites to be opened up, 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 22.

Table 4-7: Permits, licenses and approvals required by proposed Lugala RGC project activities

	Permit/Licences/ Approvals	Issuing/Aproving agency	Use	Responsibility	Legal Framework
1	Environmental approval ESIA certificate.	NEMA	Approval for commencement of the project	MoWE	National Environment Act 2019
2	Water abstraction permit.	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,	DGSM/ MEMD/	Contractor	MWE	Mining Act, Cap 148

	Permit/Licences/ Approvals	Issuing/Aproving agency	Use	Responsibility	Legal Framework
	opening up of quarries and sand pits				
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 Affairs	Contractor & Supervising, Consultant/ MWE	Contractor	Immigrations Act, Cap 66
10	Building and hoarding Plan Approval (Workers camps, Workshops, and other structures to be used as operation areas or	District Local Government	The plan must conform to regulatory standards for human occupancy	Contractor	Physical Planning Act, Local Government Act

	Permit/Licences/ Approvals	Issuing/Aproving agency	Use	Responsibility	Legal Framework
	accommodation for staff)				
11	OTV licences	Ministry of Works and Transport	Transportation of workers	Contractor	Traffic and Road Safety Act
12	C-ESMP 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

5 BASELINE ENVIRONMENTAL AND SOCIO-ECONOMIC

5.1 PHYSICAL ENVIRONMENT

5.1.1 CLIMATE AND WEATHER

Namayingo district in the Eastern Region of Uganda has a Tropical monsoon climate which corresponds to the Köppen climate classification category "Am" (Beck et al., 2018). Tropical monsoon climates have monthly mean temperatures above 18 °C in every month of the year and a dry season. The area experiences extreme seasonal variations in monthly rainfall throughout the year. The project area experiences two rainy seasons. The first rainy season is from March to May followed by a less pronounced rainy season from September to November. The annual rainfall varies between approximately 1450 mm and 1565 mm (Figure 5-220). Spatially, rainfall is more concentrated in the North Eastern part of the project area, gradually reducing towards the South West.

Generally, June is the driest month with maximum precipitation of about 58 mm. The rainy season commences in March until May where maximum precipitation (about 244 mm) occurs. Between January and February, the precipitation is low at about 65 mm, while from September to November, high precipitation is experienced to a peak of about 150 mm. December shows gradual decline in precipitation to a low of about 91 mm (Figure 56). The project area is estimated to have an annual average temperature that typically varies from 18.3°C to 28.3°C and is rarely below 17.2°C or above 31.7°C. The monthly ambient temperature varies throughout the year with the high maximum temperatures observed in January, February, March, November and December, while the minimum temperatures occur in April to October (Figure 5-1).

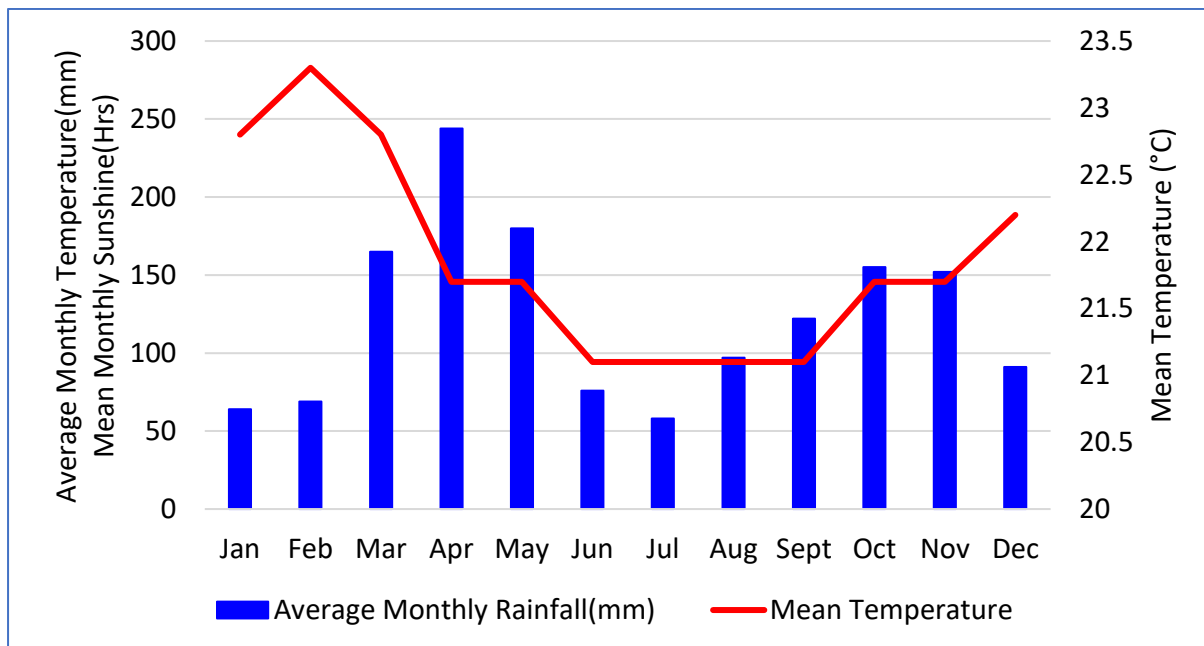


Figure 5-1: Mean monthly precipitation in the project area

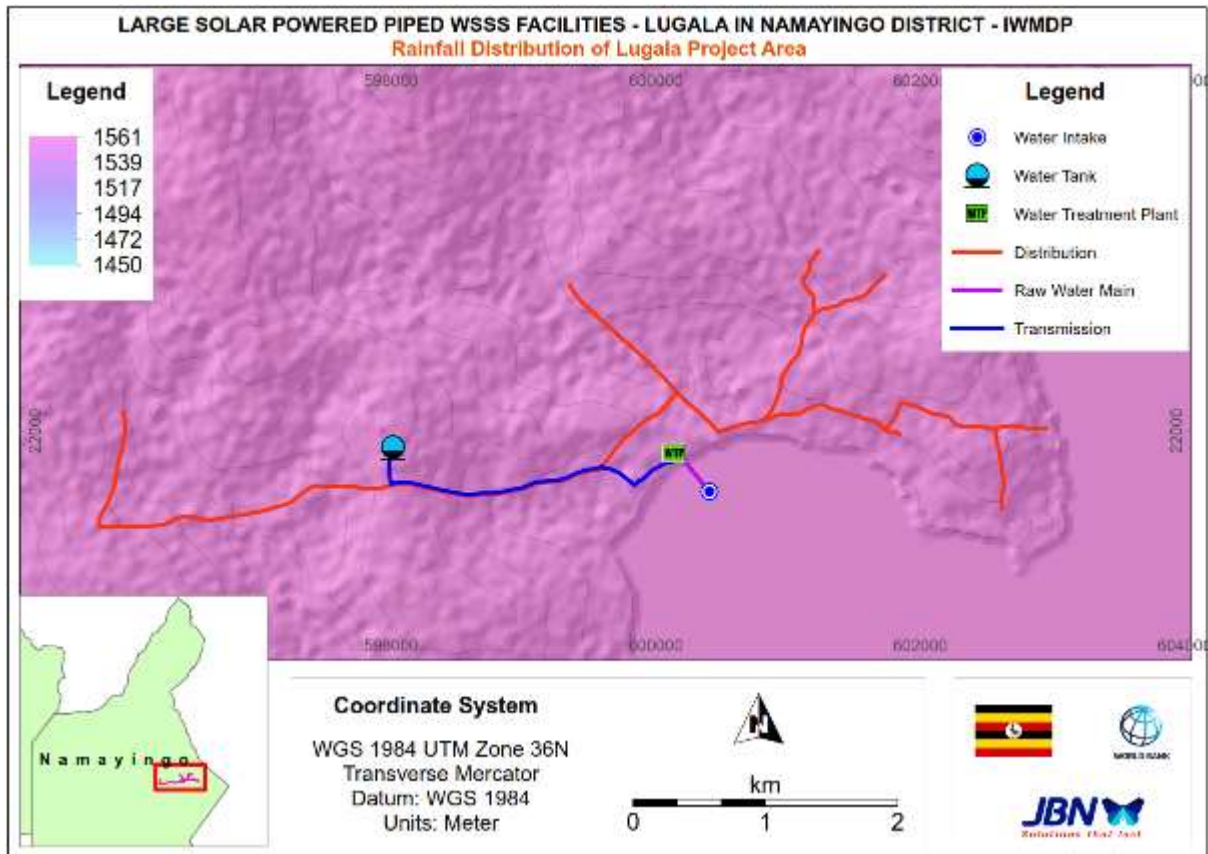


Figure 5-2: Mean annual rainfall (mm) distribution over Lugala project area

5.1.2 WATER RESOURCES AND HYDROLOGY

According to the Uganda Water Supply Atlas records by 25th April, 2022, Uganda has four (4) main Water Management Zones (WMZs) (Upper Nile, Kyoga, Victoria and Albert) and eight (8) river basins (Albert Nile, Aswa, Kidepo, L. Kyoga, L. Victoria, L. Edward, L. Albert and Victoria Nile). Namayingo district is located in eastern Uganda partly along Lake Victoria shores and on Islands in Lake Victoria. About 70% of the district is occupied by Lake Victoria. The district has both surface and groundwater resources in form of streams and rivers with wetlands, especially along the shores of Lake Victoria. Situated in between two WMZs, the district is drains to Lake Kyoga (in the north) and Victoria Basin (in the south) (Figure 5-3). Much of the low-lying areas are characterised by wetlands drained by seasonal and permanent (Figure 5-4) and rivers into both L. Victoria. The intake site is about 300 m in the L. Victoria. The area within district is covered by cropland (78%) and trees (12%), and the remaining swamps.

The project will abstract 933.63 m³/day of raw water from L. Victoria in Laugala Beach Village to meet the average day demand for Lugala RGC of **934** m³/day by 2040. Lake Victoria contains about 2,750 cubic kilometres (2.2 billion acre-feet) of water. The proposed project water abstraction is negligible compared to the Lake storage capacity.

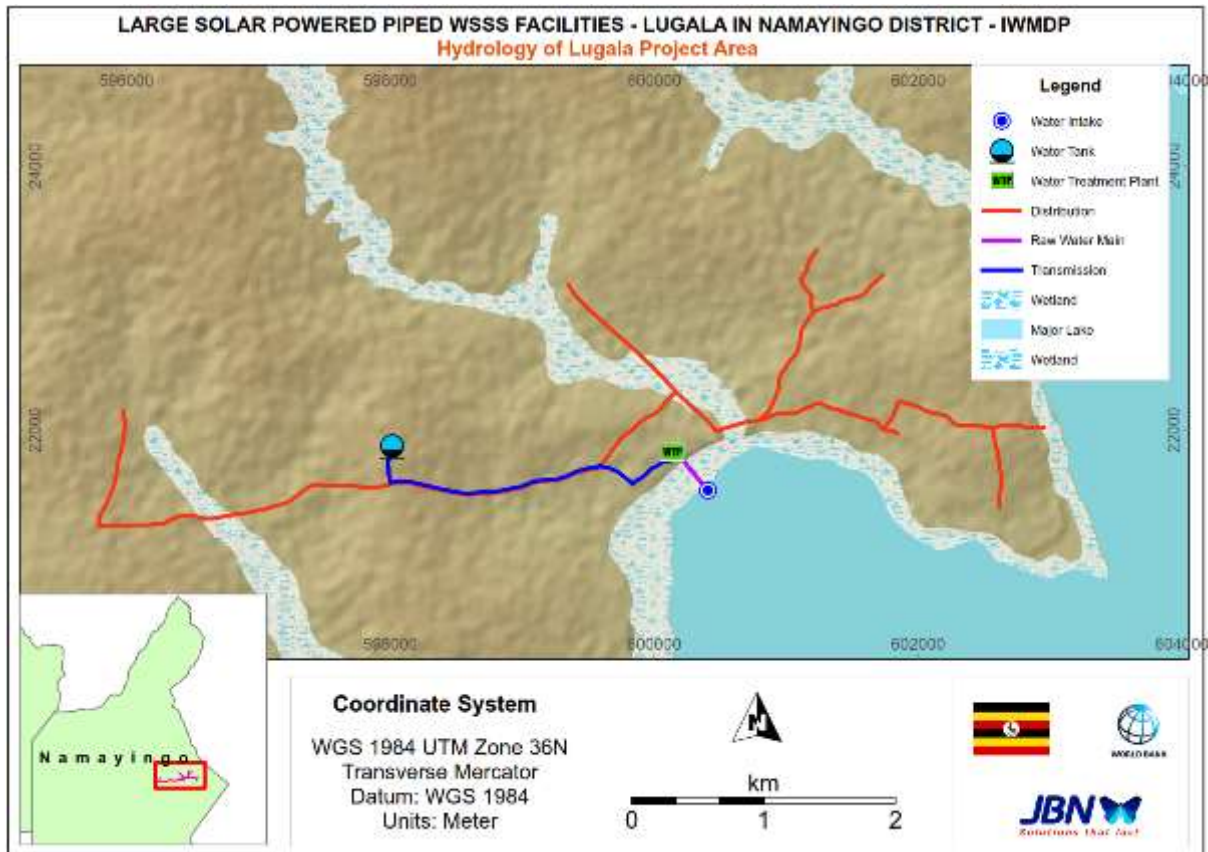


Figure 5-3: Hydrology of the project area



Figure 5-4: Permanent wetlands around L. Victoria near the abstraction site

5.1.3 TOPOGRAPHY

The topography of Namayingo contains only modest variations in elevation characterized by extensive undulating lowlands, isolated hills and pediments of approximately 115m with linear and convex

slopes between 2 and 8% and a maximum elevation change of 148 m. There are flat valley bottoms with slopes less than 2%. The general surface slopes range from 120m in the south-west near Lake Victoria 100m in the North. The district is sculptured into a rolling landscape with gentle slopes and swallow valleys (occupied by papyrus swamps) of amplitude far less than 1125m and a large portion of ridges/hilltops, so much so that a lot of arable land is available on hilltops, slopes and the valleys and it is where most of the socio-economic activities take place. The project area is gentle sloping with maximum and minimum elevations of 1126 m and 1215 m respectively. The average elevation above sea level of 1,180 m. It is well drained to either direction because it's surrounded by the arms of L. Victoria (Figure 5-5)

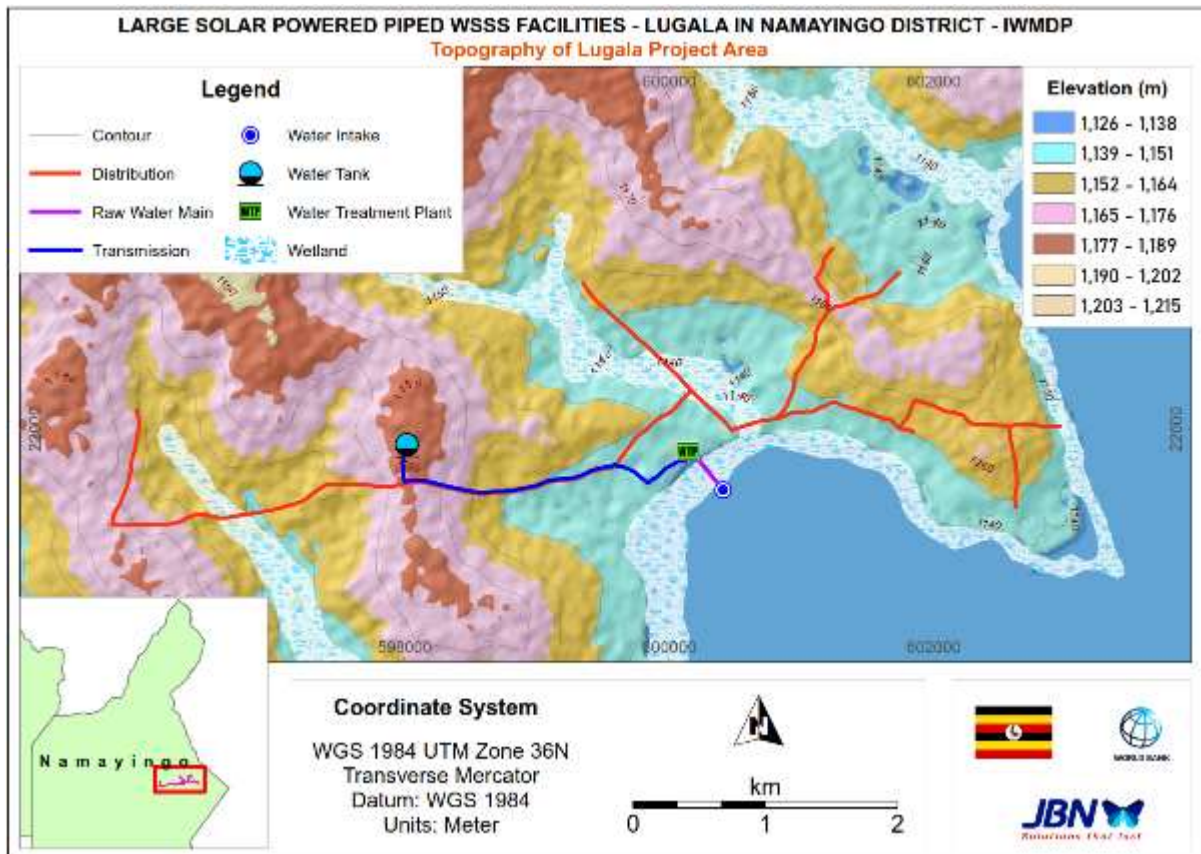


Figure 5-5: Topography of project area

5.1.4 GEOLOGY AND GEOMORPHOLOGY

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

According to the geological map of Uganda (GTK, 2014), Namayingo lies in the Lake Victoria Terrane (LVT) of the Tanzania Craton extends into the south-eastern corner of Uganda. The LVT comprises predominantly mafic metavolcanic rocks overlain by a unit composed of felsic metavolcanics and met sediments and several granitoids. The rock system is a basement underlined by the Nyanzian system

that is rather complex and includes a variety of granites, gneisses, quartzite and small areas of other kinds of strong folded metamorphic rocks.

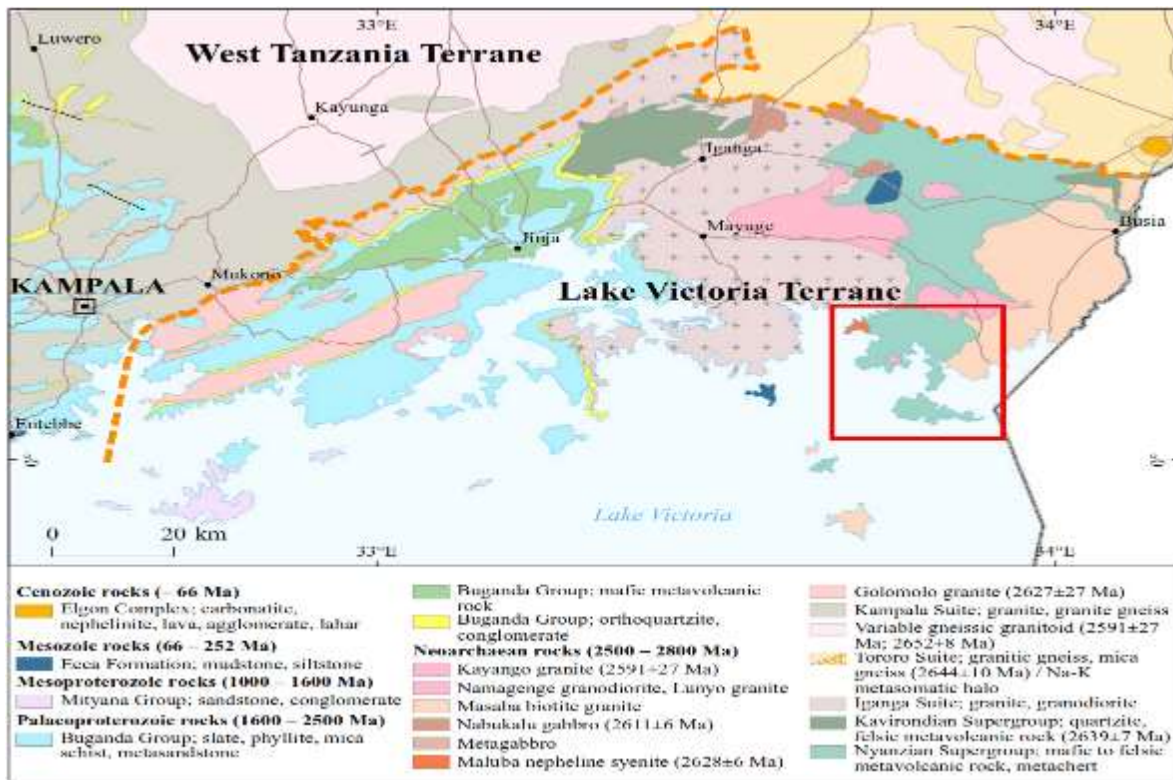


Figure 5-6: Geological map of Namayingo District Lake Victoria Terrane (LVT)

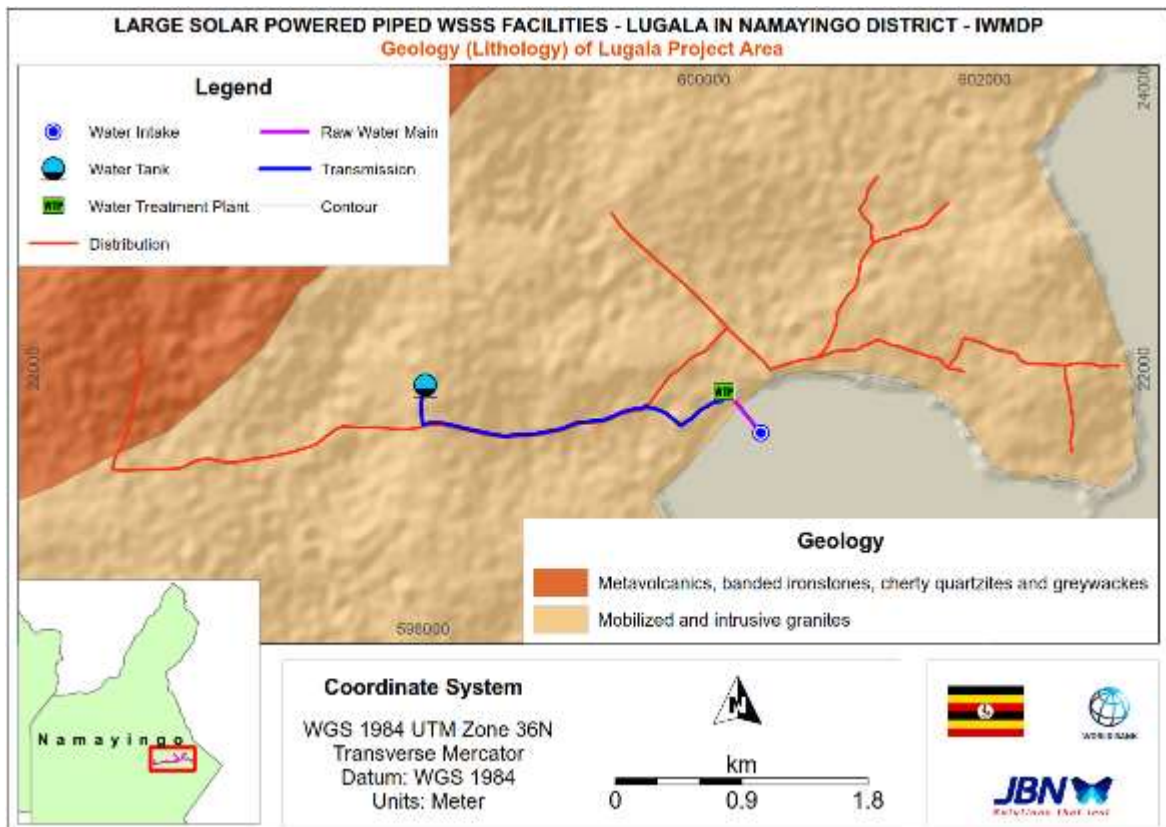


Figure 5-7: Geology of the Project Area

5.1.5 SOILS

Generally, all soil types in Namayingo District are mainly loamy and sand loams. These soils have fine textile with rather loose structure, which are easily eroded and leached. Most soils are acidic in nature. Soil types in the district include: (i) Yellow - red sandy, clay loams soils varying from dark grey to dark red which are slightly acidic and mainly derived from granite, gneissic and sedimentary rocks. They occur on gently undulating - hilly topography; (ii) Brown - yellow clay loams with laterite horizon with a variety of dark brown to dark greyish brown, which are slightly acidic. These occur on flat ridge tops or as of undulating topography; (iii) Light - grey- white mottled loamy soils with laterite horizon ground, structure-less loamy sands. They are acidic - allocative and mainly found on the lower and bottom slopes. **Black and grey clays often calcareous**; These soils have strongly pedal surfaces of fine clay aggregates which grade into coarse and fine structured strongly pedal heavy clays. The lower subsoil may be less dark or even mottled and grade into a carbonate layer. These soils have high nutrient levels including sodium. Some may be saturated for at least three months of the year due to topographic and groundwater positions, regarded as waterlogged soils. Notable characteristics include: high shrink-swell potential, strong structure, self-mulching surfaces, high organic matter content in upper soil, some mottling at depth, and high clay content throughout. They are deep to very deep (>2 m). The black and grey clays often calcareous soils were formed as a result of geological and weathering processes. They are mainly hydromorphic soils characterised by undifferentiated river alluvium. These commonly known as the Histosols. **Red and brown sandy loams over murrum and ironstone and on red clay loams**; these are mainly used for gardening. This soil is normally made up of sand along with varying amounts of silt and clay.

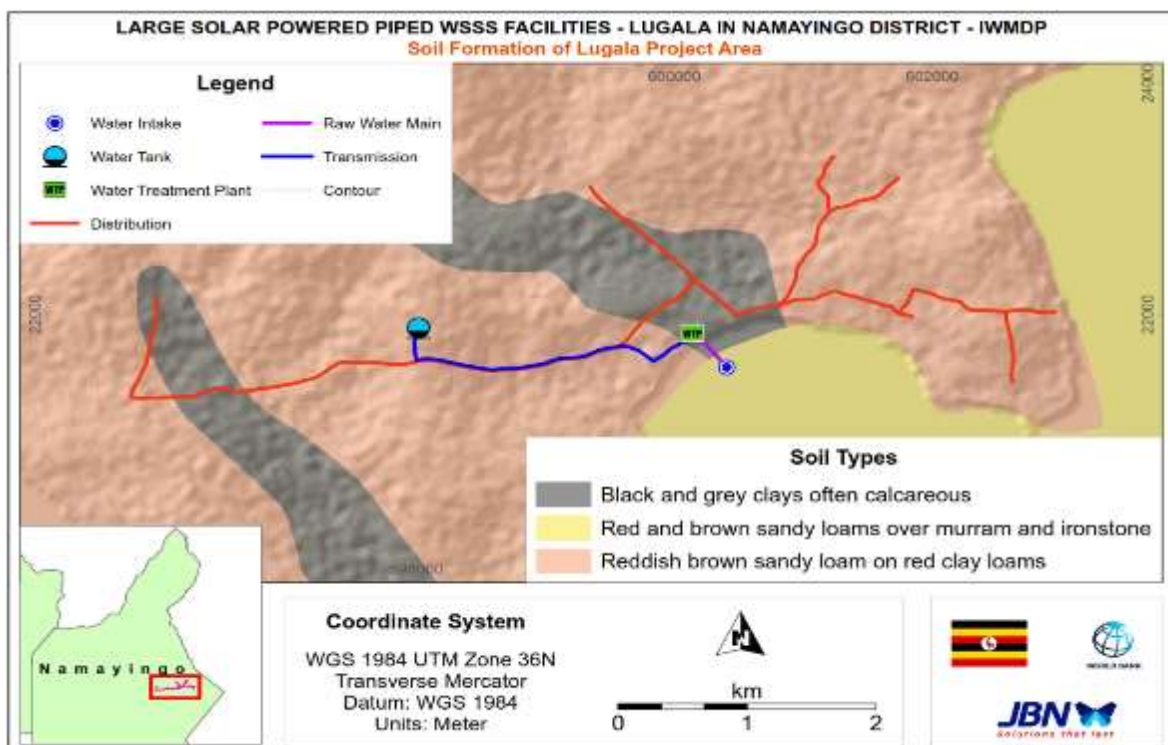


Figure 5-8: Soil of Project Area

Most people prefer sandy loam soil for their gardening because this type of soil normally allows for good drainage. Sand particles are often larger and more solid than other types of particles found in soil, and for this reason, there is normally more room for water to move freely through it. If water

cannot drain well, plants are often at greater risk of becoming oversaturated, which might increase the likelihood that they will rot and develop diseases or fungus. The reddish-brown sandy loam on red clay loams are underlain by the basement complex gneisses and granites of Kabira Catena commonly known as the Lixic Ferralsols. The red and brown sandy loams over murram and ironstone are underlain by the Quartzites sandstones and relic laterite of the Lake Victoria.

5.1.6 WATER QUALITY ANALYSIS

Water quality assessment was done through water sample collection from L. Victoria near the intake for laboratory analysis of parameters (Figure 5-10). A water sample from the lake 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.

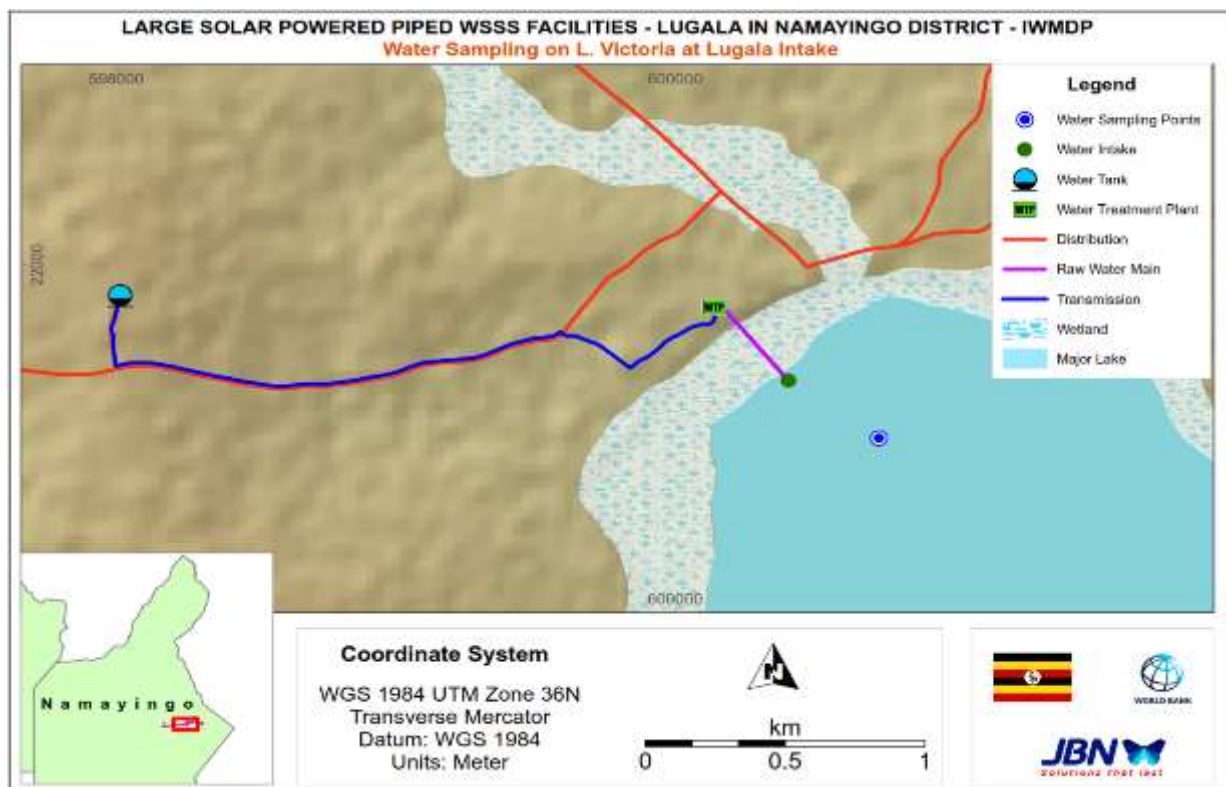


Figure 5-9: Location of the water quality measurement/sampling points



Figure 5-10: Water sampling from L. Victoria (Lugala) located near the proposed WTP

5.1.6.1 WATER QUALITY LABORATORY ANALYSIS RESULTS

The water quality of Lugala, where the water sample was collected from L. Victoria near the intake is presented in Table 5-1. All tested water quality parameters were within drinking water standards (IDEAS 12 2018 Maximum permissible for natural potable water) except the Manganese and E. coli. 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. Further, all tested parameters were within national baseline values for lake water quality monitoring. The water quality analysis certificate is presented in Annex 1.

Table 5-1: Water quality of L. Victoria at Lugala

Parameter (unit)	Test results	Uganda National Bureau of Standards Drinking water standards (DUS ISO 24510:2007 - Maximum permissible for natural potable water)
Turbidity (NTU)	0.92	25
pH (Units)	7.21	5.5-9.5
Electrical Conductivity ($\mu\text{S}/\text{cm}$)	160	2500
Total dissolved solids (mg/L)	112	1500
Total Hardness as CaCO_3 (mg/L)	36	600
Fluoride (mg/L)	0.06	1.5
Sulphate (mg/L)	7.4	400
Chlorides (mg/L)	10	250
Nitrates as N (mg/L)	0.18	10
Nitrites as N (mg/L)	<0.002	0.003
Manganese (mg/L)	<0.01	0.001
Total Iron (mg/L)	0.08	0.5
<i>E. coli</i> (CFU/100 mL)	8	<1

5.2.1 MONITORED PARAMETERS

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

5.2.1.1 RESULTS FOR PARTICULATE MATTER

The Table below presents results for PM2.5 and PM10 taken at selected receptors within the Lugala RGC project area (Table 5-2).

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

			Min	Aver	Max	WHO AQG	Min	Aver	Max	WHO (AQG)
Lugala Landing Site	17/02/2022 10:59am-12:39pm	0598043 E 0021617 N	0.017	0.023	0.035	0.045	0.013	0.015	0.018	0.015
Budala Trading Centre	17/02/2022 14:44pm-15:14pm	0533930 E 0136545 N	0.014	0.022	0.045	0.045	0.008	0.011	0.029	0.015

WHO AQG (2021): PM2.5: 0.015 mg/m³(24hr averaging), PM10: 0.045 mg/m³ (24hr averaging)

The ambient average levels of PM 2.5 ranged from 0.011mg/m³ to 0.015mg/m³ while the average levels of PM10 ranged from 0.022mg/m³ to 0.023mg/m³. The values recorded at the two sites (Lugala Landing site and Budala Trading Centre) were within the WHO Air quality limits for particulate matter. The low values of particulate matter recorded at Lugala Landing site was attributed to the vegetation cover (trees and grass) of the area and moist soils at the shores of Lake Victoria. The low values recorded at Budala Trading Centre was due to limited economic activities that included a few small-scale retail shops and a local bar.

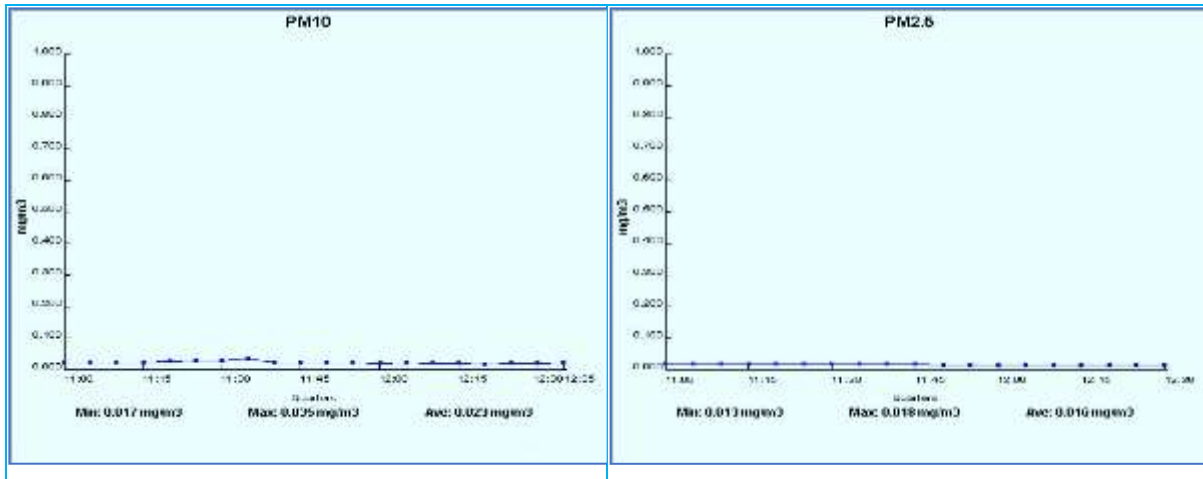


Figure 5-11: Variation of Particulate matter with time of the at Lugala Landing Site

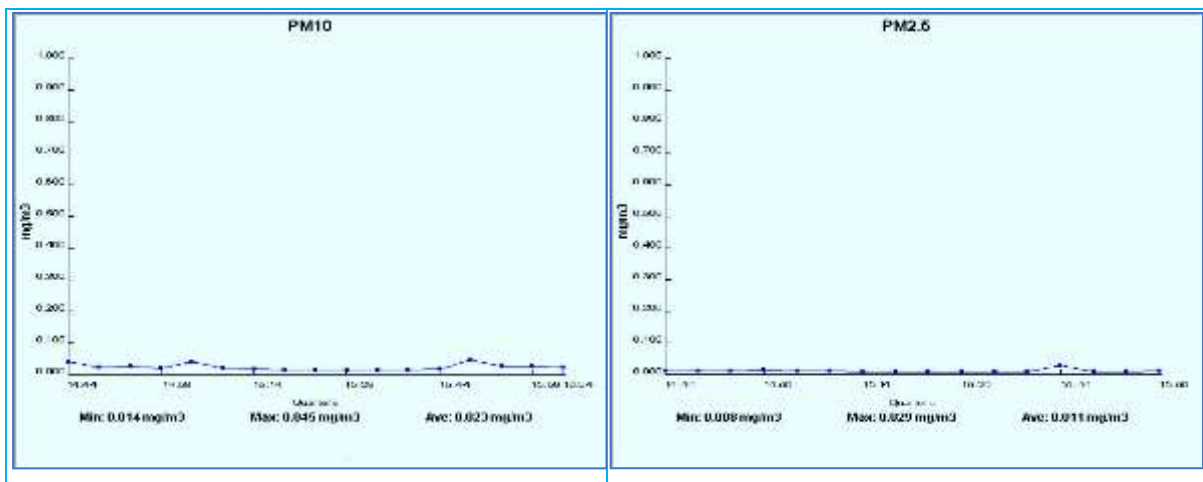


Figure 5-12: Variation of Particulate matter with time of the at Budala Trading Centre



Figure 5-13: Particulate matter measurements at the two sampled receptors

5.2.1.2 POLLUTANT GASES

The four most common pollutants considered during the assessment included nitrogen dioxide (NO₂), carbon monoxide (CO), sulphur dioxide (SO₂) and volatile organic compounds (VOCs) as shown in Table 25.

Table 5-3: Summary of Baseline Gas Emissions Readings for Lugala RGC

Location	Date & Run time	Readings			
		CO (ppm)	NO ₂ (ppm)	SO ₂ (ppm)	VOCs (ppm)
Lugala Landing Site	17/02/2022 10:57 am -13:5 pm	Min: 0.00	Min: 0.092	Min: 0.01	Min: 0.04
		Ave: 1.34	Ave: 0.111	Ave: 0.05	Ave: 0.06
		Max: 5.78	Max: 0.146	Max: 0.12	Max: 0.09
Budala Trading Centre	17/02/2022 14:37 pm -17:37 pm	Min: 0.00	Min: 0.092	Min: 0.01	Min: 0.03
		Ave: 0.04	Ave: 0.106	Ave: 0.05	Ave: 0.04
		Max: 0.15	Max: 0.114	Max: 0.12	Max: 0.06

WHO AQG: NO₂: 0.2mg/m³ or 0.106ppm (1-hour averaging), WHO AQG: SO₂: 0.5mg/m³ or 0.2ppm (10-minute averaging), WHO, 1999: CO: 10mg/m³ or 9ppm (8-hr averaging)

The average values monitored at the two sampled sites, Nitrogen dioxide (NO₂) ranged from 0.106 ppm – 0.111 ppm, Carbon monoxide (CO) ranged from 0.04 ppm – 1.34 ppm, Sulphur Dioxide (SO₂) ranged from 0.046 ppm – 0.083 ppm and 0.04 ppm – 0.056 ppm for Volatile Organic Compounds (VOC).

All average values of gases were in conformity with WHO Air quality Standards during the assessment, with exception from levels of Nitrogen dioxide (NO₂) recorded at Lugala Landing site. This was mainly attributed to burning of engine fossil fuels when propelling boats from the docking area. The low levels of gases recorded was due to limited activities to activities to emit these gases as indicated in Table 5-3.

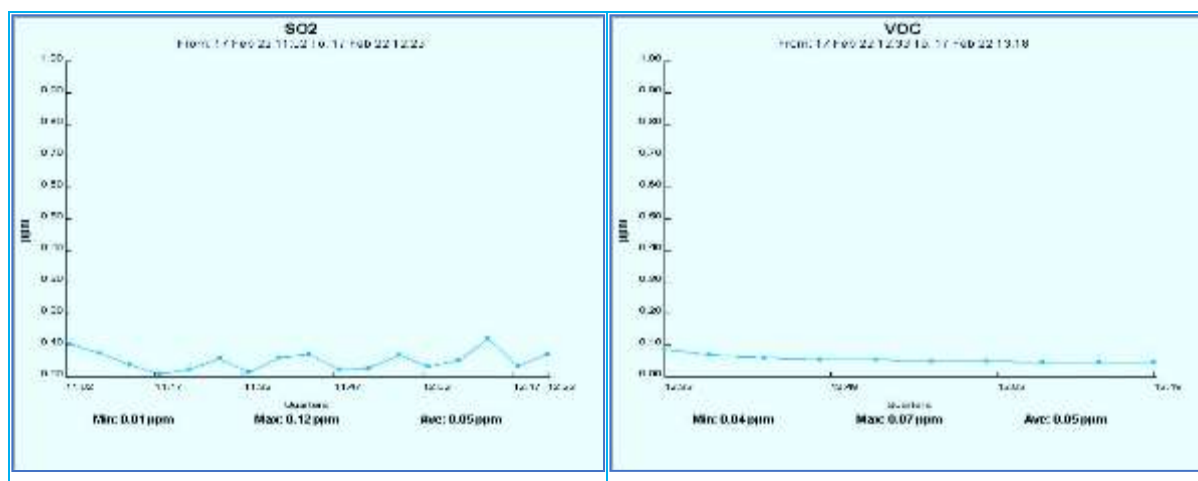


Figure 5-14: Variation of VOC and CO levels with time of day at Lugala Landing Site

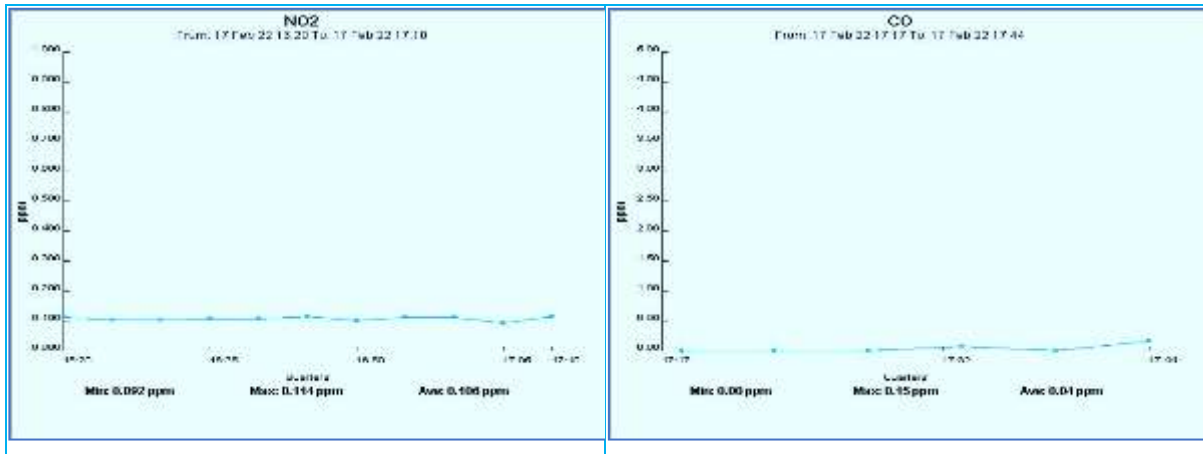


Figure 5-15: Variation of VOC and CO levels with time of day at Budala Trading Centre

5.2.2 NOISE MEASUREMENTS

The equivalent continuous sound pressure level with A-weighting (i.e. LAeq) was monitored (Table 26). The findings are compared with the limits as stipulated in The National Environment (Noise Standards and Control) Regulations 2003.

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

Location & Details	GPS Coordinates	LAFmin (dB)	LAFmax (dB)	LAeq (dB)	Maximum Permissible Noise Limits Day (dBA)
Lugala Landing site	0598043 E, 0021617 N	42.2	80.8	55.3	55
Budala TC	0533930 E, 0136545 N	38.6	80.3	55.6	55

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

Noise levels (LAeq) for the monitored sites ranged from 55.3 dBA (Site 2: Budala trading centre in mixed residential area) to 55.6 dBA (Site 1: Lugala landing site in a commercial setup). The noise levels recorded at these different sampled receptors varied depending on the noise sources at a specific monitoring time of the day. The baseline noise levels measured were slightly above the maximum permissible noise limits in Budala trading centre. This emanated from movement of a hauler truck within the trading centre that stroke a loud peak of LCpeak 105.2 dB at 16:18:38 EAT during the assessment, accruing to an increase in the equivalent sound level (LAeq). Noise levels in Lugala landing site were within the maximum permissible noise limits as indicated in Table 5-4.

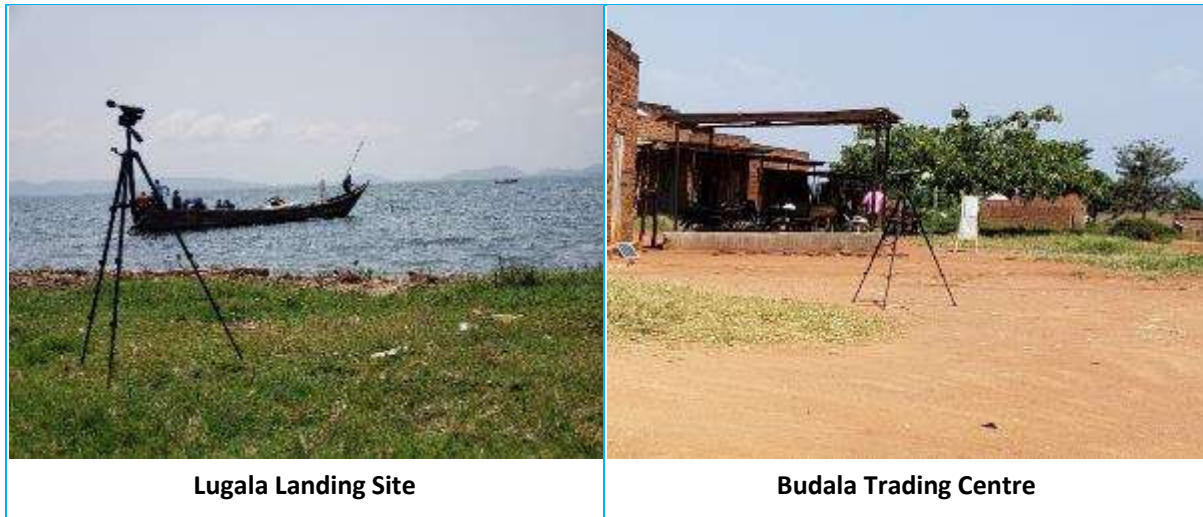


Figure 5-16: Ambient Noise monitoring at the two selected receptors

5.2.3 VIBRATIONS

Ground vibration is measured in terms of Peak Particle Velocity (PPV) with units in mm/s which refers to the movement within the ground of molecular particles and not surface movement. The displacement value in mm refers to the movement of particles at the surface (surface movement). Due to absence of Uganda standards for vibrations, the ground vibrations standards are adopted from Ireland. Typical vibration from transportation and construction sources falls in the range of 10-30Hz and usually centres around 15Hz. Therefore, the limit of 12.5mm/s for construction equipment was adopted.

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

Allowable Vibration Velocity (Peak Particle Velocity) at the Closest Part of Any Sensitive Property to the Source of Vibration, at a Frequency of		
Less than 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 & Vibration in for Ireland)

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

Location	Date and Time	Coordinates 36N	VEL mm/S			
			Min	Aver	Max	IFC/BS 5228:2009
Lugala Landing Site	17/02/2022 11:07am-14:02pm	0598043 E 0021617 N	0.00	1.46	3.5	2
Budala Trading Centre	17/02/2022 14:44pm-17:40pm	0533930 E 0136545 N	0.5	1.75	4.5	2

The seismic occurrences were measured at an average velocity of 1.46 VEL mm/S at Lugala Landing Site and an average velocity of 1.75 VEL mm/S at Budala Trading Centre. The vibration values within the measured receptors were within the vibration limits. The measurements are mainly attributed to

the granular nature of soils that are susceptible to the relatively insignificant vibratory motion as indicated in Table 5-6.

5.3 BIOLOGICAL ENVIRONMENT

5.3.1 LAND USE AND LAND COVER

The main land uses and land cover types in Lugala RGC are cropland, wetland and forestland as shown Figure 5-17 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 5-17 below.



Figure 5-17: Land use in Lugala RGC


Landuse.

Most of the land use types project area are agriculture (cultivation of crops and grazing land), sand mining, infrastructure development/settlements such as rural trading centers, schools, health center, roads, and homesteads. Customary Land tenure system is the most predominant in the project area and predominatnly owned by men. The only critical habitat remaining in Lugala is the wetland recorded at the proposed site for the water intake and the treatment and lagoon where the transmission line will pass. However, the proposed site for the reservoir and the transmission lines lies within areas that have gone through several vegetation transformations, the current status is basically subsistence agro-land of crops, and open fallow with remnant trees. The intake and treatment sites are located within the NEMA jurisdiction zones under wetland management guidelines Uganda,

therefore, the area of conservation importance at all levels and are considered to be a priority or critical habitat type for any Project. Important to note is that the wetlands in the project area for Lugala RGC consist of permanent and seasonal swamps. Three wetlands were recorded within the proposed water project footprint of Lugala and the three wetlands were not similar in terms of species composition.

- i. Lake Victoria shoreline wetland for the intake and treatment site, composed of; - *Typha domingensis*, *Cyperus papyrus*, *Echinochloa pyramidalis*, *Polygonum pulchrum*, *Eichhornia crassipes*, *Burnatia enneandra*, and *Phragmites mauritianus*.

Table 5-7: Lake Victoria shoreline wetland vegetation

Location	Description	Photography
Proposed water treatment site of Lugala in Namayingo (36 N, 600105, 21744)	Proposed site's major is sand mining. Most of the primary vegetation were cleared due to that factor.	


- ii. The lagoon swamp located shortly before Lugala landing site.
- iii. seasonal swamp situated along Budala transmission line. The two wetlands were almost similar in terms species composition and were categorized with two vegetation stratum i.e., (a) The swamp edge categorized as swamp edge characterized by herbaceous species such as; - *Cyperus dives*, *Leersia hexandri*, *Alternanthera sessilis*, *Sporobolus pyramidalis* and *Hyparrhenia collinam*, associated with *Albizia coriaria*, *Flueggea virosa*, and *Acacia seyal*. (b) The region of shallow water, categorized with *Syperus papyrus*, *Echinochloa pyramidalis*, and *Eichhornia crassipes*.

Table 5-8: Vegetation in the sand mining area

Location	Description	Photography
Lugala 36. N 600258, 21861	Sand mining site with <i>Bathidavia</i> trees	

The reservoir site is cassava garden characterized by 40% of bare earth. The transmission/distribution lines will traverse through areas with gardens, and several categories of infrastructure, with no critical habitat along all the pipelines.

Table 5-9: Cassava Vegetation at the proposed reservoir site and along the transmission line

Location	Description	Photography
<p>Plate 4:</p> <p>Proposed reservoir site in Budala for Lugala water project.</p> <p>(36 N. 598030, 21883)</p>	<p>The entire is covered with cassava, with only one jackfruit tree.</p>	

5.3.2 VEGETATION

There are three principal natural terrestrial habitats within the Lugala RGC. The water intake and treatment, along with the distribution, transmission and reservoir site for the Eastern Rural Growth Center water project. i.e., Lugala landing site for the intake and water treatment lies in between, the permanent wetlands along the shores of Lake Victoria and a lagoon. The reservoir site is basically located in a cassava garden, and all the transmission lines will traverse places that have undergone several vegetation transformations. The current status of these areas is subsistence from land with clumps of bushes, thickets, grassland, and agricultural land characterized by crops and open land with few remnant trees for the reservoir site, transmission and distribution lines.

5.3.2.1 VEGETATION SURVEY RESULTS

From all the surveyed sites and transmission routes, a total of one hundred, sixty-eight (168) individual species were recorded, from forty-two (42) families. Herbs or grasses recorded the highest individuals with two hundred, twenty-five (125) contributing 75%, followed by trees/shrubs with twenty-nine (29) representing 17%, and lastly liana with fourteen (14) species contributing only 8% of the species composition. All the study sites were not rich in terms of plant species diversity. The number of species recorded in any geographical location depends more on the time factors and sample size before other factors such as ecological and anthropogenic. All the proposed sites for the water project differed in area size factor that determines the number of sampling units. The transmission line to the reservoir and beyond had 10 sample plots accumulating to 0.314 Ha, T2 (Businoho) had 7 (0.2198 Ha), T3 had 6 (0.188 Ha), and intake and treatment site had 5 accumulating to 0.157 Ha, respectively as indicated in the figure 35 below (Rarefaction curve).

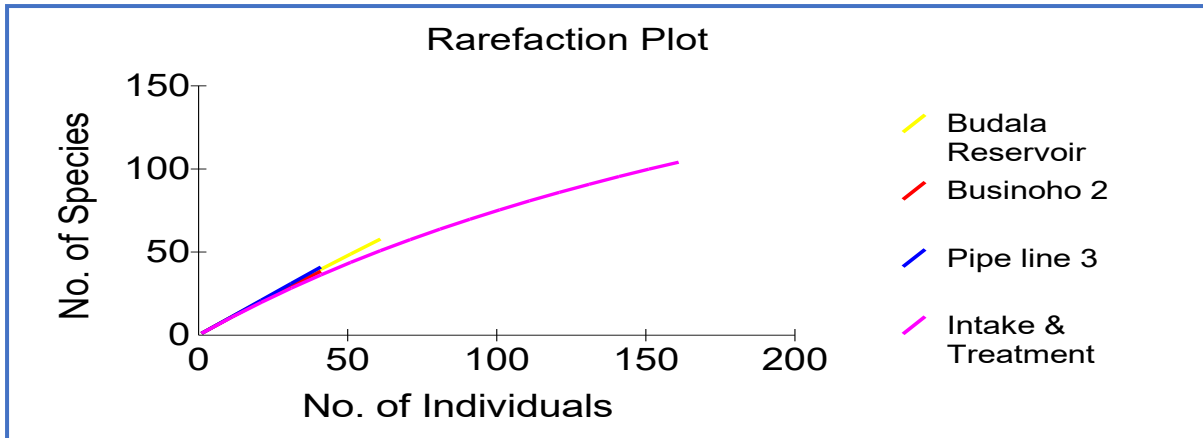


Figure 5-18: Project area Species richness curve

5.3.2.2 SPECIES RICHNESS AND DIVERSITY

The diversity of an area is considered, to be the number of different species. From the field surveys conducted from the Eastern Rural Development Centers water project footprint, diversity was considered to be high according to the log series. Figure 5-10 reveals a low species diversity from all the study sites. Poaceae (Graminaea) family registered the highest number of species with 26, followed by Fabaceae 23, Malvaceae 13, Asteraceae (Compositae) and Cyperaceae 12 each, Euphorbiaceae and Lamiaceae 8 each, Convolvulaceae 7, and Acanthaceae 6. The rest registered 5 or less.

5.3.2.3 COMPARISON IN SPECIES COMPOSITION FROM DIFFERENT STUDY SITES FOR PLANTS

According to Figure 5-19, 25% of all the species at all sampled sites were the same. Budala transmission line was similar to the pipeline following the main road to Namayingo. The treatment area was similar to the Businoho transmission pipeline in terms of plant communities and species composition.

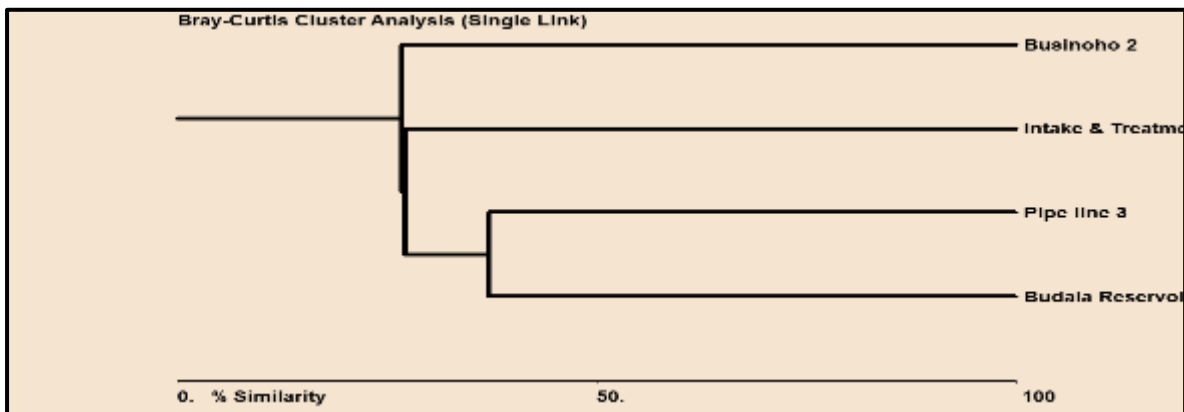


Figure 5-19: Species diversity and Richness analysis

The implication: The sites generally have a variety of species

Table 5-10: Shannon-Wiener and Alpha species diversity values

Index	Budala Reservoir	Businoho 2	Pipe line 3	Intake & Treatment
Shannon H' Log Base 10.	1.797	1.602	1.653	1.971

Shannon Hmax Log Base 10.	1.806	1.613	1.653	2.029
Alpha	532.678	293.451	495694.56	126.847

5.3.2.4 CONSERVATION STATUS OF THE SPECIES

Using the IUCN Red List Categories and Criteria at Global, Regional and National Levels, there are eleven categories to consider when carrying out global, regional, and national Red List assessment as indicated in Table 5-11 below.

Table 5-11: Vegetation conservation status categories

EX	Extinct
EW	Extinct in the Wild
RE	Regionally Extinct
CR	Critical in the region
EN	Endangered in the region
VU	Vulnerable in the region
NT	Near-threatened in the region
LC	Least Concern
RR	Regional Responsibility
DD	Data Deficient
NE	Not Evaluated

Out of the one hundred, sixty-eight (168) plant species encountered in all study sites, none of them have been listed on the IUCN Red List of Uganda, 2018. Therefore, the species are of no great conservation concern in the country and in the region but bearing in mind the impact and effect of deforestation and forest degradation on the ecosystem.

5.3.2.5 SPECIES ABUNDANCE

Abundance is measured by presence/absence. As the name suggests, with presence/absence data, only a species within the plot is considered. This method is the simplest form of vegetation data analysis. Density is the count of individual tree stems and not species within the plot. Density is calculated by using the number of individual trees in the area covered. In this study, the calculations are based on the number of individual stems recorded from all sites. Tree abundance was low, with only 36 stems which had a Density of only 40.95 per hectare.

5.3.2.6 INVASIVE SPECIES

Only sixteen (16) were identified as invasive from the project footprints of Lugala RGC. Some species like: - *Cassia siemea* (Fabaceae) tree was commonly found planted at schools, trading centers and homestead to act as shade, *Eucalyptus ssp*, *Gravillea robusta* (Proteaceae), and *Maesopsis eminii* (Rhamnaceae), are planted to serve the purpose as wood source, *Artocarpus heterophyllus* (Jackfruit),

Mangifera indica (mango tree), and *Syzygium cumini* (Myrtaceae) are much planted around homestead, and social centers as fruit tree (Table 5-12).

Table 5-12: A list of invasive species, their uses, and the Impact of invasiveness on the ecosystem

S/N	Family	Species	Budala Reservoir	Businoho 2	Pipe line 3	Intake & Treatment	Lifeform	Status
1	Amaranthaceae	<i>Alternanthera sessilis</i>	1	1	0	1	Herb	Invasive
2		<i>Catharanthus roseus,</i>	0	0	0	4	Herb	Invasive
3	Asteraceae	<i>Acanthospermum hispidum</i>	1	0	0	0	Herb	Invasive
4		<i>Bidens pilosa</i>	1	1	1	3	Herb	Invasive
5		<i>Conyza sumatrensis</i>	0	0	1	1	Herb	Invasive
6		<i>Tithonia diversifolia</i>	0	0	0	1	Herb	Invasive
7		<i>Xanthium strumarium</i>	0	0	0	3	Herb	Invasive
8	Canaceae	<i>Cana indica</i>	0	0	0	1	Herb	Invasive
9	Convolvulaceae	<i>Cuscuta australis</i>	0	0	0	1	Herb	Invasive
10	Fabaceae	<i>Cassia occidentalis</i>	1	0	0	4	Herb	Invasive
11		<i>Senna spectabilis</i>	0	0	0	2	Tree	Invasive
12		<i>Sida acuta</i>	1	0	1	3	Herb	Invasive
13	Mimosaceae	<i>Dichrostachys cinerea</i>	1	0	0	0	Shrub	Invasive
14	Tribulaceae	<i>Tribulus terrestris</i>	0	0	0	1	Herb	Invasive
15	Verbenaceae	<i>Lantana camara</i>	1	0	0	1	Shrub	Invasive
16		<i>Stachytarpheta indica</i>	0	0	0	1	Herb	Invasive

Table 5-13: A list of invasive species, their uses, and the Impact of invasiveness on the ecosystem

N/S	Family	Species	Status	Impact	Uses
1	Amaranthaceae	<i>Alternanthera sessilis</i>	Native	resistant to drought and areas of low soil fertility and therefore readily becomes dominant under such circumstances	acts as an agricultural weed
2	Apocynaceae	<i>Catharanthus roseus,</i>	Introduced	Fast growing, forming dense thickets displacing native species, all parts of the plant are extremely toxic to human and animals	
3	Asteraceae	<i>Acanthospermum hispidum</i>	Introduced	The spiny fruits are hazard to livestock, biodiversity in agricultural fields.	

N/S	Family	Species	Status	Impact	Uses
4		<i>Bidens pilosa</i>	native to South and Central America	high reproductive potential and fast-growing rates to rapidly spread and colonize new areas. outcompete and eliminate crops and native vegetation.	Medicinal
5		<i>Conyza sumatrensis</i>	Introduced	One of the world's worst weeds. highly competitive that can great colonize an entire area where it occurs hence reducing grazing space for animals	Can be used in mulching of degraded agriculture land
6		<i>Tithonia diversifolia</i>	Introduced	Rapid vegetative reproduction, by forming dense stands it prevents the growth of young native plants	
7		<i>Xanthium strumarium</i>	Introduced	Major weed of row crops	
8	Canaceae	<i>Cana indica</i>	Introduced	Pest plant, an invasive garden plant	Introduced
9	Convolvulaceae	<i>Cuscuta australis</i>	Introduced	Parasitic, Reduced native biodiversity	
10	Fabaceae	<i>Cassia occidentalis</i>	Introduced	Affects crops, and plantation	
11		<i>Senna spectabilis</i>	Introduced	Ecosystem change/habitat alteration, Modification of nutrient regime	Forage, agroforestry, fuel wood, vegetable
12		<i>Sida acuta</i>	Introduced	infests various habitats, becomes most problematic in pastures and rangelands	
13	Mimosaceae	<i>Dichrostachys cinerea</i>	Native	Successional patterns, Monoculture formation, negatively impacts agriculture	Forage, Soil improvement, Charcoal, Fuelwood, Wood,
14	Pontederiaceae	<i>Eichhornia crassipes</i>	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.

N/S	Family	Species	Status	Impact	Uses
15	Verbenaceae	<i>Lantana camara</i>	Introduced	Damaged ecosystem services, fire regime, negatively impacts: agriculture animal health; forestry; human health, Reduced native biodiversity	Fodder, ornamental, Erosion control, Fuelwood
16		<i>Stachytarpheta indica</i>	Introduced	Damaged ecosystem services, Habitat alteration, Nutrient regime, Successional patterns, Monoculture formation, Negative impact on grazers, and Reduced native biodiversity.	Fodder, ornamental, Erosion control,

5.3.3 FAUNA

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

5.3.3.1 BUTTERFLIES

A total of thirteen (13) butterfly species representing three families and seven genera were recorded in the project areas (Table 36). Butterflies also appear at different times of the year depending on season (survey was undertaken during dry season) . Given more time, more species could have been encountered/recorded. Two species were recorded at the water Intake, Five species at the Treatment plant, Five species at the Reservoir tank infrastructure site, and Eight species along the distribution and supply pipeline areas.

No evidence of studies in the project area is known to indicate any earlier studies on butterflies in the study area. Most of the project area environment have been modified. Ecological characterization of the encountered species indicates that three (3) species are widespread and occur in a wide range of habitats, two species were forest-dependent species and prefer areas characteristic of closed canopy forest habitats. Three (3) species are forest non-dependent species and are more often encountered in a variety of forest edge, degraded forest and woodland habitats. Four (4) species are migratory and these are constantly on the move shifting from one habitat to the other.

No species with restricted / limited distribution were encountered. Based on the 2020 IUCN Red List of Threatened species and the national Red list of threatened species, none of the butterfly species encountered during the survey of the project area is of conservation concern. They are all categorized as Least Concern (LC).

Table 5-14: Checklist of butterflies encountered within the proposed project site

Family	Species Scientific and Common Names	Red List Status	Water Intake / Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
Nymphalidae	<i>Acraea serena</i> Orange Acraea – W	Least Concern				3
Nymphalidae	<i>Acraea sotikensis</i> Sotik Acraea – F	Least Concern				2
Nymphalidae	<i>Acraea uvui</i> Tiny Acraea – f	Least Concern			2	2
Nymphalidae	<i>Hypolimnas misippus</i> Diadem – M	Least Concern		1	1	
Nymphalidae	<i>Junonia oenone</i> Blue Pansy W	Least Concern		2		1
Nymphalidae	<i>Junonia orithya</i> Eyed Pansy – M	Least Concern	1			
Nymphalidae	<i>Junonia 113ardan</i> Little Commodore – W	Least Concern			1	1
Nymphalidae	<i>Junonia stygia</i> Brown Pansy – f	Least Concern				1
Nymphalidae	<i>Neptidopsis ophione</i> Scalloped Sailer – f	Least Concern		1		
Nymphalidae	<i>Phalanta eurytis</i> African Leopard Fritillary M	Least Concern				1
Papilionidae	<i>Papilio demodocus</i> Citrus Swallowtail – M	Least Concern		1		
Papilionidae	<i>Papilio lormieri</i> Central Emperor Swallowtail - F	Least Concern			2	
Pieridae	<i>Catopsilia florella</i> African Migrant - M	Least Concern	1	1	5	5
			Two species	5 species	5 species	8 species



Figure 5-20: Identified butterfly species in the project area

5.3.3.2 DRAGONFLIES

Two species of dragonflies were recorded during the survey. The two include *Pseudagrion hageni* Painted Sprite and *Brachythemis leucosticta* Southern Banded Groundling. The Painted Sprite *Pseudagrion hageni* was recorded only at the treatment plant. The Southern Banded Groundling *Brachythemis leucosticta* was recorded at three sites; at the Water Source / Intake, Reservoir Tank and Distribution & Supply Pipeline areas. The Southern Banded Groundling *Brachythemis leucosticta* was very common. It was seen following people around wetlands and also along the roads that are not far from the 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.



Figure 5-21: *Pseudagrion hageni* Painted Sprite

5.3.3.3 AMPHIBIANS

Eight (8) amphibian species representing one toad and seven frogs were encountered during the survey (Table 37). They represent five families and five genera. Amphibians generally are secretive creatures which need time to conduct a complete species inventory. During the survey, five species were recorded at the Water Intake / Source; four species recorded at the treatment plant and six species recorded along the distribution and supply pipeline areas. No species were recorded at the reservoir tank.

Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis* is usually found near or in water (Rödel 2000). It is found practically in all freshwater habitats. The species tend to migrate during the dry season to the edges of rivers and in the wet season to surroundings of ponds (Spieler 1997). The Mascarene Rocket Frog *Ptychadena mascareniensis* is an adaptive species that can adapt easily to modified environment. Physiologically, the skin of Steindachner's Toad *Sclerophrys steindachneri* are more adapted for dry weather than frogs.

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

Table 5-15: Amphibian species recorded within the project area

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
Bufonidae	<i>Sclerophrys steindachneri</i> Steindachner's Toad	Least Concern		1		
Dicroglossidae	<i>Hoplobatrachus occipitalis</i> Eastern Groove-crowned Bullfrog	Least Concern	9	4		1
Hyperoliidae	<i>Hyperolius kivuensis</i> Kivu Reed Frog	Least Concern	1			1
Hyperoliidae	<i>Hyperolius viridiflavus</i> Common Reed Frog	Least Concern	1			1
Phrynobatrachidae	<i>Phrynobatrachus mababiensis</i> Dwarf Puddle Frog	Least Concern				1
Phrynobatrachidae	<i>Phrynobatrachus natalensis</i> Natal Puddle Frog	Least Concern	3	1		1
Ptychadenidae	<i>Ptychadena anchietae</i>	Least Concern				3

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
	Anchieta's Rocket Frog					
Ptychadenidae	<i>Ptychadena mascareniensis</i> Mascarene Rocket Frog	Least Concern (U-DD)	1	2		
			5 species	4 species	Zero species	6 species

5.3.3.4 REPTILES

Seven reptilian species were recorded in and around the sites for the proposed Lugala RGC project area (Table 38). The species comprised Three lizards, two skinks, one snake and one crocodile. The occurrence of the Nile Crocodile *Crocodylus niloticus* was reported by the residents at Lugala landing site. Green snakes were also reported. However, because of the poor description provided, the fauna ecologist could not ascertain their identify. Four species were registered at the water Intake point, four species at the Treatment plant site, two species at the reservoir tank site and three species along the distribution and supply pipeline areas. Reptiles are also secretive species and need ample time to conduct a comprehensive survey to compile a complete species list. If the survey is given more time, more species could be encountered.

More individuals of the family Agamidae and family Scincidae were recorded during the survey relative to other species. A number of them were seen basking on buildings, stones, heaps of bricks and trees in and around the project sites and along the distribution and supply pipelines. According to Harold (1992), most agamids have well-developed limbs; the head is normally held high off the ground, and they are agile predators. This increases their colonization success (Savage 1992). According to Gerlach, 2005, many Scincidae species (skinks) are generalists with a wide ecological tolerance. This might account for the common occurrence of the Striped Skink *Trachylepis striata* in the project area.

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

Table 5-16: Reptile species encountered within the project area

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
Agamidae	<i>Acanthocercus atricolis</i> Blue Headed Tree Agama	Least Concern		2		

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
Agamidae	<i>Agama agama</i> Red-Headed Rock Agama	Least Concern			1	7
Elapidae	<i>Naja melanoleuca</i> Forest Cobra	Least Concern	reported			1
Crocodylidae	<i>Crocodylus niloticus</i> Nile Crocodile	Least Concern CITES Appendix II Listed	reported			
Scincidae	<i>Trachylepis striata</i> Striped Skink	Least Concern		6	1	1
Scincidae	<i>Trachylepis maculilabris</i> Speckled-lipped Skink	Least Concern	1	1		
Varanidae	<i>Varanus niloticus</i> Nile Monitor	Least Concern CITES Appendix II Listed	reported	2		
			4 species	4 species	2 species	3 species



Figure 5-22: The Blue Headed Tree Agama *Acanthocercus atricolis* encountered in the project area

5.3.3.5 BIRDS

Forty-Eight (48) species of birds constituting 4.5% of Uganda’s bird fauna were recorded in the project areas (Table 39). The species are classified into Thirty-two families and forty-three genera. Thirteen species were encountered at the water intake area, sixteen species at the treatment plant site, twelve species at the water reservoir tank site and twenty-nine species along the areas of the distribution and supply pipelines.

The birds are of different ecological characteristics which have been modified over time. One species is a Forest-dependent species (forest specialist), two species were forest generalist, which are typically birds of forest edges and gaps; they are likely to be more common there, and in secondary forest, than in the interior of intact forest. Eight species were forest visitors (Table 40). These birds occur where trees are found. Trees form an important ecological feature in their life cycle. Eight birds were water specialists which are restricted to wetlands or open water and these were recorded where wetlands or open waters are represented. Six species were water generalists and these comprise wetland visitors. Seventeen species are grassland specialists and prefer open habitat or grassland areas. Two species are categorized as widespread. Two categories of migrants were encountered, three (3) species were Afrotropical migrants and one species was Palearctic migrant. The Afrotropical migrants migrate within African countries while the palearctic migrants are species breeding in Europe or Asia. The Grey Wagtail *Motacilla cinerea* was the only palearctic bird species recorded during the survey. The Grey Wagtail *Motacilla cinerea* has an extremely large range. The population size is extremely large (5,000,000-19,999,999) and the trend appears to be stable. The Woodland Kingfisher *Halcyon senegalensis*, African Openbill Stork *Anastomus lamelligerus*, and *Merops albicollis* White-Throated Bee-Eater are afro-tropical migrants recorded during the survey.

Table 5-17: List of Birds recorded around with in the project area

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
ACCIPITRIDAE	73 - <i>Elanus caeruleus</i> Black-Shouldered Kite - G	Least Concern				1
ALCEDINIDAE	375 - <i>Halcyon senegalensis</i> Woodland Kingfisher - A	Least Concern		1		
ALCEDINIDAE	383 - <i>Ceryle rudis</i> Pied Kingfisher - W	Least Concern	8			
ANATIDAE	57 - <i>Anas undulata</i> Yellow-Billed Duck - W	Least Concern				3
ANHINGIDAE	7 - <i>Anhinga rufa</i> African Darter – W	Least Concern	33			8
APODIDAE	358 - <i>Cypsiurus parvus</i> African Palm Swift - G	Least Concern	1			

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
ARDEIDAE	21 - <i>Egretta garzetta</i> Little Egret - W	Least Concern		7		10
ARDEIDAE	26 - <i>Ardea melanocephala</i> Black-Headed Heron - w	Least Concern				1
BUCEROTIDAE	420 - <i>Lophoceros nasutus</i> African Grey Hornbill – O (G)	Least Concern			2	
CICONIIDAE	30 - <i>Anastomus lamelligerus</i> African Openbill Stork - AwG	Least Concern				2
CICONIIDAE	35 - <i>Ephippiorhynchus senegalensis</i> Saddle-Billed Stork - W	R-VU, U-VU				5
Cisticolidae	645 - <i>Cisticola chiniana</i> Rattling Cisticola - O	Least Concern		1	1	2
CISTICOLIDAE	677 - <i>Camaroptera brachyura</i> Grey-Backed Camaroptera - f	Least Concern		1		
COLLIIDAE	369 - <i>Colius striatus</i> Speckled Mousebird - O	Least Concern		1		1
COLUMBIDAE	270 - <i>Turtur tympanistria</i> Tambourine Dove - F	Least Concern				
COLUMBIDAE	280 - <i>Columba unicincta</i> Afep Pigeon - FF	Least Concern		2		
COLUMBIDAE	284 - <i>Streptopelia decipiens</i> African Mourning Dove - O	Least Concern	7	3	3	1
COLUMBIDAE	289 - <i>Streptopelia senegalensis</i> Laughing Dove - f	Least Concern		1		

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
CORVIDAE	858 - <i>Ptilostomus afer</i> Piapiac - G	Least Concern				4
CUCULIDAE	323 - <i>Centropus superciliosus</i> White-Browed Coucal – O	Least Concern			1	
ESTRILIDIDAE	963 - <i>Lagonosticta rubricata</i> African Firefinch - O	Least Concern			3	2
ESTRILIDIDAE	974 - <i>Uraeginthus bengalus</i> Red-Checked Cordon-Bleu - G	Least Concern		3		
ESTRILIDIDAE	980 - <i>Spermestes cucullata</i> Bronze Mannikin - widespread	Least Concern	5			13
ESTRILIDIDAE	981 - <i>Spermestes bicolor</i> Black-and-White Mannikin - f	Least Concern	1			7
HIRUNDINIDAE	507 - <i>Ptyonoprogne fuligula</i> Rock Martin – O	Least Concern	3			
HIRUNDINIDAE	509 - <i>Hirundo smithii</i> Wire-Tailed Swallow – w	Least Concern	1			
LANIIDAE	812 - <i>Lanius collaris</i> Common Fiscal - G	Least Concern			1	1
MALACONOTIDAE	843 - <i>Laniarius erythrogaster</i> Black-Headed Gonolek - f	Least Concern	2	1	2	5
MEROPIIDAE	387 - <i>Merops lafresnayii</i> Cinnamon-Chested Bee-Eater - F	R-RR		3		
MEROPIIDAE	390 - <i>Merops albicollis</i> White-Throated Bee-Eater - Af	Least Concern	2			1

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
MOTACILLIDAE	517 - <i>Motacilla cinerea</i> Grey Wagtail - P	Least Concern PM				1
MOTACILLIDAE	520 - <i>Motacilla aguimp</i> African Pied Wagtail - w	Least Concern		1	1	2
MUSOPHAGIDAE	305 - <i>Crinifer zonurus</i> Eastern Grey Plantain-Eater - widespread	Least Concern			1	
NECTARINIIDAE	787 - <i>Chalcomitra senegalensis</i> Scarlet-Chested Sunbird - f	Least Concern				1
NECTARINIIDAE	790 - <i>Nectarinia kilimensis</i> Bronze Sunbird - f	Least Concern		1		
NUMIDIDAE	142 - <i>Numida meleagris</i> Helmeted Guineafowl - G	Least Concern				3
PASSERIDAE	880 - <i>Passer cordofanicus</i> Rufous Sparrow – O	R-RR		9	2	1
PHALACROCORACIDAE	6 - <i>Microcarbo africanus</i> Long-Tailed Cormorant - W	Least Concern				1
PLOCEIDAE	903 - <i>Ploceus intermedius</i> Lesser Masked Weaver - W	Least Concern	13			
PLOCEIDAE	908 - <i>Ploceus cucullatus</i> Black-Headed Weaver - O	Least Concern		96 (with 120 nests)		30 (with nests)
PLOCEIDAE	932 - <i>Euplectes axillaris</i> Fan-Tailed Widowbird - w	Least Concern				1
PSITTACIDAE	292 - <i>Poicephalus meyeri</i> Brown Parrot - O	Least Concern			2	

Family	Species Scientific and Common Names	Red List Status	Water Source	Treatment Plant	Reservoir Tank	Distribution & Supply Pipelines
PYCNONOTIDAE	732 - <i>Pycnonotus barbatus</i> Common Bulbul - f	Least Concern				7
RALLIDAE	178 - <i>Zapornia flavirostra</i> Black Crane - W	Least Concern	1	2		
SCOPIIDAE	28 - <i>Scopus umbretta</i> Hamerkop - w	Least Concern				7
STURNIDAE	872 - <i>Lamprotornis purpuroptera</i> Ruppell's Starling - O	Least Concern				3
THRESKIORNITHIDAE	39 - <i>Bostrychia hagedash</i> Hadada Ibis - w	Least Concern	3			2
TURDIDAE	612 - <i>Turdus pelios</i> African Thrush - f	Least Concern			1	
			13 species	16 species	12 species	29 species

Table 5-18: Ecological Characterization of birds encountered in project area

Ecological description	Numbers	Descriptions
Forest specialists (FF)	1	Forest interior birds
Forest generalists (F)	2	Normally breed in the forest or fragments but may occur outside the forest
Forest visitors (f)	8	Non-forest birds
Water specialist (W)	8	Restricted to wetlands or open water
Water generalist (w)	6	Often found near water
Open habitat (O) and Grassland specialist (G)	17	Characteristic of open grasslands
Afrotropical (A)	3	Species migrating within Africa
Palaearctic (P)	1	Species breeding in Europe or Asia
Wide Spread	2	Species with a wide distribution

According to the IUCN 2020 Red List of Threatened species all species encountered and recorded during the survey are listed as Least Concern (LC). However, three species of conservation significance were registered during the survey. The *Merops lafresnayii* Cinnamon-Chested Bee-Eater and the *Passer cordofanicus* Rufous Sparrow are listed as a Regional Responsibility (R-RR). Their conservation

is a responsibility of the African region. The Saddle-Billed Stork *Ephippiorhynchus senegalensis* is rated as being vulnerable at regional and national levels. The Saddle-Billed Stork *Ephippiorhynchus senegalensis* has an extremely large range. The population size may be small (670-17000 individuals), but it is not believed to approach the thresholds for Vulnerable under the population size criterion (<10,000 mature individuals with a continuing decline estimated to be >10% in ten years or three generations, or with a specified population structure). Population seems to be declining. Despite the fact that the population trend appears to be decreasing, the decline is not believed to be sufficiently rapid to approach the thresholds for Vulnerable under the population trend criterion (>30% decline over ten years or three generations). For these reasons the species is evaluated as Least Concern by IUCN.



Figure 5-23: some of the encountered bird species in the project area

5.3.3.6 MAMMALS

No mammal species or its sign was encountered during the survey of the project area. Presence of the Hippopotamus *Hippopotamus amphibius* was reported by the residents. Residents said One hippopotamus was reportedly seen the day before this survey was done. The project area environment has been heavily modified and this affected the occurrence of the mammal fauna.

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. The Hippopotamus *Hippopotamus amphibius* is listed as being vulnerable. In Uganda, the Hippos are widespread and locally abundant. The population in Uganda ranges between 7,000-10,000.

5.4.1 INTRODUCTION

This chapter examines into the socio-economic characteristics obtaining in the project area such as, livelihood sources, employment, vulnerable groups, and related gender issues. The primary data collected during the socio-economic survey has been used to evaluate the baseline status of the project area and attendant communities

5.4.2 LOCATION

Lugala Centre RGC is located in Banda sub-county, Namayingo District as seen in Figure 5-24 below. The proposed piped water supply system and sanitation facilities project in Lugala RGC will cover 8 villages of Lugala Beach, Budalaa A, Buhima and Sidende in Lugala Parish, and Namake, Bukwoyo, Bunini and Busiro in Buchumba Parish.

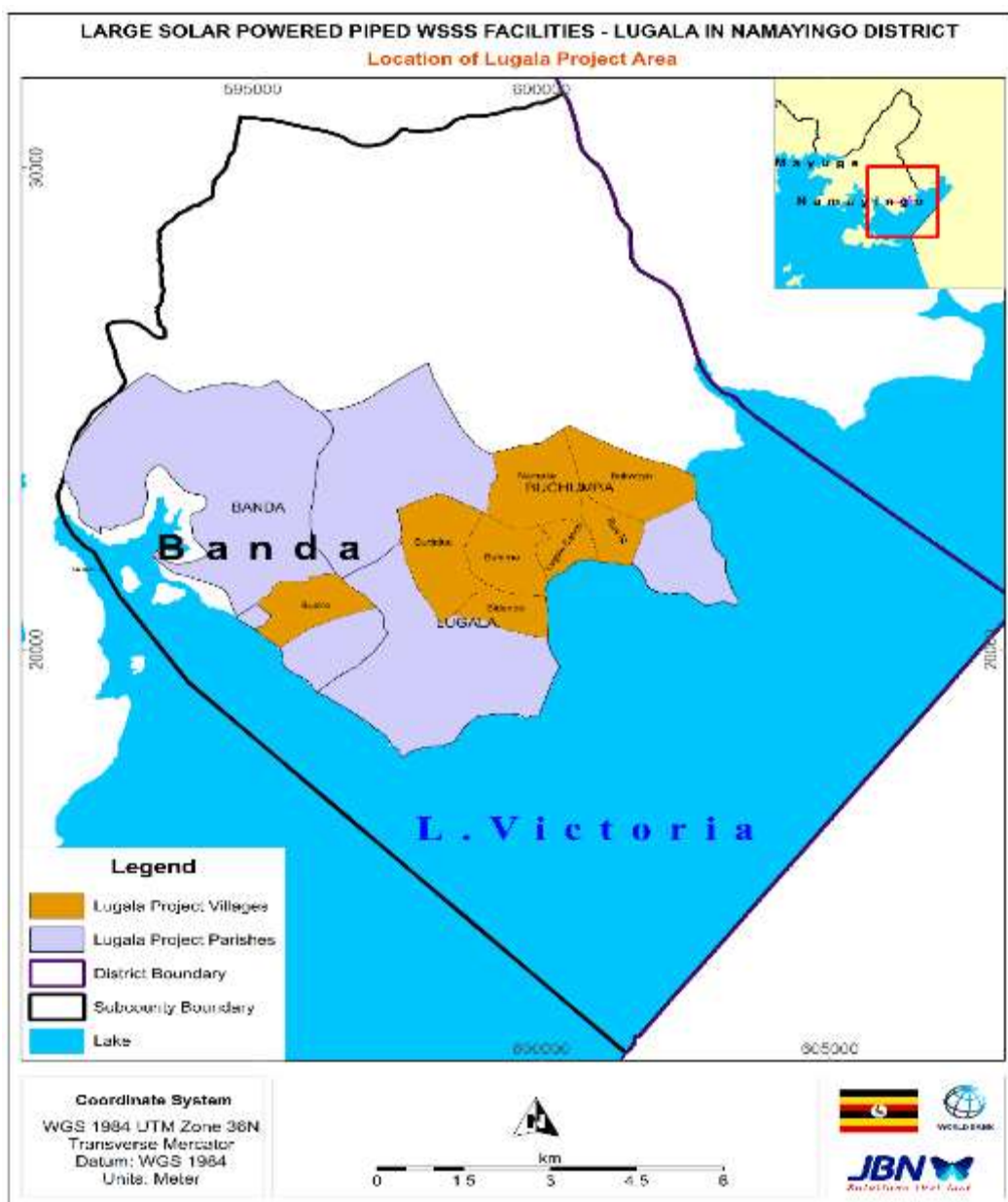


Figure 5-24: Lugala Centre RGC Project Area Map

5.4.3 POPULATION DEMOGRAPHICS

5.4.3.1 POPULATION

The district has a total population of 215,443 people of which 109,140 are females and 106,303 males according to the 2014 National population and housing census. The fertility rate lies at 7.8 children per woman. UBOS population projections indicate that the core beneficiary villages of Lugala RGC have a total population of **8,626** people and **1597** households. The most populated village is Budalaa (333 HHs), Buhima (274 HHs), Lugala Beach (238 HHs), Namake (215 HHs), Bukwoyo (179 HHs), Bunini (142 HHs), Busiro (135 HHs) and Sidende (81 HHs) as shown in Figure 5-25 below.

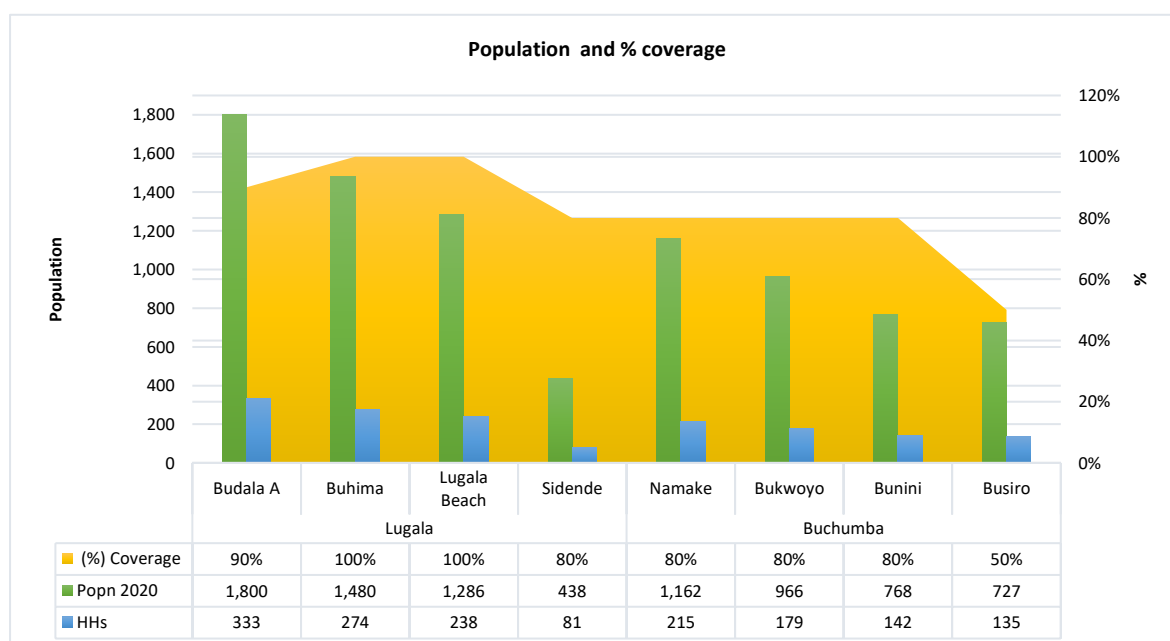


Figure 5-25: Target Population in Lugala RGC

Implications: According to the design report (water demand assessment) for Lugala RGC, its notable that the project will abstract 933.63 m³/day to satisfy the maximum day demand of 934 m³/day for a projected population of 17,400 people (MWE, 2019) in the ultimate year (2040).

A socio-economic field study was conducted on 153 respondent households, representing 97% of determined sample using Morgan and Krejcie (1970) Sample Size Determination of the total population of the target villages.

5.4.3.2 ETHNICITY AND RELIGIOUS AFFILIATION

Namayingo is a multi-lingual community comprising of the Samia as the majority, Basoga, Japadhola, Bagishu, Baganda, Jaluo, Bakenye, Bagwere, and Itesots.

The project area is ethnically heterogeneous and a number of tribes were established to exist in the area. Basamia were the most predominant representing 71.9% (Table 5-19) followed by Basoga 11.1%, Jaluo 7.2%, Bagisu 3.9% Itesot at 3.3% and Banyole (0.8 %). Other tribes recorded in the project area during the survey included; Japhadhola, Banyole, Bagwere.

Table 5-19: Ethnicity

Tribal affiliation	Frequency	Percentage
Basoga	17	11.1

Bagwere	2	1.3
Bagisu	6	3.9
Basamia	110	71.9
Banyole	1	0.7
Itesot	5	3.3
Japadhola	1	0.7
Jaluo	11	7.2
Total	153	100.0

This implies that Samia, Lusoga and Lumasaba should be the languages used for communication in regard to the project.

The household survey conducted along the Lugala RGC revealed that the population were predominantly of the Christian faith (92.8%). Several religions were recorded during household survey. Protestants are the most dominant (37.9%) followed by Catholics (31.4%), Pentecostals at 22.2% Muslims at 7.2%- and seventh-day Adventists represented 1.3% as shown in Table 5-20 below.

Table 5-20: Religious affiliation

Religious affiliation	Frequency	Percentage (%)
Catholic	48	31.4
Protestant	58	37.9
Islam	11	7.2
Pentecostal/born again	34	22.2
SDA	2	1.3
Total	153	100.0

The fact that almost all of households reported that they have a religion implies that religious affiliation (belief in God) is a value in this community. Religious beliefs should not be disrespected during the implementation of project phases.

5.4.3.3 VULNERABILITY IN THE HOUSEHOLDS

Slightly over eleven percent (11.5%) of households that participated in the household survey live with members who have a vulnerability (Table 5-21). This is lower than the national average of 12.5% (2014 National census). The most common form of disability reported were hearing disorder (3.9%) and physical impairment (3.9%). Other forms of disabilities noted in the community were blindness or sight impairment, mental illness (including epilepsy), hearing impairment and speech impairment. The elderly was also noted as vulnerable because of their reduced ability to contribute to productively to household livelihoods. The survey also included 21 female headed households which were 13.8% of the households sampled.

Table 5-21: Vulnerability

Type of vulnerability	N	Percentage
Physical Impairment	5	3.2%
Hearing Disorder	6	3.9%
Blindness	3	1.9%
Old Age	3	1.9%
Mental Disorder	1	0.6%

Aspects of vulnerability shall be considered during the resettlement action planning process and also during the construction period. It is imperative that the construction project accrue benefits to all people including but not limited to availing gainful employment opportunities to the less affluent in society.

5.4.4 GENDER

5.4.4.1 GENDER AND MARITAL STATUS OF RESPONDENTS

According to the UBOS, 2022 Statistical projections Banda sub-county under which Lugala parish falls has a population of 12,900 males and 13,000 females⁷.

From the field findings (Table 5-22), it was revealed that the gender composition of the household heads in the sampled households was skewed with males recording 86.2% and females 13.8% respectively.

Table 5-22: Type of household heads

Type of house hold head	Percentage (Frequency)
Female headed	13.8% (21)
Male headed	86.2% (132)
Total	100% (153)

Gender equity is critical for good governance as it ensures the effective participation and benefit sharing between women and men, boys and girls in the democratization process, leadership, decision-making and law enforcement. As such, there should be gender inclusive and employment practices for both men and women during the project construction and operation phases.

Therefore, implementation of this water project should involve both men and women, since at a local level all of them 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

In most surveys it is very crucial to capture the marital status of household members as marriage is one of the principal factors that influence the household size. Since, a married woman is highly exposed to the chance of being pregnant and bearing a child and hence also increasing the dependency burden to a certain household. Results from the field indicate that the married were

⁷ <https://www.ubos.org/explore-statistics/20/>

78.4%, Divorced/Separated 9.2%, single 9.8% and widowed 2.6% (Table 5-23). There were more female household heads who were divorced and separated (7.2%) as compared to the men (2%).

Table 5-23: Marital Status

Marital status		Female headed	Male headed	Child headed
Single	Count	4	11	15
	%	2.7%	7.2%	9.8%
Married	Count	3	117	120
	%	2%	76.5%	78.4%
Divorced/Separated	Count	11	3	14
	%	7.2%	2%	9.2%
Widowed	Count	3	1	4
	%	2%	0.7%	2.6%
Total	Count	21	132	153
	%	13.7%	86.3%	100%

5.4.4.2 GENDER ROLES IN WATER COLLECTION

Respondents were asked about role playing in relation to water collection at household level. Results from the project area (Table 5-24) reveal that 42.5% of the respondents revealed adult female to be involved in water collection, 30.7% adult male, 13.7% boy children and 13.1% girl children (Figure 5-26).

Table 5-24: Individuals mainly involved in water collection

Individuals mainly involved in water collection	Frequency	Percentage
Adult Male	47	30.7
Adult Female	65	42.5
Girl children	20	13.1
Boy children	21	13.7
Total	153	100.0



Figure 5-26: Girls transporting water on a bicycle

5.4.4.3 PREVALENCE OF GBV IN THE PROJECT AREA

Gender Based Violence (GBV), is an umbrella term for any harmful act that is perpetrated against a person’s will and that is based on socially ascribed gender differences. GBV includes acts that inflict physical, mental, sexual harm or suffering; threats of such acts; and coercion and other deprivations of liberty, whether occurring in public or in private life. GBV disproportionately affects women and girls across their lifespan and takes many forms, including sexual, physical, and psychological abuse. It occurs at home, on the streets, in schools, workplaces, farm fields, and refugee camps; during times of peace as well as in conflicts and crises. According to the UDHS 2016, 64% of females of ages 15-49 having experienced physical, sexual, or emotional violence perpetrated by their current or most recent spouse or partner. Similarly, according to UNFPA 2013 ,61.1% of the females between 15-24 years think it is justified to beat a wife. The term GBV is most commonly used to underscore systemic inequality between males and females —which exists in every society in the world—and acts as a unifying and foundational characteristic of most forms of violence perpetrated against women and girls (VAWG). The term GBV stems from the 1993 United Nations Declaration on the Elimination of Violence against Women, which defines violence against women as “any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women.” Discrimination on the basis of sex or gender identity is not only a cause of many forms of GBV, but also contributes to the widespread acceptance and invisibility of such violence—so that perpetrators are not held accountable and survivors are discouraged from speaking out and accessing support. Therefore, as a project deliberate effort has to be made by the contractor through Action plans and codes of conduct to mitigate against GBV.

5.4.4.3.1 PREVALENCE OF GBV IN THE PROJECT AREA

The information collected from the project area for the period of 2020 by the Uganda Police crime indicates that there 93 reported cases of sexual assault, 95 cases related to child abuse and 110 cases

of common assault. Field consultation with Banda police station also indicated that there are several forms of GBV shown in the Figure 5-27 below.

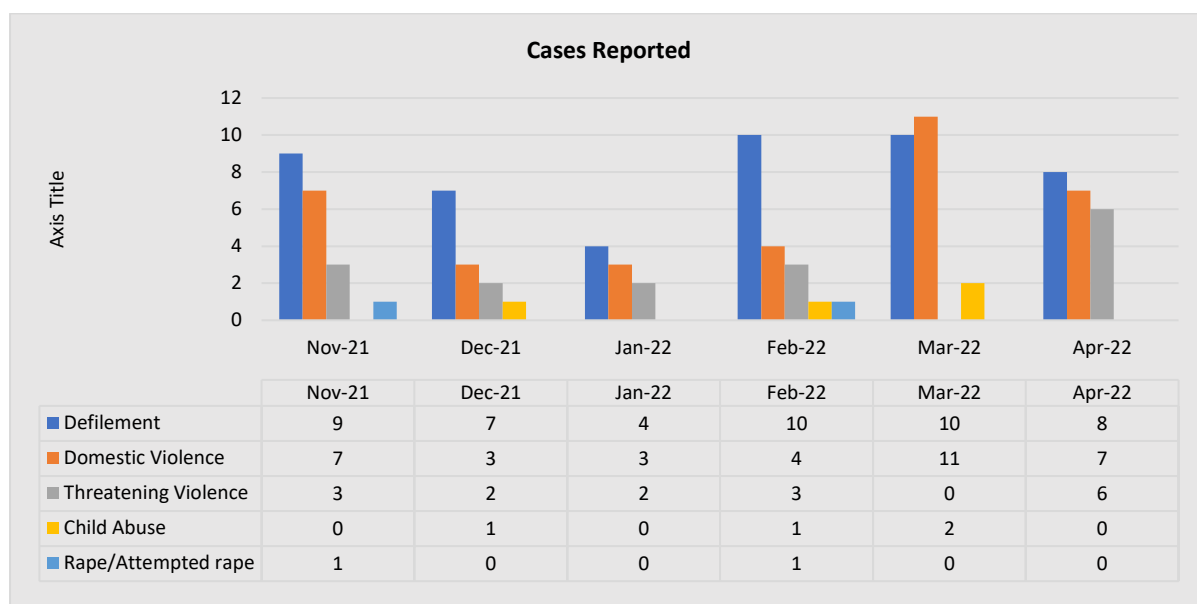


Figure 5-27: GBV cases reported

(Source: Banda Police Post, May 2022)

When asked about the victims of GBV in the community majority of the respondents indicated that were Married women (41.9%), girls (41.2%). 7.9% respondents also indicated that children of the are also victims of GBV. While boys were 5.2 and men 3% as shown in the Table 5-25 below.

Table 5-25: Victims of GBV

Victims	N	Percentage
Girls	110	41.2
Married women	112	41.9
Boys	14	5.2
Men	8	3.0
Children	21	7.9
Maids	2	0.7
Total	267	100

Regarding common forms of abuse experienced in the community, 40.2% cited battering/beating, 33.8% verbal insults and abuses, 4.1% burning, 7.9% as the most common forms of abuse. Respondents gave a variation of common abuses in the community as shown in the Table 5-26 below

Table 5-26: Common types of abuses

Common types of abuses	N	Percentage
Battering/beating	107	40.2
Burning	11	4.1

Verbal abuses/insults	90	33.8
Attempted murder	1	0.4
Forced sex	3	1.1
Unwanted sexual touches	21	7.9
Marrying off girls early	5	1.9
Threatening violence against spouse or children	5	1.9
Use of proceeds/money without spouse consent	1	0.4
Preventing spouse from owning property	2	0.8
Preventing spouse from using family land	2	0.8
Stop spouse from talking/community meetings	5	1.9
Preventing spouse from working outside home	5	1.9
Engaging children in work instead of school	4	1.5
Not economically supporting family	4	1.5
Total	266	100

5.4.4.3.2 PERPETRATORS OF THE ABUSES

Sexual & Gender -based violence (SGBV) is not a new phenomenon. SGBV is perpetrated against men, women, boys and girls, however, the vast majority of cases reported involve women and girls. Existence of SGBV violates one's rights and slows down progress in achieving sustainable inclusive human development UBOS, (2019). When respondents were asked about the main perpetrators of GBV, 52.2% mentioned male spouses, 27.3% female spouses and strangers as the main perpetrators of gender-based violence. Strangers were also revealed as some of the perpetrators 10.2% as well as other relatives 6.1% living within the household (Table 5-27).

Table 5-27: Common Perpetrators

Perpetrators	N	Percentage
Male spouse	128	52.2%
Female spouse	67	27.3%
Other relative	15	6.1%
Clan elder	4	1.6%
Community leader	1	0.4%
Stranger	25	10.2%
Employer/boss	1	0.4%
Male teacher	2	0.8%
Community member	2	0.8%

Total	245	100.0%
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5.4.5 HOUSING AND SETTLEMENT

5.4.5.1 HUMAN SETTLEMENT PATTERNS

There are four major human settlement patterns in Lugala RGC, namely:

1. Compact or Nucleated settlements - this is common in Lugala landing site in Lugala Beach and Busiro Trading Centre, where large number of dwellings are constructed very close to each other forming semi-urban settlements. These areas have over the years transformed from small human settlement (hamlet), into village and its now growing trading center. There are observable characteristics of an expanding congested dwellings with inappropriate sanitation and hygiene facilities especially pit latrines and solid waste management facilities.
2. Linear settlements along roads, are commonly along community roads that traverse the RGC.
3. Dispersed or dotted settlements with dwelling located far apart and often within a village landscape, as observed in the entire project area except where trading centres exist.
4. Informal settlements - these are illegal dwellings often in restricted and/or prohibited areas such as wetlands and 100-meter buffer zone of Victoria shorelines. These settlements are common at Lugala landing site.

The settlement patterns are shown in [Figure 5-28](#) and [Figure 5-29](#) below.





Figure 5-28: Common settlements in project villages



Figure 5-29: Lugala Trading centre/landing site in the project area

Implication 1: Both the project components and human settlement patterns will impact on each other in positive and negative ways. In order to meet the increasing human demand for water, some pipe work intensification will be required especially in areas where distribution mains are too far away for the customers, and co-joining with the existing piped network (laid by RWSS / MWE in neighbouring areas of Buchumba parish). In a negative way, the construction phase (transmission and distribution mains, reservoir tank, access routes) will in some way affect traffic flow in short run, restrict resource use such as open water source, sand mining, grazing through fencing off the site, and economic displacement (loss of land, assets, or access to assets leading to loss of income sources or other means of livelihood).

Implication 2: The project will raise the quality of life in terms of supply of clean and safe affordable water and provision of sanitary facilities (public toilet). The new water supply will attract more human settlements, hence transforming Lugala RGC into a bigger urban agglomeration most likely Town Board in future years as defined by National Urban Policy 2017.

5.4.5.2 HOUSING & SHELTER

The survey findings (Figure 5-30) indicate that 25.6% of the dwellings are permanent (bricks, cemented, plastered and iron roofed); 49.8% semi- permanent (brick and iron roofed but not cemented, or plastered); and 24.6% are temporary (mud, wattle and grass thatched). Additionally, 88.2% (135 out of 153) respondents said they use the dwellings for residential and 11.8% (18 out of 153) use the shelters as business premises, and all are owned by the occupiers (no renting). In terms of duration of residence, 81.7% (125 out of 153) of the respondents have resided in the area for more than 5 years, compared to 18.3% (28 out of 153) who have stayed for less than 5 years.

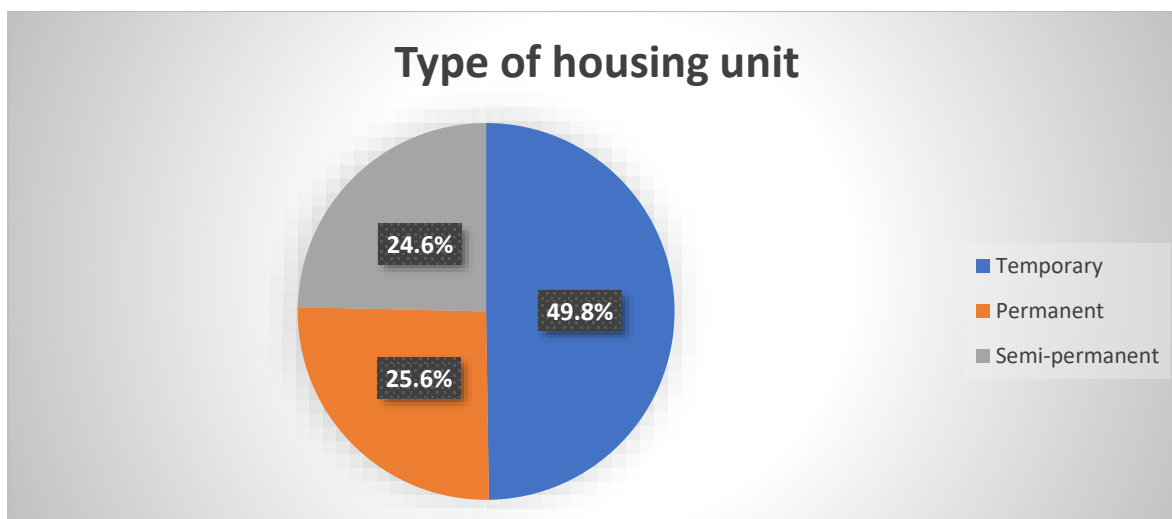


Figure 5-30: Type of housing

Implications: The housing and shelter characteristics have direct influence on the design of required connections such as house Connections, Yard Taps, Stand Posts and Part Time Users. The project will establish 258 No. service connections in the initial year 2020, and 1,888 No. service connections in the ultimate year 2040.

5.4.6 ECONOMIC STATUS

Poverty is a major concern among both urban and rural communities (UBOS, 2018). A review of 2021 UBOS report on poverty distribution in Uganda indicates that Busoga region (covering Namayingo District / Lugala RGC) ranks 3rd across the country, with Karamoja and Elgon region being the highest at 60.2% and 43% respectively. The economic status of household in Lugala RGC was measured based on occupations and livelihoods, average annual incomes and assets owned at household level.

5.4.6.1 OCCUPATION AND LIVELIHOODS

According to the Namayingo Third District Development Plan (DDP III) 2020/21 – 2024/25, Livelihoods patterns in Namayingo District are centred on rain fed agriculture. Results from the field indicate that 62.1% of the respondents were engaged in agriculture as the main source of livelihood, followed by trading (18.3%), fishing 7.2%, casual labour 3.9% and formal employment 3.3% among other sources of livelihood (Table 5-28).

Table 5-28: Source of livelihood

Primary source of livelihood for the HHD	N	Valid Percentage
Farming	95	62.1
Formal employment	5	3.3
Casual labour	6	3.9
Trading	28	18.3
Service provision	6	3.9
Student	2	1.3
Fishing	11	7.2

Primary source of livelihood for the HHD	N	Valid Percentage
Total	153	100

The Namayingo Third District Development Plan (DDP III) 2020/21 – 2024/25 indicates that bimodal rains supply sufficient amounts of moisture to produce surplus amounts of food crops such as Maize, sweet potatoes, cassava and beans. Cassava, as well as maize, is also produced for sale at the local market. When questioned about the most typically grown crops, respondents revealed producing maize (27.4%), Cassava (35.8%), beans (14.2%) and sweet potato at 14.7% among others (Table 5-29).

Table 5-29: Commonly grown crops

Commonly grown crops	N	Percentage
Beans	28	14.7%
Maize	52	27.4%
Irish potato	2	1.1%
Sweet potato	28	14.7%
Cassava	68	35.8%
Sorghum	5	2.6%
Vegetables	4	2.1%
Rice	1	0.5%
Others	2	1.1%
Total	190	100.0%



Figure 5-31: A boat docking area in Bunini Village



Figure 5-32: Different sources of livelihood in Budalaa and Lugala Beach Villages, respectively

During stakeholder consultations at Lugala trading center, it was noted that unemployment affects mostly the youth both male and female. The major coping mechanism is resort to illegal fishing using prohibited methods such as EMIGONO, gambling, under-paying casual labour, water vending, petty trade, dependency on remittances, sand mining within buffer zone of Lake Victoria, commuter transport on (passenger boats and motorcycles commonly known as bodaboda), car washing, alcoholism, charcoal burning, firewood selling, harvest and sell of local building materials, among others.

5.4.6.2 AVERAGE ANNUAL INCOME

Majority of the respondents (43.8%) indicated that they earned more than 1,403,000, 27.2%, between 503,000 - 1,403,000 and 29% less than 503,000 per year (Table 5-30). This generally shows that the income levels are generally low for persons with families to feed, clothe, pay for medical care and take to school.

Table 5-30: Average annual income (household head)

Average annual income	Percentage (Frequency)
Less than 503,000 (Low)	29% (44)
503,000 - 1,403,000 (Medium)	26.2% (440)
More than 1,403,000 (High)	44.8% (69)
Total	100% (153)

5.4.6.3 HOUSEHOLD ASSETS

Ownership and control of physical and financial assets are essential to an individual's well-being. Assets generate and help diversify income; provide collateral to gain access to credit; alleviate liquidity constraints in the face of shocks; and provide status in society (Deere and Doss, 2006) hence the importance of establishing asset ownership at household level. From the field survey, respondents owned a variation of physical assets which included houses (26.7%), mobile phone (22.9%), domestic animals (11.8%), radios (16.7%) and bicycles (10.8%) among others (Table 5-31).

Table 5-31: HH Assets

Type of asset	N	Percentage
House	104	26.7
Domestic animals	46	11.8
TV set	21	5.4
Radio	65	16.7
Motorcycle	21	5.4
Bicycle	42	10.8
Mobile phone	132	86.3
Other	1	0.3
Total	432	100.0

Further analysis of ownership of household assets by gender of household heads is shown in Table 5-32: Ownership of HH assets by Gender

Type of Assets owned		Gender		Total
		Female headed	Male headed	
House	Count	10	94	104
	%	9.6%	90.4%	
Domestic animals	Count	0	46	46
	%	0.0%	100.0%	
TV set	Count	0	21	21
	%	0.0%	100.0%	
Radio	Count	4	61	65
	%	6.2%	93.8%	
Motorcycle	Count	0	21	21
	%	0.0%	100.0%	
Bicycle	Count	3	39	42
	%	7.1%	92.9%	
Mobile phone	Count	9	80	89
	%	10.1%	89.9%	
Other	Count	0	1	1
	%	0.0%	100.0%	
Total	Count	15	117	132
	% of Total	11.4%	88.6%	100.0%

During focus group discussion with women in the Namake village (Buchumba Parish), it was noted that most of the productive assets such land, house, motor cycles, domestic animals among others are owned and controlled by men. Even where women have some ownership and control, men tend to claim co-ownership. This therefore implies that there are cultural and structural barriers to women ownership control and use of productive assets. And the provision of clean and safe water will contribute to women participation in productive activities by lessening the time spent to collect water.

below.

Table 5-32: Ownership of HH assets by Gender

Type of Assets owned		Gender		Total
		Female headed	Male headed	
House	Count	10	94	104
	%	9.6%	90.4%	
Domestic animals	Count	0	46	46
	%	0.0%	100.0%	
TV set	Count	0	21	21
	%	0.0%	100.0%	
Radio	Count	4	61	65
	%	6.2%	93.8%	
Motorcycle	Count	0	21	21
	%	0.0%	100.0%	
Bicycle	Count	3	39	42
	%	7.1%	92.9%	
Mobile phone	Count	9	80	89
	%	10.1%	89.9%	
Other	Count	0	1	1
	%	0.0%	100.0%	
Total	Count	15	117	132
	% of Total	11.4%	88.6%	100.0%

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5.4.7 LAND OWNERSHIP AND ACQUISITION

5.4.7.1 LAND TENURE

Customary Land tenure system is the most predominant in the project area. Survey results (Table 5-33) indicated that the majority (75.8%) were customary land owners, 22.9% tenant Kibanja owners (lease on customary land) and licensee and Squatters at 0.7% each category .

Table 5-33: Land wnership

Land ownership	Frequency	Percentage
Customary Landowner	116	75.8
Tenant (Kibanja)	35	22.9

Squatter	1	0.7
Licensee[renting]	1	0.7
Total	153	100.0

Construction of project facilities such as the pipeline will require easement in some cases while permanent footprint of project facilities might also be required in some cases. This might present a challenge at the stage of compensation/paying some easement fees, especially for Kibanja owners (lease on customary land) because there is likelihood of PAPs claiming ownership of land which is not rightfully theirs.

5.4.7.2 METHOD OF ACQUISITION

Regarding the method of acquisition, majority of the respondents (49%) indicated that they inherited the land from parents 40.5% bought it, and 9.8% are renting the land (Further analysis of the respective methods of acquisition is also shown in **Error! Reference source not found.** Overall majority of the households acquired land through inheritance.

Table 5-34: Land Acquisition

Land acquisition method	Frequency	Percentage
Bought	62	40.5
Inherited from parents	75	49.0
Renting (tenant)	15	9.8
Squatter	1	0.7
Total	153	100.0

Even analysis in terms of gender, reveals that majority of the female headed households also acquired land by inheritance as indicated in table 5-35 below.

Table 5-35-Method of acquisition by gender

Gender		Bought	Inherited from parents	Renting (tenant)	Squatter	Total
Female headed	Count	6	11	4	0	21
	%	3.9%	7.2%	2.6%	0.0%	13.7%
Male headed	Count	56	64	11	1	132
	%	36.6%	41.8%	7.2%	0.7%	86.3%
Total	Count	62	75	15	1	153
	%	40.5%	49.0%	9.8%	0.7%	100.0%

During meetings, with local leaders it was common opinion that the socio-cultural set up made it easier for man to acquire more land since they are the most preferred gender for inheritance of properties.

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Female headed	Count	6	11	4	0	21
	%	3.9%	7.2%	2.6%	0.0%	13.7%
Male headed	Count	56	64	11	1	132
	%	36.6%	41.8%	7.2%	0.7%	86.3%
Total	Count	62	75	15	1	153
	%	40.5%	49.0%	9.8%	0.7%	100.0%

During meetings, with local leaders it was common opinion that the socio-cultural set up made it easier for man to acquire more land since they are the most preferred gender for inheritance of properties.

5.4.7.3 PROJECT LAND ACQUISITION

The details of land requirements for the transmission and distribution lines are appended as Appendix 7 of this report and a summary included in Table 5-36 below.

Table 5-36: Land requirements for Major infrastructures on the project

Project Component	Land Requirement by Project (Acres)	Village	Owner (Name, Contact)	Land Tenure

Water Intake Structure on Lake Victoria and Raw Pump House		Lugala Beach	N/A (Protected Lake Zone)	N/A
Water Treatment Plant, Lake Buffer Zone	2.16	Buhima	Mahaha Stephen Siminyo, 0752164396	Licensee
			Luwaga Godfrey	Licensee
			Okumu Brian, 0752318594	Licensee
			Kibira Ali, 0757258841	Licensee
Reservoir Site	0.22	Budala	Mugeni Godfrey	Customary
		Budala	Egesa Pascali, 0742358839	Customary
Public Toilet Site	0.025	Buhima	Lugala Health Centre II	Customary

Source: RAP report

5.4.8 ACCESS TO WATER

Safe drinking water is essential for human health, welfare and productivity and is also widely recognized as a human right. According to the Uganda Water Atlas 2021, the rate of access to safe water (as ratio of people served by a safe water point to the total population, stands at 61% in the entire Namayingo district, with rural access at 61% while urban access at 55% as of year 2021. The access rate is at 44 % in Banda Sub-County (covering target area) second lowest in Namayingo district, with Bukana Sub-County having the lowest rate 20% (MWE/ Water Atlas, 2022).

According to Namayingo DDPIII 2020/2021 - 2024/2025, the district has 668 domestic water points which serve a total of 158,350 people – 147,902 in rural areas. 123 water points have been non-functional for over 5 years and are considered abandoned. In terms of functional water sources, there are 33 shallow wells, 29 deep boreholes; 21 RWHTs, 137-yard taps and 5 institutional connections.

There are three existing piped water systems in Namayingo District, two of which are mini systems located at Lugala Primary School and another at Busiro Trading Centre, constructed by the Safe Water Project under a joint initiative by University of Applied Science and Arts, Northwestern Switzerland and Water School Uganda (Figure 5-33) and the Water Trade Project (Figure 5-34).

The third water supply system is called ‘Banda Town Council Water Supply System’ constructed by GoU/Ministry of Water and Environment (MWE) under the supervision of Rural Water Supply and Sanitation Department of in Namayingo District (Figure 5-35). The system has 160 service connections. However, it has poor functionality because the community have abandoned system due to water salinity.



Figure 5-33: Safe water project



Figure 5-34: Busiro Trading centre Water Supply System by GoU/ MWE / RWSSD



Figure 5-35: A piped water system in Banda Town Council for Buwoya-Buboko

Implications: It is likely that when the project is implemented (operation phase), there will be increased access to safe and clean portable water. However, some households may not be able to access piped water due to inability to afford water fees, levels of rigidity to adjust, more so if tariff plans are perceived as costly as well as existence of alternative sources especially deep boreholes. However, there is need to intensify supply by repairing and/or adding the existing distribution network under the ‘Buwoya-Buboko Piped Water Supply System’

5.4.8.1 WATER SOURCES

Results from the field (Table 5-37) also indicate that the majority of the community member draw their water from community L. Victoria (62.1%) and community boreholes (32.7%).

Table 5-37: Common types of water sources

Water source	Frequency	Percentage (%)
Community Borehole	50	32.7
Protected Spring	1	0.7
Unprotected spring	6	3.9
River/Lake	95	62.1
Piped Water System	1	0.7
Total	153	100.0



Figure 5-36: Fetching water from the Lake at Lugala Beach Landing site



Figure 5-37: A borehole within the community and a rainwater harvesting tank at Lugala HC II

Most respondents (54.2%) didn't like their water sources from where they collected water, while 45.8% liked their current water source (Table 5-38).

Table 5-38: Preference of water source

Preference of water source		Frequency	Percentage
No		83	54.2
Yes		70	45.8
Total		153	100

When questioned about the preference of the water source (Table 5-39), 35.2% indicated having no other option, 24.9% cited the short distance, 21.9% indicated accessing the water for free, and 17.6% clean water.

Table 5-39: Preference of water source

Reason for preference of water source	N	Percentage
Short distance	58	24.9
Free water	51	21.9
Clean water	41	17.6
Water tastes better	1	0.4
No other option	82	35.2
Total	233	100

5.4.8.2 DISTANCE, TIME SPENT AND TRIPS MADE TO A WATER SOURCE

Regarding distance to water source, the majority 43.1% of respondents reported travelling 100-500 meters to access the water source 36.6% 100 m while only (20.3%) travelled 1-1.5 Km to access the nearest water source in the proposed project area (Table 5-40).

Table 5-40: Distance to water source

Distance to water source	Frequency	Percentage
100 m	56	36.6
100 - 500 m	66	43.1
1-1.5 Km	31	20.3
Total	153	100.0

Regarding the number of trips made to collect water, most respondents (79.7%) indicated making 1-3 for round trip including waiting time at a water source ,19.6% making 3-5 trips and only 0.7% making more than 5 trips (Table 5-41).

Table 5-41: Trips made to a water source

Number of trips made	Frequency	Percentage
1 - 3	122	79.7
3 - 5	30	19.6
> 5	1	0.7
Total	153	100.0

In terms of the time households spent fetching water, from the main water source, majority of respondents 67.3% indicated spending 1 hour, 23.5% 1-2 hours, 7.2% 3-5 hours and 2% above 5 hours (Table 5-42). Survey respondents attributed the longer time taken at springs to their slow recharge rates at the end of the dry season, and long waiting queues at boreholes which are usually used by a large number of the community . Overall, the findings show that women and girls mostly bear the

burden of fetching water compared to the men and boys. Improving access to safe water sources through this project would improve more the wellbeing of women and girls by reducing time spent to collect water. In addition, women and girls are at more exposure to GBV and VAC risks as they travel long distances to fetch water. Hence during construction and operation phases, mitigation measures against GBV and VAC should be put in.

Table 5-42: Time taken to reach a water source

Number of trips made	Frequency of Responses				Total	Over all Percentages
	Female adults	Male adults	Boys	Girls		
1	82	10	3	9	103	67.3
1 - 2	29	3	1	3	36	23.5
3 - 5	9	1	0	1	11	7.2
Above 5	2	1	0	2	3	2.0
Total					153	100.0

5.4.8.3 WATER USE AND VOLUMES

Water consumption is that part of water which is not distributed to other economic units and does not return to the environment, because it is either incorporated in products, or consumed by households and livestock. According to UBOS ,2021, Total water consumption excluding households in 2020 was 32,963,329 million cubic metres from 32,241,313 million cubic metres in 2019, representing an increase of 2.24 percent following an increase of 8.93 percent in 2019 and a decline of 6.09 percent in 2018. Regarding water usage the vast majority 46.4% mentioned that they used 50 litres and above ,23.5%-41-50 litres, 13.7% 31-40 litres and 13.1% 10-20 litres as shown in the Table 5-43 below.

Table 5-43: Amount of water used

Amount of water used	Frequency	Percentage
10-20 litres	20	13.1
21-30 litres	5	3.3
31-40 litres	21	13.7
41-50 litres	36	23.5
50 litres and above	71	46.4
Total	153	100.0

Domestic water uses include drinking, food preparation, bathing, washing clothes and dishes, and livestock (Table 5-44).

Table 5-44: Water uses

Water use	N	Percentage
Water for drinking	141	32.6

Washing clothes	145	33.6
Cooking food/tea	127	29.4
Mini- irrigation	1	0.2
Livestock	17	3.9
Business (saloon, shop, restaurant)	1	0.2
Total	432	100

There is an increasing demand of water for production for crop and animal production, especially from Lake Victoria. However, to a small extent, farmer households will use piped water as key source for water for production for livestock (poultry, cattle, goats) at 3.9%, and mini-irrigation (0.2%) mainly for vegetable growing.

5.4.8.4 ABILITY AND WILLINGNESS TO PAY

On the issue of payment for water, 66.7% of the respondents indicated not paying for water while 33.3% paid for it (Table 5-45). Related to the above, was the vendor of water to the household, field results show that 49% of the respondents revealed accessing water from a bicycle vendor while 51% fetched their own water. The respondents also indicated that they pay bills with 51% paying daily, 3.9 weekly and 45.1 monthly.

Table 5-45: Payment for water

Payment for water	Frequency	Percentage
Yes	51	33.3
No	102	66.7
Total	153	100.0
Seller of water to household		
Water vendor on bicycle	25	49.0
Fetches by respondent	26	51.0
Total	51	100.0

About the cost of water for a 20 litre jerrycan, 9.2% indicated paying more than 600/= for a jerrycan, 15.7% pay 500/= and 6.5 % less than 100/= (Table 5-46).

Table 5-46: Cost of 20 litre jerrycan

Cost of 20 litre jerrycan	Frequency	Percentage
Less than 100/=	10	6.5
200/=	1	0.7
300/=	1	0.7
400/=	1	0.7

500/=	24	15.7
More than 600	14	9.2
Do not buy water	102	66.7
Total	153	100.0

Survey respondents were also questioned on their readiness to pay for a new house connection service and they gave a variation of rates they could afford with the majority 57.1 % indicating 5,000-10,000/= 14.3%, 10,000-20,000/= ,10.7% 20,000-30,000 and 7.1% for 3000-5000 and 50,000-60,000/= among rates as shown in the Table 5-47 below.

Table 5-47: Amount prepared to pay for house connection

Amount prepared to pay for house connection	Frequency	Percentage
50,000 – 60,000	11	7.1
20,000-30,000	16	10.7
10,000-20,000	22	14.3
5,000-10,000	87	57.1
3,000-5,000	11	7.1
2,000-3,000	5	3.6
Total	153	100.0

On the maximum they can pay for a 20l jerrycan obtained from a safe water respondent indicated 100/= 56.8%,50/= 12.5%,14.8% 200/= and 10.2% for 300/= and 2.3% 30/= as shown in the Table 5-48 below.

Table 5-48: Payment for a 20-litre jerry

Amount prepared to pay for a 20-litre jerry can from a safe water source	Frequency	Percentage
600	2	1.1
500	2	1.1
300	16	10.2
200	23	14.8
100	87	56.8
50	19	12.5
40	2	1.1
30	3	2.3
Total	153	100.0

During a consultation meeting at Banda Sub County technical team, it was revealed that there are about 14 water vendors operating majorly in Lugala RGC.

Implications: Often water vendors are negatively affected by piped water system. However, it was revealed that instead the piped water system will create more jobs for water vendors since there are many villages that need water.

5.4.8.5 PREFERRED SERVICE OPTIONS

Regarding the preferred service options 57.5% of respondents preferred a Yard tap connection 18.3%, house connection and 24.2% public stand pipe (Table 5-49).

Table 5-49: Service level options

Service level options	Frequency	Percentage
House Connection	28	18.3
Yard Tap	88	57.5
Public Standpipe	37	24.2
Total	153	100.0

5.4.8.6 MOBILE MONEY ACCESS

Mobile money can be defined as an electronic wallet service that enables one to send and receive money anywhere using a mobile/cellular phone. On owning a mobile handset 86.3% of the respondents indicated having mobile handsets and 98% indicated having access to mobile money payments which is indicative of increasing financial inclusion (Table 5-50). This is indicative of the adoption of the mobile phone as a means of accessing financial services by the growing number of low-income earners in rural areas and can be used as one the payment options for their water supply service.

Table 5-50: Ownership of mobile handset

Ownership of mobile handset	Frequency	Percentage (%)
No	21	13.7
Yes	132	86.3
Total	153	100.0
Access to mobile money payment		
Yes	150	98.0
No	3	2.0
Total	153	100.0

5.4.9 WASTE DISPOSAL AND HYGIENE

Pit Latrine Coverage – Survey findings indicated that 25.6% (39 out of 153) households don't have pit latrines.

Open Defecation: Survey findings indicated that 73.8% (123 out of 153) respondents said that they have ever witnessed / observed conditions that depict open defecation in open grounds, river line, grass, bushes and crop fields; while 26,2 % (40 out of 153) said No.

Results from the baseline indicate that vast majority 96.7% revealed using Pit latrines (basic sanitation facility), 2% VIP latrines and 0.7% Poor flush and Ecosan toilet (semi-improved sanitation facility) respectively as shown in the Table 5-51 below. No one in the RGC reported using water borne flush toilets (standard sanitation facility)

Table 5-51: Type of waste disposal method

Type of waste disposal method	Frequency	Percentage (%)
VIP latrine	3	2.0
Pit Latrine	148	96.7
Ecosan	1	0.7
Double Vault Latrine	1	0.7
Total	153	100.0

In terms gender, the survey revealed the overall the male headed households have more access to sanitary facilities than female headed households as summarised in the table 5-52 below.

Table 5-52-Access to sanitary facilities by Gender

Gender		VIP latrine	Pit Latrine	Ecosan	Double Vault Latrine	Total
Female headed	Count	0	20	0	1	21
	%	0.0%	13.1%	0.0%	0.7%	13.7%
Male headed	Count	3	128	1	0	132
	%	2.0%	83.7%	0.7%	0.0%	86.3%
Total	Count	3	148	1	1	153
	%	2.0%	96.7%	0.7%	0.7%	100.0%

When asked about the issues of sharing toilets, 69.3% indicated that they don't while 30.7% indicated that they do (Table 5-53). Those who share sanitary facilities cited the challenge of keeping shared toilets clean which exposes them to the risk of disease and infections. The main reason for sharing sanitation facilities mainly included (i) lack of HH owned facility, and (ii) sharing with visitors as there are no public sanitation facilities in the RGC.

Table 5-53: Sharing of toilets

Sharing of toilets	Frequency	Percentage (%)
No	106	69.3
Yes	47	30.7
Total	153	100.0

Awareness and handwashing practice is good amongst the surveyed population with 77.7% of the respondents being able to mention at least 3 critical times for hand washing (Figure 5-38 and Table 5-54). This should be promoted further. The focus should shift to monitoring actual hand washing practice rather than knowledge.

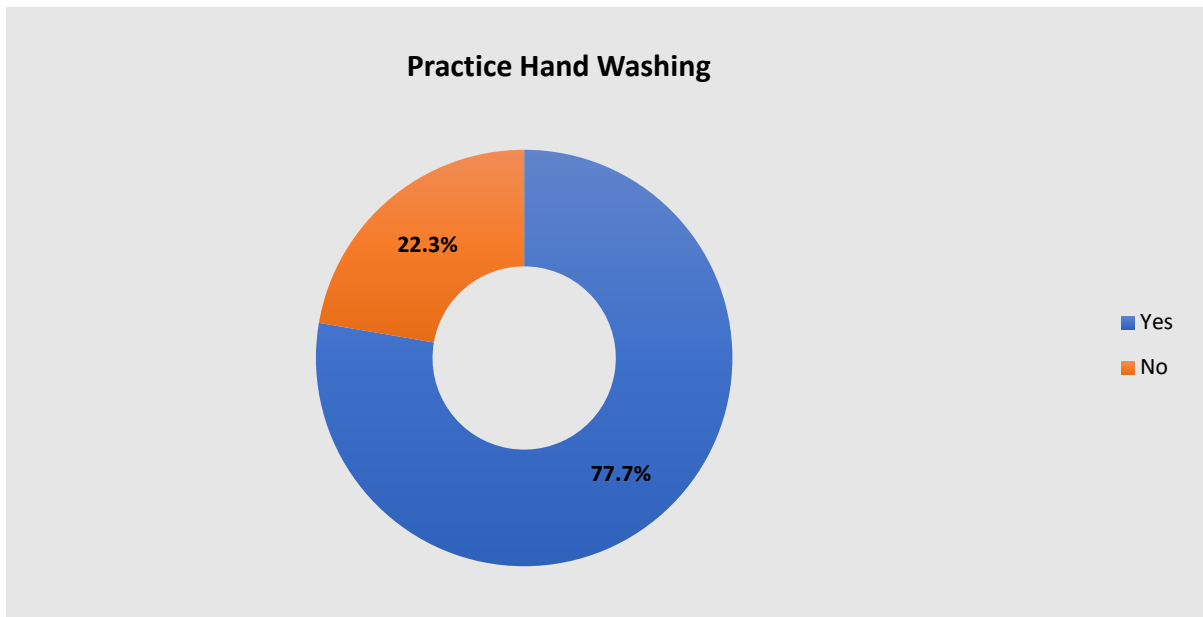


Figure 5-38: Hand washing practices

Table 5-54-Handwashing by Gender

Gender		No	Yes	Total
Female headed	Count	5	16	21
	% of Total	3.4%	10.8%	14.2%
Male headed	Count	28	99	127
	% of Total	18.9%	66.9%	85.8%
Total	Count	33	115	148
	% of Total	22.3%	77.7%	100.0%

On disposal of solid waste, survey results show that 63.2% of the respondents Dug-pit ,27.3% used it as farm manure, 4.8% disposed of their waste at a communal dump site, 1.4% had their garbage Collected by Town Authority or Private Company and 3.3% threw their waste by the road side (Table 5-55).

Table 5-55: Disposal of solid waste

Disposal of solid waste	N	Percentage (%)
Dug-pit	132	63.2%
Farm as manure	57	27.3%
Collected by Town Authority or Private Company	3	1.4%
Communal Dump	10	4.8%
Thrown at Road side	7	3.3%
Total	209	100.0%

5.4.9.1 PERCEPTION ABOUT SOLID WASTE AND COLLECTION FEES

Most of the respondents 68.3% revealed that the solid waste collection fee is unaffordable while 31.7% indicated that it is relatively affordable. Related to waste collection is the important aspect of cost. Survey respondents were questioned on how much they pay for waste collection. 63.2%

indicated not paying ,18.4% paying <Ugx 1000,16.7% < Ugx. 5000 and 0.9% Ugx. 1000 per interval of collection as shown in the Figure 5-39 below.

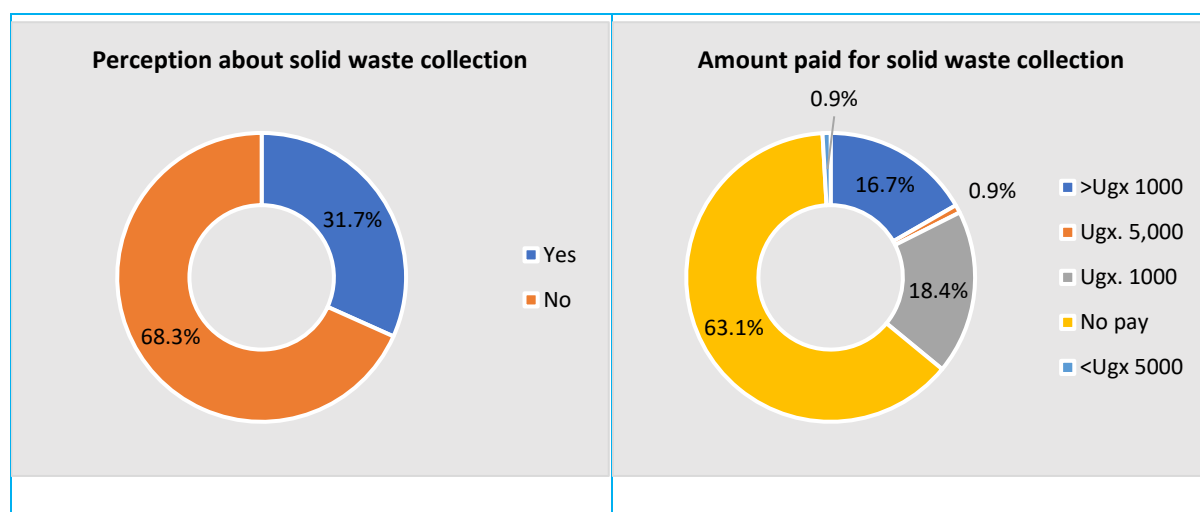


Figure 5-39: Perceptions about payment for solid waste

5.4.10 HEALTH SERVICES

5.4.10.1 ACCESS TO HEALTHCARE

According to the Namayingo District Third District Development Plan (DDP III) 2020/21 – 2024/25) the district is served by 34 Health Facilities, 1 Health Centre IV, 7 Health Centre IIIs and 25 Health Centre IIs. A total of 17 Health facilities (1 HC IV, 7HC IIIs and 9HC IIs) out of 34 facilities offer PMTCT services, while 12 HCs are accredited for ART services.

Data from the field survey indicate that 54.2% of the respondents used Privately run clinic /drug shop to access medical healthcare services, 22.2% used health centre IIs, 15% Community Health Centre and 8.5% health Centre IIIs (Table 5-56).

Table 5-56: Nearest Health Centre

Type of nearest HC	Frequency	Valid Percentage (%)
Health Centre III	13	8.5
Health centre II	34	22.2
Community Health Centre	23	15.0
Privately run clinic /drug shop	83	54.2
Total	153	100.0

When asked about the nearest health facility ,41.8% of the respondents indicated walking 100 m- 500 m to the nearest health facility, 35.3% 1-1.5 Km, 19.6% 100 m and 3.3% above 5 Km (Table 5-57).

Table 5-57: Distance to the nearest HC

Distance to the nearest HC	Frequency	Percentage (%)
100m	30	19.6

100-500m	64	41.8
1-1.5km	54	35.3
Above 5km	5	3.3
Total	153	100.0

Timely access to high quality and specialised healthcare services is vital to reduce mortality hence the need to interrogate access and distance travel to referral healthcare facility. From the field survey, 71.2% travelling above 5 Km from their principal places of residence. 11.1% travelled 100 m ,9.5% 1-1.5 Km and 8.5% 100-500 m as shown in the Table 5-58 below.

Table 5-58: Distance to Referral Hospital

Distance to referral H/F	Frequency	Percentage (%)
100m	17	11.1
100-500m	13	8.5
1-1.5km	14	9.2
Above 5km	109	71.2
Total	153	100.0

5.4.10.2 MOST COMMON DISEASES

Health information for the year 2020/21 – 2024/25 was obtained from the district local government health department. From the data it was observed that top common ailments differ at different health centres; within Malaria is within 55.5% and common cold/cough 16.1% are within top five ailments reported for all health centres. Similarly, from the field survey, Malaria and cough were the most common diseases in the project area with 41% and 33% prevalence rate (Figure 5-40).

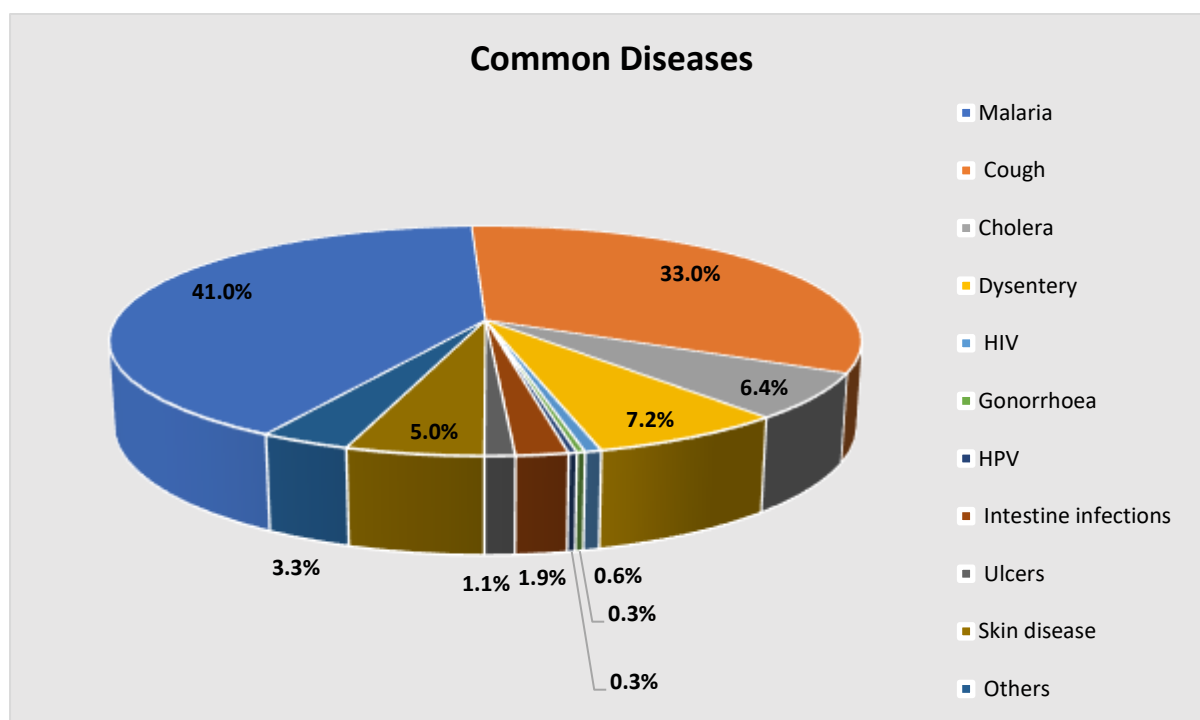


Figure 5-40: Common Diseases

5.4.10.3 WATER IN HEALTH CARE FACILITIES

Nationally, 33% of health facilities in Uganda have basic water supply (WHO Global Baseline Report, 2019). According to UNICEF/JMP⁸, Uganda ranks highest in terms of ‘Limited’ water at HCF at 65.15% in Sub Saharan Africa in terms of indicators on Water in Health Care Facilities (WinHCF). It ranked 6th in terms of having ‘Basic’ water at 30.81% and 10th rank for having ‘No Service’. In Namayingo district, there are 45 health facilities (30 Gov’t; 9 PNFP; 6 PFP). In terms of health facility level, there is 1 clinic, 31 HC II, 10 HC III and no hospital. However, within the RGC, only one health facility (Busiro Church of God HC III) has access to piped water (1 PSPs) provided by The Safe Water Project. The status of water sources in other 2 health facilities is shown in **Table 5-59** below.

Table 5-59: Water in Health Facilities in Lugala RGC area

Facility	Location	Ownership	Major water source accessed	Piped Water	PSPs	No. of RWHTs	Capacity
Lugala HC II	Lugala	MoH/ Gov’t	Lake Victoria <i>(RWHT is non- functioning due to lack of rain harvested water)</i>	No	0	1	10,000
Buchumba HC II	Buchumba	MoH/ Gov’t	Deep borehole	No	0	0	-
Busiro Church of God HC III	Busiro	NGO/ PFP	Deep borehole	Yes	1	1	2,000
Total – 3 HCs					1	2	12,000

(source: HC Management (KII), May 2022)



Figure 5-41: Raining water harvesting at Lugala HCII

Implications: One critical thing to note is that Lake Victoria is a major water source for health facilities in the area. As a contribution, the project will provide improved supply of safe and clean water to the 3 health facilities namely Lugala HC II, Buchumba HC II and Busiro Church of GOD HC II. Additional water storage tanks can potentially be useful for each facility. It is anticipated that the piped water will make a positive impact to the health service delivery, hence contributing to achievement of health sector targets under NDP III 2020/21- 2024/25, as well as ‘SDG 3 - Ensure healthy lives and promote well-being for all at all ages. By emphasis, the WHO notes that “Achieving SDG 3 will depend on progress in other SDGs – e.g., clean water and sanitation, poverty reduction, education; nutrition; gender equality; sustainable energy and safer cities” (WHO⁹, 2017).

5.4.11 EDUCATION SERVICES

From the survey findings household heads predominantly have low level of education with up 56% of reporting that they did not attain a primary seven leaving certificate. Only 27% of household heads were recorded to have completed ordinary level education in comparison to the national education average of 71% of Ugandans having attained primary level education (Table 5-60).

Table 5-60: Level of education of respondent

Level of education of respondent	Frequency	Percentage
Primary Education	86	56
Ordinary level	42	27
A' level	1	1
Vocational	5	3
University/college	3	2

None	16	10
Total	153	100

Regarding access to education services, field data shows that most households were able to access primary school that were within walking distance of 1-1.5 Km (47.6%), 100-500 m (31.7%) and 100 m (13.1%) Only (7.6%) of the respondents indicated travelling over 5 Km to access primary schools from their principal places of residence (Table 5-61).

Table 5-61: Distance to nearest Primary School

100 m	19	13.1
100-500 m	46	31.7
1-1.5 Km	69	47.6
Above 5 Km	11	7.6
Total	145	100.0

Regarding secondary schools, most respondents indicated that they have to travel over 5 Km (43.7%), (34.8%) 1.5-5 Km, 100 m-500 m (9.6%) to access secondary schools. However, some responds lived in close proximity with the school travelled for 100 meters (11.9%), as shown in the Table 5-62 below.

Table 5-62: Distance to nearest secondary schools

100 m	16	11.9
100-500 m	13	9.6
1-1.5 Km	47	34.8
Above 5 Km	59	43.7
Total	135	100

5.4.11.1 ACCESS TO WATER IN SCHOOLS

The global target of achieving universal access to basic WASH services in schools by 2030 aims at extending water beyond the household to include institutional settings, such as schools, healthcare facilities and workplaces (UNICEF¹⁰, 2020). Its notable that water in schools has direct impact on education outcomes in primary secondary and tertiary levels (MOES, 2020). In all the schools, the major water source are Lake Victoria, 3 functional RWHTs and PSP by The Safe Water Project in two schools.

Capacity of RWHTs: The total water tank capacity in the 3 schools is 30,000 liters serving a school population of 1,583 learners as shown in **Table 5-63** below.

Average distance to water source: The average distance to an open water source (Lake Victoria) for is less than 150 meters.

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

Table 5-63: Water facilities for schools within Lugala RGC

Name of School in Lugala RGC	Owner ship	School Popn		Major Source of water	Average Distance to Source in meters	No. of RWHTs	Capacity in Liters
		Male	Female				
Lugala CU P/S	Gov't	359	475	Lake Victoria	<150 m	0	-
Budala P/S	Gov't	333	173	PSP / RWHT	Onsite	1	10,000
Elimu Nursery & P/S	Private	118	103	Lake Victoria	<150 m	0	-
Busiro Church of GOD P/S	Private	271	180	PSP & L. Victoria	<150 m	1	10,000
Buchumba Hill P/S	Private	237	277	L. Victoria	<150 m	1	10,000
Overall, School Population in all schools in RGC		2,638		18.7%			30,000
School Going Age Population (6-18 years) in Banda Sub County		7,396	6,747				

(Source: Schools Management (KII), May 2022)

Implications: The water scarcity in schools will reduce. The project will likely benefit 18.7% (2,638 out of 14,143) school going age population (6-18 years) of boys and girls within Lugala 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 Lugala RGC system (SGI-Uganda/MWE, 2019). The potential benefits of PSP and/or YT will as well trickle down to neighboring households within relatively distant schools. The increase in availability of reliable sources of safe and clean water to school will contribute to better school education outcomes especially Enrolment rate, attendance rate, completion rate, teacher performance. The access and utilization of piped water will contribute to reduction in absenteeism, lower the rate of absenteeism and dropout rate especially for girls partly attributed to lack of sanitary and menstrual health facilities. In this regard, the project will contribute to achievement of Education targets under NDP III 2020/21- 2024/25, as well as to SDG 4 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'.



Figure 5-42: Plastic RWHT at Budala Primary School

5.4.12 ENERGY SOURCES IN THE PROJECT AREA

According to the NDPIII 2020/21 – 2024/25, exploitation of the energy from wood, which is consumed in the form of charcoal or firewood is not reliable because it heavily relies on non-renewable energy, which is both costly, untimely, limited and has serious environmental effects. 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 figure below. A considerable number were found to be using off-grid energy sources such solar (69.9%) for lighting and this points to the proliferation of renewable energy sources in rural areas. Firewood (63.4%) was the most highly used source of energy for cooking. Only a few 16.6% are connected grid power and use it lighting.

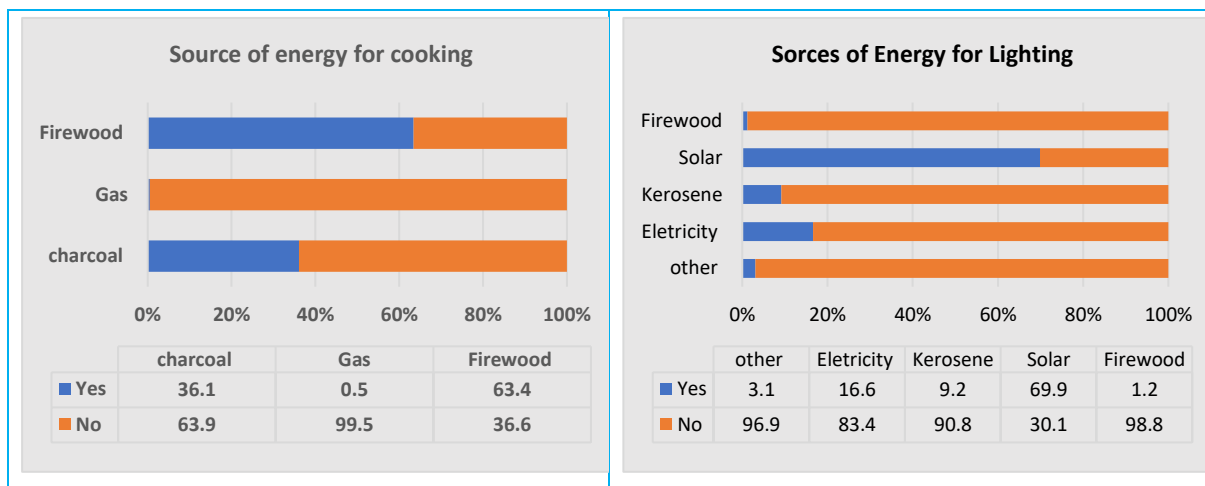


Figure 5-43: Energy sources in the project area

5.4.13 HIV/AIDS

According to the Uganda HIV/AIDS country progress report July 2016-june 2017, the country has made great strides in reducing HIV incidence, HIV related mortality, infant HIV infection and HIV prevalence where the National HIV/AIDS Strategic Plan (NSP) targets were surpassed. The Uganda Population HIV Impact Assessment (UPHIA) results revealed that the country has made significant progress in reducing the HIV prevalence from 7.3% in 2011 to 6% in 2017. More still according to UNAIDS report, there are 1,400,000 people living with HIV and AIDS in Uganda of which 84% know their HIV positive status and 72% of people living with HIV were on treatment. Women are disproportionately affected by HIV in Uganda: of the 1 300 000 adults living with HIV, 770 000 (59.23%) were women. New HIV infections among young women aged 15–24 years were more than double those among young men: 14 000 new infections among young women, compared to 5000 among young men. HIV treatment was higher among women than men, however, with 79% of adult women living with HIV on treatment, compared to 63% of adult men (UNAIDS 2018¹¹). According to the UGANDA POPULATION-BASED HIV IMPACT ASSESSMENT UPHIA 2016–2017 the HIV/AIDS prevail of Namayingo is 4.7% since it lies within the East Central region and the district specific prevalence rate is 5.7%. According to the Namayingo District Third District Development Plan (DDP III) 2020/21 – 2024/25, the HIV prevalence rate is at 5.7%. (Commercial Sex Workers, Fish Folks, BodaBoda, Gold miners and the like. 75% of the district is in Lake Victoria, with 16 Islands & out of which 9 islands are currently habitable.

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

Regarding factor that contribute to the spread of HIV/AIDS, respondents indicated lack of information 23.7%, poverty 16.4%, peer pressure 17.6% prostitution 10.5% and alcohol/drug abuse 4.8%. Numerous factors likely to contribute to the spread of HIV/AIDS are presented in the table below. Prostitution and illicit sex are very common in Namayingo especially among (Commercial Sex Workers, Fish Folks, Boda Boda riders, gold miners whose have an HIV/AIDS prevalence rate of 5.7%.

Table 5-64: Factor contributing to the spread of HIV/AIDS

Factor contributing to the spread of HIV/AIDS	N	Percent
Poverty	72	16.4
Lack of information	104	23.7
Peer pressure	77	17.6
Alcohol abuse	44	10
Drug abuse	21	4.8
Parental neglect	21	4.8
No antenatal care service	14	3.2
No HIV service providers	19	4.3
GBV	10	2.3
Prostitution	46	10.5

Early marriage	10	2.3
Total	438	100

5.4.14 STRATEGIES TO CURB HIV/AIDS SPREAD

When interviewed about strategies of controlling HIV/AIDS, respondents revealed various ways in which it can be controlled such as sensitization activities, Bylaws against prostitution, Promotion of ABC and Bylaws against drug/alcohol abuse among others as shown in the Table 5-65 below.

Table 5-65: HIV/AIDS control

HIV/AIDS control	N	Percentage
Sensitization activities	90	22.3
Prevention of GBV	31	7.7
Bylaws against prostitution	67	16.6
Promotion of ABC	42	10.4
Bylaws against drug/alcohol abuse	29	7.2
Improve antenatal care services	26	6.5
Engage HIV service providers	31	7.7
Bylaws against early marriage	20	5
Gender empowerment	35	8.7
Testing & counselling	32	7.9
Total	403	100

5.4.15 ANTICIPATED POSITIVE IMPACTS

The survey also sought to capture perceptions of the respondents and the wider community about the project. And as such, asked them about the impacts of constructing the water supply system, field results show that 40.4% of the respondents envisage improvement in the quality of life, 19.3% increase in job opportunities 18.1% provide electricity accessibility, 16.4% agricultural productivity and 5.8% boosting trade in the area (Table 5-66).

Table 5-66: Anticipated project impacts

Anticipated impacts	N	Percentage
Will improve quality of life	69	40.4
Will provide electricity accessibility	31	18.1
Will improve agricultural productivity	28	16.4
Will Increase job opportunity	33	19.3
Will boost business in trading area	10	5.8

Total	171	100
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6 STAKEHOLDER ENGAGEMENT

6.1 OVERVIEW

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

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

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

The stakeholder engagement mechanisms employed during this study included information sharing meetings with the stakeholders, focus group discussions and key informant interviews. The information was disclosed in relevant local languages and in a manner that is accessible and culturally appropriate. Meetings were also held with disadvantaged and vulnerable groups affected by the project such as, women, PWDs, youth, elderly, among others. During meetings with the key stakeholders, key issues discussed included; proposed project component, benefits, likely environmental and social risks, impacts and mitigation measures, grievance redress mechanism at community, construction site, Sub County, District and MWE levels covering communities and workers and its importance and role during project implementation among others. This chapter describes the public information and consultation process that was implemented by the consultant as part of the ESIA. The engagement process has been designed to meet both Ugandan legal requirements for stakeholder engagement and international requirements for engagement as outlined in the World Bank Safeguards Policy (OP 4.01 Environmental Assessment).

6.2 OBJECTIVES OF STAKEHOLDER ENGAGEMENT

The objectives of engaging stakeholders during the ESIA study were to:

- a. To introduce the proposed Lugala RGC large solar-powered water supply and sanitation project and ESIA, specifically to inform stakeholders about the proposed project strategies and potential impacts,

- b. Share project information with key stakeholders,
- c. To raise awareness, obtain baseline information,
- d. Obtain stakeholder views, and concerns regarding the proposed project and potential impacts,
- e. Integrate stakeholder views and recommendations into measures to minimise and/or mitigate negative impacts and enhance positive impacts.

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

6.2.1 PRINCIPLES OF STAKEHOLDER ENGAGEMENTS

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

- a. **Stakeholder's appreciation:** During stakeholder engagement with the different groups, the project was welcome, and stakeholders were looking forward to the water project and the associated benefits like enhanced water access and improved sanitation/hygiene.
- b. **Stakeholders' concerns:** Stakeholders including government officials, political leaders, affected communities, and other stakeholders expressed several concerns on the negative impacts of the project such as; delays in project implementation works, poor quality works as a result of contractor not doing a good job, fear of loss of property such as crops especially along the water transmission mains/lines, delays in addressing grievances that may be reported, how the grievance committees will work, issues of sexual and gender based violence, increase in cases of HIV/AIDS, and other concerns.
- c. **Involvement:** Stakeholders especially at District level requested that the contractor involves the District Technical Teams during implementations period.

6.2.2 TARGET STAKEHOLDER GROUPS

Target groups for the ESIA stakeholder engagement included the following:

- e. Ministries, Agencies and national agencies;
- f. Districts' local government authorities, technical and political officials;
- g. Project-affected communities and households ensuring representation of all gender.
- h. Relevant community-based organisations among other interested parties.

6.2.3 ISSUES AND CONCERNS

Early, informed, and prior consultation meetings were carried out first with district technical, political teams together with respective sub-county officials and beneficiary communities were conducted in from February to May 2022. These meetings were held at the respective local government chambers organised by both the consult and respective entity leadership; gave an overview of the project, explained the ESIA process together with likely potential and negative impacts. An interactive discussion was held; participants shared experiences of similar projects, provided their views, fears, expectations regarding the Solar-powered Water Supply and Sanitation project and thereafter

responses by the consultant shared. A summary of the key findings from the consultation process right from the scoping to the detailed ESIA phase are presented in Tables 41 below.

Table 6-1: Key Issues Raised

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
<p>Namayingo District officials on 5th February 2022 at Namayingo District Education Office boardroom</p>	<p>The proposed project is ranked among the key development priorities in the district. There are several upcoming rural growth centres in Namayingo district with limited access to social and public services such as access to safe drinking water and adequate sanitation facilities.</p>	<p>The project will contribute to improved access to safe water as a key development priority in Namayingo district. The ESIA has noted this as a positive impact of the project on social development indicators of the district.</p>
	<p>Ministry of Water and Environment should ascertain the quality of the water at proposed surface water source for the proposed solar powered piped water scheme for Lugala RGC. This is due to the fact that some ground water sources in the district have been rendered unfit for domestic use due to salinity and hardness of the water produced. For instance, the previously constructed Banda Town Council piped water scheme by MME yields hard and saline water, which has hampered usage among the target communities.</p>	<p>The feasibility was conducted and the best option of design recommended surface water from Lake Victoria.</p> <p>The ESIA undertook water quality analysis, the results of which are included in Section 5.1.6. Results obtained from water quality analysis indicate that apart from high levels of E.coli (which can be treated) all the other parameters fall within the recommended levels and, and will be safe for domestic use after treatment.</p>
	<p>The district received a piped water supply scheme in Bugoya, which is located 5km from the proposed scheme. The Bugoya water supply scheme is currently not functional due to water quality issues at the source. The project should consider connecting the proposed Lugala RGC scheme to the water supply infrastructure for Bugoya to increase coverage and utilize the already established non-functional infrastructure.</p>	<p>This concern has been made as key recommendation of the ESIA.</p>
	<p>The project should investigate land ownership issues to ensure no conflict arises after project establishment, especially for the location of the water source, water treatment plant and the reservoir/supply tank.</p>	<p>A project RAP was undertaken to establish land ownership, value land allocated to the project and compensation for locations where the project may utilise the land permanently shall be made.</p>

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<p>The political and technical authorities at Namayingo District should be involved in identification of all projects in relation to the district priority needs.</p>	<p>This was noted and the ESIA processes involved the consultation with Political and technical officials at the local governments within Namayingo District. In addition ESIA has developed a comprehensive ESMPs proposing key roles and responsibilities to Namayingo District LG (see Sections 9.1 and 9.2)</p>
	<p>The project should carefully develop a communication strategy in relation to compensation for land take on the project. Poor communication in relation to compensation for land take may impend project implementation.</p>	<p>A RAP study on the project was conducted. And compensation values determined for approval by GCV. The client with support from service provider shall implement the RAP and Manage E&S risk associated with the project.</p>
<p>MoGLSD on 17th May 2022</p>	<p><u>Land acquisition:</u> For water supply system issues, land will have to be secured especially for intake, WTP, reservoir and along transmission and distribution networks.</p> <ul style="list-style-type: none"> ▪ Consent forms from local leaders and other concerned authorities on land ownership should be availed to address the issues of land ownership. 	<p>During RAP land ownership was ascertained involving local authorities and the client will ensure further verification of documents relating to land ownership with full involvement of local authorities during RAP implementation.</p>
	<p><u>Permits and approvals</u></p> <ul style="list-style-type: none"> ▪ All certification from concerned ministries and authorities i.e.; Directorate of water resources etc., should be acquired. ▪ Site layout plans and architectural designs for solar powered piped water system and all that is entailed therein, should be submitted to the ministry for approval. Additionally, geotechnical survey/ study reports on bearing ratio to hold the pipes should be submitted 	<p>All the permits to be obtained by the Contractor and the Client have been outlined in Section 4.6 above. The client to ensure that all the permits and licences required by the respective entities are acquired.</p>
	<p><u>Design considerations:</u></p> <ul style="list-style-type: none"> ▪ The design lifespan of the sanitary facilities should be based on the size of the septic tank and the target population. 	<p>The Engineering design considered the population projections and the life span of the facilities.</p>

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<p><u>Health and welfare:</u></p> <ul style="list-style-type: none"> ▪ Welfare provision based on gender ranging from accommodation and sanitation facilities. All employees should have written documentation of their contracts (explaining their salary/ wage, time-off duty etc.) ▪ The employees should be pre-medically examined to determine mental capabilities before they are engaged or assigned with different tasks. ▪ HIV/AIDS services should be extended to the employees through provision of contraceptives and allowing them to optionally share among themselves. 	<p>The Contractor shall develop and implement labour management plans which among other consideration shall include recruitment, welfare, HIV/AIDs management, remuneration, grievance redress mechanisms amongst others.</p>
	<p><u>Health and safety considerations:</u></p> <ul style="list-style-type: none"> ▪ Emergency preparedness should be in place, emergency contacts displayed to know whom to contact e.g., red cross has Ambulances to attend to emergencies on road accidents. There should be internal preparedness in case of emergencies. ▪ Firefighting mechanisms especially in camps e.g., Assembly points, fire extinguishers and smoking places should be designated. ▪ Personal Protective equipment should be provided based on the risk assessed. ▪ Safety (occupation & community) during construction should be observed. Risk assessment should be done, mitigation measures addressed and protection explained for preparedness. ▪ The contractor should construct sanitation facilities to cater for labour force to be employed different from public toilets planned for the communities. ▪ During digging of ditches, sites should be hoarded off with clear signage. ▪ Traffic control through signage / flagmen and diversions should be done with the aid of Police and other concerned stakeholders. ▪ Traffic management plans, excavation methods (machines), dust pollution and emanating noise should be addressed. ▪ Driver competency, vehicle maintenance schedules should always be assessed and safe operating distances from the road addressed (50 m for borrow pits and 15-20 m for transmission mains) 	<p>These recommendations have been included in the ESMP. Additionally, the Contractor will be required to develop and implement/enforce health and safety management plans as part of CESMP for both the construction and operation phases, respectively.</p>

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<p>Pollution and environment management:</p> <ul style="list-style-type: none"> ▪ Water treatment plan should guard against waste contamination of the environment, facility pollution to underground waters. ▪ Restore the site to a more likely pristine nature, revegetate and encourage tree planting along the mains and more should be planted around the sludge treatment plant to curb the odour. 	<p>The recommendations have been incorporated in impact assessment and further included in the ESMP. Further more the contractor shall develop and implement pollution and environment management plan as part of the CESMP.</p>
	<p>Community engagement:</p> <ul style="list-style-type: none"> ▪ The vulnerable groups should be planned for especially during the design of sanitary facilities ▪ The redress mechanism plans should be in place to address challenges among workers, workers to community. A committee should be formed therein having natives of the area especially LC chairperson to bridge the gap between workers and community. 	<p>The sanitation facilities have provisions of stances for PWDs, female and males.</p> <p>A Grievance Redress Mechanism for workers and communities has been proposed and shall be implemented by the contractors during construction.</p>
	<p>Employment:</p> <ul style="list-style-type: none"> ▪ The employment policy of the country should be followed; contracts, payment mechanisms, appointment letters should be in place. Children should not be employed ▪ The contractor should be gender sensitive during employment for gender equality. And when employing, some percentage should be from the local people as part of ownership and sustainability of the project. 	<p>The Contractor shall develop and implement labour management plans that are consistent with the employment act 2006. Local workers shall be employed on the project and both men and women shall be given equal opportunities. Child labour shall be strintly prohibited from the project.</p>
Banda Sub County officials on 17th February 2022	For recruitment of skilled and unskilled labour on the project, priority should be given to the youth in Banda Sub County.	The contractor shall provide for employment of skilled and unskilled labour on the project
	When is the project likely to begin?	The contruction is likely to start in mid of 2023 after approval of the ESIA, implementation of the RAP and completion of procurement of contractor and supervising consultant.

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	<p>Since 2019, there is inadequate feedback on the project to stakeholder. There is need timely communication on the project.</p>	<p>The Client shall continue to organise meetings, radio talk shows and briefings/report to the stakeholders during project implementation. A separate consultant is being procured to undertake stakeholders engagement.</p>
	<p>Lugala beach village landing site has no proper waste management facility. The proposed sanitation facility should be located at the landing site.</p>	<p>The project has provision for sanitation facilities, however the location for each of sanitation facilities will be given by local governments.</p>
	<p>The common diseases among the people at the landing site are water borne. With the proposed project, we anticipate a reduction in the occurrence of such diseases.</p>	<p>The purpose of this project is to provide clean and safe water; however, the communities are encouraged to adapt good sanitation and hygiene practices to contribute to the reduction of water borne diseases.</p>
	<p>How much will a jerry can of water cost?</p>	<p>The project feasibility study (MWE, 2019) proposed a Ugx. 50 per 20 litre jerrycan.</p>
	<p>Will there be compensation for land take on the project?</p>	<p>RAP is being undertaken to ensure that there will be compensation for land take.</p>
	<p>The Rwoya – Buhoko piped water scheme previously constructed and operational in Banda Town Council yields saline water. The target population abandoned the scheme. There is therefore limited uptake of the scheme. The proposed Lugala piped water system should consider supply water to Banda Town Council since there is already available water transmission, storage and distribution infrastructure.</p>	<p>The ESIA has taken up this as a key recommendation for the design.</p>
	<p>Has the project defined the location of water kiosks? Will there be compensation for location of kiosks?</p>	<p>The location of kiosks will be determined at project construction phase.</p>

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	The health centres in Banda Sub County should be connected to the safe fresh water proposed. Most clinics use saline water to clean equipment, which corrodes them.	The designed WSS system targets both institutions and households.
	For recruitment of skilled and unskilled labour on the project, priority should be given to the youth in Banda Sub County.	The contractor shall provide for employment of skilled and unskilled labour on the project and shall target the youths.
Meeting with communities in Lugala beach on 5 th May 2022	Residents requested to be considered for job opportunities especially during the construction phase of the project in order to better their Standards of Living.	The contractor shall provide for employment of skilled and unskilled labour on the project
	Local chairperson with consent from the community residents informed the meeting about an ever-increasing population especially with in Lugala trading centre with more of the immigrants from Kenya and the neighbouring districts. This has exerted pressure on the sanitation aspect of the area.	The feasibility study noted these issues and justified for the Lugala WSS system uner IWMDP.
	Lugala HCII only offers out-patient services.	The contractor shall undertake further mapping of health service providers and Lugala HCII may be among the potential medical referral service providers.
	From the numerous encounters made, residents cautioned that during project implementations, the contractor should be vigilant and well equipped with first aid provisions to prevent and manage the common cases of snake attacks reported at Lugala beach.	The contractor shall undertake first aid trainings and establish first aid facilities during construction.
	There are increasing cases of sexually Transmitted Infections especially HIV/AIDS emerging from unsafe indulgences and there are also reported cases of rape against women and girls as attempts to collect water from the Lake.	The contractor to develop and implement measures for HIV/AIDS, GBV and VAC prevention and management. In addition, the client is procuring a dedictaed consultant for managing E&S risks including HIV/AIDS, GBV, VAC, EHS during construction.

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
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	The road crossings on the project have been noted. MWE will consult UNRA before construction across road crossings
	There is lack of consultations with UNRA as decisions are made to cross roads without notification and inputs to UNRA	
	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	MWE to consult URNA regarding road crossings.
	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.	Maintenance of the channels shall be undertaken to remove debris so as to allow smooth flow of the water.
Meeting with communities in Buchumba village on 5 th May 2022	The community members welcomed the project and informed the consultant that they have a big challenge of unclean water where by some community members defecate in the lake water yet it is the same water, they drink hence diseases like diarrhea dysentery and bilharzia.	The purpose of this project is to provide clean and safe water; however, the communities are encouraged to adapt good sanitation and hygiene practices to contribute to the reduction of water borne diseases.
	The chairman shared that they have one functioning borehole which is very far for some community members and it always has long lines where by it is shared by two villages which forces some people to depend entirely on lake water which contains germs hence in need of other water sources that are reliable	The feasibility study noted the challenges of WSS supplies in lugala RGC, hence proposed this intervention.
	Men complained that their wives spend a lot of time at the borehole and lake while rumourmongering and making deals with other men which has contributed to domestic violence in most families.	The proposed WSS supplies shall contribute to reduction of travel times to water sources which will further mitigate domestic violence amongst the families.

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	They mentioned that there is a fear when the project starts, the community members will be not involved in anyway and informed that some community members can do casual labouring and others are learned degree holders and can apply their skills therein.	The contractor shall provide for employment of skilled and unskilled labour on the project and shall target the youths.
MWE (with DWRM, Wetlands Department and Enviromental Affairs) on 8 th June 2022	For every catchment area identified for source water protection, the catchment management organization/ committee should be engaged.	Source protection plan is being developed for the water source.
	Ensure to develop sanitation/ solid waste management plans and clearly indicate the dumping so as to prevent issues of leachates and salts flowing to water sources and pollution of the environment due to improper solid waste handling.	The contractor shall develop waste management plan as part of CESMP to address solid wastes management during constratction. However, the communities are encouraged to adapt good saniataion and hygein practices so as to contribute to the reduction of water pollution.
	The developer should obtain wetland user permits prior to installation of the pipes.	During constraction the contractors shall obtain wetlands use pertmits to allow for crossing of the pipe works.
Meeting at Banda Secondary School on 5 th May 2022	The head teacher welcomed the project and appreciated the ministry of water for commendable development coming in the area. He therefore recommended that the new solar piped water supply should consider supplying water to the school and the neighbouring Banda Primary school.	The project shall support institutions such as schools and health centers amongst others with WSS.
	The school is the only government aided secondary aided school in the subcounty with a total enrolment of 1215 students with 757 boys and 458 girls ranging from primary one to six. In dry seasons the school also allow students move out in search for water from boreholes in the neighbouring communities. This puts the girls in a risky situation where they may be assaulted and, in some cases, impregnated.	Additionally, the contractor shall work closely with school management to ensure protection of school communities from any risks such as Accident, SEA, child labour, HIV/AIDs etc during constructions.
	The head teacher informed that the school including the entire subcounty have water challenge. The implementation of the Banda Town Council piped water supply was a flop as	The proposed water source will be Lake Victoria hence the issues of hardness water may not arise.

Stakeholder/Date/ Venue	Views and concerns	Response/Clarification by the Consultant
	the project didn't yield any fruits. The water supplied was hard and saline which the community abandoned and resorted to other sources.	Further regular monitoring of water shall be undertaken by MWE.

6.3.1 OVERVIEW

Effective grievance redress mechanism gives an opportunity to the organization to implement a set of specific measures to ensure good governance accountability and transparency in managing and mitigation of environmental and social issue of a particular project. The community grievance redress shall consist of grievance committees and shall be formed at the community level, construction site, Sub County/town council, District and MWE. A separate GRM for workers shall also be formed at the Construction site. The flow of grievance management is provided under Annex I. The GRM shall be disclosed as part of stakeholder engagement.

6.3.2 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

6.3.3 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

6.3.3.1 MEMBERSHIP AND COMPOSITION OF GRIEVANCE MANAGEMENT COMMITTEE STRUCTURES

- GMCs at Village or Parish Levels
- Village and Parish GRM committees will be established as voluntary committees for each infrastructure to be constructed at village or parish levels depending on the community dynamics, area covered and nature of works. Community GRM Committees will have 10 members including
 - Chairperson,
 - Vice Chairperson,
 - Secretary,
 - Other Members (7) including a youth, Elderly Person, PWD and at least 3 members should be female. Quorum sitting shall be of at least five (5 members).

The LC I Chairpersons and Vice Chairpersons will be ex-officials to these committees.

NB: The committee shall be formed either at village or parish level given that linear projects traverse several communities. It is important that committees are accessible to communities at village or parish level.

6.3.3.2 GMCS AT CONSTRUCTION SITES

Each construction site shall have a Site GMC responsible for handling all community grievances related to construction including those grievances referred by the village/ Parish GMC. The Site GMC shall comprise of the following;

- The Resident Engineer/ Supervising Consultant (Chairperson)
- The Contractor's Contract Manager
- Sociologist for the Consultant
- Sociologist for Contractor (Secretary)
- Environmentalism for the Consultant
- Environmentalism for the Contractor
- Health and Safety Officer for the Contractor
- 2 Community Representatives (1 Female and 1 Male)

This committee shall consolidate and address all grievances from the community at the site and escalate any matters appropriately to the respective Local Government and MWE.

6.3.3.3 GMC AT SUB COUNTY/TOWN COUNCIL LEVEL

The committee will be formed at the sub-county level and its membership shall consist of;

- Local Council III (chairperson);
- The Sub County Chief,
- Community Development Officer (Secretary)
- Environment focal person
- Representatives of PAPs
- Parish Chief of the respective area where the complaint originated from.

6.3.3.4 GMC AT DISTRICT LEVEL

At the District Level, the Grievances Management Committee shall consist of;

- a) LC V Chairperson (Chairman)
- b) Chief Administrative Officer or a his/ her Representative
- c) District Community Development Officer (Secretary)
- d) Head of Natural Resources
- e) District Water Officer
- f) Representative from the PAPs
- g) District Lands officer

Note: Due to complex nature of grievances, the committees can be extended to include any other relevant officers suitable for addressing the prevailing grievances.

6.3.4 WORKERS GRIEVANCE COMMITTEE STRUCTURES

The common anticipated Grievances for Employee may include; Unsafe physical working conditions, Failure to issue formal contracts to workers, Illegal termination of contracts, Changes without prior notice, Poor employee relations, Poor/ failure/ delayed remuneration, Violation of workers' rights, Inadequate safety, health, and welfare amenities, Labor-management hostility, Incidences of workplace favouritism and nepotism, among others.

The grievance redress system for workers shall have three major committees set up and supported. These include the Workers' Council, Site Disciplinary Committee and overall Grievance Committee.

6.3.4.1 WORKERS' COUNCIL

The workers' council shall be constituted 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.

6.3.4.2 SITE DISCIPLINARY COMMITTEE

During the construction phase, a number of disciplinary related cases might emerge. Hence, each Site shall have to set up site disciplinary committee to ensure self- enforcement mechanism of discipline among workers.

The committee shall comprise of;

- a) Consultant's Sociologist (Chairperson)
- b) Contractor's Human Resource Officer (Secretary)
- c) Workers' representatives (a Female and a Male).

The site disciplinary committee shall receive all disciplinary related complaints referred from the Workers' Council or from the Contractor's Management.

6.3.4.3 OVERALL SITE GRIEVANCE MANAGEMENT COMMITTEE (GMC)

Each construction site shall have a Site Grievance Management Committee comprising of the following;

- a) The Resident Engineer/ Supervising Consultant (Chairperson)
- b) The Contractor's Contract Manager
- c) Sociologist for the Consultant
- d) Sociologist for Contractor (Secretary)
- e) Environmentalist for the Consultant
- f) Environmentalist for the Contractor
- g) Health and Safety Officer for the Contractor

6.3.4.4 MANAGEMENT OF GBV, VAC AND OTHER OFFENSES

The management and referral of GBV, VAC, and other related criminal cases or allegations shall be inline with the Uganda Criminal Judicial requirement. The contractor and client shall ensure adequate sensitizations of stakeholders on the prevention measures and reporting of all criminal cases including GBV and VAC. In addition, MWE is recruiting dedicated consultant to among others ensure the implementation of mitigation measures, reporting and survivor centered management of GBV and VAC on the project. The reporting and referral pathways have been presented under annex I.

6.4 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.

7 ANALYSIS OF ALTERNATIVES

Analysis of alternatives aids to maximize environmental and social safety. Alternatives can take on several forms including technological options, project site options, transportation options, labour sources and type, among others.

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:

- f) Project or No Project Alternatives;
- g) Site Location and Design Alternatives;
- h) Routing Alternatives, and
- i) Technology Selection Alternatives.

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

7.1 PROJECT VS NO PROJECT OPTION

7.1.1 "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 Adjumani Water Supply System is not implemented. This means that all the proposed project components sites would remain in their current state, with neither positive nor negative impacts e.g., water resource potential of Lake Victoria would remain unchanged as water will not be extracted. This alternative ignores all the immense positive impacts. In this respect, government and the communities would lose all potential benefits associated clean water. The low water supply and sanitation services in the area would continue to exist.

In the long term, the no-project scenario would be more disastrous as the biggest population in Namayingo District specifically Banda Sub County would continue using point water sources that 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, and generation of 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. In short, Uganda's Vision 2040 of having a piped water supply across the country and poverty eradication would be futile.

7.1.2 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 Lugala RGC is urgently needed by the community improve water access and to accelerate development in the project area. All stakeholders consulted had no objection to the proposed project implementation activities. They were very optimistic about the project citing its contribution to developments in the district, through job creation, revenue collection by government and other secondary socio-economic benefits, which the proposed development will create.

7.1.3 CONCLUSION ON PROJECT OR NO PROJECT ALTERNATIVES

This “No Project Alternative” is not sustainable in the short and long run because the growing demand for clean water in Namayingo District, Banda Sub County needs a remedy. This option is therefore not recommended.

Therefore, the minor benefits of the No-Project option are far outweighed by the benefits to be attained through implementing the project, hence, the “Project Alternative” is taken as feasible for implementation on condition that the identified impacts are mitigated as suggested.

7.2 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.

7.2.1 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 933.63 m³/day. Ground water and surface water options were considered as further detailed below.

7.2.1.1 GROUND WATER

The ultimate year (2040) maximum day demand is 933.63 m³/day. An analysis was carried of the borehole yield required for 16-hour pumping regime in Table 7-1 below.

Table 7-1: Available Borehole Capacity

Lugala RGC	Maximum Day Demand at Given Tariff (m ³ /day)		
	USh 36/ 20L	USh 50/ 20L	USh 83/ 20L
Demand- m ³ /hr	62.50	58.35	50.98
1 No Borehole	62.5	58.4	51.0
2 No Boreholes	31.3	29.2	25.5
3 No Boreholes	20.8	19.5	17.0
4 No Boreholes	15.6	14.6	12.7

It is proposed that at least three boreholes of 19.5 m³/hr yield over a 16-hr pumping regime. However, the geological structure of the ground water is such that the water is saline and will thus require specialised treatment processes whose operations and maintenance costs are high.

7.2.1.2 SURFACE WATER FROM LAKE NAKUWA (L. KYOGA)

The project will abstract 933.63 m³/day of raw water from L. Victoria in Lugala Beach Village to meet the average day demand for Lugala RGC of 934 m³/day by 2040. Lake Victoria contains about 2,750 cubic kilometres (2.2 billion acre-feet) of water. The proposed project water abstraction is negligible compared to the Lake storage capacity.

7.2.1.3 CONCLUSION ON GROUND OR SURFACE WATER SOURCES ALTERNATIVES

The surface water source of Lake Victoria can provide the quantity of water needed for the piped water supply for Lugala RGC. Groundwater sources in the form of production wells are a viable source of water for the piped water supply system however the saline nature of this water provides as seen in the water quality analysis of samples carried out on samples by NWSC laboratories in Bugolobi as shown in Annex 8.3, indicate a treatment challenge as the treatment process is costly which may lead to increase in the cost of production of water resulting to the increase of the tariffs hence this option has been ruled out

7.2.2 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.

7.2.2.1 WATER TREATMENT PROCESS SCENARIOS

Table 7-2: Two Alternative Water Treatment Scenarios

Component	Scenario I (Packaged WTP)	Scenario II (Conventional WTP)
Intake Capacity (m ³ /day)	980.31	980.31
Intake Structure	1No.	1No.
Raw Water Pumping Main (m)		
OD225 uPVC PN10	300	300
Raw Water Pumps (Submersible)		
Head 16m, Flow 61.27m ³ /hr	2No. (1No. Duty, 1No. Standby)	2No. (1No. Duty, 1No. Standby)
Water Treatment Plant Capacity (m ³ /day)	1,120.00	933.63
Packaged Water Treatment Plant (70m ³ /hr)	2No.	
Alum Dosing Unit and House		1No.
Rapid Hydraulic Mixing Tank		1No.

Component	Scenario I (Packaged WTP)	Scenario II (Conventional WTP)
Aerator		1No.
Flocculator - Horizontal Flow Type		1No. Channel with 5No. Compartments
		9.1mx2.0mx2.0m deep with 5 Baffels
Sedimentation Tanks		2No. Rectangular
		13mx4.3mx3.0m deep
Rapid Gravity Sand Filters		4No. Rectangular
		5.4mx2.7mx2.0m deep
Clear Water / Contact Tank		2No. Rectangular
		8.35mx3.75mx3.5m deep
Sludge Drying Beds		1No.
Sump, Chlorine Dosing Unit and Pump House	1No.	1No.
Clear Water Pumps		
Head 82m, Flow 58.35m ³ /hr	2No. (1No. Duty, 1No. Standby)	2No. (1No. Duty, 1No. Standby)
Backwash Pumps		
Head 11m, Flow 2.92m ³ /hr	2No. (1No. Duty, 1No. Standby)	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	3,500	3,500
Storage Tank	296m ³ Cold Pressed Steel Tank Elevated on 15m steel tower	
Distribution Network (m)	13,160	

Component	Scenario I (Packaged WTP)	Scenario II (Conventional WTP)
Source: Project Estimates		

The preliminary capital investment costs determined for the proposed water supply and sanitation interventions as summarized in Table 7-3 below.

Table 7-3: Summary of Combined Capital Cost Estimates

Item	Description	Capital Investment Costs	
		Scenario I	Scenario II
1.0	Preliminary and General Items	600,116,668	464,516,175
2.0	Intakes / Pump House	673,254,676	673,254,676
3.0	Treatment Plant Works	3,364,924,928	1,795,000,000
4.0	Raw Water Transmission Mains	42,033,917	42,033,917
5.0	Clear Water Transmission Mains	200,358,236	200,358,236
6.0	Storage Reservoir	385,250,000	385,250,000
7.0	Distribution Network and Service Connections	665,824,926	665,824,926
8.0	Water Office	120,000,000	120,000,000
9.0	Mechanical and Electrical for Raw Water	155,000,000	175,000,000
10.0	Mechanical and Electrical for Clear Water	221,000,000	497,000,000
11.0	Solar Items	173,520,000	91,440,000
	Sub Total 1	6,601,283,351	5,109,677,930
	Allow 10% Contingency	660,128,335	510,967,793
	Sub Total 2	7,261,411,686	5,620,645,723
	Allow 18% VAT	1,307,054,103	1,011,716,230
	Grand Total	8,568,465,789	6,632,361,953
Source: Project Estimates			

The per capita investments and re-investment costs for each scenario was calculated for the initial year (2020), intermediate year (2030), and the ultimate year (2040). The computations have been based on the served population. The results are given in **Table 7-4** below.

Table 7-4: Per Capita Investment & Re-investment Costs

Per Capita Investment Cost	Currency
----------------------------	----------

	Scenario I (PWTP)		Scenario II (CWTP)	
	(USh)	(US \$)	(USh)	(US \$)
Resident population - Initial year (2020)	993,319	261	768,871	202
Resident population - Intermediate year (2030)	699,387	184	541,355	142
Resident population - Ultimate year (2040)	492,455	130	381,181	100
Per Capita Re-Investment Cost	Currency		Currency	
	(USh)	(US \$)	(USh)	(US \$)
	(USh)	(US \$)	(USh)	(US \$)
Resident population - Intermediate year (2030)	59,380	16	84,311	22
Resident population - Ultimate year (2040)	41,811	11	59,365	16
Source: Project estimates.				

7.2.2.2 CONCLUSION ON WTP SCENARIOS

The best Internal Rate of Return (IRR) is got from the Scenario II (+1.5%) with Scenario I having an IRR of +0.9%. This means that at the tariff of USh 2,500 per m³ both Scenarios provide a surplus hence can break even. 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.

7.2.3 TARIFF DETERMINATION

The unit consumption rates, the levels of service and the consumer population figures have been used to calculate the water demand at the various tariff levels. The water demand computation has been made based on the ability to pay (5% of Income), with the consumption based on the adopted unit rates, and for the different tariffs of Ush 36, 50 and 83 per 20 litres.

A tariff of Ush 50/20 litres has been adopted. This is the proposed tariff to be charged by the operator of the system. The demands at tariffs of USh 36 and 83 have been calculated for comparative purposes only.

The ranges of the maximum day total demands are given in **Table 7-5** below. This is inclusive of 20% un-accounted for water. A maximum day factor of 1.3 has been applied to the average day demands.

Table 7-5: Summary of Maximum Day Demands

Basis of Computation	Demand at Given Tariff (m ³ /day)			
	NWSC 2018 (PSP-Urban Poor)		Umbrella Tariff (Proposed Tariff)	NWSC 2018 (Domestic)
	USh 36 / 20L		USh 50/ 20L	USh 83 / 20L

ATP (5% Income)	1,000	934	816
Source: Project Estimates			

7.2.3.1 CONCLUSION ON TARIFF DETERMINATION

The computation based on ATP (5% income) at the water tariff of US\$ 50 per 20 litres results in the second highest demand when compared with the other tariffs. The demand at the Tariff of US\$ 36/20 litres gives the highest demand with that at the Tariff of US\$ 83/20 litres being the lowest. The demand at the proposed tariff of US\$ 50/20 litres was adopted at a 934m³/day for the ultimate year to meet the feasibility of providing water to the RGC.

7.3 SANITATION FACILITIES

7.3.1 ALTERNATIVE TYPES OF SANITATION FACILITIES

There are many types of sanitation facilities used in Uganda (**Figure 7-1**), 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.

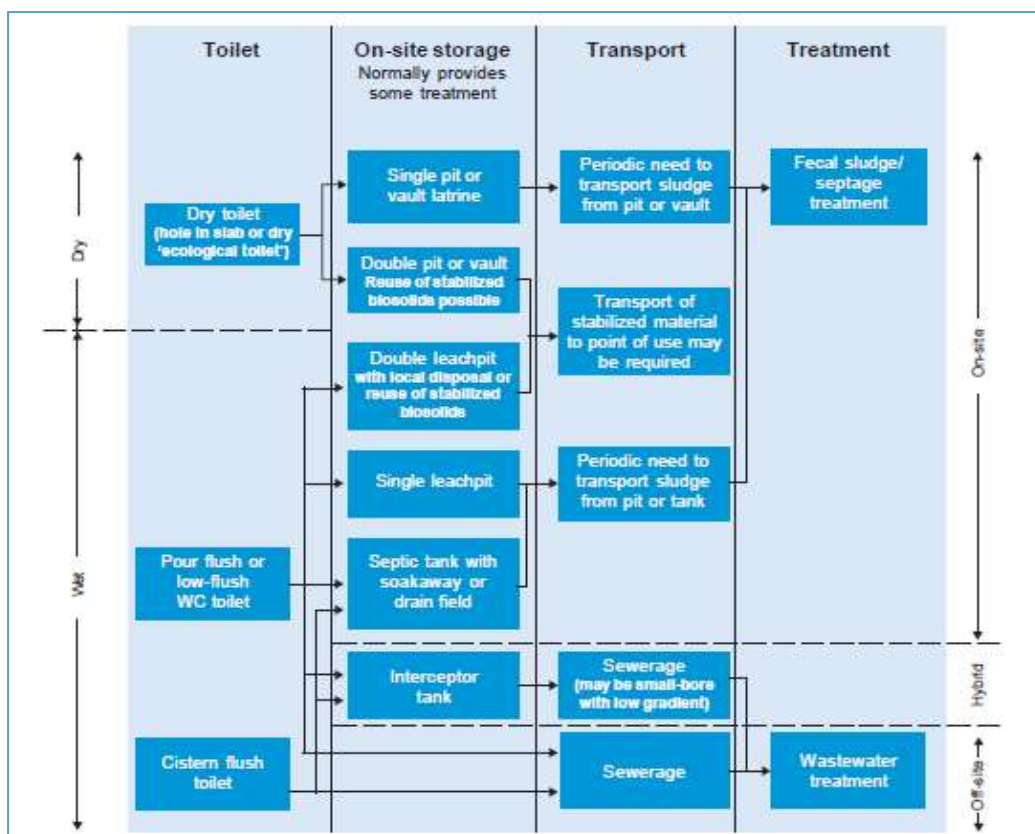


Figure 7-1: Categorisation of sanitation facilities

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

Table 7-6 below.

Table 7-6: Factors for selection of public sanitation technology options

Factor	Description
Institutional Factors	<ul style="list-style-type: none"> These factors are related to the effective O&M arrangements that could be put in place given the financial and human resources available
Physical Factors	<ul style="list-style-type: none"> Insufficient space to store faecal waste – this is more likely to be a problem for vaults that are normally raised above floor level than for pits and tanks which can be located below floor level. Insufficient space to allow absorption of waste water into the ground – this is mainly a problem for cistern flush toilets discharging to septic tanks followed by soak aways. Another factor to be considered is that seepage from soak pits and soak a way sited close to buildings can cause damp problems in buildings and result in structural damage although damp proof can be used. Ground conditions include the soil type. The soil type affects the operation of soak aways due to the infiltration capacity of the soil
Environmental Factors	These factors are concerned with the source of water, for instance:

Factor	Description
	<ul style="list-style-type: none"> ▪ Where the community is dependent on boreholes for their drinking water, the possibility of ground water contamination must be considered as this is a potential problem mainly for on-site technologies. ▪ A minimum distance of 10m should be allowed between a soak pit and a shallow well, but this standard will almost be impossible to achieve in most urban settings. ▪ Where the groundwater table is more than 1.5m below the bottom of the pit, the most likely contamination route will be along the side of the well. This suggests that, if off-site technologies are not feasible, the focus then should be on blocking the potential contamination route along the side of the well for instance by using a puddle clay layer
Socio-economic Factors	<p>These factors include the level of water supply service (i.e. house connections are feasible with a sewerage system) and the population/ housing density (i.e. onsite systems are more appropriate for less densely populated rural areas).</p> <p>The total quantity of wastewater produced will depend on water consumption, which in turn will depend on the location of the water source and the length of time for which water is available each day. When per capita consumption is relatively low (<30l/c/d) then, depending on ground conditions and population density, it should be possible to deal with all the waste water on-site.</p> <p>When per capita consumption is higher, on-site disposal of black water is still possible, but sullage water will need to be disposed of off-site. Off-site disposal of all waste water will be required if black water and sullage water flows are combined on-site to produce sewage</p>
Cultural Factors	<p>Cultural factors are related to the cultural norms and practices of the community especially about, anal cleansing, faecal disposal and the general hygiene practises. Sanitation systems, even when they are properly designed, may not be appropriate when social and cultural factors affecting sanitation and hygienic practices of the community members are not considered.</p> <ul style="list-style-type: none"> • For instance, technologies involving re-use of excreta are unfeasible in communities where sight or handling of waste is culturally and socially unacceptable. • In the same way, dry technologies are inappropriate for communities which prefer water for toilet hygiene. • In communities that require a high level of privacy, the design of communal facilities should provide for these requirements.
Financial Factors	<p>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.</p>

1.1.1 Sanitation Facility Alternative

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

Table 7-7: 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. Can contribute to pollution of surface water and ground water sources.	Suitable for a household not public or institutional use			

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
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
		Does not need water for operation.	Suitable for public or institutional use		Emptying costs may be significant compared to capital costs.	
	Can accept common degradable anal cleansing materials	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.	

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
		<p>Significant reduction of pathogen</p> <p>Sludge requires secondary treatment and/or appropriate discharge.</p> <p>Can contribute to pollution of surface water and ground water sources.</p> <p>Requires constant source of cover material (soil, ash, leaves, etc.).</p>				
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 precautions (low or no operation cost).	Use requires practice and/or skills		
		Urine and treated faeces can be recycled for agricultural purposes if desired		Careful slab washing required if faeces to remain dry.		
		Urine may cause odour problems		Moslems and others who use water for anal cleansing may find dehydrating eco-		
Requires a constant source of ash, sand, or lime.						

Sanitation facility type	Physical Factors	Environmental Factors	Socio-economic Factors	Cultural Factors	Financial Factors	Score
				sans more complicated to use		
Double-Pit Pour Flush with Cesspit*		Use of stored material as soil conditioner	Because of the alternating pit design, their life is virtually unlimited. i.e., reduced reinvestment costs.		Low cost (though higher than for simple pit latrines).	Positive +8 Negative -3 Total=5
		Moderate reduction in pathogens	Relatively simple construction so some or all can be built by the householder			
		No flies or odour problems	Suitable for public or institutional use			
		Even if limited, a constant source of water must be available.				
		Requires construction of a pit – which may be difficult in areas of hard ground or high groundwater.				
Can contribute to pollution of surface water and ground water sources.						
Full Flush Toilet + Septic Tank + Soak Pit	Septic tank can be built and repaired with locally available materials.	No odour problems if used correctly.	Cheaper than sewerage for medium to low population density.	Widely used in Uganda	Longest life space with emptying and proper disposal of wastewater	Positive +10 Negative -5

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

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

When the sanitation facilities fill up, they must be emptied and faecal sludge disposed of. This sludge is to be disposed 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. Lugala RGC is in Banda 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 is 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 a fee for every time, they use the toilet or, a standard user fee is charged for using the toilet at any one time.

8 IMPACTS ANALYSIS, ENHANCEMENT AND MITIGATION MEASURES

8.1.1 IMPACT DESCRIPTION

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

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

Cumulative (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.

8.1.2 IMPACT SENSITIVITY

Sensitivity is generally site specific and criteria the was developed from baseline information gathered. The sensitivity of a receptor was determined based on review of the population (including proximity, numbers, vulnerability, among others) and presence of features (sensitive ecosystems), such as rare and endangered species, unusual and vulnerable environments, architecture, social or cultural setting, major potential for stakeholder conflicts on the site or the surrounding area. Generic criteria for determining sensitivity of receptors are outlined in **Table 8-1**. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study.

Table 8-1: Criteria for rating impact sensitivity

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

8.1.3 INTENSITY OF IMPACT

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

potential impacts, categorized as major, moderate, minor, or negligible based on consideration of the parameters such as:

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

Each of these characteristics is addressed for each impact. Consideration of the above gives a sense of the relative intensity of the impact.

Table 8-2: Criteria for rating impact intensity

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

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

8.1.4 IMPACT EVALUATION AND DETERMINATION OF SIGNIFICANCE

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

Impacts will be identified and significance will be attributed considering the interaction between intensity criteria and sensitivity criteria as in the significance matrix (**Table 8-3**).

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

Table 8-3: Determination of impact significane

		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.

8.1.5 CUMULATIVE IMPACT ASSESSMENT

The combined, incremental effects of human activity, referred to as cumulative impacts, pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts

accumulate over time, from one or more sources, and can result in the degradation of important resources.

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

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

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

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

Step 3: Establish Information on Baseline Status of VECs

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

Step 4: Assess Cumulative Impacts on VECs

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

Step 5: Assess Significance of Predicted Cumulative Impacts

Determination of impact significance and overall agreement among affected communities and other relevant stakeholders strengthens mitigation measures and monitoring programs, focusing on

expected probable cumulative impacts. The significance of all CIs was evaluated not in terms of the amount of change, but in terms of the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed implying evaluation of CIs in the context of ecological thresholds. Therefore, appropriate thresholds and indicators were defined to determine impact and risk magnitude and significance in the context of past, present, and future actions including identification of identify trade-offs hence establishment of how these impacts will affect the sustainability and/or viability of the resource and/or VEC and the consequences and/or trade-offs of taking the action versus no action.

Step 6: Management of Cumulative Impacts – Design and Implementation

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

8.2 PRE-CONSTRUCTION PHASE POSITIVE IMPACTS

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

8.2.1 SHORT-TERM EMPLOYMENT

Limited employment opportunities shall be 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 local residents along the alignment

8.3 PRE-CONSTRUCTION PHASE NEGATIVE IMPACTS

8.3.1 SOCIAL ANXIETY

Information disclosure on impending implementation works of Lugala 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 Lugala and Buchumba Parishes, Banda 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 5.4.7.3) 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 Lugala 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

8.4.1 CREATION OF EMPLOYMENT OPPORTUNITIES FOR THE LOCAL PEOPLE

Temporary job opportunities shall be available during the construction phase of the project. The possible direct jobs for community workers include unskilled (casual labour) and semi-skilled works for trenchers, plumbers, masons, painters, carpenters, mechanics, electricians, mixer operators, steel benders, drivers, community educators, porters, cooks, and security guards. These will be involved in construction works for laying pipes, water towers, sumps, pump stations, among others. This shall be an important positive impact to the community because unemployment has been cited as one of the most pressing problems in Uganda today with the youth unemployment increasing from 13.3 per cent in 2013 to 18.6 per cent in 2015¹². 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 5.4.6.1), 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 Lugala 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

8.4.2 CREATION OF MARKET FOR CONSTRUCTION MATERIALS

The Project will require construction materials, some of which will be sourced locally from Lugala 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.

8.4.3 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

8.4.4 RENTAL INCOME

Property owners in Lugala and Budala Trading Centres and surrounding areas in Banda 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.

8.5 CONSTRUCTION PHASE NEGATIVE IMPACTS

8.5.1 LOSS OF LAND AND DISPLACEMENT OF ECONOMIC ACTIVITIES

The project mostly traverses farmland under cultivation along with settled and built-up areas. The project developer, MoWE, intends to mostly use road reserves of the existing public roads which are government land for the transmission and distribution lines. However, the water source site, and storage reservoir sites shall be located on private land, whose owners will be engaged by MoWE and local leaders in the process of land acquisition in accordance with the Land Act and World Bank Environmental and Social safeguard policies as well as relevant national laws. According to the RAP (2022), the project will require a permanent land take and an easement corridor (from a total of approximately 2.405 acres with PAPs (Table 8-4). Given the current land use/cover of the key project sites, this will be converted as construction of project facilities occurs on the respective sites. The

clearing of corridor, movement of equipment and contractor staff and laying of pipes may lead to spot destruction of crop gardens and farm lands. Furthermore, the intake and WTP as well as access road to the site are used for sand mining, which may result in displacement of an economic activity, source of livelihood and source of revenue to Lugala Parish and/or Banda Sub County.

Table 8-4: Project Land Takes

Impact	Land Affected in Acres
Permanent Land Affected (Water Source Sites, Reservoir Sites, Access Roads, and Sanitation Facility Sites)	0.704
Permanent Land Restriction (Easement for Transmission and Distribution Pipes)	1.701
Total Land Affected	2.405

In general, the loss of land will be direct, permanent and irreversible but non-cumulative. This will be limited to proposed sites and a long-term impact. The intensity will be low since the project foot print requires small pieces of land per component, per locality and the water pipelines will mainly lie in the road reserve except the areas where access to the source and reservoir sites is required. The sensitivity has been assessed as medium because there is no physical displacement of human settlement, physical cultural resources and/or significant economic displacement. Therefore, the overall impact significance is **moderate**.

Mitigation measures

- The water transmission line routes should be as much as possible restricted within the road reserves.
- Where land take is envisaged, compensation should be adequate and timely done. All land acquired for establishment of the water sources, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies.
- Sensitize the community early enough about the project so that, those affected by the project will have time to relocate their businesses to secure settings and have the right procedure for following the appeal procedures in the GRM. Prior to the construction phase, farmers shall be sensitised on the pending project at least 6 months in advance such that cultivation within the project sites/ components’ footprint is stopped or reduced.
- As part of the RAP, a comprehensive impact survey is being conducted by experienced valuers in association with the district land board and local leaders. The results of the RAP will indicate all affected crops within the water transmission corridor/way leave, the respective owners and the replacement costs.
- PAPs should be given financial literacy on how to use their compensation packages.
- LGs should be involved in mobilisation and sensitizing PAPs.
- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to vegetation and crops.

Residual impact significance: Minor

8.5.2 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 400m 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 (50m²) 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**.

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 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; 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*

8.5.3 VEGETATION CLEARANCE

Project implementation works could result in damage to trees such as uprooting especially the small trees, breaking of branches and peeling of the barks which can lead to their death. Destruction of this floral vegetation will lead to loss of landmarks and aesthetic appeal of these locations in addition to loss of shades for crops, animals, farmers and other species of crops and animals. It could also

contribute to increasing their conservation concern. However, the earmarked sites for project implementation especially along the transmission lines, WTP, reservoir tank, sanitary facilities and water source sites do not have floral species of conservation concern and minimal vegetation clearance will be ensured during project execution works.

The vegetation survey enumerated a total number of one hundred, sixty-eight (168) individual species were recorded, from forty-two (42) families along the transmission lines and other project component sites. These were mainly herbs or grasses, trees/shrubs and liana species. However, out of the one hundred, sixty-eight (168) plant species encountered in all study sites, none of them have been listed on the IUCN Red List of Uganda, 2018. Therefore, the species are of no great conservation concern in the country and in the region but bearing in mind the impact and effect of deforestation and forest degradation on the ecosystem.

The sensitivity of the project area to loss of vegetation is low due to low species diversity and only one species of conservation concern in the project area. The intensity of the impact is also low since the project vegetation clearance will only be limited to identified project sites; mainly at the WTP (already degraded by sand mining), the reservoir (located on a cassava monocrop field), water office and sanitation facilities sites (located on built area) and the transmission and distribution lines (along community access roads). The overall significance of the risk is **minor**.

Mitigation measures

The following measures recommended for mitigating impacts on roadside trees.

- a) All trees within the earmarked areas for the transmission lines and other project components shall be marked for protection and recorded before construction activities begin in any given section.
- b) Land scaping and restoration of indigenous vegetations e.g., grasses, forbs, shrubs etc
- c) All local councils shall be sensitized on the importance of the trees within the project area and are assured that they will be protected during project implementation works.
- d) In addition to protecting the existing trees, more will be planted within the project area especially adjacent to project component facilities such as the water source, sanitary facilities and the reservoir tank as part of MoWE's project area greening program, at least 5 trees for each tree cut at locations of project components.
- e) The Contractor shall get permit from the local government for tree cutting in case they fall within the project foot prints.



Figure 8-1: Trees, crops and other vegetation adjacent to the WTP and Reservoir sites

Residual impact significance: *Negligible*

8.5.4 POTENTIAL LOSS OF FAUNA

Fauna Species such as butterflies, birds, dragonflies, mammals, amphibians, among others listed in Section 5.3.3 are mobile, deriving most of their nutritional and some non-nutritional resources from plants. Some estimate of about 300 trees (fruit trees and non timber) and shrubs especially along the earmarked transmission line and other project component facilities will be lost as detailed above. For Herpetofauna, some of the trees in and around the project components sites will be felled leading to loss of some of their hiding and basking grounds such as for the lizards. Some herpetofauna especially lizards may be killed or injured as a result of earth works or indiscriminate killing due to negative attitude towards them. There could be loss of nesting or roosting grounds for the birds established after this ESIA study as a result of felling the trees in different project sites. As the contractor clears the sites for establishment (construction civil works) of different project components, hiding and feeding places for small mammals are likely to be lost. There is always temptation for people to kill small mammals especially rats when seen during construction activities.

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

Mitigation Measures

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

Residual impact significance: *Negligible*

8.5.5 POTENTIAL INTRODUCTION OF INVASIVE PLANT SPECIES

Invasive plant species have the potential to colonize rapidly with detrimental effects on diversity and prevalence of indigenous species. Invasive species recorded within the project area include *Parthenium hysterophorus*, *Oryza barthii*, *Lantana camara*, *Mimosa podica*, and *Mimosa pigra*. Besides the problems dodder may cause to crops, it represents an important and fascinating part of natural communities where it contributes to the ecological equilibrium like any other species. It is

noted that, invasive species propagation is still a fascinating science as such, they tend ramify an ecosystem and sometimes outcompete native species. Although several methods can be applied to control the infestation, these are not always successful and lead to loss of the harvest¹³.



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

During project implementation works especially for establishment of transmission trenches and other civil works, mechanical and manual equipment does disperse seeds of these plants as they clear vegetation and undertake excavation works. Seed dispersal will also be associated with haulage raw materials such as sand and gravel to the different project sites.

The sensitivity of the project area to invasion by invasive species is low since the area already has such species. The intensity of the impact is low since the project activities will require few equipment that may disperse the species and will be limited to project foot prints. The overall impact significance is **Minor**.

Mitigation measures

- a) Transfer of spoil/overburden material across vegetation zones shall be avoided during the project implementation works. The Environment team shall identify suitable sites for overburden material dumping in the project area.
- b) Equipment shall be cleaned before they are moved between different areas of the project.

Residual impact significance: *Negligible*

8.5.6 SOIL EROSION AND SEDIMENTATION

The construction phase will involve use of heavy machinery and excavations to clear the site, strip the soil of vegetation and establishment of transmission trenches; soil disturbance is bound to happen.

The main factors that will affect soil erosion and sedimentation of surface water resources are level of vegetation clearance, terrain, erodibility of soils, and proximity of different project sites to surface water resources and community feeder roads drainage channels. The project area has some sections of gentle sloping and relatively flat terrains with sandy soils mixed with clay, silt and gravel and characteristic and/or susceptible to erosion incidences. The site more susceptible to erosion and sedimentation are the intake and WTP that are located off and onshore of L. Victoria in Lugala Beach Village, respectively. The impact will be made worse by the already existing sand mines on site. However, the site size to be affected by proposed project activities is small with low potential for mass erosion incidences and silt transportation.

The intensity of the impact is low since the project activities will be limited to project foot prints. However, the impact sensitivity is high due to location of some project components at already degraded sites in and near Victoria. The overall impact significance is **Moderate**.

Mitigations

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

Residual impact significance: *Minor*

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

According to the Uganda Population-Based HIV Impact Assessment (UPHIA 2016–2017) the HIV/AIDS prevalence rate of Namayingo is 4.7% since it lies within the East Central region and specifically 10.8% for males and 15.4% for females between the age of 20-24 on the Island given the high prevalence of

prostitution among women and fisher folk¹⁴. Additionally, Prevalence was highest among the 40–49-year age groups which may be attributed to people living longer with the virus on treatment, widow inheritance, polygamy, poverty and prostitution which is rampant in Buyende and the fishing villages which is deeply rooted in their culture. 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 fishing communities.

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 disturb the social order and even lay the ground for escalation of HIV/AIDS cases whose impacts are likely to be prolonged in prevalence. The sensitivity is however very high as these poor communities would struggle to cope with the challenges of being HIV positive. The impact intensity is however low due to the low number of workers (about 40, with priority hiring of non and semi-skilled labour from project villages) expected on the project, resulting in a **Moderate** impact significance.

Mitigation Measures

- Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community barazas.
- Provide information, education and communication about HIV/AIDS prevention, treatment and care .
- Provide an on-site clinic to provide Voluntary Counselling and Testing (VCT) services to construction crew and provision of Anti-Retroviral (ARVs) for vulnerable community members
- Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights
- Ensure safety of women and girls in provision of VCT services.

Residual impact significance: *Minor*

8.5.8 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, especially at Lugala Beach landing site, which provides a fertile ground

¹⁴ HIV epidemic in fishing communities in Uganda: A scoping review,2021

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 35-40 workers on average per site are expected to be involved in the works, most of which are casual workers to be recruited locally. The sensitivity is however very high as abused persons face challenges of unwanted pregnancies, as well as associated psychological torture. The impact significance is **Moderate**.

Mitigation Measures

- Develop and implement an SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018) and the Ministry of Gender, Labour and Social Development (Social, Safety and Health Safeguards Implementation Guidelines for Local Governments, 2020). The SEA action plan will include how the project will ensure necessary steps are in place for:
- **Prevention of SEA:** including Community Development Officers 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;
- **Codes of conduct to be issued to workers:** The contractor to develop, translate, sensitize and enforce ESHS codes of conduct which among others shall be code of conduct SEA/SH to project workers and communities.
- **Management and Coordination:** including integration of SEA in job descriptions, employment 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.

Residual impact significance: *Minor*

8.5.9 RISK OF GENDER BASED VIOLENCE AND FAMILY / MARRIAGE BREAKDOWN

GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. This impact refers to gender-based violence at the community level that mostly affect women and girls, and may also affect men and boys. This may be experienced, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services. The information collected from the project area for the period of 2020 by the Uganda Police crime indicates that there 142 reported cases of sexual assault

,70 cases related to child abuse and 123 cases of common assault. Field consultation with Namayingo police also indicated that there are several forms of GBV shown in the Table 8-5 below.

Table 8-5: GBV related cases in Banda S/C

Cases reported	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22
Defilement	9	7	4	10	10	8
Domestic Violence	7	3	3	4	11	7
Threatening Violence	3	2	2	3	0	6
Child Abuse	0	1	0	1	2	0
Rape/Attempted rape	1	0	0	1	0	0

Source: Banda SC Police Post

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

Mitigation Measures

- The contractor should provide develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project.
- Effective and on-going community engagement and consultation, particularly with women and girls; review of specific project components that are known to heighten GBV risk at the community level, such as, compensation schemes; employment schemes for women; delivery of water supplies; etc.
- Specific plan for mitigating these known risks, such as, sensitization around gender equitable approaches to compensation and employment; water services; etc
- Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.
- The Contractor should have a **“No sexual harassment”** policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges.
- MoWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities.
- Report and follow up with Uganda Police on all matters of criminal including sexual offences.
- Contractor to prepare and implement a Gender Action plan to include at minimum, in conformance with local laws and customs, equal opportunity employment, gender sensitization.
- Include gender affirmative actions and workplace conditions such as engendered washrooms, changing rooms, female condoms, breastfeeding room for breast feeding mothers, observing

working time of 8:00 am to 5:30pm so that parents especially women are able to attend to their domestic duties.

- Both men and women be considered to get jobs at the site with at least 30% of key workers being females
- Include maternity and paternity leave provisions in workers' contracts.
- Provision of gender disaggregated bathing, changing, sanitation facilities.

Residual impact significance: **Minor**.

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

Delay in payment or the non-payment of suppliers and subcontractors of a contractor is a usual occurrence in projects, and poses a grave risk to project which negatively impacts on the effectiveness of the contractor and as such affect project delivery schedule and it creates mistrust between the parties impacted. It is therefore essential, that contractors ensure they are paid on time so that they do not unnecessarily 'renege' on their contractual obligations with suppliers of good and services to the project.

Typically, local sub-contractors and suppliers operate with limited capital. Delays and failure to pay them for supplies to the project can affect their financial status and even survival in business. In addition, the expected benefits to the local economy would not be realized but rather the project would affect the local economy negatively if workers, suppliers and subcontractors are not paid. Lastly, non-payment would trigger grievances and also cause reputational damage to the project. The impact sensitivity is High while the intensity low resulting in a **Moderate** impact significance.

Mitigation Measures

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

Residual impact significance: **Negligible**.

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

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

This impact is ranked **Major**.

Mitigation Measures

- The contractor should provide of appropriate PPE to all worker at all times and enforcement of their usage.
- The contactor will ensure that the Project is implemented in total adherence to the Employment Act 2006.
- The workers should receive requisite training especially on the operation of the machinery and equipment
- There should be adequate warning and directional signs.
- Ensuring that the Contractor prepares a code of conduct for staff is followed to prevent accidents.
- The contractor should develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls
- The contractor should cordon off unsafe areas and provide safe crossing points across trenches
- The contractor should provide an onsite clinic to provide first aid services to the staff.
- The contractor should record of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate.
- Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements.
- The Contractor to repair any damage done to private property.

Residual impact significance: **Minor**.

8.5.12 IMPACTS RELATING TO CONSTRUCTION MATERIALS EXTRACTION AND TRANSPORT

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

Overall, the sensitivity of materials extraction and use is ranked as Medium and the impact intensity is rated as low due to the low quantities of materials required for such low-scale construction activities which may not even require opening up of new material sites but rather to source materials from existing sources such as sourcing sand and bricks from different areas in Banda Sub County and surrounding areas. Additionally, common haulage routes may be used that will create additional traffic

and increasing the risk of traffic accidents. The overall impact significance is therefore ranked as **Moderate**.

Mitigation measures

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

Residual impact significance: **Minor**.

8.5.13 NUISANCE OF CONSTRUCTION WASTE

Solid waste will be generated at the site during the construction phases. The waste will largely consist of typical construction waste (timber, metal, broken bricks, cement, paper, kitchen waste, waste concrete, etc.). Other site clearance activities will include vegetation clearance on site. Much of this waste can be recycled or reused though avenues to implement these management options are rarely explored. Typically, excavated material is considered unlikely to cause adverse impacts and can be used as fill, which is considered a useful reuse of the material.

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

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

Impact Mitigation strategies

- The contractor should prepare a waste management plan prior to commencement of work, including appropriate waste segregation and storage areas, collection & disposal schedule;
- The Contractor's workforce should be prohibited from burning of waste on site or in waste containers;
- The Contractor should ensure that construction wastes is sorted and separated at the point of generation to encourage the recycling of reusable wastes to reduce the waste volumes for disposal;
- The contractor in liaison with local Authorities should facilitate proper handling and disposal of construction waste from the sites. All such waste has to be disposed to the approved waste dumping sites;

- The contractor should ensure that good construction practices and site/waste management measures should be observed to ensure that all solid waste, fuels and solvents are stored in banded areas.;
- The Contractor should ensure that excavated materials or other construction materials are not stockpiled or deposited near or on-stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the watercourse itself.
- The Contractor should install signage/labels indicating nature of the stored waste materials on waste storage containers or facilities. Waste storage areas shall be sheltered, paved and banded for oil containment;
- The Contractor should ensure that traffic management is ensured during transport of the waste. Flag persons will be required. All vehicles transporting excavated materials should be cleaned before leaving the construction site to ensure no earth, mud, debris and the like is deposited by them on the community feeder roads.

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

Be clearly labelled and used solely for the storage of chemical waste.

- Be enclosed on at least 3 sides.
- Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest.
- Have adequate ventilation.
- Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and
- Be arranged so that incompatible materials are adequately separated.

Disposal of chemical waste should:

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

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

Residual impact significance: **Minor**

8.5.14 POOR SANITATION AT THE CONSTRUCTION SITE AND AUXILIARY FACILITIES

It is anticipated that once the construction phase commences, workers will be recruited which calls for need for construction/establishment of sanitation facilities such as mobile toilets and other ablution facilities which should be commensurate with the size of the workforce.

The sensitivity of this impact in the project area low and the Intensity is low given that a relatively small number of workers to be employed during the project implementation activities. The overall impact significance is therefore ranked as **Minor**.

Mitigation Measures

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

Residual impact significance: **Negligible**.

8.5.15 AIR QUALITY IMPACTS DUE TO VEHICULAR EMISSIONS

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

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

The main potential impacts of dust are:

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

Dust is the major air quality problem from construction sites. Dust is a problem for a variety of reasons. If not suppressed, dust can taint goods in shops such as clothes, sugar, salt, and grain flour and this is likely to be a major grievance amongst the business community. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. The impact of dust nuisance will be confined within the project boundary and restricted to the construction phase. Dust will inevitably occur at and inside the

construction corridor and will also be generated alongside the haul routes. The sensitive receptors include schools as well as businesses (shops) along the feeder roads and in the towns especially shops selling clothes and other items that can be affected by dust and in turn lose sale value.

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

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

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

Mitigation measures

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

Residual impact significance: **Minor**

8.5.16 RISK OF ACCIDENTS

Accidents could arise from use of project vehicles such as haulage tracks, construction equipment, excavations, fire, dusts, during project executions which will expose both the workforce and communities to the risk of accidents. Given the relatively low number of workers (60-80 workers) and the major civil works being out of community settlement, the impact is rated as low. However, when accidents occur, they may have great impact on the victims, therefore the impact intensity is High and the overall impact significance is therefore **moderate**.

Impact mitigation

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

Residual impact significance: **Minor**.

8.5.17 NOISE AND VIBRATION IMPACTS

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

Noise generated by construction equipment, haulage fleet and a construction workforce will affect the health of communities neighbouring the construction site during the implementation phase. As the noise levels from the equipment exceed 85 dB(A) which is the level from which hearing impairment is likely to occur. Prolonged exposure to high noise levels presents health risks that includes tinnitus,

stress, lack of sleep, reduce productivity, interferes with communication and concentration among community members and could contribute to accidents and injuries. None the less and new and high sources of the noise will be disruptive to members of the community particularly schools, business entities and office facilities. The disruption and health risk due to exposure to noise to the community are likely to occur though it may cause low discomfort due to the few equipment and magnitude of works that require machinery on the project and the impact level. However, the impact intensity is low. The significance of this risk is considered as **Minor**.

Mitigation measures

- The contractor should provide noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 85 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area.
- The Contractor should ensure that regular maintenance of all project equipment and haulage fleet.
- The Contractor should limit hours of continuous exposure to noise and vibrations particularly workers who operate handheld compactors and vibrators.
- The Contractor should undertake a health surveillance, treat and reassign workers that have shown signs of health impacts due to noise.
- The Contractor should restrict working hours from 7 am to 6 pm minimize community interruptions and inconveniences late at night.
- The Contractor should provide of noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 85 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area.
- The Contractor should limit hours of continuous exposure to noise and vibrations particularly workers who operate handheld compactors and vibrators.
- The Contractor should undertake a health surveillance, treat and reassign workers that have shown signs of health impacts due to noise.

Ground vibration from project implementation activities is a cause of concern to the community. This will emanate from movement of trucks, excavation works, usage of equipment (compactors, generators, etc.), etc. The most sensitive ones to ground vibrations are the semi-permanent and aged structures that can develop cracks if exposed to vibrations. Issues with construction-generated vibrations will depend on these types of activities occurring close to vibration-sensitive locations. The effects of vibration vary and depend on the magnitude of the vibration source, the ground conditions between the source and receiver, presence of rocks or other large structures in the area.

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

Allowable Vibration Velocity (Peak Particle Velocity) at the Closest Part of Any Sensitive Property to the Source of Vibration, at a Frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

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

Typical vibration from transportation and construction sources falls in the range of 10-30 Hz and usually centres around 15 Hz. Therefore, the limit of 12.5 mm/s for construction equipment was adopted. Vibration monitoring may be necessary in case the contractor utilizes equipment with vibration frequency beyond 30 Hz to detect any structural damage risks. However, given the scale of works, use of equipment with such high levels of ground vibrations that can cause structural damage is not envisaged. Therefore, the impact magnitude for vibrations is low and the sensitivity is low to medium. The impact of vibrations is likely to be significant for semi-permanent and aged structures that are located less than 10 meters from the project sites.

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

Mitigation strategies

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

Residual impact significance: **Negligible.**

8.5.18 OCCUPATIONAL HEALTH AND SAFETY RISKS

Inadequate OHS risks management could result from insufficient medical capability at the construction site; or neglect of safety equipment, precautions, and procedures. Other causes of OHS problems in similar site could include amongst others, lifting of heavy and sharp objects, poor transportation of materials for maintenance, improper storage as well as handling and use of dangerous substances/chemicals, inadequate lighting and ventilation in workplaces, lack of adequate training (or neglect of safety precautions/ guidelines) in use of equipment and tools, misuse of equipment and materials for functions they are not designed, lack of safety signage in specific areas, electrical hazard, eye hazards such as splashes, lack of adequate PPE, and biological hazards (vermin, mosquitos, pathogens, etc.). Accidents could cause considerable ecological damage, financial loss and

harm to human life. While largely reversible, some impacts such as loss of human life and body injury are irreversible.

The impact intensity is high even if the contractor 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.

Mitigation measures

- a. The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the MoWE;
- b. The Contractor shall provide safety guidelines to all operations prior to start of work;
- c. Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site;
- d. On-site training shall be conducted on how to prevent and manage incidences and such could involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences;
- e. Regular drills on site safety will be routinely conducted followed on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in case of incidences;
- f. Personnel on duty shall always wear appropriate PPEs, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff;
- g. The Contractor shall establish emergency entrances, exits and amenities in the project facilities;
- h. The Contractor shall ensure that there are First Aid Kits on the site and such shall be modestly stocked with consumables that are key in delivery of first aid on the site;
- i. The Contractor shall secure site boundaries with fences or hoardings as appropriate to keep off intrusion in the project;
- j. The Contractor shall install caution signage around the site to discourage the public from being close to the site, for example, “falling debris”, “keep off the site” etc;
- k. The Client through the Construction Supervisor will continually monitor Contractors’ compliance with Health and Safety measures;
- l. An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project;
- m. The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions; and
- n. Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor.

Residual impact significance: **Minor**

8.6 OPERATIONAL PHASE POSITIVE IMPACTS

8.6.1 PERMANENT EMPLOYMENT OPPORTUNITIES TO THE LOCAL PEOPLE

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

Table 8-6: Permanent roles during operation phase

Position	Staff Required
Manager	1
Accounts Officer	1
Secretary	1
Plumbers / Technicians	3
Meter Readers	4
Intake Attendants / Guard	6
Total	16

This impact occurring is ranked as certain while impact magnitude is taken to be high hence an impact of **Major** Significance.

Enhancement measure

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

8.6.2 INCREASED SAFE WATER SUPPLY.

Water supply is essential for human health and survival, for food security and the empowerment of women as well as the education of girls, for reduction in productivity losses due to morbidity and malnutrition, for the management and protection of natural resources. Although the crucial importance has been widely recognized, the right to safe water remains a promise unfulfilled for the world's poorest citizens. The lack of access to safe drinking water impedes economic development, thwarts progress towards gender equality and puts the health in danger.

According to Ministry of Water and Environment (MWE), feasibility report 2019, Lugala RGC will have a newly designed water supply system. Lugala RGC water supply system will abstract 933.63 m³/day (58.35m³/h at 16 hours pumping regime) from Lake Victoria at Lugala Beach village, Lugala parish, Banda Sub County. Raw water from the lake will then be transmitted through a 400 m transmission main to 980 m³/day Water Treatment Plant (WTP). Water will be distributed for 13.16 Km to the 8 project villages in Lugala and Buchumba Parishes within Banda Sub County. A total of 258 service connections shall be made in the initial year increasing to 1,888 in the ultimate year (2040). The system will serve about **12,195** residents by 2025, therefore the construction of the water supply system will go a long way in improving water supply in this area.

The project will ease the current water deficit in the project area and the environs consequently promoting the economic growth; the community will get access to quality clean water for drinking and domestic use. This will minimize cases of waterborne diseases resulting to a healthy community; reduce drudgery associated with water collection and result in gender balance.

Enhancement measure

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

8.6.3 TRANSFORMATION OF LUGALA RGC INTO AN IMPROVED URBAN CENTRE

The new water supply under Lugala RGC will attract new business ventures and subsequently more human population in search for urban centres with access to improved social services such as consistent safe water supply, thus transforming Lugala RGC modern trading centres and development of the adjacent rural dwellings with possibilities of socioeconomic transformation of the project area

and beyond. In particular, Lugala RGC water supply system and improved public sanitation will contribute to the following:

- a) Transform the 8 beneficiary villages and two trading centres of Lugala and Budala as well as neighbouring villages into better living areas.
- b) Strengthen social service infrastructures (health, educational and local administration facilities) through improved sanitation, hygiene (public health) and access to water.
- c) Appreciated value of property.
- d) Boost local trade, leisure, and hospitality sub sector.

Enhancement measures

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

8.6.4 GENERATION OF INCOME.

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

Enhancement measure

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

8.6.5 IMPROVED HYGIENE, SANITATION AND PUBLIC HEALTH CONDITIONS

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

According to socioeconomic baseline (Sections 5.4.13), only one health facility (Busiro Church of God HC III) in the RGC has access to piped water (1 PSPs) provided by The Safe Water Project, the rest rely on rainwater harvesting and surface water sources through vendors and fetching in jerrycans. All the school in the RGC have no connections to piped water and source their water from drilled boreholes.

Sanitation and hygiene in households, trading centres such as Lugala and Budala as well as other social amenities such as schools, health centres are dependent on reliable access to clean water. Improved sanitation and hygiene within the communities directly impacts on reduction of public health related illnesses, enhanced productivity, improved livelihood and standards of living. The impact is direct and permanent with certainty of occurrence and the level of impact is high. The overall impact significance is major.

Enhancement measures

- Provide piped water connections to government health facilities (institutional connection) to all social amenities such health centres and schools in Banda Subcounty and surrounding areas.
- Adjust eligibility criteria for water connections by including appropriate conditionalities such as having functional sanitation facilities, hand washing facility, rubbish pit / gunny bags for waste collection, community sanitation conditions (zero open defecation), among other. This will enable local leaders and potential water users to mobilize and prepare themselves before connection. It should be noted in many parts of Uganda, the water utility managing units such as Umbrellas have often verified some of the above hygiene and sanitation conditions before establishing household connections. At the same time, given the rural nature of communities, verifying WASH conditions before any connection if done will enhance public health and safety.
- Provide water tanks to health facilities to enable them store enough water.

8.7 OPERATION PHASE NEGATIVE IMPACTS

8.7.1 DECREASE IN WATER RESOURCES

The project will abstract 933.63 m³/day of raw water from L. Victoria in Laugala Beach Village. To meet the average day demand for Lugala RGC of **934** m³/day by 2040. Lake Victoria contains about 2,750 cubic kilometres (2.2 billion acre-feet) of water. The proposed project water abstraction is negligible compared to the Lake storage capacity. Overall impact significance on Lake storage is gauged as **Negligible**.

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**.

8.7.2 SOLID WASTE GENERATION

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

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

Mitigation measures

- Develop and implement a waste management plan for the operation phase of the project.
- Waste collection bins should be provided at strategic positions at the water offices, water source sites and reservoirs sites for temporary waste storage. The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes.
- The water supply system operator should hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA or local authorities.
- Engage waste handlers including the nearest Town Council;
- Re-usable wastes be sold or given away to interested parties; hazardous/toxic wastes (e.g., chlorine and alum containers be returned to supplier or given to a NEMA approved waste handler.
- Sensitization of communities and workers on proper waste management
- Ensure proper solid waste management practices at the construction sites including sorting at the point of generation

Residual impact significance: **Minor**

8.7.3 LAND POLLUTION, WASTE AND DRAINAGE PROBLEMS

Improved water supply is associated with an increase in the volumes of wastewater generated by households and industrial or commercial facilities. Poor disposal or management of the wastewater generated will lead to land and/ or water pollution and related sanitation problems if proper treatment systems such as septic tanks are not utilized. In cases where household are connected to water and not to sewerage system, they may use septic tanks whose cesspool or soak pit overflow may lead to contamination of soil and/or groundwater.

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

Mitigation Measures

- Sensitize households to construct proper septic tank systems;
- MoWE through the Umbrella Scheme should provide toll free numbers where they can be reached for customer support and emergency notifications.
- Adoption of the above mitigation measures will reduce impact intensity to “very low” resulting in a residual impact of minor significance.

Residual impact significance: **Minor**

8.7.4 INCREASED COST PER UNIT / REDUCED AFFORDABILITY

The cost per unit is likely to be higher than the prevailing level of water affordability.

As per baseline (Section 5.4.8) majority (66.7%) of the households in Lugala RGC do not pay for access to water, in fact, 62.1% of the population fetches water from L. Victoria. The new piped water is likely to increase the charge per jerrycan/per unit. This will hinder affordability and utilization, hence increased substitutability.

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 33.3% pay between Ugx. 200 – and more than Ugx.600 for a 20l jerrycan of water. An assessment of willingness to pay for safe piped water indicated that more than half of the population (56.8%) are will to pay Ugx. 100 for a 20l of water. Only 15.9% are prepared to pay Ugx.50 or less for a jerrycan of water.

Nonetheless, the amount charged may hinder affordability and utilization, especially for the 15.9% that may be willing to pay less than the proposed tariff, hence increased substitutability. The sensitivity of the receptors is considered to be low since household can access alternative sources (deep boreholes, L. Victoria, no matter the distance) although the water accessed may not be as safe as the proposed treated piped water. The impact intensity is considered to be medium given that the project developer put into consideration the economic situation of the project area when developing the project and ultimately when setting water prices for the project beneficiaries. The overall impact significance is **moderate**.

Mitigation measures

- Alternative water sources such as the boreholes should continue to be maintained by the water user committees.
- MoWE should support the District Local Government to continue funding construction / rehabilitation of alternative water sources such as shallow wells, boreholes, etc.
- 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**.

8.7.5 LOSS OF LIVELIHOOD BY WATER VENDORS

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

This impact is rated as possible and the impact significance rated as medium since the vendors can put their effort and investments into other sources of income, while the impact intensity is considered

to be low given that the water vendors can extend their services to areas not covered by the project. The overall impact significance is **moderate**.

Mitigation measures

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

Residual impact significance: **Minor**.

8.7.6 OCCUPATIONAL HEALTH AND SAFETY RISKS

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

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

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

Mitigation Measures

- The primary measure to mitigate OHS impacts is prevention which entails identification of risks and instituting pro-active measures to avoid them. In part this can be achieved by following national guidelines. For unavoidable risks, personal protective equipment (PPE) should be provided to workers.
- Orient all staff on safe work practices and guidelines and ensure that they adhere to them.

- Training staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences.
- Regular safety drills to constantly follow on various possible incidences.
- Use signage to warn staff and/ or visitors that are not involved in laboratory work of dangerous places.
- Develop evacuation procedures to handle emergency situations.
- Provide adequate OHS protective gear for all laboratory staff.

Residual impact significance: **Minor**.

8.7.7 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**.

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.

Residual impact significance: **Minor**.

8.8 CUMULATIVE IMPACTS

8.8.1 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 Lugala RGC, there are other inter-related activities in the project area. For example, the proposed location of the WTP is already used as a sand mining site. The sand is commercially mined and sold to trucks ferrying it to Mayuge, Jinja and sometimes to Kampala. In addition, Lugala beach is among the nearest landing sites in close proximity to Kenya. By virtue of its physical characteristics (bay), the site has potential to be converted into a port. The proposed water and sanitation project is timely and beneficial; however, the population and activities of the landing site are expected to increase.

8.8.2 VALUED ENVIRONMENT AND SOCIAL COMPONENTS

The identified VECs may include;

a) Material Source Areas

Projects implementing infrastructure development especially water pumping station, water reservoirs, booster stations, water office blocks and sanitation facilities shall require gravel, murrum, sand, rocks and among other products hence impacting on source areas.

b) Shared Land Corridors

Linear projects like roads, power lines and telecom cables normally share corridors. Relocation of such services is an impact and acquisition and compensation of such corridors may raise social and economic concerns.

c) Land and Wetlands

The project area has a major mushrooming trading centre, namely; Lugala beach landing site and Busiro centre, which continue to expand due to the population growth as a result of services within and near the centres such as schools and Lugala HC II being the biggest town from surrounding landing sites hence putting pressure on land and wetlands (cultivation, settlements and sanitation facilities). The source is located within a wetland that surrounds L. Victoria, 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.

d) Social Services

The most critical service affected by multiple construction projects is health infrastructure. Increased inflow of workers may place a burden on health units. The relatively high population in Lugala beach landing site and increase in patients at Lugala HC II may heighten the challenge. Security services may also experience increased demand due to the inflow of workers since the police post at Banda SC is manned by only 3 police officers

e) Gender and Sexual Harassment

Increased inflow of migrant labour working on different projects may increase the anonymity of workers and possible offenders. Because there are many contract workers it becomes difficult to isolate those engaged in illicit sexual behaviour and further individual involved to harassment of women. There are several on-going projects and activities by Government of Uganda and private sector that target fishing within Kidera RGC. Possible concurrent implementation of all these projects and interventions within the same project area or in proximity of the RGC project has the potential to generate cumulative impacts.

8.8.3 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 victoria), (b) the lugala wetlands, where the treatment plant and the distribution pipelines will be located and (c) the settlement areas (Lugala and Busiro trading centers) 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 such as sand mining, stone quarrying activities including development of Lugala beach and Busiro trading centre 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 Lugala WSSP will include degradation of Lugala Wetland, Lake Victoria shores, water and air pollution.

Proposed Mitigation Measures:

- Limiting the area of the project footprint,
- Promotion of tree planting
- Restoration of degraded wetland
- Obtaining and complying with Wetland use permit
- Awareness creation on environmental and social safeguards among 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 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 Lugala 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 Namayingo and Banda 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 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,
- a) Supervision of the excavations for the water pipes and subsequent laying and burying of pipes,
- b) Occupational health and safety of workers and the community among others,
- c) the fate of solid waste/debris disposal and other wastes after it has reached and has left the site,
- d) Behavioural changes among the community and Contractors staff,
- e) Water Quality,
- f) Noise and dust pollution, and
- g) Biodiversity changes.

9.1.1 APPROVAL OF THE ESMP ACTIVITIES

Implementation of ESMP activities will be approved by MoWE and safeguards compliance will be one of the bases for payment. Final payment for the contractor shall be tagged to successful restoration of all disturbed areas and clean-up of all construction sites.

9.1.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN REVIEWS

The ESMP is a living/dynamic document subject to similar influences and changes from variations to the provisions of the project specifications. It will be reviewed at an interval of 6 months in order to identify any required amendments.

Table 9-1: Environmental and Social Mitigation Plan

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
POSITIVE IMPACTS – CONSTRUCTION PHASE			
Provision of direct jobs (casual workers) for locals - youth, women and men	• Recruit locals for construction jobs according to their skills.	• Contractor	Embedded in contractor's fees
	• Promote labour-intensive construction methods to create more jobs.	• Contractor	
	• Adhere to the local labour laws of 30% women in employment and remuneration of workers above the minimum wage.	• Contractor	
	• Ringfence some jobs such as cleaning and cooking specifically for local women.	• Contractor	
	• Encourage qualified females to apply for jobs.	• Contractor	
	• Gender sensitive facilities such as bathrooms, toilets and breastfeeding spaces to be provided to create a conducive working environment.	• Contractor	5,000,000
NEGATIVE IMPACTS – CONSTRUCTION PHASE			
Land use/cover change	• Restrict water transmission and distribution lines to road reserves.	• Contractor	-
	• Compensate for land as per Ugandan laws on Land Acquisition and in line with World Bank's OP 4.12.	• MWE	
	• Movement of vehicles and equipment must follow designated pathways or agreed upon access roads.	• Contractor	-
Land acquisition and resettlement	• Implement the RAP in line with Ugandan laws and the World Bank's ESS5	•	
	• Engage local communities to provide land voluntarily especially for the distribution lines	• MWE	Covered in RAP implementation budget
	• Select land requiring minimal or no relocation at all	• MWE	
	• Use road reserves for pipe works	• Contractor	-
	• Provide a fair and prompt compensation to the affected people	• MWE	
	• Determine the extent of property lost or destroyed and provide fair and prompt compensation to the effected people.	• MWE	Covered in RAP implementation budget
	• Obtain murrum and subsoil from a NEMA/ DLG licensed source.	• Contractor	

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
Deterioration of landscape and visual quality	• Install berms and drainage channels to control surface water run-off during earthworks.	• Contractor	Within contractor's bid budget
	• Restore of borrow pits and revegetate with native species.	• Contractor	
	• Close monitoring of impact on natural resources with enforcement of contract or legislative options.	• DLG/ MWE	10,000,000
Soil Erosion	• Limit vegetation clearance to localities required for development.	• Contractor	-
	• Hoard off construction sites and instate soil barriers before excavations to intercept any eroded material and any soil material.	• Contractor	Within contractor's bid budget
	• Remove topsoil prior to carrying out excavations and stockpile separately so that it is used last in backfilling of the excavated areas.	• Contractor	
	• Backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation.	• Contractor	
	• Remove excess excavated soil material which will not be used for construction works in a timely manner and deposit at an approved site	• Contractor	
• Ensure proper landscaping and vegetation restoration is carried out using native species to further reduce the possibility of soil erosion.	• Contractor		
Loss of Vegetation and degradation of Habitat	• Limit vegetation clearance to localities required for development.	• Contractor	-
	• Avoid and minimize cutting of trees at all project sites.	• Contractor	-
	• Movement of vehicles and equipment must follow designated pathways or agreed upon access roads.	• Contractor	-
	• Remove and destroy any encountered invasive species	• Contractor	-
	• Sensitize all project workers to minimize damage to vegetation and fauna.	• Contractor	Within contractor's bid budget
	• Use existing road corridors for construction and operational access wherever possible.	• Contractor	-
Disturbance and degradation of wetland ecosystems	• Where the alignment requires the suspension points for the water pipes to be located in the swamp and in areas which cannot be easily accessed, build temporary access to wetland areas not easily accessible from existing roads or causeways, that will be removed after.	• Contractor	Within contractor's bid budget
	• Obtain wetland user permits from NEMA before constructing across or along wetlands and follow all guidelines given.	• MWE	150,000

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> All project workers should be sensitized to minimize damage to flora and fauna. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas. 	<ul style="list-style-type: none"> MWE 	-
Generation of waste	<ul style="list-style-type: none"> The Contractor shall develop and implement a Waste Management Plan 	<ul style="list-style-type: none"> Contractor 	15,000,000
	<ul style="list-style-type: none"> All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities. Other forms of waste which are inert must be collected by NEMA gazetted waste handlers and taken to a NEMA gazetted waste disposal facilities for disposal. 	<ul style="list-style-type: none"> Contractor 	10,000,000
	<ul style="list-style-type: none"> All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated district landfills for disposal. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> All plastic waste generated during construction, such as mineral water bottles, polyethene bags, jerrycans and cups shall be collected and taken for recycling in plastic collectors in Namayingo for onward transmission to plastic recyclers. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Human excreta shall be managed using a mobile toilet and then disposed at the waste stabilization ponds at Namayingo Hospital. 	<ul style="list-style-type: none"> Contractor 	10,000,000
	<ul style="list-style-type: none"> The contractor will work with Namayingo district Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records maintained at all times. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
Noise and Vibrations	<ul style="list-style-type: none"> Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> Periodic medical hearing checks should be performed on workers exposed to high noise levels. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Sites must be hoarded to curb noise impacts to neighbouring communities. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Works should be undertaken during day time i.e. from 8 am to 6pm. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Works near schools or health centres should be done in periods like weekends in order for noise and vibrations not to interfere with learning environment. 	<ul style="list-style-type: none"> Contractor 	-

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> Weekly monitoring of noise levels at active sites should be carried out by the contractor. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
Air Pollution	<ul style="list-style-type: none"> Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h on the highway and 40 km/h off the highway. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> Workers will be provided with PPE and the use of PPE shall be enforced. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> All surfaced roads shall be subject to road cleaning and un-surfaced roads to dust suppression, the methodology and frequency of which shall be included in the Contractor's Traffic Management Plan. 	<ul style="list-style-type: none"> Contractor 	
	<ul style="list-style-type: none"> Stockpiles of friable material will be grassed in order to prevent wind erosion. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO2 and NO2 are minimised. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
Reduced Traffic Safety	<ul style="list-style-type: none"> The Contractor shall develop and implement a traffic management plan to be approved by the supervision engineer 	<ul style="list-style-type: none"> Contractor 	11,000,000
	<ul style="list-style-type: none"> All road closures shall be separately notified and agreed with the subcounty administration. 	<ul style="list-style-type: none"> Contractor/ Subcounty Council 	-
	<ul style="list-style-type: none"> Vehicular access to and from hospitals, police stations, and other public institutions shall be maintained through the use of steel road plates over open trenches. Pedestrian access to schools, health facilities, and other premises frequently accessed by the public will be maintained with the use of walking boards. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> To minimize interference with traffic, half of the road shall be closed to enable vehicles use one half as the other half is being excavated and installed with pipe work. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Road safety and site safety training should be done involving construction workers, police and local community. 	<ul style="list-style-type: none"> Contractor/ Police/ LC 	-
	<ul style="list-style-type: none"> Conspicuous signage shall be well placed on roads and the Contractor's Traffic guides on ground shall direct traffic in case of diversions or open trenches. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> All company vehicles used in the transportation of construction workers, material and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form before usage. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> All drivers to be employed by the Contractor shall be qualified, skilled with valid driving permits. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm). 	<ul style="list-style-type: none"> Contractor 	-
Risk of misinformation due to failure to engage stakeholders	<ul style="list-style-type: none"> Prepare a comprehensive Stakeholder Engagement Plan (SEP); 	<ul style="list-style-type: none"> Contractor 	50,000,000
	<ul style="list-style-type: none"> Community liaison activities; 	<ul style="list-style-type: none"> MWE 	20,000,000
	<ul style="list-style-type: none"> Undertake radio talk shows to communicate progress of the project to local stakeholders. 	<ul style="list-style-type: none"> MWE 	3,000,000
Risk of violence against children (VAC)	<ul style="list-style-type: none"> Develop a strict employment code of conduct to protect the girl child. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Sensitize employees on dangers of molestation of children, especially the girl child. 	<ul style="list-style-type: none"> Contractor 	3,000,000-
	<ul style="list-style-type: none"> Sensitize the Contractor against child labour and implement the child labour act; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Demand birth certificate or any identify that clearly shows the age of a job applicant; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Issue each worker with an applicant letter with well spelt out terms of engagement. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Monitoring school attendance 	<ul style="list-style-type: none"> Contractor/ DLG 	-
	<ul style="list-style-type: none"> Sensitization in schools 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Reporting mechanisms in place such as a whistleblowing system. 	<ul style="list-style-type: none"> Contractor 	-
Risk of Sexual and Gender Based Violence (SGBV) - e.g. physical assault, Sexual abuse, and sexual harassment	<ul style="list-style-type: none"> The Contractor should have a sexual harassment policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> MWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities; 	<ul style="list-style-type: none"> MWE 	Cost included as part of supervising engineer's cost, contractor and

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
			stakeholder engagement consultant.
	<ul style="list-style-type: none"> Put SGBV reporting mechanisms in place; 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Community sensitization among men and women. 	<ul style="list-style-type: none"> Contractor 	-
HIV/AIDS risks	<ul style="list-style-type: none"> Procure a consultant/ service provider to sensitize workers on proper social behaviour and conduct with regard to community norms, HIV/AIDS and other sexually transmitted diseases. HIV/AIDS policies should be developed at the workplace. Free HIV/AIDS testing, counselling and condom distribution be encouraged for both workers, sex workers and local community. The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. 	<ul style="list-style-type: none"> Contractor 	Cost included as part of supervising engineer's cost, contractor and stakeholder engagement consultant.
	<ul style="list-style-type: none"> Social bonds are not readily controlled, and the permanence of HIV/AIDS transmission makes this particular impact of social bonding both negative and also positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual exploitation can also occur. It is therefore important to tackle the issue of social bonding with firmness and fairness, forbidding powerful relationships, which lead to exploitation of mostly women and children, while encouraging relationships that may lead to permanent situations. 	<ul style="list-style-type: none"> Contractor/ DLG 	-
Risk of not engaging stakeholders in project monitoring	<ul style="list-style-type: none"> Bring onboard the relevant stakeholders including Namayingo DLG to participate in routine project monitoring. 	<ul style="list-style-type: none"> MWE 	Included under stakeholder engagement consultant.
Decommissioning of auxiliary facilities	<ul style="list-style-type: none"> Demolish all auxiliary facilities 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Remove all obsolete equipment, vehicles, trucks and machinery shall be removed from sites 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Backfilling all openings with overburden soil 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Planting fast-growing trees and grasses to stabilize the excavated areas 	<ul style="list-style-type: none"> Contractor 	-

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

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
Loss of livelihood for water vendors	<ul style="list-style-type: none"> Provide paid employment to water vendors who will lose their livelihood 	<ul style="list-style-type: none"> EUWS 	Per EUWS' operation budget
NEGATIVE IMPACTS AND RISKS – PHASE CROSSCUTTING			
Occupational Health and Safety Risks	<ul style="list-style-type: none"> The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the developer. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Contractor shall provide safety guidelines to all operations prior to start of work. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site. To ensure occupational health and safety on construction sites, the Contractor shall be obliged to comply with all applicable Ugandan Construction Health and Safety Standards as required by the Occupational Safety and Health Act of 2006. These include provisions of the Factories Act, Labour Unions Act and Workman's Compensation Act. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Regular drills will be constantly followed on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in case of incidences. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Personnel on duty shall at all times wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Contractor shall establish emergency entrances, exits and amenities. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> The Contractor shall ensure access to first aid kits. 	<ul style="list-style-type: none"> Contractor 	3,000,000
	<ul style="list-style-type: none"> The Contractor shall ensure safe working heights through provision of work platforms, scaffolds and adequate supervision by ensuring regular inspection of formwork, false work and temporary supports before loading or pouring concrete. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
	<ul style="list-style-type: none"> The Contractor shall secure site boundaries with fences or hoardings as appropriate. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Contractor shall install caution signage around the site to discourage the public from being close to the site, for example, "falling debris", "keep off the site" etc. 	<ul style="list-style-type: none"> Contractor 	Within contractor's bid budget
	<ul style="list-style-type: none"> The Developer through the Construction Supervisor will continually monitor Contractors' compliance with Health and Safety measures. 	<ul style="list-style-type: none"> MWE 	Within supervision consultant's bid budget
	<ul style="list-style-type: none"> An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions. 	<ul style="list-style-type: none"> Contractor 	-
	<ul style="list-style-type: none"> Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor. 	<ul style="list-style-type: none"> Contractor 	-

9.2 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 Eastern Umbrella of Water and Sanitation, who will take over management of the project, will be responsible for the implementation of the ESMP. The Developer, the Contractor and the Operator should employ an Environmentalist with relevant academic qualification and work experience. At the local level Mbale and Namayingo offices will be responsible for the day-to-day monitoring of the ESMP in their areas of jurisdiction.

At the National level, two institutions i.e. the National Environment Management Authority (NEMA) and the Ministry of Gender, Labour and Social Development will be involved. MWE also has 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.

9.2.1 INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

The Project will be implemented by MoWE through its regional entities (WMZs, WSDFs) in close collaboration with Namyingo 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) ¹⁵

Table 9-2: Institutional Mandates

Institution	Mandate/ Responsibilities
Funding Institution	
The World Bank	The World Bank will be financing the project and is therefore expected to offer implementation support supervision to the project's environmental and social performance through missions. The World Bank will designate a safeguards team that can participate in safeguards missions.

¹⁵ Uganda -Integrated Water Management and Development Project Appraisal Document Report No: PAD2716 World Bank May 23 2018

Implementing Agencies	
Ministry of Water and Environment- MoWE	<p>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).</p> <p><i>MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.</i></p>
Directorate of Environmental Affairs-DEA	<p>The DEA is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change.</p> <p>On this project, DEA together with NEMA will be responsible for issuing wetland user permits for the water abstraction and treatment plant sites.</p>
Directorate of Water Development (DWD)	<p>The DWD is responsible for providing overall technical oversight for the planning, implementation, and supervision of the delivery of urban and rural water and sanitation services across the country, including water for production. DWD is responsible for regulation of provision of water supply and sanitation and the provision of capacity development and other support services to Local Governments, Private Operators, and other service providers.</p> <p>On this project, DWD under its department of RWS is responsible for planning and execution of the project up to the construction phase. WSDF, in the same Directorate will take over operation and management of the project as well as implementation of the project source protection plans through its EUWS, both departments under DWD.</p>
Directorate of Water Resources Management- (DWRM)	<p>The DWRM is responsible for developing and maintaining national water laws, policies, and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction, and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary waters resources and peaceful cooperation with Nile Basin riparian countries.</p> <p>On this project, DWRM will be responsible for issues surface water abstraction permits for the project as well as approval and monitoring the implementation of source protection plans.</p>
Private Sector Involvement	
Supervising Consultant	<p>The Contractor will prepare Method Statements for specific activities such as excavation works and submit for the Supervision Engineer's review and comments before commencement of works. If the Engineer notifies the Contractor that a</p>

	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. Namayingo 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 ESIA's of the planned interventions with relevant line agencies. Other lead agencies that would participate in the review are the Ministry of Local Government and local governments. Specifically, the Environmental Monitoring and Compliance Department of NEMA is responsible for the review and approval of ESIA's, post-implementation audits and monitoring of approved projects. Although project sponsors have a responsibility for monitoring their own activities, NEMA carries out its own monitoring largely through District Environmental Officers and environmental inspectors at NEMA's head office/ Lead Agencies.
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 (Banda Police Post/ Namayingo District Police)	The project will be implemented in Lugala Beach Village, Banda Sub County, Namayingo District. The police post at Banda Sub County will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Namayingo 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.

9.3 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 Namayingo District and composed of the local environmental authorities, representatives from the District and NEMA and any other lead agencies may also carry out monitoring. The Contractor shall undertake monitoring of key environmental parameters like water quality, noise, and air pollution etc. and make monthly reports to the Developer.

9.3.1 PURPOSE OF MONITORING

A monitoring program is aimed at ensuring that proposed mitigation and enhancement measures are implemented to generate intended results, otherwise the measures needs to be modified, ceased, or replaced when inappropriate. Furthermore, monitoring allows assessing compliance with National

Environmental/Social standards as well as with the World Bank Operational Safeguards Policies relevant to the project.

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

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

9.3.2 SCOPE OF ENVIRONMENTAL AND SOCIAL MONITORING

Environmental and social monitoring covers the following:

- Disclosure of information and public sensitisation
- Protection of flora and fauna
- Noise
- Air emissions
- Soil quality and management
- Transport and traffic
- Waste management
- Water management
- Cultural heritage
- General site management and occupational health and safety
- Social monitoring
- Contractors' obligations

Environmental monitoring will be undertaken at different levels as described below

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

9.3.3 OTHER MONITORING ACTIVITIES AND PROCESSES

9.3.3.1 WEATHER FORECASTS

Weather monitoring and forecast is important to ensure that the Contractor plans for activities and provides mitigation where weather especially rainfall may pose challenges. This will be critical during excavation works.

9.3.3.2 SITE INSPECTION

Routine inspections will be carried out to cover all aspects of environmental and social management on the site. Daily inspection aims to identify any environmental issues and rectify them without delay whereas weekly, monthly and quarterly inspections will verify that the daily inspections are identifying any maintenance requirements and that these requirements are being completed in an appropriate time frame. Site inspections will be carried out by the Contractor with instructions from the Supervision Consultant.

9.3.3.3 MEETINGS

Monthly site meetings are to be held to discuss project progress and, in such meetings, safeguards issues shall be sufficiently discussed and minuted. That shall include a review of the effectiveness of the mitigation measures, successes, and non-compliances. This will be a platform for the Engineer, the client (MoWE) and World Bank to raise any environmental issues arising from the joint inspection and as a reaction to the contractor's presentation.

9.3.3.4 RECORDKEEPING

MoWE shall ensure that all relevant monitoring and compliance records are readily available. Section 122 (6) of NEA (2019) states, "A developer shall maintain proper records of the monitoring undertaken under subsection (2), which shall be made available to the Authority or lead agency upon request" while subsection (7) states, "A lead agency or the Authority may require the developer to submit monitoring reports in a prescribed form".

9.3.3.5 MONTHLY ENVIRONMENTAL AND SOCIAL REPORT

Either a standalone Monthly Environment Report shall be prepared, or safeguards shall be sufficiently covered in the Contractor's Monthly Progress Report in fulfilment of the Contractor's contractual reporting obligations. The report will highlight different activities undertaken to manage environmental and social aspects of the project in line with contract specifications, laws, standards, policies, and plans of Uganda and World Bank Safeguard policies. Planning for management of environmental aspects is typically done on a continuous basis. In that regard, every monthly progress report should include a schedule for environmental and social activities for the next month.

This Contractor's Monthly Report is expected to summarize the following:

- a) Progress in implementing the CESMP and the standalone management plans;
- b) Status of key approvals and documentation for the project;
- c) Compliance with legal obligations and specifications;
- d) Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management;
- e) Summary of any complaints by the community and actions taken/to be taken; and
- f) Key environmental activities for the next month.

9.3.3.6 ENFORCEMENT OF COMPLIANCE AND ENVIRONMENTAL COMPLIANCE AUDITS

The supervising engineer must strictly supervise implementation of the ESMP and where there are breaches, the supervising engineer should issue written instructions, cautions and warnings as applicable. Where the contractor fails to comply, contractual clauses should be invoked, and penalties or fines effected. If necessary, the civil works can be suspended if the contractor repeatedly fails to

adhere to instructions. MoWE should penalize the supervising consultant if he fails to supervise and enforce ESMP implementation by the contractor.

Furthermore, MoWE will take the responsibility to fulfil the requirements for an environmental and social audit, not less than 12 nor more than 36 months after project completion or commencement of operations respectively in line with the National Environment Act 2019 and the Audit Regulations of 2020.

During the operation period, MoWE will take the responsibility to fulfil the requirements for an environmental and social audit in line with the National Environment Act 2019 and the Audit Regulations of 2020. MoWE shall submit the environmental compliance audit report to NEMA and undertake mitigation measures to address and rectify any non-compliance detected.

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	Water intake areas along & TL & DL	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 Along the TL and DL	Ha No. species	Progress Reports Restoration/ completion certificates	Restricted to TL & DL Restored	Supervising Engineer MWE/ NEMA	20,000,000 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	10,000,000 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, <i>Collection manifests</i>	0 Legal disposal	MWE DLG Contractor	10,000,000 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, 2.5})	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
Safety and health risks	Signage No. of training First aid kits No. and type of PPE.	Daily by contractor, Weekly by Consultant and	Project site	Number of safety measures provided No of near misses, incidences/accidents recorded.	Incidents/Acc. Log, injuries and inspection	0	MWE Contractor	5,000,000 10,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
	Fence in place	Quarterly by MWE.		No. of toolbox talks conducted				5,000,000
	Monitoring			Incident investigation				2,000,000
	Health and sanitation facilities in site.			Number of incidents involving company and contract vehicles including delivery trucks.				Contract
	Safety register			Number of trespassers				Contract
				Number and types of Incidents, Injuries and Near Misses.				
				Conformance to Facility Standards (Planned maintenance, structural integrity, heavy and light vehicle standards, condition of roads, condition of bunds, alarm systems).				
				Procedural breaches (Working at height, electrical safety, lock-				

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
				out tag out, Vehicle interaction, confined spaces, machine guarding, chemical management (PPE) Training records				
HIV/AIDS	No. of sensitization training VCT services and Anti-Retro-Viral Treatment Supply of condoms	Monthly Sub contracted	Project site Community	Number of HIV/AIDS mainstreaming strategies provided	Monthly report		MWE Contractor	5,000,000 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 Contract
Management of grievances for workers	Community and Contractor Grievance Committees	Monthly	Project site	No. Reported Cases and resolved	Grievance Log	100% of reported grievances addressed	MWE Consultant Contractor	5,000,000 10,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
and communities							Insurance Company	Insurance claims
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								
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	Intake and WTP	All	Lab. Analysis	Ntl Stds	MWE	40,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
					Hydrogeological analysis			
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
Total monitoring costs								249,000,000

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

9.5 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS DURING OPERATION

9.5.1 WATER SAFETY PLAN

MoWE should develop, implement, and maintain a water safety plan taking into consideration the potential risks to the safety of the water from the supply catchment area to the consumer. A water safety plan should consist of three key components:

- a) System assessment to determine whether the drinking-water supply chain (up to the point of consumption) as a whole can deliver water of a quality that meets health-based targets.

- b) Identifying control measures in a drinking water system that will collectively control identified risks and ensure that the health-based targets are met; and
- c) Management plans describing actions to be taken during normal operation or incident conditions and documenting the system assessment (including upgrade and improvement), monitoring and communication plans and supporting programmes.

A water safety plan should include:

- a) Measures to protect the source of drinking water from risks of pollution;
- b) Measures to ensure all installations intended for the production of drinking water exclude any possibility of contamination. For this purpose and in particular:
 - The installation for collection, the pipes and the reservoirs should be made from materials suited to the water and in such a way as to prevent the introduction of foreign substances in water;
 - the equipment and its use for production should meet hygienic requirements;
- c) Measures to ensure an appropriate treatment such as pre-treatment processes, coagulation, flocculation, sedimentation, filtration and disinfection are undertaken to assure the safety of water for the consumers;
- d) Appropriate operational monitoring system including monitoring parameters that can be measured and for which limits have been set to define the operational effectiveness of the activity; frequency of monitoring and procedures for corrective action that can be implemented in response to deviation from limits. If, during production it is found that the water is polluted, the producer shall stop all operations until the cause of pollution is eliminated; and
- e) A verification plan to ensure that individual components of a drinking-water system, and system as a whole is operating safely.

Public health surveillance (that is, surveillance of health status and trends) contributes to verifying drinking-water safety. Adequate infrastructure, proper monitoring and effective planning and management; and a system of independent surveillance are basic and essential requirements to ensure the safety of drinking-water. Surveillance should cover the total supply network from the source of untreated water to the consumer delivery points.

9.5.2 WATER QUALITY MONITORING PLAN

MoWE will undertake water quality tests before use of the water by the communities to determine if water is safe to drink and to establish a baseline so that any future degradation can be detected. The Uganda Drinking Water Standards (Table 9-4) are as follows:

Table 9-4: Uganda Drinking Water Quality Standards and WHO Drinking Water Standards

Characteristic	Unit	US-201: 2008 Requirement	WHO 2011 Requirement
Physical Requirements			
Colour	Hazen units, max. Pt scale	15	No Guideline
Odour		Acceptable to consumers and no abnormal changes	No Guideline

Taste		Acceptable to consumers and no abnormal changes	No Guideline
Turbidity	NTU	5	1
Dissolved Solids	mg/l	700	No Guideline
Suspended Solids	mg/l	0	No Guideline
Electrical Conductivity (EC)	$\mu\text{S/cm}$	1500	250
Chemical Requirements			
pH		6.5 – 8.5	6.5 – 8.5
Total Hardness (as CaCO_3)	mg/l	500	No Guideline
Calcium (as Ca)	mg/l	75	No Guideline
Sodium (as Na)	mg/l	200	200
Magnesium	mg/l	50	No Guideline
Arsenic (as As)	mg/l	0.05	0.01
Copper (as Cu)	mg/l	1.0	2.0
Chloride (as Cl)	mg/l	250	250
Chromium (as Cr 6+)	mg/l	0.05	0.05
Fluoride (as F)	mg/l	1.0	1.5
Iron (as Fe)	mg/l	<0.30	No Guideline
Manganese (as Mn)	mg/l	0.1	0.1
Nitrates (as NO_3)	mg/l	5	50 (Total Nitrogen)
Barium	mg/l	1.0	0.7
Aluminium (as Al)	mg/l	0.1	0.2
Sulphates	mg/l	200	250
Zinc (as Zn)	mg/l	5.0	3.0
Lead (as Pb)	mg/l	0.05	0.01
Selenium (as Se)	mg/l	0.01	0.01
Cadmium (as Cd)	mg/l	0.01	0.003
Phenolic substances ($\text{C}_6\text{H}_5\text{OH}$)	mg/l	0.001	No Guideline

Mercury (as Hg)	mg/l	0.001	0.001
Cyanide	mg/l	0.01	0.07
Poly nuclear aromatic substances	mg/l	nil	No Guideline
Residual free chlorine	mg/l	0.2	0.2
Mineral oil	mg/l	0.01	No Guideline
Anionic detergents	mg/l	0.2	No Guideline
Pesticides		Trace	Trace
Carbon chloroform extracts (CCE, organic pollutants)	mg/l	0.2	No Guideline
Source: Uganda Bureau of Standards, WHO Guidelines, 2011			

The minimum parameters to be tested are as detailed below:

Physicochemical:

- Conductivity, or dissolved solids
- Colour
- Turbidity
- Taste
- Odour

Microbiological:

- Faecal coliform bacteria or E. coli;
- Shigella spp
- Salmonella spp

Chemical:

- Fluoride as F-
- Nitrate
- Nitrite
- pH value
- Aluminium
- Iron(total)
- Ammonia
- Residual chlorine

The frequency of sampling and surveillance will be as detailed in **Table 9-5** below:

Table 9-5: Minimum frequency of sampling of water for surveillance

Population served (P)	Frequency (minimum) of sampling
P > 100,000	10 samples every month per 100,000 of population served
25,001 – 100,000	10 samples every month
10,001 – 25,000	3 samples every month

2500 – 10,000	2 samples every month
P < 2500	1 sample every month

A sampling programme that takes into consideration appropriate international recommendations should be established and implemented. The sampling should be regular, and its frequency should mainly depend on the following factors:

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

9.6 HANDLING OF CHEMICALS AND OTHER POTENTIALLY HARMFUL MATERIALS

Chlorine, a harmful and toxic chemical, will be employed at the storage reservoirs during project operation. Thus, it must be safely handled to prevent any accidents, including health and safety issues. This section analyses the handling aspects of this chemical.

9.6.1 DESIGN AND MANAGEMENT OF CHLORINATION STORAGE AND DOSING AREAS

The following special storage and handling features should be utilized and maintained during the water supply project operation.

- (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.

9.6.2 HANDLING OF CHLORINE DURING OPERATION

Chlorine reacts violently with hydrogen, acetylene gases and solvents creating heat (EPA, 2011b). The reaction of chlorine with ammonia can create explosive compounds and gases that are toxic to breathe. Chlorine also reacts with metals. In the presence of water, chlorine can create a highly corrosive and dangerous acid mist. Therefore:

- 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.

9.7 CHANCE FINDS PROCEDURE

During excavations, chance finds may be encountered. Therefore, the contractor should have a chance finds management plan that defines the measures necessary for the overall management of any cultural heritage encountered during construction.

In order to avoid potential damage to cultural property discovered during construction, the following will apply:

- a) Workers must be vigilant to any relics found during excavation;
- b) In case of a discovery during the excavation, workers must immediately report the findings to the Foreman;
- c) The Foreman must stop the work immediately and communicate the findings to the Supervisor;
- d) The Supervisor then communicates the findings to the Contractor Manager;
- e) The Contractor Manager then notifies MWE Safeguards Team;
- f) The Department of Museums and Monument of Uganda will then be notified either via communicating with the MWE Safeguards Team via telephone or email or based on a site visit within 14 days from the time of discovery;
- g) Any further excavations or continuation of the infrastructure development at the Site of the discovered heritage will be undertaken only with the approval of the Department of Museums and Monuments;
- h) Should the Conservator of Antiquities from the Department of Museums and Monuments confirm that the discovered resource falls within the heritage resource description, he/she will report the resource to the Minister of Tourism, Heritage and Antiquities for preservation and protection;
- i) Rescue excavation or *in-situ* conservation will be proposed based on the disturbance likely to be caused by the project or in relation to cost vis-à-vis value of the heritage resource;
- j) MWE will then apply for either an excavation or preservation in-situ license of the discovered resource. The feasible proposal will then be executed. In case of in-situ conservation, the site will be managed and open to the communities and tourists that access the project area; and
- k) All chance finds will be recorded in the chance find form.

The project activities will then continue after the following have taken place:

- i. In the case of archaeological artefacts discovery, MWE will inform the Uganda Museum and grant a period where specialists from the Department of Museums and Monuments excavate and curate the artefacts professionally;
- ii. In the case of discovered human remains the police will have to be notified and either the remains are taken for forensic investigation or the LC1 authorities sanction the reburial of the remains at another location. The Contractor then meets the relocation and reburial expenses which shall be claimed from MWE; and
- iii. In the case of an encounter with an unknown sacred site, relocation ceremonies will be undertaken by the custodians of the site and the contractor then meets the relocation expenses which shall be claimed from MWE.

Overall, the following precautions ought to be undertaken:

- a) **Site avoidance:** If the boundaries of the site have been delineated, attempt must be made to redesign the proposed development to avoid the site;
- b) **Mitigation:** If it is not feasible to avoid the site through re-design, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation; and
- c) **Site Protection:** It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include erection of high visibility fencing around the site or covering the site area with a geo-textile and then capping it with fill. The exact prescription would be site- specific.

During the implementation of the project and if, a PCR is encountered, the following can be contacted:

Ministry of Tourism, Wildlife and Antiquities Rwenzori Towers 2 nd Floor, Plot 6 Nakasero Road. KAMPALA, UGANDA. P. O. Box 4241 Kampala Phone: +256 414 561 700 Email: info@tourism.go.ug	The Uganda Museum Plot 5-7 Kira Road, P. O Box 365, KAMPALA-UGANDA (+256) 414 232707. www.mtti.go.ug .
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9.8 DECOMMISSIONING PLAN

The Lugala 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.

10 COMMITMENT, RECOMMENDATIONS AND CONCLUSION

10.1 COMMITMENTS

- i. The Contractor shall implement the mitigation measures stipulated in the ESMMP. The same shall be extended or included in any contract entered into with any sub-contractors;
- ii. The Contractor together with the District Environment Officers, officials from NEMA, MoWE and other relevant Government agencies and departments shall carry out monitoring to ensure that the recommended mitigation measures in addition to ESIA conditions of approval and other relevant ESHS requirements are complied with;
- iii. Annual EHS audits of the proposed Lugala RGC Solar-Powered Water Supply and Sanitation Project will be carried according to the NEMA conditions of approval;
- iv. Proper waste management facilities and emergency preparedness/response measures shall be put in place;
- v. Commitments should also imply prompt actions by the Contractor in event of any relevant issues which may arise during the course of the project;
- vi. In order to attain the commitments made in ESIA report and other ESHS aspects of the WSSP under Lugala RGC, the Contractor should hire one full time Environmental and Social Officer, one Health and Safety Officer, an Environmental and Social Manager, and Environmental Social Health and Safety Manager;
- vii. MoWE should also hire one Environmental Safeguard Specialist, One Social Development Specialist, and one Graduate Environmentalist, one graduate sociologist and one health and Safety graduate;
- viii. This ESMP will be disclosed in the communities around the project area and discussed with the members of the Grievance Redress Committees who are tasked to register and report local grievances and concerns; and
- ix. Contractor should commit to compel all subcontractors to follow and implement this ESMP, commitments, and measures outlined in the Contractor ESMP (C-ESMP) prepared inline the OPRC.

10.2 RECOMMENDATIONS

Based on the assessment, the following key recommendations are made:

- Extending the water supply system to Buguya trading center which already has an existing networks of pipe that was established for using ground water systems that was found to be abandoned due to its hardness
- The Design of the public sanitation facilities should provide for two stances (one for female and the other for male) for PWDs
- The design should incorporate upgrading the access road to the intake and treatment plant.

Considering the results of the ESIA, the ESIA team recommends the approval of the proposed project and its components for implementation on condition that the recommended mitigating measures are implemented, and as any other stakeholders may recommend in the course of review of this report or following audit.

10.3 CONCLUSION

The proposed implementation of the the Large Solar-powered WSSS Project under Lugala RGC will not only have positive impacts like improved access to clean and safer water, creation of employment opportunities, skills transfer, creation of market for local goods and services, enhanced sanitation, hygiene and public health among the urban communities, rural dwellers and social amenities local and national economy benefits within the project area (8 villages in Lugala and Buchumba Parishes in Banda Subcounty, Namayingo District) but also, the WSSP upon completion will spur the country's economic development through enhancement of sectoral growth for sectors like tourism, agriculture, health, industry and trade within and beyond the project area at large especially facilitated by access to quality and adequate water supply.

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

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

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ANNEX A: NEMA APPROVAL OF TOR



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17, 19 & 21, Jinja Road
P.O. Box 22255, Kampala, UGANDA.
Tel: 255-414-251054, 251055, 251068
342758, 342759, 342717
Fax: 255-414-257521 / 232880
Email: info@nema.go.ug
Website: www.nema.go.ug

NEMA/4.57th June, 2022

The Permanent Secretary,
Ministry of Water and Environment,
P.O. Box 20026,
KAMPALA.

Tel: +256 417889400
Email: mwe@mwe.go.ug

RE: SCOPING REPORT AND TERMS OF REFERENCE FOR UNDERTAKING AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR FIVE LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES IN, IGWAYA AND KIDERA IN BUYENDE DISTRICT, KITENGA IN KALIRO DISTRICT, BUKIZIBU-BUMWENA IN MAYUGE DISTRICT AND LUGALA IN NAMAYINGO DISTRICT (EIATOR 8454)

Reference is made to the Scoping Report and Terms of Reference (TOR) for carrying out an Environmental and Social Impact Assessment (ESIA) for the above-mentioned Project, which was submitted to this Authority on 6th April, 2022, for review and consideration for approval.

This Authority has finalized the review and grants formal **approval** of the said TOR. Please note that the approval of the TORs **does not grant permission** to start implementing any of the proposed project activities, as this is not a Certificate of approval.

Please undertake separate Environmental and Social Impact Assessments (ESIAs) in respect to piped water supply systems and sanitation facilities in:

- (a) Igwaya and Kidera, Buyende District;
- (b) Kitenga, Kaliro District;
- (c) Bukizibu-Bumwena, Mayuge District; and,
- (d) Lugala, Namayingo District.

In addition to the scope of work presented in the TOR, you are advised to make due consideration of the aspects below during the conduct of the ESIA studies, and the preparation of ESIA reports:

- i. Provide a comprehensive description of the project components and activities covering the construction and operational phases, associated infrastructure, details of the design and capacity of water supply systems, the methods and

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chemicals to be used for water treatment, and size of the workforce; and the implications of these on the environment.

- ii. Undertake geotechnical investigations of the proposed project sites so as to inform the design and construction of the Water Supply Systems and Sanitation Facilities.
- iii. Include in the ESIA reports hydrological investigative reports in regards to the potential impacts of the project on underground water resources within the proposed project areas, and mitigation actions to address such impacts.
- iv. Provide a detailed description of the waste streams that will be generated from the activities of the piped water supply systems and sanitation facilities, and the measures and equipment that will be put in place to handle such waste.
- v. Include in the ESIA reports other relevant baseline information that is project site specific, on the soils, water, air quality and noise levels; as well as, clear-coloured photographs depicting the current status of the project areas and the neighbouring environs.
- vi. Provide clear coloured and well-labelled location maps/images (*preferably each covering A-3 size paper*) and accurate sets of GPS coordinates clearly indicating the site boundaries and locations of the various project components. Ensure that all GPS coordinates are provided in UTM format.
- vii. Append to the ESIA report well-labelled copies of the proposed site layout plan (*preferably covering A3 or larger paper size*) that shows the layout and placement of the different project components.
- viii. Carry out comprehensive consultations with all the relevant key stakeholders including, Buyende, Kaliro, Mayuge and Namayingo District Local Government Authorities, Department of Occupational Safety and Health (Ministry of Gender, Labour and Social Development), local communities in the neighbourhood and the Directorate of Water Resources Management (DWRM) particularly in regards to potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA reports.
- ix. Include in the ESIA report, comprehensive analysis of analysis of alternatives/ options to the selected project location, design and technology among other aspects.
- x. Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified environmental impacts of the proposed project.

- xi. Make reference to all the relevant provisions of the applicable policies, laws, regulations, guidelines and standards, in particular, the National Environment Act, No. 5 of 2019.
- xii. Append to the ESIA reports, authentic copies of land ownership and acquisition documents.
- xiii. Consider any other critical environmental aspects/concerns which, may have not been initially foreseen during preparation of the scoping report and TOR, and include an evaluation of such environmental and social concerns in the ESIA reports.
- xiv. Indicate the estimated cost of the project evidenced by a certificate of valuation of the capital investment of the project, issued by a qualified and registered valuer in accordance with Regulation 18(1) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.
- xv. Provide evidence of payment of a non-refundable administration fee of 30% (thirty percent) of the total fees on submission of the Environmental and Social Impact Statements, in accordance with Regulation 49(2) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.

Note that only registered environmental practitioners including the team leader should be contracted to conduct the ESIA for the proposed project.

This is therefore, to recommend that you proceed with carrying out the ESIA studies for the proposed solar powered piped water supply systems and sanitation facilities. We look forward to the receipt of comprehensive copies of the ESIA reports, for our further action.



Monica Angom
FOR: EXECUTIVE DIRECTOR

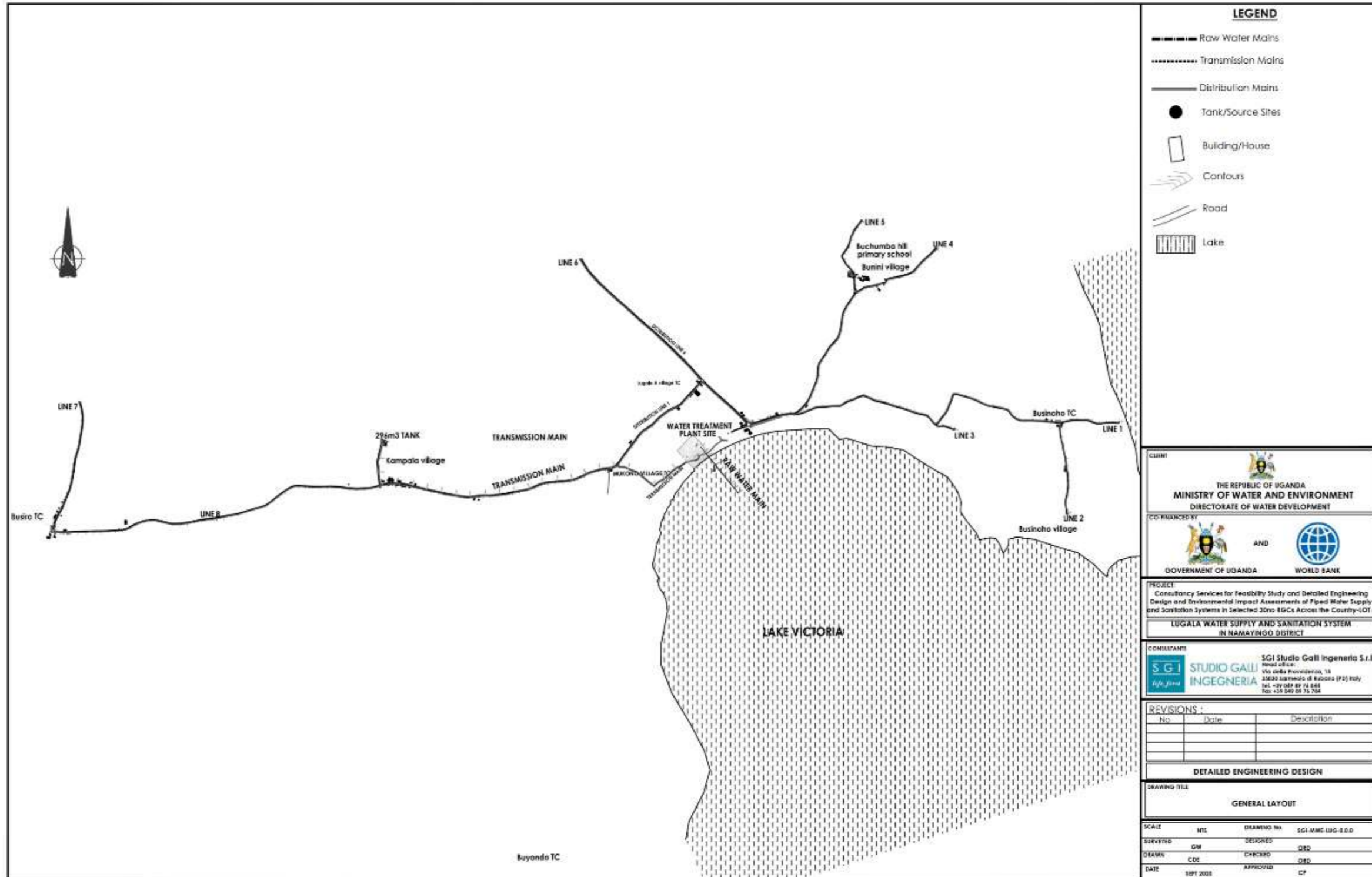
NEMA approval conditions for the Terms of Reference

No.	Condition	Section included
(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 Section 2.3 (Project Description) of this report
(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.	Reviewed and required information included under geology and soils (Section 5.1.4 and Section 5.1.5). Geotechnical investigations report Appendix 7
(iii)	Include in the ESIA reports hydrological investigative reports in regards to the potential impacts of the project on surface 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 under waste management Sections 2.3.1.4.9 (Sludge treatment) 2.3.1.4.10 (Dirty Backwash Tank) and, 2.3.1.4.11 (Sludge drying beds) and 2.4.2.2
(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.	Included as Chapter 5 (Baseline Environmental and Socio-economic)
(vi)	Provide clear coloured and well-labelled location maps/images (preferably each covering A-3 size papery and accurate sets of GPS coordinates clearly indicating the site boundaries and locations of the various project components. Ensure that all GPS coordinates are provided in UTM format.	Clear coloured and well-labelled location maps/images have been provided in Chapter 2 (Project Description) and Chapter 5 (Baseline

No.	Condition	Section included
		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 Appendix 2 of this report
(viii)	Carry out comprehensive consultations with all the relevant key stakeholders of Mayuge 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 6
(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 7 (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.
(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.	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.

No.	Condition	Section included
(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 5 (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 2.6.2 as adopted from the project feasibility and design report.
(xv)	Provide evidence of payment of a non-refundable administration fee of 30% (thirty percent) of the total fees on submission of the Environmental and Social Impact Statements, in accordance with Regulation 49(2) of The National Environment (Environmental and Social Assessment) Regulations, S.I No.143/2020.	To be appended at submission of the report to NEMA

ANNEX B: DESIGNS AND TECHNICAL DRAWINGS



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

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

LUGALA WATER SUPPLY AND SANITATION SYSTEM
 IN NAMAYINGO DISTRICT

CONSULTANT

SGI STUDIO GALL INGEGNERIA S.r.l.
 Head office:
 Via della Provvidenza, 18
 20090 Sarnano di S. Lucia (PS) Italy
 Tel. +39 087 87 74 848
 Fax +39 047 86 75 704

REVISIONS :

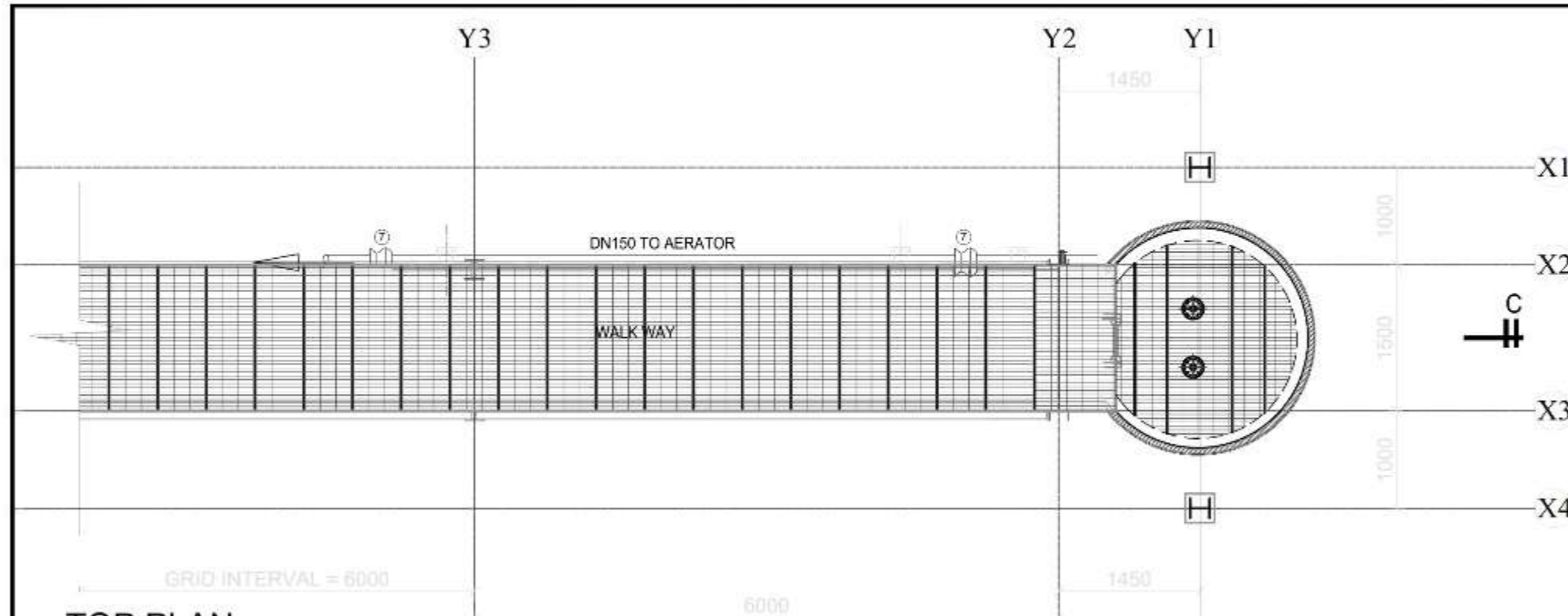
No.	Date	Description

DETAILED ENGINEERING DESIGN

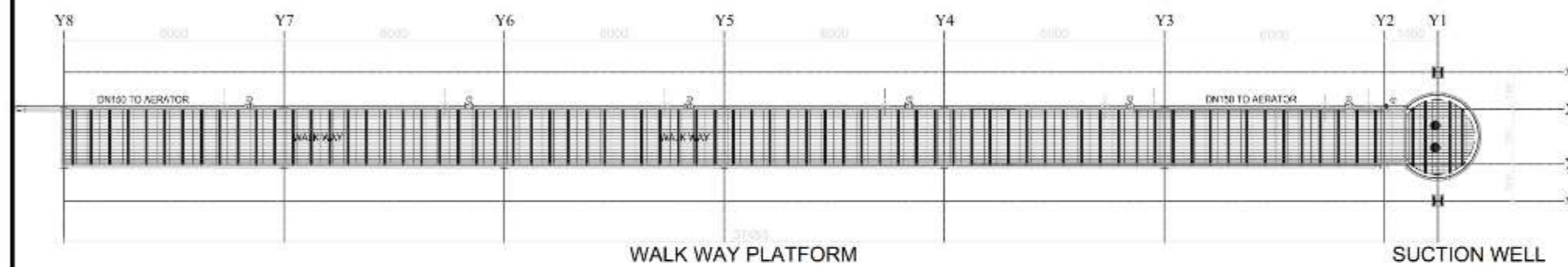
DRAWING TITLE

GENERAL LAYOUT

SCALE	N1:1	DRAWING No.	SG1-MMS-UG-8.00
DESIGNED	GM	DESIGNED	DEB
DRAWN	CDE	CHECKED	DEB
DATE	18PT 2008	APPROVED	CP



TOP PLAN SCALE, 1:50



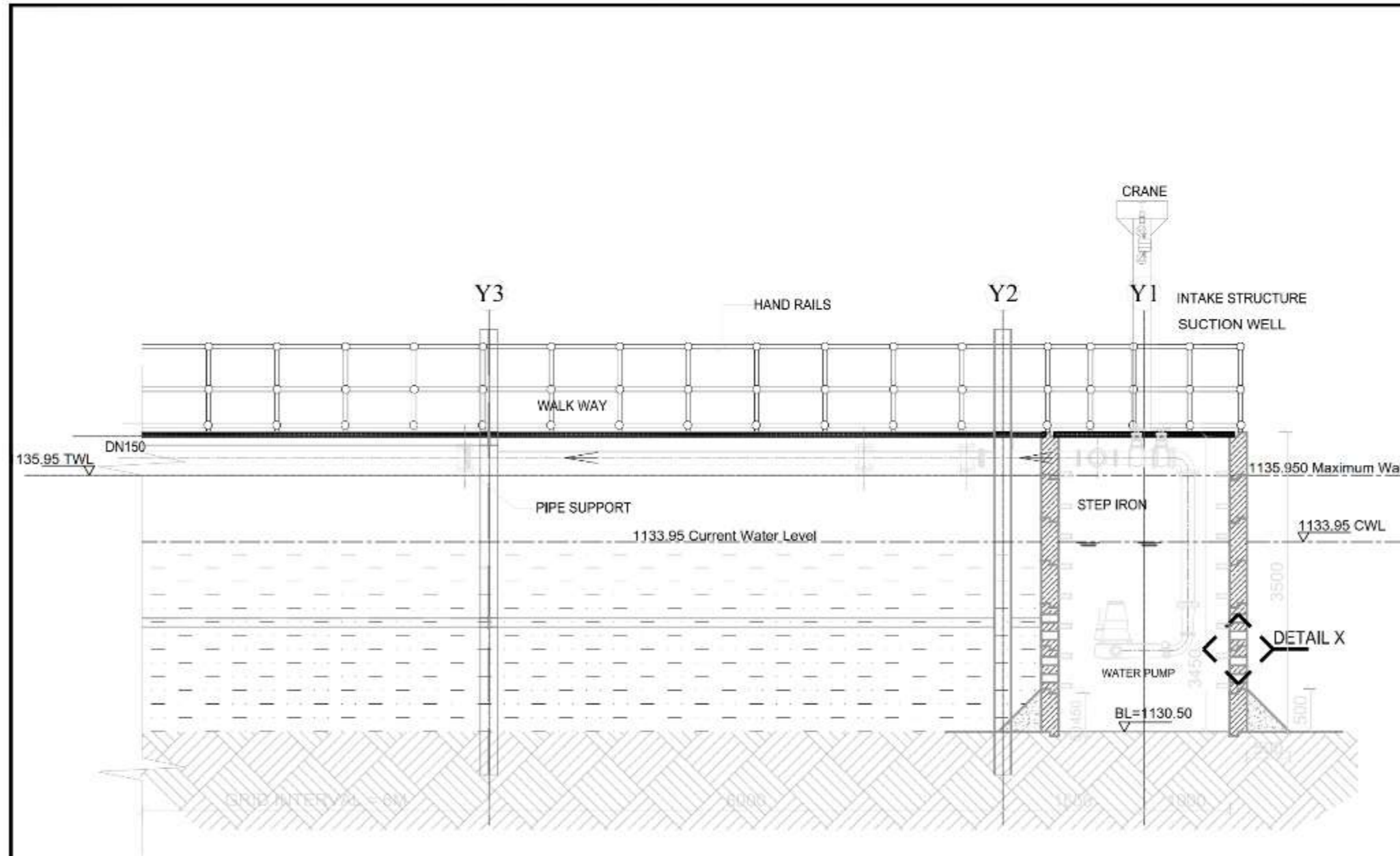
WALK WAY PLATFORM

SUCTION WELL

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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<p>PROJECT</p> <p>Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no IGCS Across the Country-LOT 4</p> <p>LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT</p>													
<p>CONSULTANTS</p>  <p>SGI Studio Galli Ingegneria S.r.l. Via Carlo Farini, 15 35100 Sarmeola di Rubano (PD) Italy Tel. +39 049 87 74 844 Fax. +39 049 75 75 754</p>													
<p>REVISIONS :</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		No.	Date	Description									
No.	Date	Description											
<p>DETAILED ENGINEERING DESIGN</p>													
<p>DRAWING TITLE</p> <p>INTAKE STRUCTURE TOP PLAN</p>													
SCALE	AS SHOWN	DRAWING No.	SGH-WEL-UG-1.1.D.										
SURVEYED	GW	DESIGNED	DFD										
DRAWN	COE	CHECKED	DFD										
DATE	SEPT 2020	APPROVED	CP										



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
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- 5) All mass concrete is class 15/10mm aggregate

<p>CLIENT</p> <p style="text-align: center;">  THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT </p>													
<p>CO-FINANCED BY</p> <p style="text-align: center;">  AND  GOVERNMENT OF UGANDA WORLD BANK </p>													
<p>PROJECT:</p> <p>Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no IGAs Across the Country-LOT 4</p> <p style="text-align: center;">LOCAL WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT</p>													
<p>CONSULTANTS:</p> <p>  SGI Studio Galli Ingegneria S.r.l. <small>Head Office:</small> Via Carlo Farini, 15 35100 Sarmeola di Rubano (PD) Italy Tel. +39 049 87 74 844 Fax. +39 049 75 75 754 </p>													
<p>REVISIONS:</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		No.	Date	Description									
No.	Date	Description											
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SURVEYED	GW	DESIGNED	DFD										
DRAWN	CDR	CHECKED	DFD										
DATE	SEPT 2020	APPROVED	CP										



NOTES

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- 5). All mass concrete is class 15/10mm aggregate

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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 Urban MDCEs Across the Country-LCT II
LUGALA WATER SUPPLY AND SANITATION SYSTEM
 IN NAMAYINGO DISTRICT

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 Fax. +39 0471 99 75 785

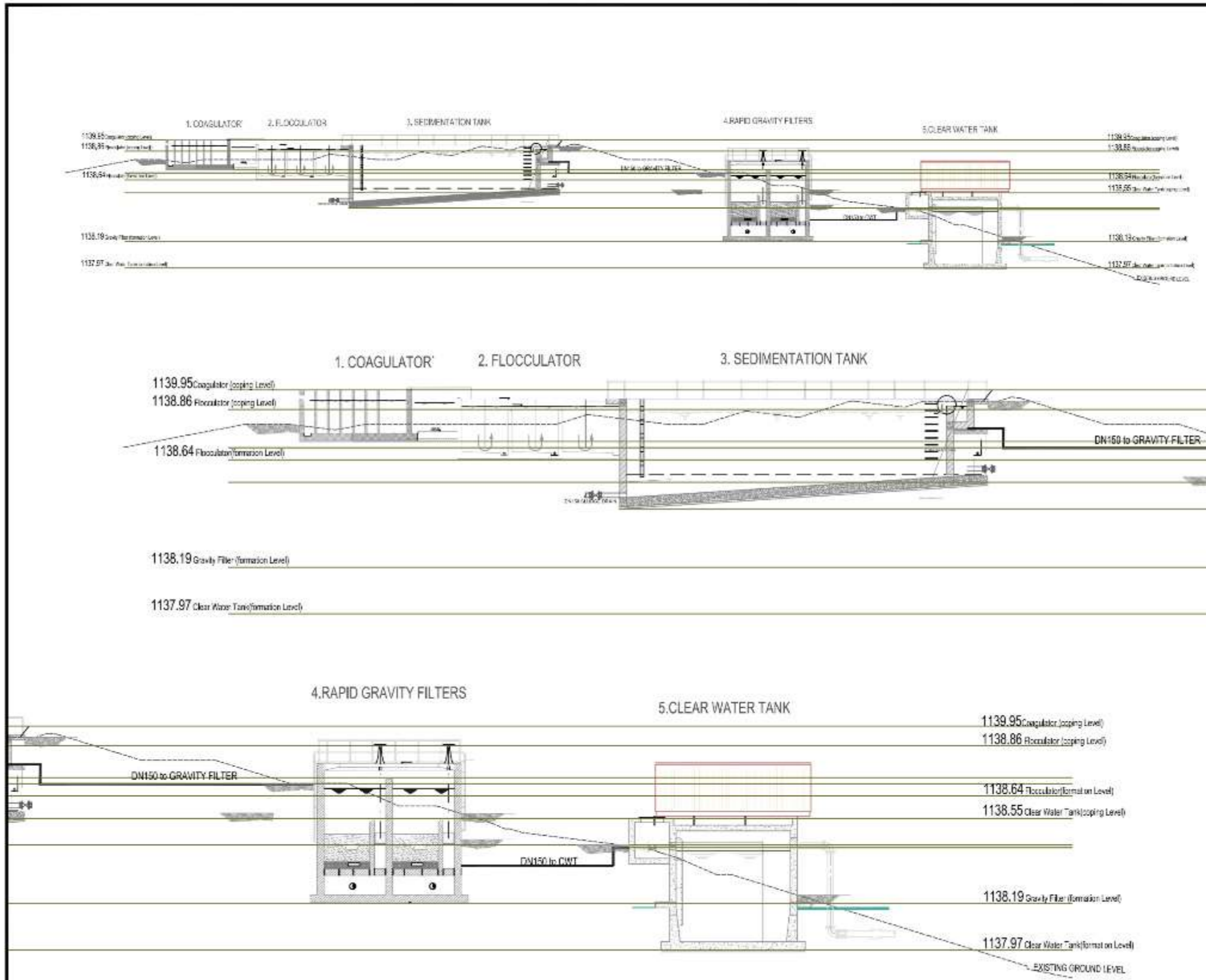
REVISIONS:

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
TREATMENT PLANT SITE LAYOUT

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SURVEYED	GN	DESIGNED	ORD
DRAWN	CEE	CHECKED	ORD
DATE	SEPT 2020	APPROVED	OP



NOTES

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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 Urban WDCs Across the Country-ICT II

**LUGALA WATER SUPPLY AND SANITATION SYSTEM
 IN NAMAYINGO DISTRICT**

CONSULTANTS

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 Fax. +39 045 99 25 765

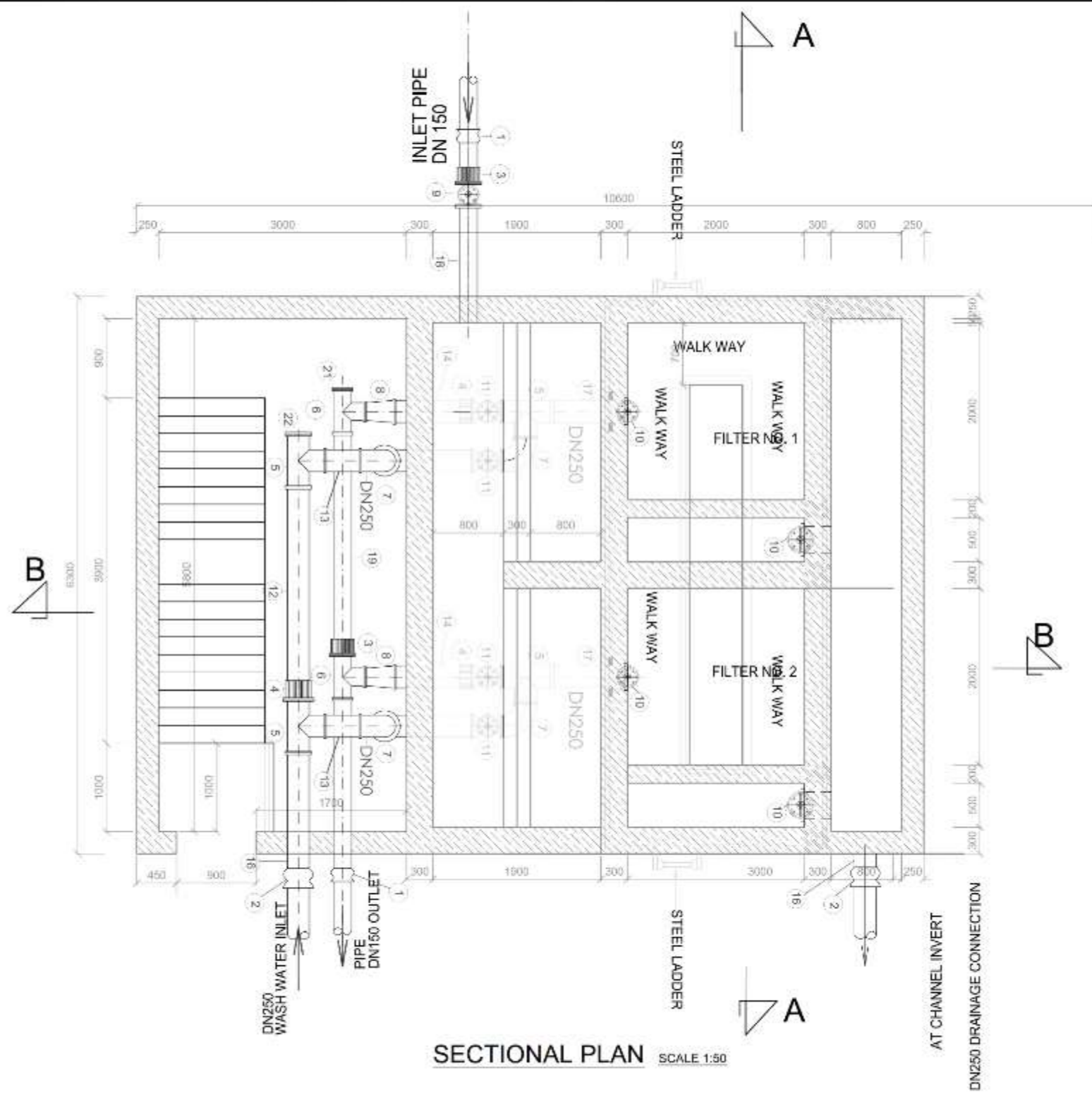
REVISIONS:

No	Date	Description

DETAILED ENGINEERING DESIGN

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SURVEYED	GN	DESIGNED	ORD
DRAWN	CEE	CHECKED	ORD
DATE	SEPT 2020	APPROVED	OP



SECTIONAL PLAN 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

PIPE FITTING SCHEDULE

1. 2No. DN150 male coupling
2. 2No. DN250 male coupling
3. 2No. DN150 male flanged adaptor
4. 3No. DN250 male flanged adaptor
5. 4No. DN250/250 of flanged tee
6. 2No. DN150/150 of flanged Tee
7. 6No. DN250 of flanged 90° bend
8. 2No. DN250/150 of flanged Tee
9. 1No. DN150 of flanged gate valve
10. 4No. 50x500 perlocks
11. 4No. DN250 flanged gate valve
12. 1No. DN250 flanged/spigot pipe length ne 3m
13. 2No. DN250 of flanged pipe length not exceeding 1.0m
14. 2No. DN250 flanged/spigot pipe length not 1.5m
15. 2No. DN250 of flanged pipe length ne 3m
16. 1No. DN250 flanged/spigot pipe with puddle flanged, ne 2m
17. 2No. DN250 of flanged pipe with puddle flanged, length ne 2m
18. 1No. DN150 flanged/spigot pipe with puddle flanged, ne 2m
19. 2No. DN150 flanged/spigot pipe length ne 3m
20. 1No. DN150 flanged/spigot pipe with puddle flanged, ne 3m
21. 1No. DN 150 blank flange
22. 1No. DN250 blank flange

CDDC


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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 30ne BGCs Across the Country LOT 6
 LUGAJA WATER SUPPLY AND SANITATION SYSTEM
 IN NAMAYINGO DISTRICT

CONSULTANTS:

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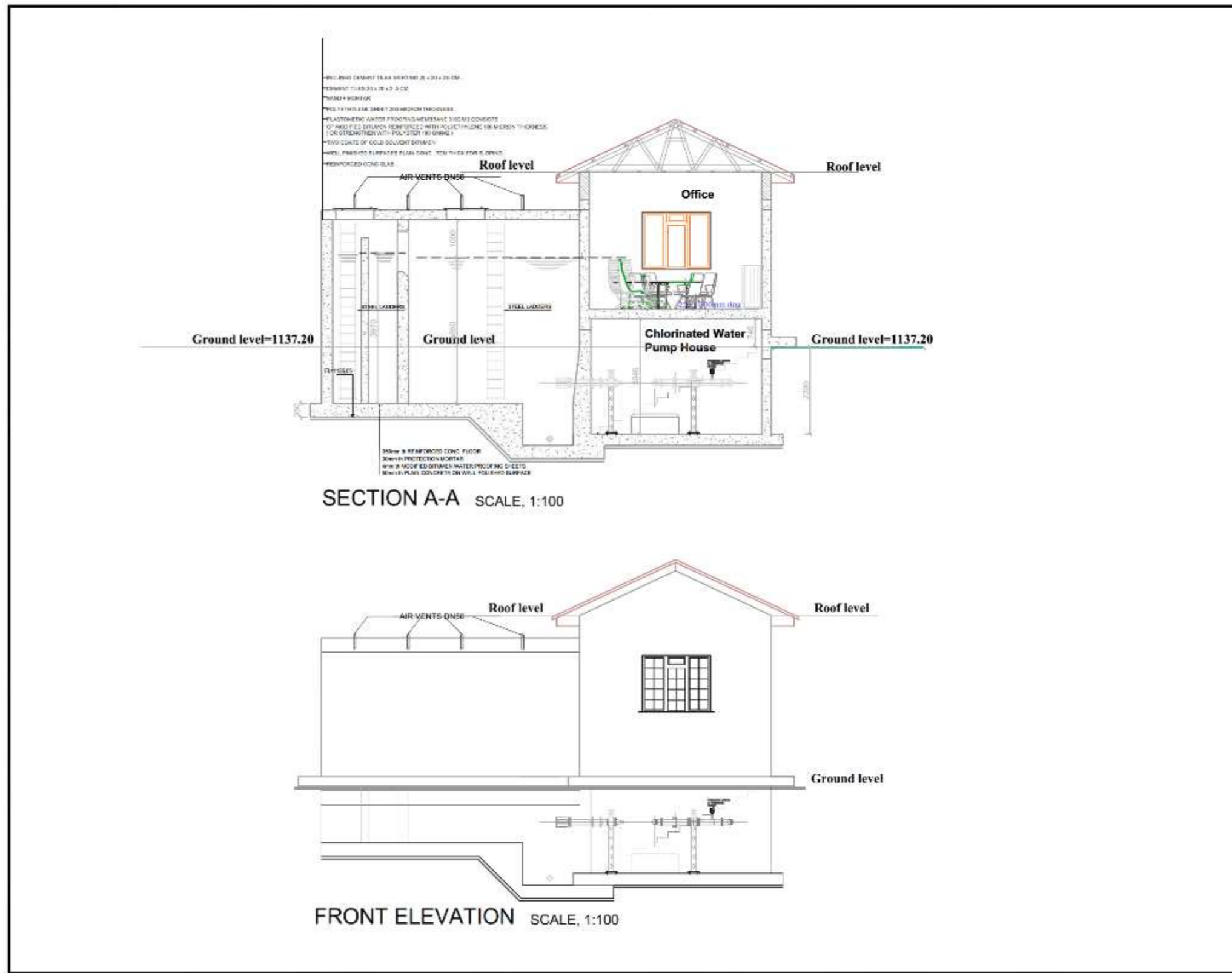
REVISIONS :		
No.	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

**RAPID GRAVITY FILTER
SECTIONAL PLAN**

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1:50	GW		
SURVEYED		CHECKED	
DRAWN			
DATE		APPROVED	
SEP' 2020			



- 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. DN150 flanged pipe with puddle flange, n.e 1.5m.
 2. 2No. DN150 detachable coupling.
 3. 2No. DN150 flanged gate valve.
 4. 1No. DN150 flange/spigot with puddle flange, n.e 1.0m.
 5. 4No. DN150 90° flange bends.
 6. 3No. DN150 flanged gate valve.
 7. 1No. DN150 double flanged pipe, length not exceeding 4m.
 8. 1No. DN150 detachable coupling.
 9. 2No. DN250 flanged spigot pipe with puddle flange, n.e 1.3m.
 0. 2No. DN150 flanged strainers.
 1. 1No. DN250 flanged pipe, length not exceeding 1.5m.
 2. 2No. DN250 90° flange bends.
 3. 1No. DN250 double flanged pipe with puddle flange, n.e 4m.
 4. 1No. DN250 blank flange.
 5. 2No. DN100 flanged spigot pipe, n.e 2.5m.
 6. 1No. DN100 flanged gate valve.
 7. 1No. DN100 flange adaptor.

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 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessment of Piped Water Supply and Sanitation Systems in Selected 30no BGCs Across the Country-LOT 4
 (UGANDA WATER SUPPLY AND SANITATION SYSTEM IN NAMA YINYO (SUBJECT))

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 Tel. +39 0742 94 70.882
 Fax +39 0742 94 70.774

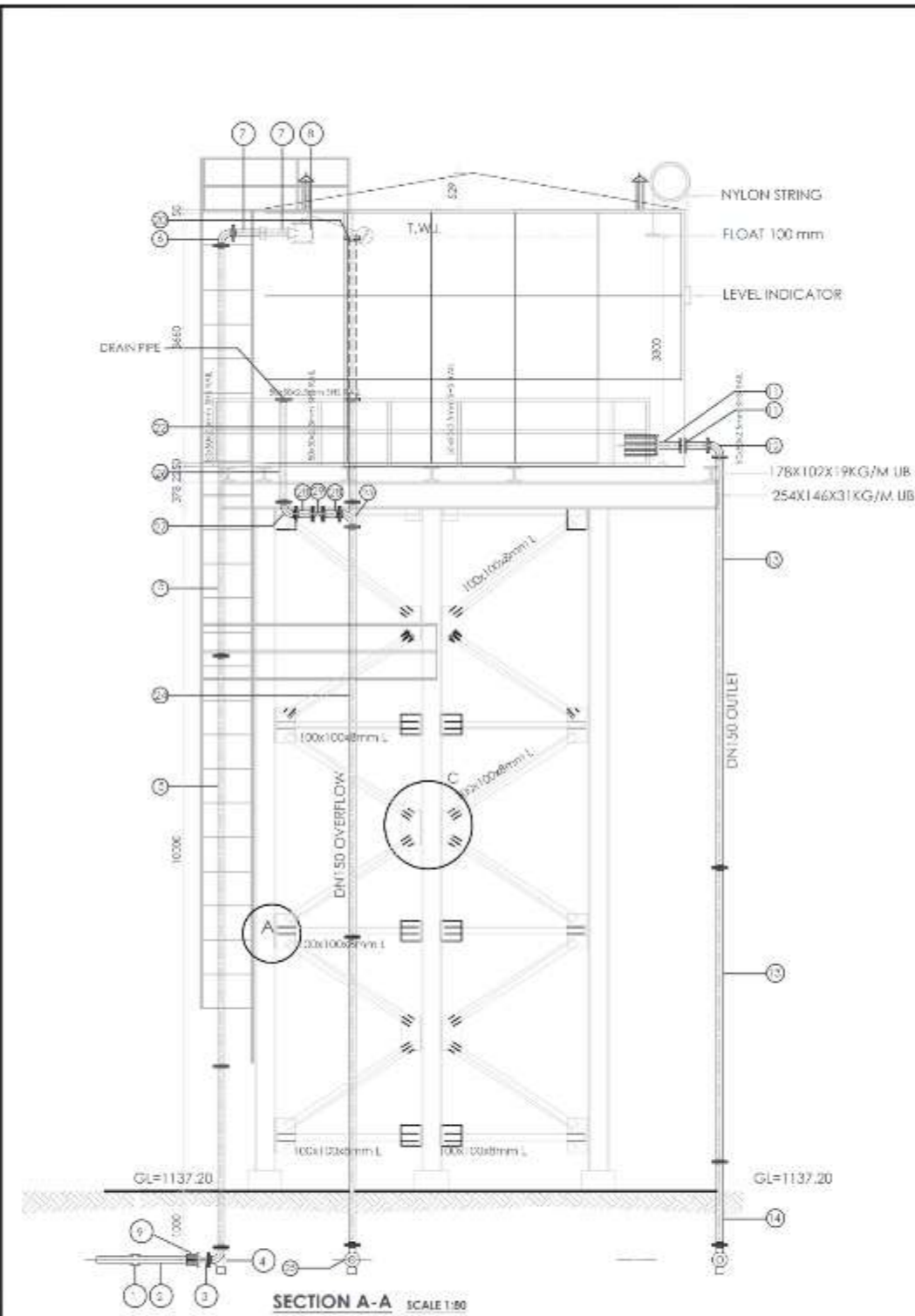
REVISIONS:

No.	Date	Description

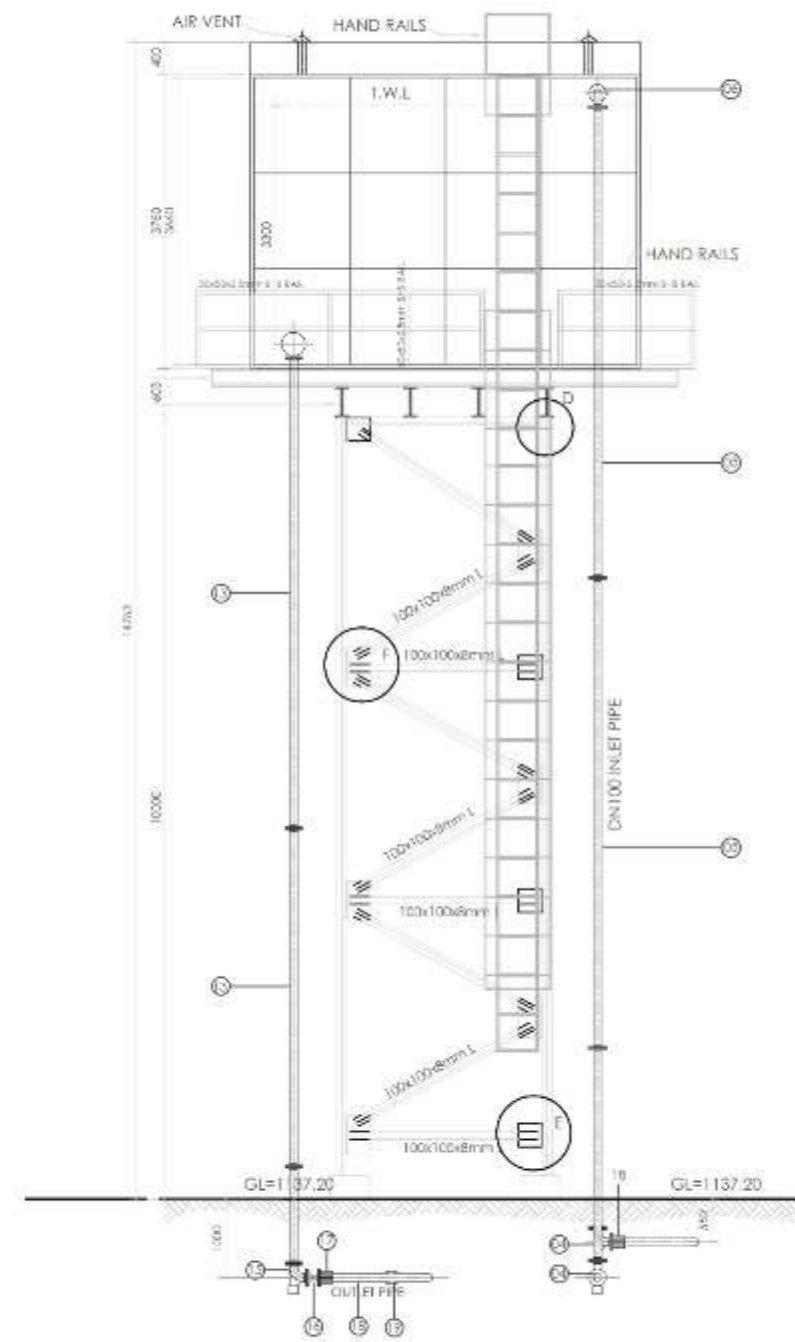
DETAILED ENGINEERING DESIGN

DRAWING TITLE
 CLEAR WATER TANK + PUMP HOUSE
 SECTION A-A & FRONT ELEVATION

SCALE	1:100	DRAWING No.	SGI/MWE/UG-3-4.1
SURVEYED	GW	DESIGNED	CBG
DRAWN	CBG	CHECKED	CBG
DATE	SEP 2020	APPROVED	CP



SECTION A-A SCALE 1:80



SECTION B-B SCALE 1:80

- NOTES**
- All dimensions are in mm unless stated otherwise.
 - All levels are in metres above sea level.
 - Structural details are not included.
 - All structural concrete is Class 25/10.
 - All mass concrete is Class 15/10.

- PIPE FITTING SCHEDULE**
- 1No. DN100 Viking Johnson or Similar Coupling.
 - 1No. DN100 Pipe not exceeding 2.0m.
 - 1No. DN100 All Flanged Gate Valve.
 - 1No. DN100 All Flanged Duck foot 90° bend.
 - 3No. DN100 Double Flanged Pipe not exceeding 6.0m.
 - 1No. DN100 All Flanged 90° bend.
 - 2No. DN100 Double Flanged Pipe not exceeding 6.0m.
 - 1No. DN100 Flanged Roll Rest Valve.
 - 1No. DN100 Flanged Adaptor, Max type or similar.
 - 1No. DN100 Flanged Outlet Pipe Strainer.
 - 2No. DN150 Double Flanged Pipe not exceeding 6.0m.
 - 1No. DN150 All Flanged 90° bend.
 - 2No. DN150 Double Flanged Pipe not exceeding 6.0m.
 - 1No. DN150 Double Flanged Pipe not exceeding 2.0m.
 - 1No. DN150 All Flanged Duck foot 90° bend.
 - 1No. DN150 Flanged Gate Valve.
 - 1No. DN150 Flanged Adaptor, Max type or similar.
 - 1No. DN150 Double Flanged Pipe not exceeding 2.0m.
 - 1No. DN150 Viking Johnson or Similar Coupling.
 - 1No. DN150 Flanged 90° bend.
 - 1No. DN150 Double Flanged Pipe not exceeding 2.8m.
 - 1No. DN100 Double Flanged Pipe not exceeding 2.0m.
 - 1No. DN150/100 All Flanged Tee.
 - 2No. DN150 Double Flanged Pipe not exceeding 6.0m.
 - 1No. DN150 All Flanged Duck foot 90° bend.
 - 1No. DN150 All Flanged Pipe with puddle flange n.e 2.0m.
 - 1No. DN150 All Flanged 90° bend.
 - 1No. DN150 Double Flanged Pipe not exceeding 0.4m.
 - 1No. DN150 Flanged Gate Valve.
 - 1No. DN150 Flanged Adaptor, Max type or similar.

CGWH

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PROJECT
 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30th EGCs Across the Country-LOT 4

LUGALA WATER SUPPLY AND SANITATION SYSTEM
 IN NAWAYINDO DISTRICT

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 20148 Sesto San Giovanni (MI) Italy
 Tel. +39 02 83 72 804
 Fax +39 02 83 72 754

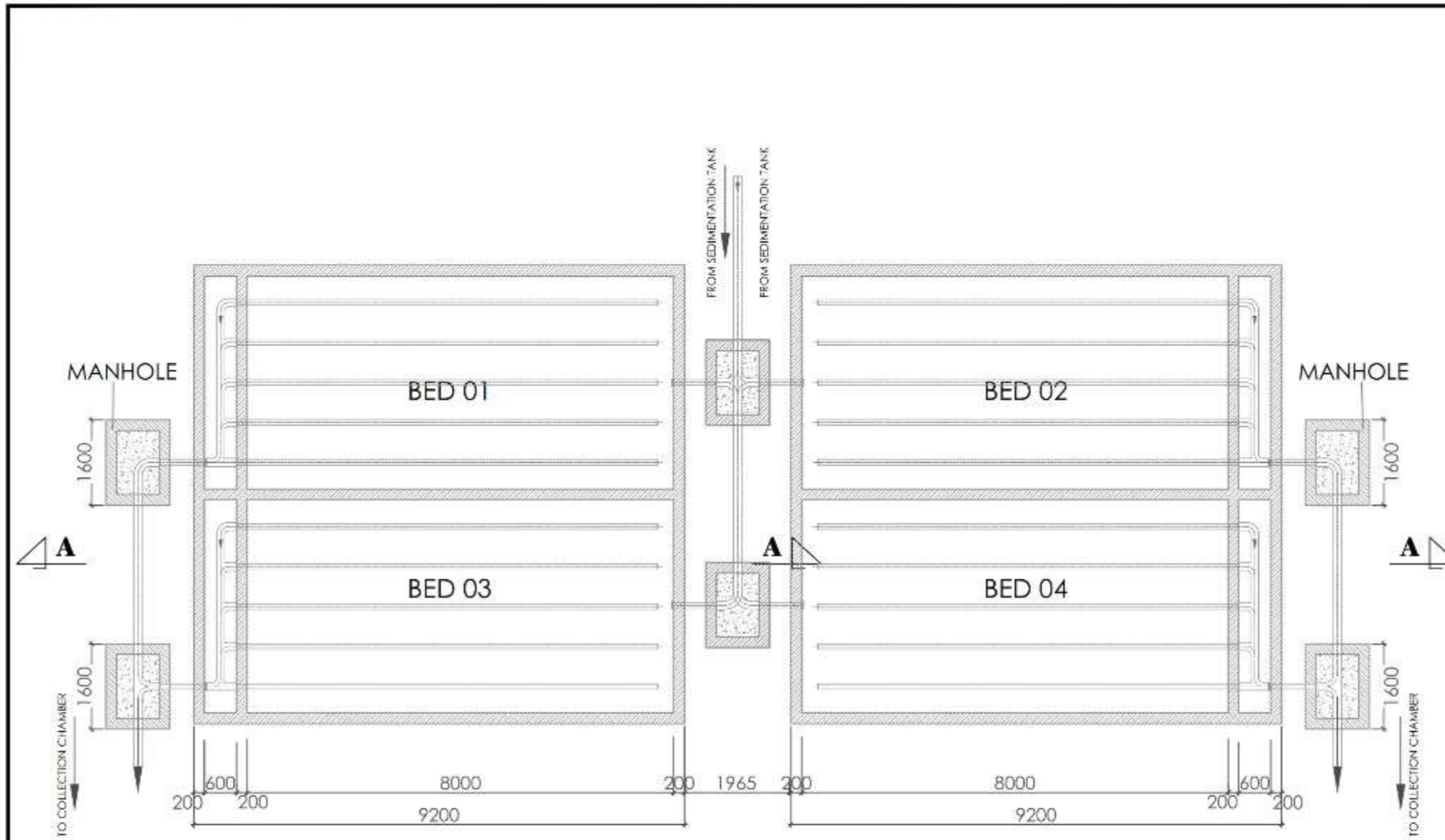
REVISIONS:

No.	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
**BACK WASH TANK
 SECTION A-A AND B-B**

SCALE	AS SHOWN	DRAWING No.	SGH/WC-LUS-3.5.1
SURVEYED	GW	DESIGNED	OSD
DRAWN	CDE	CHECKED	OSD
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.

CURT


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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 IGCs Across the Country-LOT 4

LUGALA WATER SUPPLY AND SANITATION SYSTEM
IN NAMAYINGO DISTRICT

CONSULTANTS:

 **STUDIO GALLI**
INGEGNERIA

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 Via della Provvidenza, 13
 39030 Sommadossi (Bozole) (TN) Italy
 Tel. +39 0461 82 72 004
 Fax. +39 0461 82 72 005

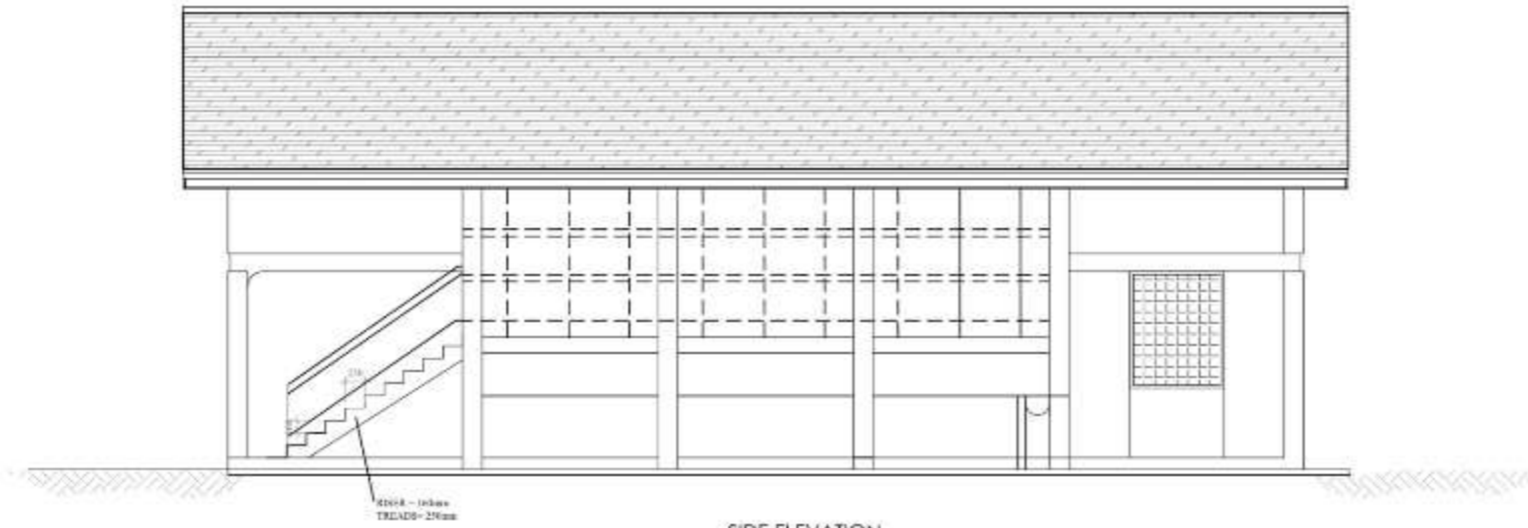
REVISIONS:		
No	Date	Description

DETAILED ENGINEERING DESIGN

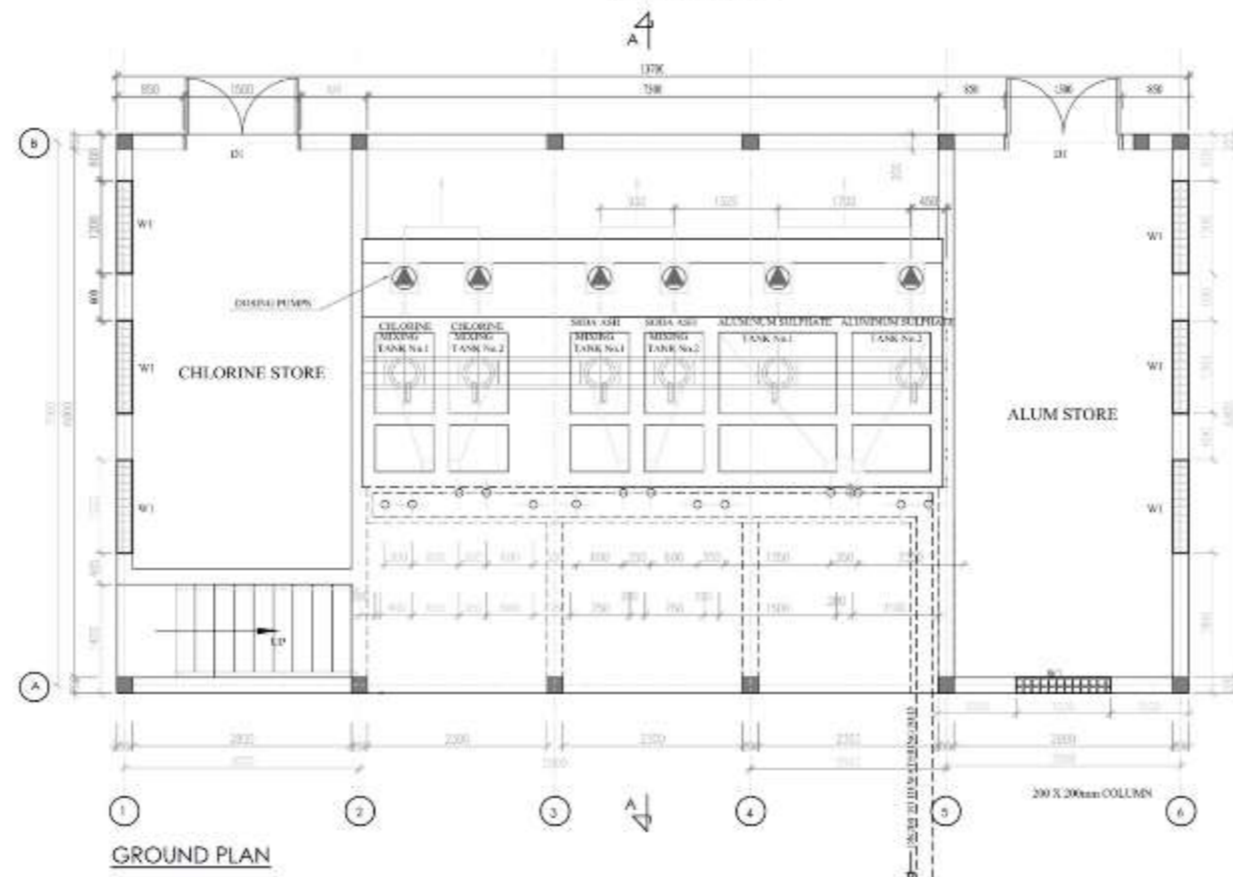
DRAWING TITLE

**SLUDGE DRYING BED
TOP PLAN**

SCALE	AS SHOWN	DRAWING No.	SGI-MWE-UG-3-EE
SURVEYED	GVN	DESIGNED	CRD
DRAWN	CRD	CHECKED	CRD
DATE	SEPT 2020	APPROVED	CP



SIDE ELEVATION



GROUND PLAN

NOTES

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- 5). All mass concrete is class 15/10mm aggregate
- 6). For Site Layout, see Dwg. MWE/LOT1/SUS/W/1.0.0

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PROJECT
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 LUGALA WATER SUPPLY AND SANITATION SYSTEM IN HAMATYINGO DISTRICT

CONSULTANT

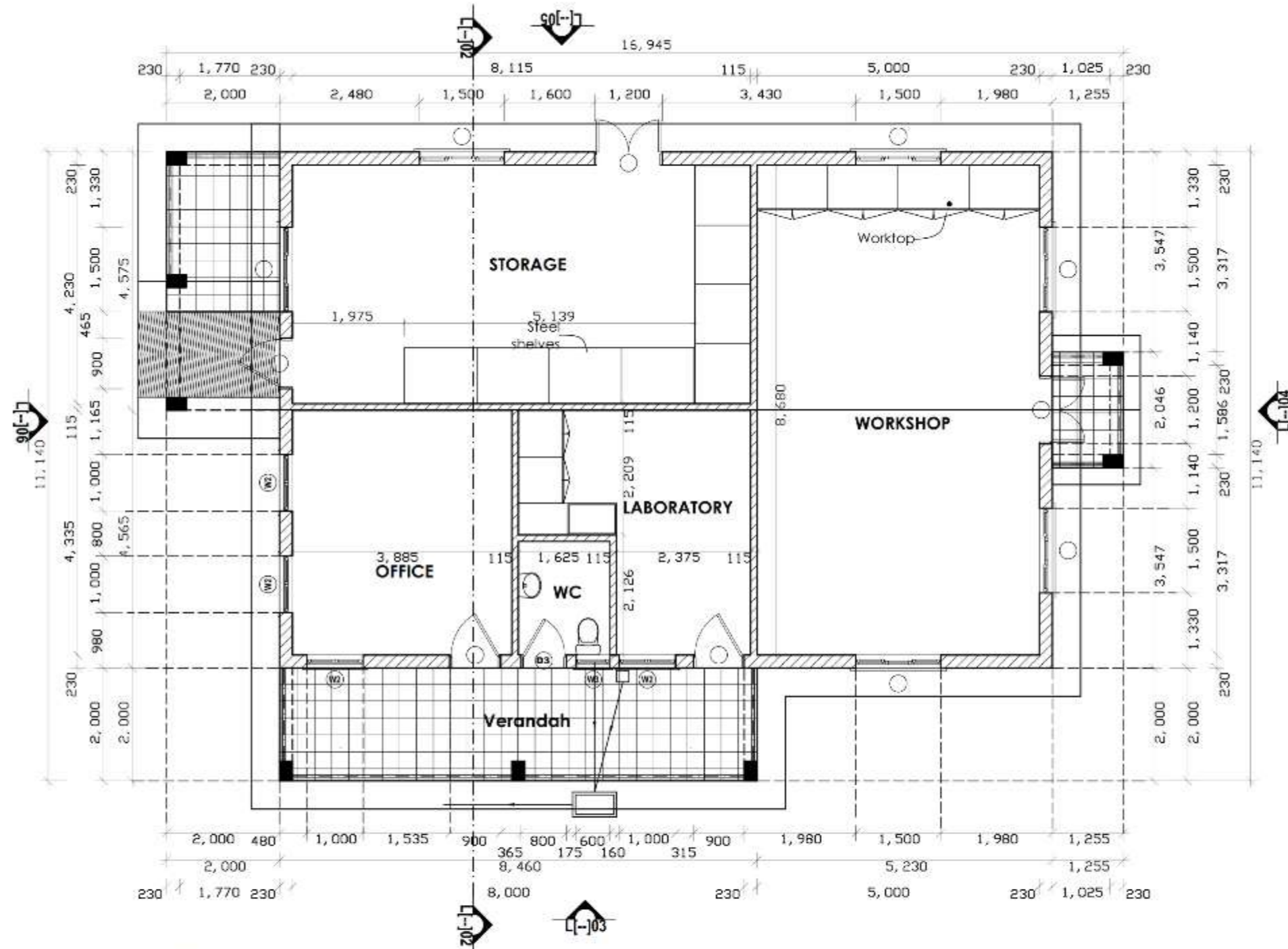
 SGI Studio Galli Ingegneria S.r.l.
 Head Office
 Via della Repubblica, 13
 20122 Bergamo (Italy)
 Tel. +39 045 79 74 84
 Fax +39 045 79 74 84

REVISIONS:

No.	Date	Description

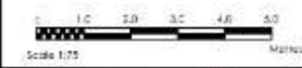
DETAILED ENGINEERING DESIGN
 DRAWING TITLE
CHEMICAL HOUSE
SECTIONAL PLAN & ELEVATION

SCALE	AS SHOWN	DRAWING NO.	SGI-WWT-LUG-0.7.C
DESIGNED	GW	CHECKED	CEB
DRAWN	CEB	APPROVED	CEB
DATE	10/11/2011		

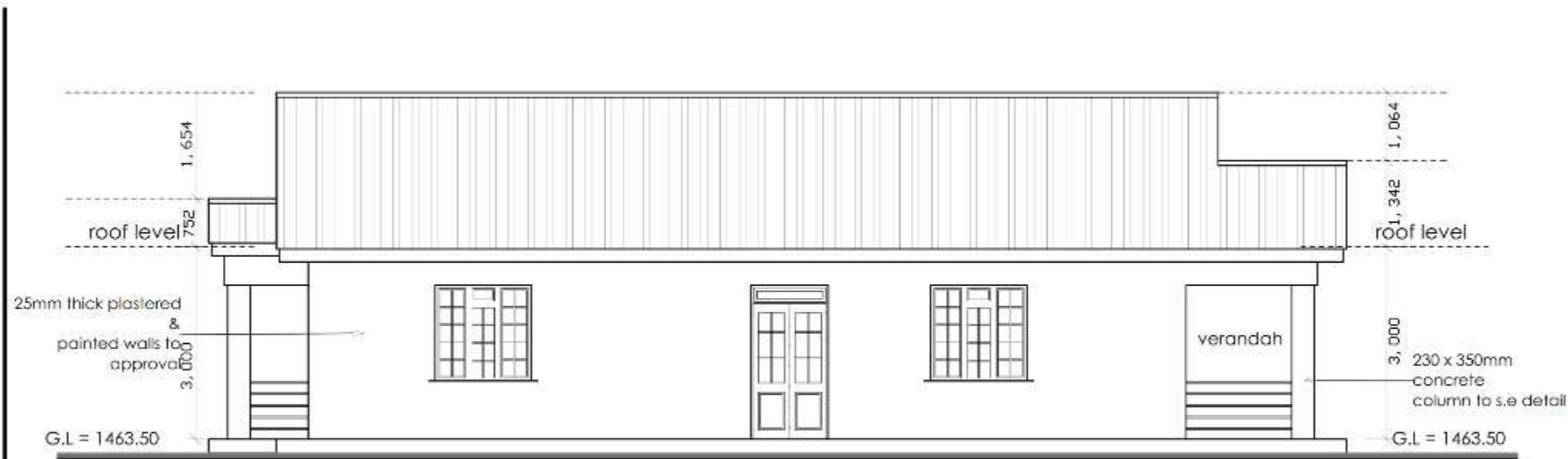


GROUND FLOOR PLAN [L--]01 scale 1:100

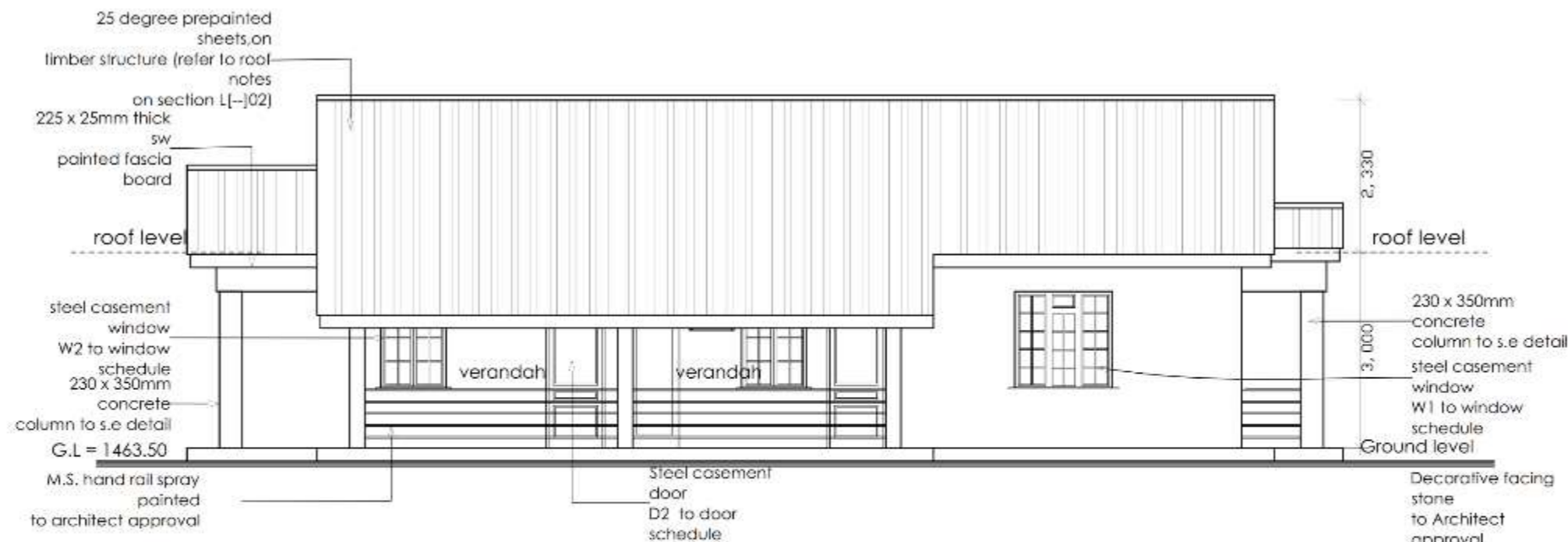
- 2). All levels in metres above sea level
- 3). Structural details are not included
- 4). All structural concrete is class 25/10mm aggregate
- 5). All mass concrete is class 15/10mm aggregate



 THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT													
AND GOVERNMENT OF UGANDA WORLD BANK													
PROJECT: Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country LOT 4 LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT													
CONSULTANTS: STUDIO GALLI INGEGNERIA SGI Studio Galli Ingegneria S.r.l. Head Office: Via della Provvidenza, 11 20030 Sarnano di Tubbano (PD) Italy Tel. +39 0429 89 5844 Fax +39 0429 89 5844													
REVISIONS: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>		No	Date	Description									
No	Date	Description											
DETAILED ENGINEERING DESIGN													
DRAWING TITLE WORKSHOP & OFFICE GROUND PLAN													
SCALE: AS SHOWN	DRAWING No: SQ-MWE-UID-3.5.0												
SURVEYED: UIN	DESIGNED: CSD												
DRAWN: CDE	CHECKED: CSD												
DATE: SPT 2020	APPROVED: CP												



ELEVATION L[--]05 scale 1:100

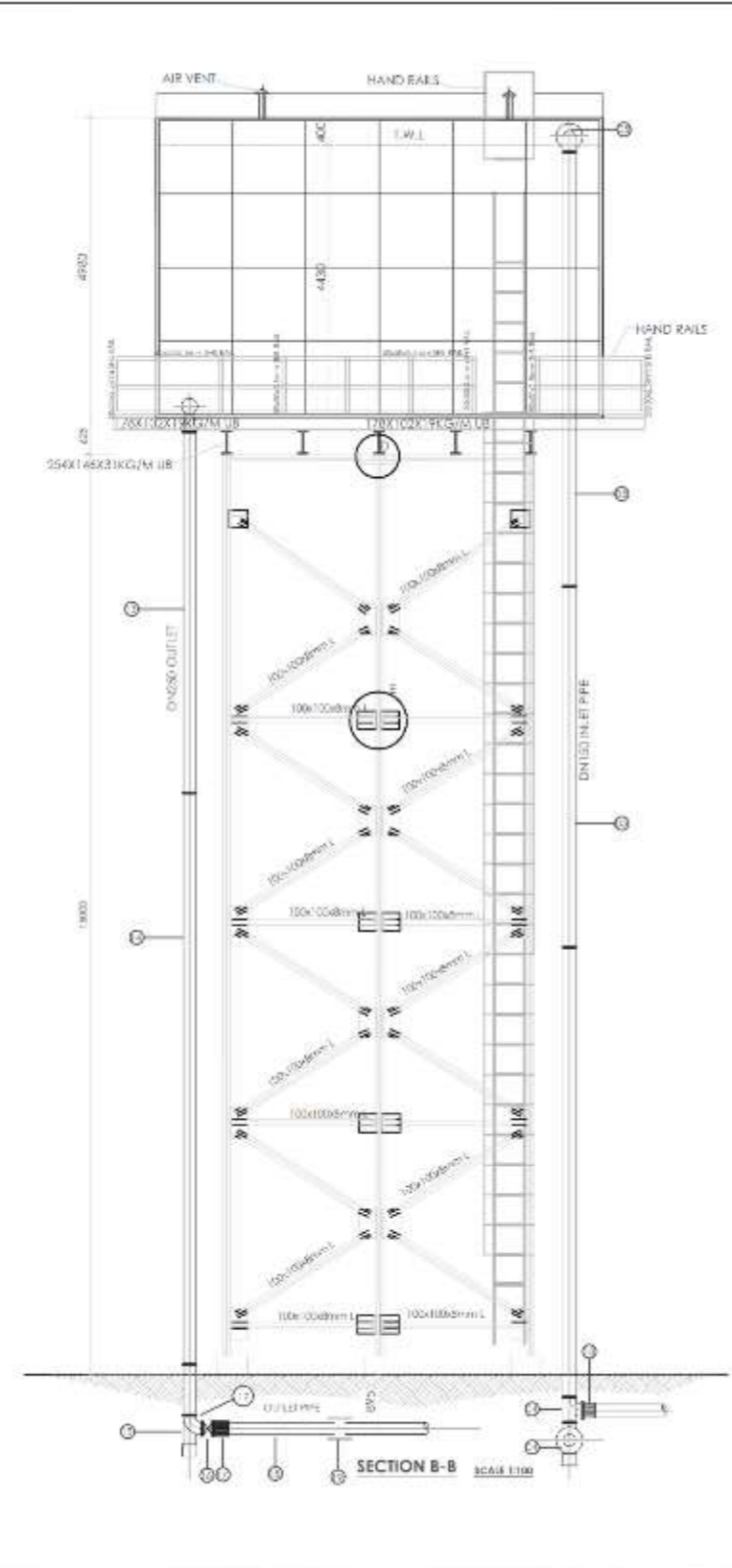
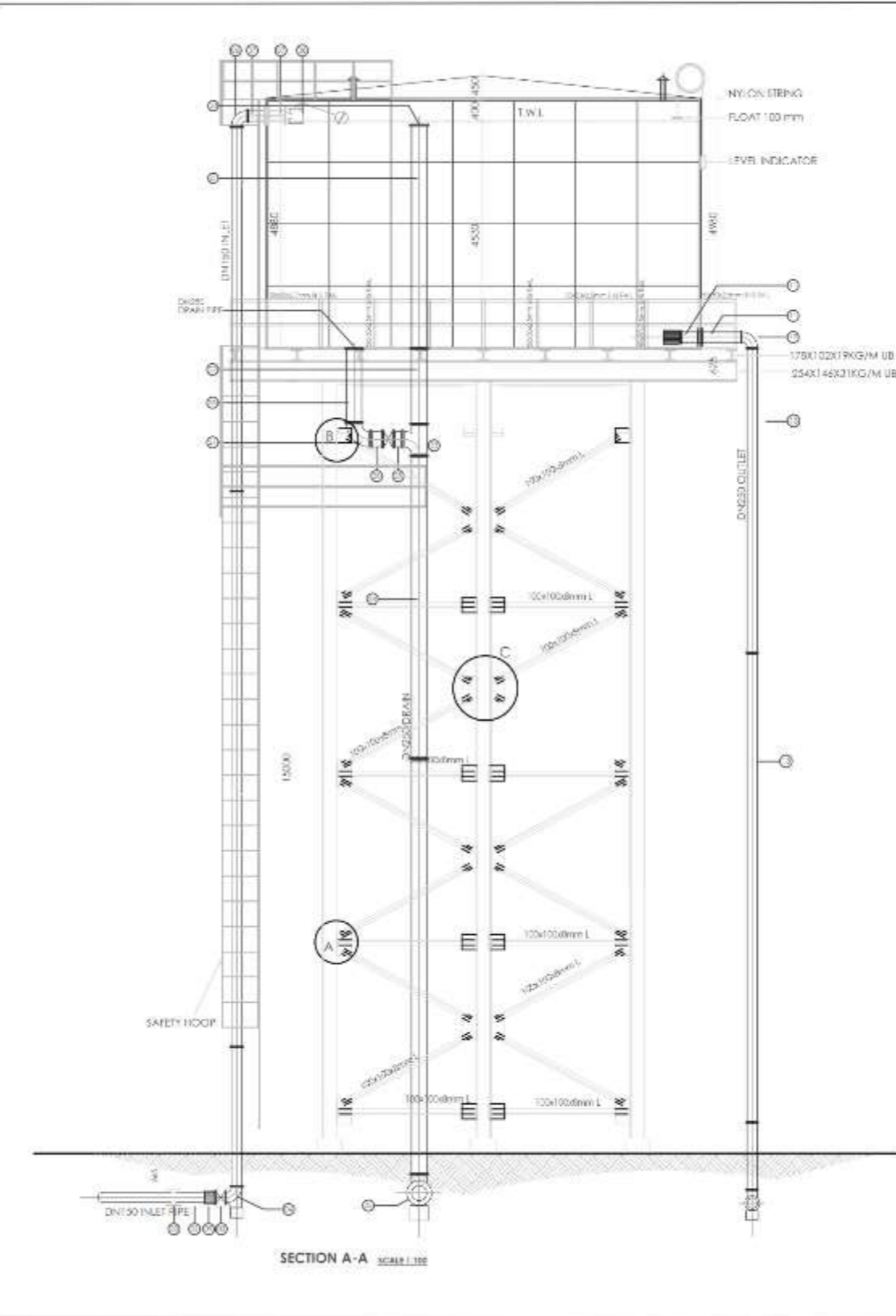


ELEVATION L[--]03 scale 1:100

- 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



<p>THE REPUBLIC OF UGANDA MINISTRY OF WATER AND ENVIRONMENT DIRECTORATE OF WATER DEVELOPMENT</p>													
<p>GOVERNMENT OF UGANDA AND WORLD BANK</p>													
<p>PROJECT: Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country LOT 4</p> <p>LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT</p>													
<p>CONSULTANTS: SGI Studio Gall Ingegneria S.r.l. Head Office: Via della Provvidenza, 13 20132 Sarnano di Tubbano (PC) Italy Tel: +39 049 89 19 844 Fax: +39 049 89 15 784</p>													
<p>REVISIONS:</p> <table border="1"> <thead> <tr> <th>No</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		No	Date	Description									
No	Date	Description											
<p>DETAILED ENGINEERING DESIGN</p>													
<p>DRAWING TITLE: WORKSHOP & OFFICE ELEVATION L[--]03 & 05</p>													
SCALE: AS SHOWN	DRAWING No: SQ-MWE-UID-S.S.1												
SURVEYED: UIN	DESIGNED: CSD												
DRAWN: CDE	CHECKED: CSD												
DATE: SPT 2020	APPROVED: CP												



NOTES

- All dimensions are in mm unless stated otherwise.
- All levels are in metres above sea level.
- For Site location see Dwg. SGHMWE-LUG-0.0.0
- Structural details are not included.
- All structural concrete is Class 25/10.
- All mass concrete is Class 15/10.

PIPE FITTING SCHEDULE

- 1 No. DN150 Coupling.
- 1 No. DN150 Pipe not exceeding 2.0m.
- 1 No. DN150 All Flanged Gate Valve.
- 1 No. DN150 All Flanged Duck foot 90° bend.
- 3 No. DN150 Double Flanged Pipe not exceeding 4.0m.
- 1 No. DN150 All Flanged 90° bend.
- 2 No. DN150 Double Flanged Pipe not exceeding 0.6m.
- 1 No. DN150 Flanged Ball Float Valve.
- 1 No. DN150 Flanged Adaptor: Most type or similar.
- 1 No. DN250 Flanged Outer Pipe Stance.
- 1 No. DN250 Double Flanged Pipe not exceeding 0.6m.
- 1 No. DN250 All Flanged 90° bend.
- 2 No. DN250 Double Flanged Pipe not exceeding 4.0m.
- 1 No. DN250 Double Flanged Pipe not exceeding 2.0m.
- 1 No. DN250 All Flanged Duck foot 90° bend.
- 1 No. DN250 Flanged Gate Valve.
- 1 No. DN250 Flanged Adaptor: Most type or similar.
- 1 No. DN250 Double Flanged Pipe not exceeding 2.0m.
- 1 No. DN250 Coupling.
- 1 No. DN250 Flanged Ball Mouth.
- 1 No. DN250 Double Flanged Pipe not exceeding 2.0m.
- 1 No. DN250 Double Flanged Pipe not exceeding 2.0m.
- 1 No. DN250/100 All Flanged Tee.
- 2 No. DN250 Double Flanged Pipe not exceeding 4.0m.
- 1 No. DN250 All Flanged Duck foot 90° bend.
- 1 No. DN250 All Flanged Pipe with outside flange n.e 2.0m.
- 1 No. DN200 All Flanged 90° bend.
- 1 No. DN200 Double Flanged Pipe not exceeding 2.0m.
- 1 No. DN200 Flanged Gate Valve.
- 1 No. DN200 Flanged Adaptor: Most 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 30m RGCs Across the Country-LOT 4

LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT

CONSULTANTS

SGI STUDIO GALLI INGEGNERIA
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 Via della Pianca 15
 33030 Gemona di Sonico (PN) Italy
 Tel. +39 0435 87 74 544
 Fax. +39 0435 86 75 104

REVISIONS

No.	Date	Description

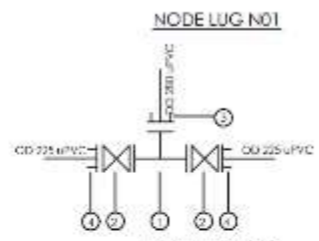
DETAILED ENGINEERING DESIGN

DRAWING TITLE

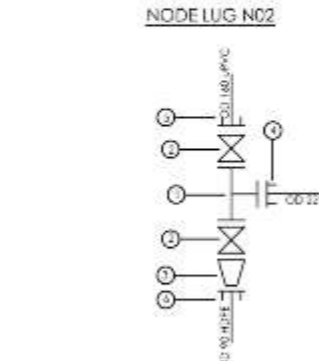
300M³ RESERVOIR TANK SECTION A-A AND B-B

SCALE 1:100 **DRAWING No.** SGHMWE-LUG-0.1.2

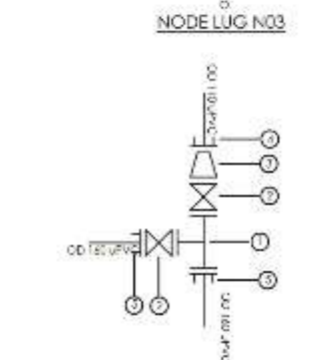
SURVEYED	DESIGNED	CHECKED
GW		
DRAWN	CREATED	DATE
DATE	APPROVED	
SEPT 2020		



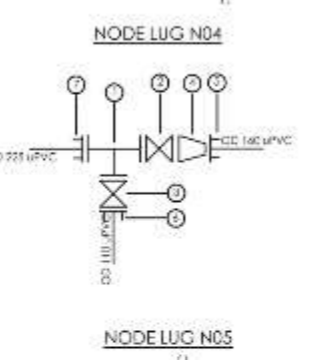
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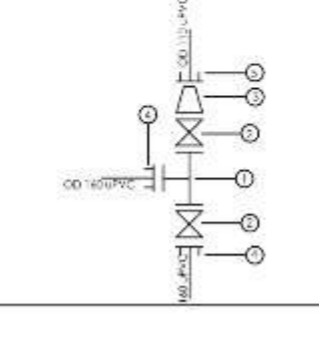
NODE LUG N02



NODE LUG N03



NODE LUG N04



NODE LUG N05

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	D/ALL FLANGED TEE	200/200	1	10
2.	D/ FLANGED GATE VALVE	200	2	10
3.	D/ FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN200XOD200	1	10
4.	D/ FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN200XOD225	2	10

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	ALL FLANGED TEE	150/200	1	10
2.	D/ FLANGED GATE VALVE	100	2	10
3.	D/ FLANGED TAPER	100/85	1	10
4.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN150XOD225	1	10
5.	D/ FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN150XOD140	1	10
6.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN80XOD90	1	10

SCHEDULE OF PIPEWORK & FITTINGS

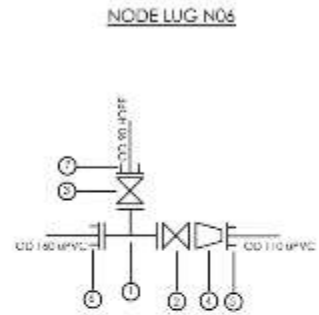
ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	D/ ALL FLANGED TEE	150/100	1	10
2.	D/ FLANGED GATE VALVE	100	2	10
3.	D/ FLANGED TAPER	100/100	1	10
4.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD110	1	10
5.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD140	2	10

SCHEDULE OF PIPEWORK & FITTINGS

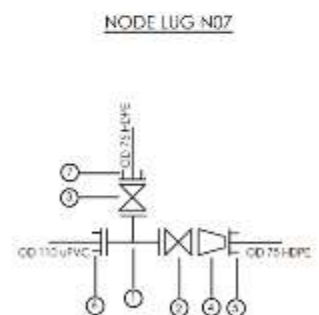
ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	D/ ALL FLANGED TEE	200/100	1	10
2.	D/ FLANGED GATE VALVE	200	1	10
3.	D/ FLANGED GATE VALVE	100	1	10
4.	D/ FLANGED TAPER	200/100	1	10
5.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN150XOD140	1	10
6.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD110	1	10
7.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN200XOD225	1	10

SCHEDULE OF PIPEWORK & FITTINGS

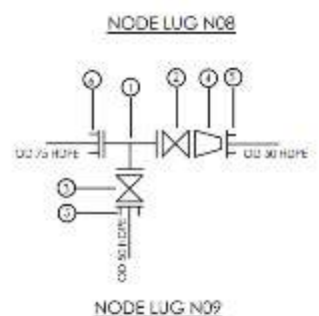
ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	ALL FLANGED TEE	150/100	1	10
2.	D/ FLANGED GATE VALVE	100	2	10
3.	D/ FLANGED TAPER	100/100	1	10
4.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN150XOD140	2	10
5.	D/ FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD110	1	10



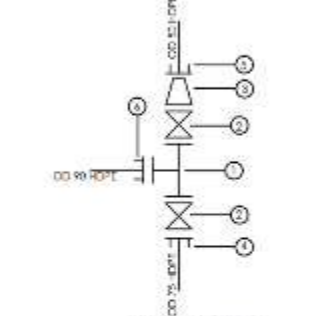
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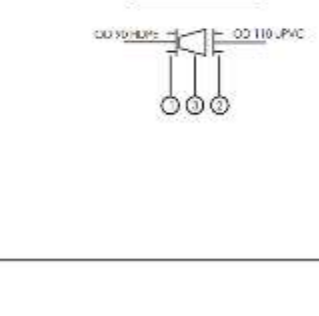
NODE LUG N07



NODE LUG N08



NODE LUG N09



NODE LUG N10

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	D/ ALL FLANGED TEE	150/85	1	10
2.	D/ FLANGED GATE VALVE	100	1	10
3.	D/ FLANGED GATE VALVE	85	1	10
4.	D/ FLANGED TAPER	150/100	1	10
5.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN150XOD110	1	10
6.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN150XOD140	1	10
7.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN80XOD90	1	10

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	D/ ALL FLANGED TEE	100/85	1	10
2.	D/ FLANGED GATE VALVE	100	1	10
3.	D/ FLANGED GATE VALVE	85	1	10
4.	D/ FLANGED TAPER	100/85	1	10
5.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD110	1	10
6.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD140	1	10
7.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN80XOD90	1	10

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	D/ ALL FLANGED TEE	85/85	1	10
2.	D/ FLANGED GATE VALVE	85	1	10
3.	D/ FLANGED GATE VALVE	85	1	10
4.	D/ FLANGED TAPER	85/85	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN40XOD50	2	10
6.	ALL FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN80XOD75	1	10

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	ALL FLANGED TEE	60/40	1	10
2.	D/ FLANGED GATE VALVE	40	2	10
3.	D/ FLANGED TAPER	60/40	1	10
4.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN80XOD90	1	10
5.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN40XOD50	1	10
6.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN40XOD75	1	10

SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(ND)	QTY.	PN
1.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN80XOD90	1	10
2.	COMPRESSION FLANGED ADAPTOR (MAX TYPE OR SIMLAR)	DN100XOD110	1	10
3.	D/ FLANGED TAPER	100/85	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 RGs Across the Country-LOT 4

LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT

CONSULTANTS

SGI Studio Galli Ingegneria S.r.l.
 P.zza della Repubblica, 15
 36020 Sarnonno di Rubano (VI) Italy
 Tel. +39 0445 79 544
 Fax +39 0445 79 780

REVISIONS:

No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

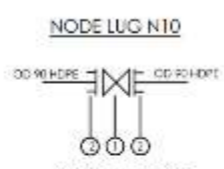
PIPE NODE DETAILS

SCALE AS SHOWN **DRAWING No.** SCA-WWS-UG-7.6.0

SUPERVISOR GM **DESIGNED** DRD

DRAWN CDE **CHECKED** DRD

DATE 30/11/2020 **APPROVED** CP



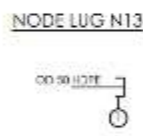
SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	CF FLANGED GATE VALVE	80	1	10
2.	COMPRESSION FLANGED ADAPTOR (MAXI TYP) OR SIMILAR	DN80XDN100	2	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	100	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	40	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	45	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	45	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	40	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	40	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	100	1	10



SCHEDULE OF PIPEWORK & FITTINGS

ITEM	DESCRIPTION	SIZE(DN)	QTY.	PN
1.	END CAP	100	1	10

LEGEND

CLIENT

THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
 DIRECTORATE OF WATER DEVELOPMENT

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

LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMAYINGO DISTRICT

CONSULTANT

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 Via della Provvidenza, 12
 40025 SERRAVALLE DI RENO (BO) ITALY
 Tel: +39 049 95 75 044
 Fax: +39 049 95 75 706

REVISIONS:

No.	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE

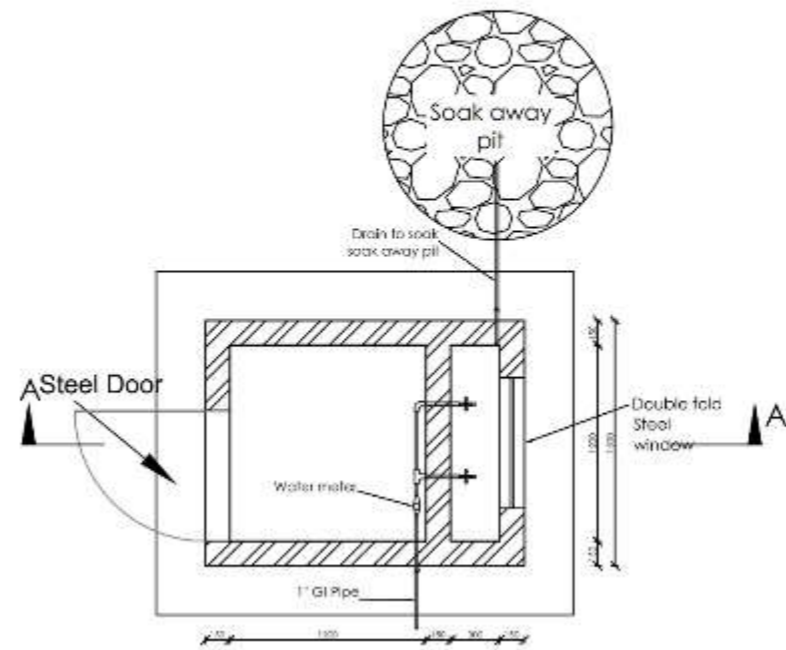
PIPE NODE DETAILS

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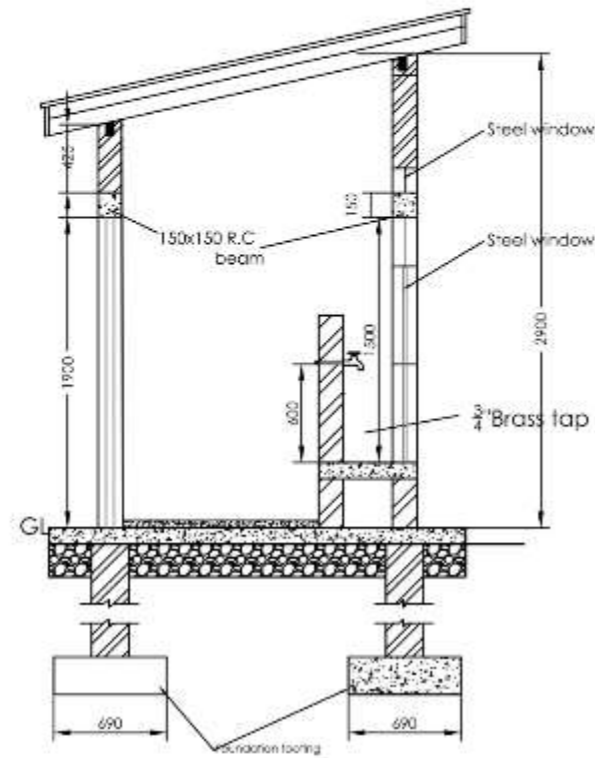
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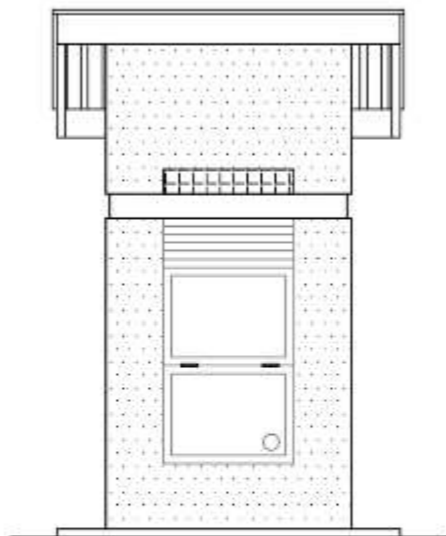
DATE: SEP 2020 **APPROVED:** GP



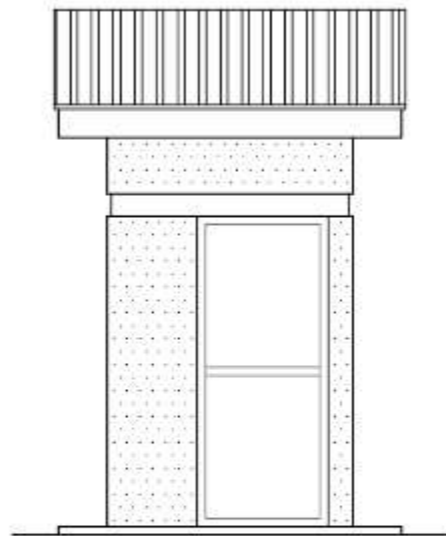
GROUND PLAN



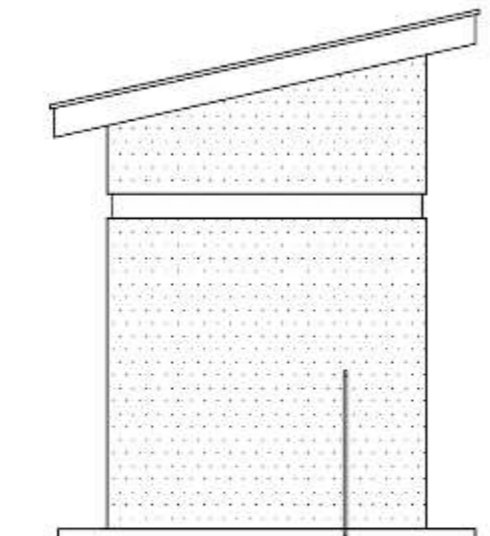
SECTION A-A



FRONT ELEVATION



REAR ELEVATION




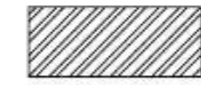


SIDE ELEVATION

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

CUBEN
 THE REPUBLIC OF UGANDA
 MINISTRY OF WATER AND ENVIRONMENT
 DIRECTORATE OF WATER DEVELOPMENT

CO-FUNDING BY
 GOVERNMENT OF UGANDA AND WORLD BANK

PROJECT:
 Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Flood Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LDF 4
 LUGALA WATER SUPPLY AND SANITATION SYSTEM
 IN NAMAYINGO DISTRICT

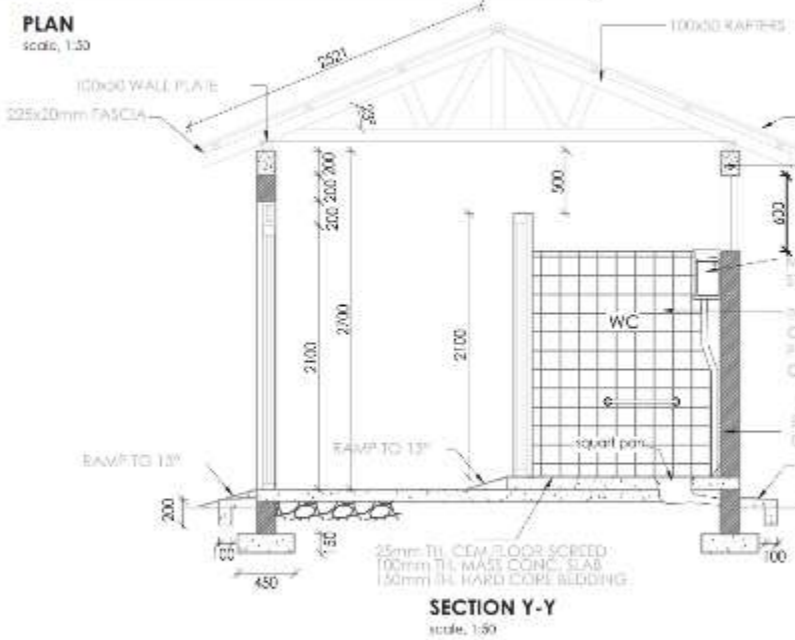
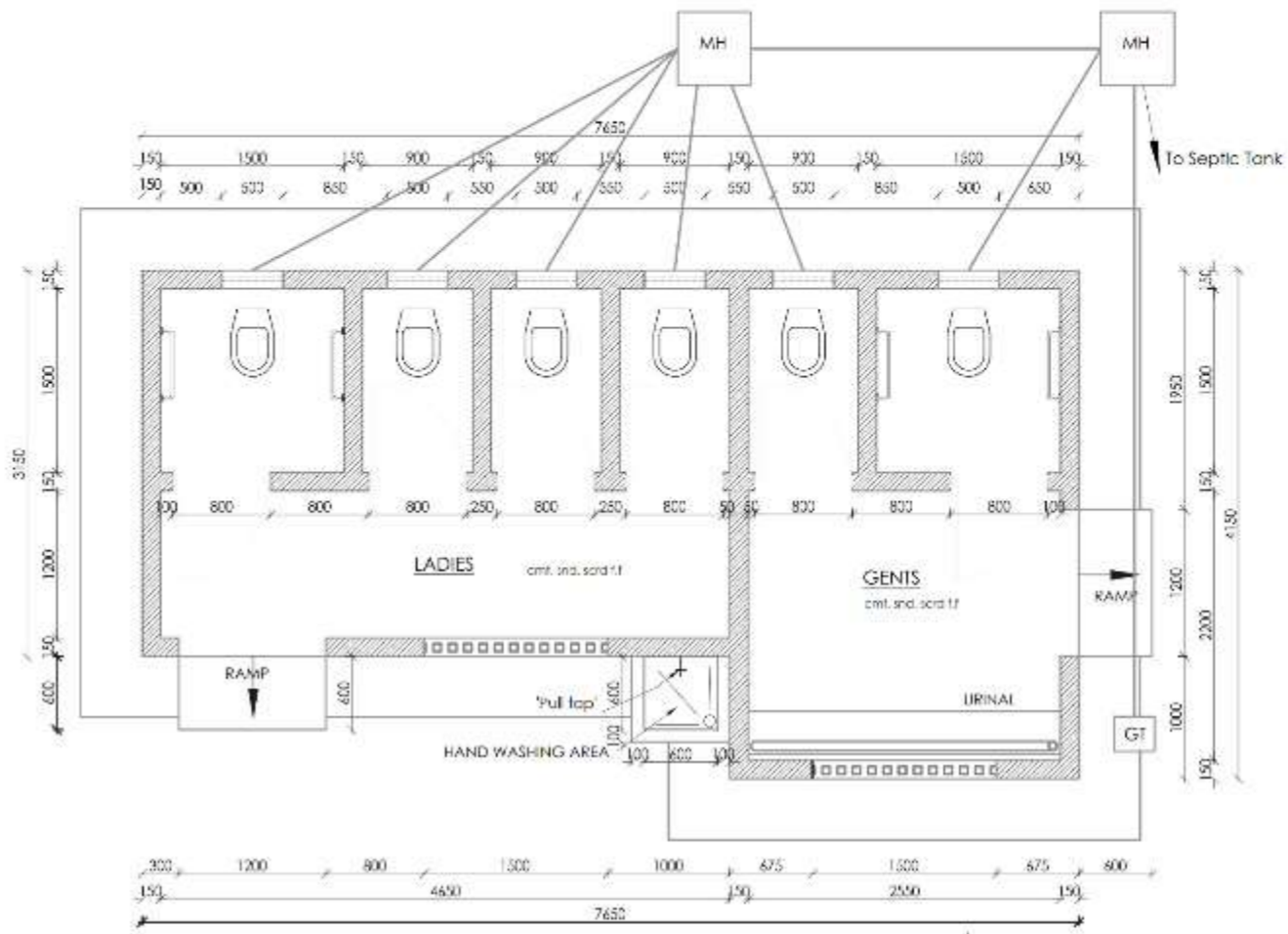
CONSULTANTS
 SGI STUDIO GALLI INGEGNERIA S.r.l.
 Via della Provvidenza, 13
 20090 Sarnonno di Rubano (PD) - Italy
 Tel. +39 049 86 26 144
 Fax +39 049 89 74 784

REVISIONS:		
No	Date	Description

DETAILED ENGINEERING DESIGN

DRAWING TITLE
**TYPICAL WATER KIOSK
 PLAN, SECTIONS AND ELEVATIONS**

SCALE	AS SHOWN	DRAWING NO.	SGH-WDC-LUG-3.0.0
SURVEYED	CW	DESIGNED	DBD
DRAWN	CDP	CHECKED	CRD
DATE	08/01/2020	APPROVED	CDP



RING BEAM DETAIL
scale: 1:10

NOTES

1. All dimensions are in mm unless stated otherwise.
2. All levels are in metres above sea level.
3. Structural details are not included.
4. All structural concrete is Class 25/10.
5. All mass concrete is Class 15/10.

CLIENT

THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER DEVELOPMENT

CO-FINANCED BY

GOVERNMENT OF UGANDA AND WORLD BANK

PROJECT:
Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RDCs Across the Country-LOT 4

**LUGALA WATER SUPPLY AND SANITATION SYSTEM
IN NAMAYINGO DISTRICT**

CONSULTANTS

SGI STUDIO GALLI INGEGNERIA S.r.l.
Via della Provvidenza, 12
20050 Sarnano (RN) Italy
Tel: +39 0461 99 79 544
Fax: +39 046 55 72 782

REVISIONS:

No.	Date	Description

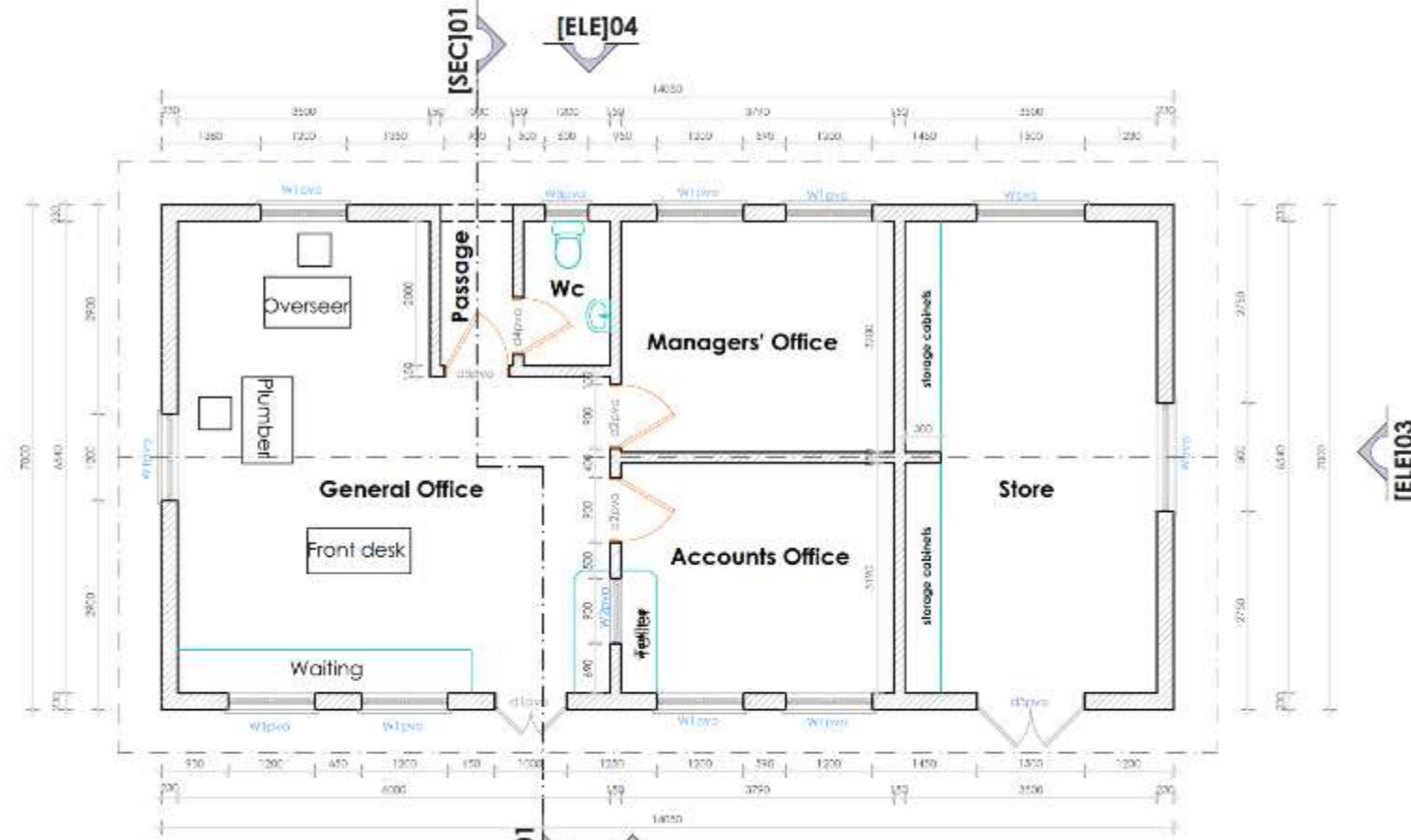
DETAILED ENGINEERING DESIGN

DRAWING TITLE
**PUBLIC TOILET
PLAN, SECTION AND RING BEAM DETAIL**

SCALE	AS SHOWN	DRAWING No.	SD-MWE-UD-11.01
SURVEYED	GW	DESIGNED	CHD
DRAWN	CLD	CHECKED	CHD
DATE	SEP 2022	APPROVED	CH



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-LUG-01.0
4. Structural details are not included.
5. All structural concrete is Class 25/10.
6. All mass concrete is Class 10/10.

<p>CONFIRMCED BY</p>													
<p>PROJECT:</p> <p>Consultancy Services for Feasibility Study and Detailed Engineering Design and Environmental Impact Assessments of Piped Water Supply and Sanitation Systems in Selected 30no RGCs Across the Country-LOT 4</p> <p>LUGALA WATER SUPPLY AND SANITATION SYSTEM IN NAMATINGO DISTRICT</p>													
<p>CONSULTANTS:</p> <p>SGI Studio Galli Ingegneria S.r.l. Head Office: Via delle Pinelliane, 11 20092 Sarnano (PG) Italy Tel. +39 0543 70 644 Fax +39 0543 70 704</p>													
<p>REVISIONS:</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Date</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		No.	Date	Description									
No.	Date	Description											
<p>DETAILED ENGINEERING DESIGN</p>													
<p>DRAWING TITLE</p> <p>WATER OFFICE FLOOR PLAN AND ELEVATION</p>													
<p>SCALE: AS SHOWN</p>	<p>DRAWING No: SGI-MWE-LUG-13.0.0</p>												
<p>DESIGNED: CW</p>	<p>DESIGNED: ORG</p>												
<p>DRAWN: CDE</p>	<p>CHECKED: ORG</p>												
<p>DATE: SEPT 2020</p>	<p>APPROVED: CP</p>												

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 ATTACHED

JBN
EQUIPMENT THAT LAST

ATTENDANCE LIST

Project Name: WMPD - R&G - Eastern Uganda

Location: Nakasongola District Date: 24/01/2022

No.	Name	Contact Designation	Email / Contact	Signature
01	NZIRA Moses	For DDC	moses.nzirira@gmail.com 0701 524830	
02	Quina John Patrick	CAD	0772682073 quinjohnpatrick@gmail.com	
03	SANYA RONATA	Dist. of Chairperson	0752418183 sanyaronata@gmail.com	
04	Carl Nanyalo	SEHO - MURKES	0775-191504 canyalo@gmail.com	
05	WAN MOSES OKWI	Health & Safety Specialist	0777183060	
06	Fitu Isaiak	Sen. MURKES	07541955	
07	Christine Nanyalo	SEHO - MURKES R&G - 3	0776658243 christine.nanyalo@gmail.com	

JBN
EQUIPMENT THAT LAST

ATTENDANCE LIST

Project Name: WMPD - R&G - Eastern Uganda

Location: Nakasongola District Date: 24/01/2022

No.	Name	Contact Designation	Email / Contact	Signature
08	Isaac Gashun	DCO	isacgashun@gmail.com 0701 535850	
09	EXUBA GASHUN	DCO	0792591094 exuba.gashun@gmail.com	
10	Sarah Kasule	Sen. Murkes - Dist. Murkes & R&G	0732165839	
11	Christine Nanyalo	SEHO / MURKES R&G - 3	0776658243	
12				
13				
14				

ATTENDANCE LIST

Project Name: Banda Subcounty - 5 R.C.s - Eastern Uganda
Location: Banda Town Council

Date: 17/01/2022

No.	Name	Gender	Designation	Contact	Email	Signature
1	MASIGIWA SHEAR PRINCE	F	Parish Chief	0701026048		
2	GIBUNDA PAUL	F	CDM	0750437122		
3	OBURA SAMUEL	M	SCO	0722656171		
4	MARIONA BERNARD		Chief Executive	0782723521		
5	BACUNE SCAMPER	F	TI AGENT	0788358973		
6	ANNA EUGENIA	F	Parish Chief	0702450258	anna@sigas.gov.ug	
7	DIAGINA JACKSON	M	CDM	0752655009		
8	MARIONA STEPHEN	M	AGRIC. OFFICER	0777508446		
9	Ojanga Isaac	M	A.V.O	0711376698	ojanga@sigas.gov.ug	
10	OSWALD ALLAN	M	Parish	0706033274		
11	MASIGA FRED B	M	FOR CDD	0704100715		
12	LUBALE CHARLES	M	Parish Chief	0755524225	luba@sigas.gov.ug	
13	JUMA CHRISTOPHER	M	CDM	0752246133		

ATTENDANCE LIST

Project Name: Banda Sub County - 5 R.C.s - Eastern Uganda
Location: Banda Town Council

Date: 17/01/2022

No.	Name	Gender	Designation	Contact	Email	Signature
1	Malingu Washington	M	Fisheries Officer	0782448126		
2	ORUMU WILBER	M	Parish Chief	070860090		
3	SABITA MILDRED	F	SCO	078666009		
4	MARIONA MABEL	F	Parish Chief	0702705522		
5	ERUSTEN EUGENIA	F	Parish Chief	073417197		
6	POUNSA JAMES	M	CDM	0752655009		
7	OLUARE GERARD	M	CD Police	078498496		
8	LYMA CLEMENT	M	Parish Chief	0750265811		
9	LIAM BERT KENNETH	M	CDM	0758097008		
10	OLUARE GERARD	M	CDM	0704100715		
11	MASIGA RICHARD	M	FOR SXS	0759723077		
12	OSWALD FREDERICK	M	CDM	0760000007		
13	OSWALD FRANCIS	M	FOR GSO	0771388128		

ATTENDANCE LIST

Project Name: S.P.C. - Entom Uganda

Location: Lugala Beach Site

Date: 17/02/2022

No	Name	Gender Sex	Designation	Contact	Area	Signature
1	OLIVER NAMBWA	F	Residence	0759474577	Lugala Beach	<i>[Signature]</i>
2	AUNA CHRISTINA	F	Residence	0755010515	Lugala Beach	<i>[Signature]</i>
3	KAGAME BASSEM	M	TOUR OPERATOR	0750770240	Lugala Beach	<i>[Signature]</i>
4	JUMA ABANI	M	RESIDENT	0704502308	LUGALA BEACH	<i>[Signature]</i>
5	GEORGE BAMBUNGU	M	RESIDENCE	075937166	Lugala Beach	<i>[Signature]</i>
6	BALIKWISA MURUKU	M	PHARMACY	0757066833	ALABURUNG	<i>[Signature]</i>
7	BWIRE JAMUEL	M		0759351902	Lugala	<i>[Signature]</i>
8	MOSES ABIGYANI	M	DRUGS	0752838576	Lugala	<i>[Signature]</i>
9	JUMA SOKI	M		0755011440	Lugala	<i>[Signature]</i>
10	EMALO MOSES	M	BOBA BOBA	070507850	Lugala	<i>[Signature]</i>
11	OLIVER JOSE	M	FARMER	075573213	Lugala	<i>[Signature]</i>
12	SAMUYA JAMES	M		075538316	Lugala	<i>[Signature]</i>
13	OCHENO MARIAM	M	IS		Lugala	<i>[Signature]</i>
14	Obusimo Oloki	M	CP/RESEARCH	0752001172	Lugala	<i>[Signature]</i>

Stakeholder consultation record:

Name of Assignment: _____

Purpose of consultation (tick appropriate box):

ESMF	<input type="checkbox"/>	Environmental Audit	<input type="checkbox"/>
RFF	<input type="checkbox"/>	RAP	<input type="checkbox"/>
ESIA	<input checked="" type="checkbox"/>	Other (specify)	

Date: 15/5/2022

Location: Entom TECHNICAL, MAMALIMES DISTRICT

Project name: SECO ENRICHED WATER SUPPLY AND SANITATION FACILITIES PROJECT, LUGALA B.C.

Proponent: _____

Name of person official met:	Gender	Village	Designation	Contact (Telephone)	Sign/Initial	
	M	F				
TAAKA EUNICE		✓	Lugala	member	-	TE
OPRANI RICHARD	✓		Lugala	member	-	<i>[Signature]</i>
OSINYA BERNARD	✓		Lugala	member	0759174919	<i>[Signature]</i>
MUGOYA JOSEPH	✓		Lugala	"	0773930633	<i>[Signature]</i>
NEKEA EVELYN		✓	"	"	-	<i>[Signature]</i>
JUMA ROBERT	✓		Lugala	member	0773255597	<i>[Signature]</i>
OTAMBO WILBER	✓		Lugala	"	0955412220	<i>[Signature]</i>
BARWA ELEPHAS	✓		Lugala	"	0770627655	<i>[Signature]</i>
OHYANGO JOHN OKUMU	✓		Lugala	"	0775620605	<i>[Signature]</i>
ETYANG PAUL	✓		Lugala	"	0778505574	<i>[Signature]</i>

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP		Environmental Audit			
	RPF		RAP			
	ESIA	<input checked="" type="checkbox"/>	Other (specify)			
Date: 25/5/22						
Location: KAMBA TOWN COUNCIL, NAMATINDO DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES - LUZALA R/C						
Proponent:						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/cell)	Sign/ Initial
	M	F				
NEBO JULIET		<input checked="" type="checkbox"/>	Lugala	member	071055009	JL
AGATA RADIAEL		<input checked="" type="checkbox"/>	Lugala	member	0705596869	JA
NABOBA SCARLE		<input checked="" type="checkbox"/>	Lugala	ms	2023172265	NS
GOIMBI NANASRA		<input checked="" type="checkbox"/>	Lugala	member	0 -	GP
DUMBA JOHN		<input checked="" type="checkbox"/>	Lugala	member	0775060509	DT
OHYANGUS WAFUTAM JULIET		<input checked="" type="checkbox"/>	Lugala	member	0702767140	-
Radnael Sanyu		<input checked="" type="checkbox"/>	Lugala	member	-	-
Nearaia Jennifer		<input checked="" type="checkbox"/>	Buhina	member	-	-
Joyce Kyakawira		<input checked="" type="checkbox"/>	Sisira	member	-	-
newe sa Lydia			Dubola	member	078 35 43163	LD
ADOM COMPIINE			Lugala		0707376680	
NANDEBT MURICHE			MUSIMBI LUZALA	member		

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP		Environmental Audit			
	RPF		RAP			
	ESIA	<input checked="" type="checkbox"/>	Other (specify)			
Date: 25 th /05/2022						
Location: KAMBA TOWN COUNCIL, NAMATINDO DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES						
Proponent: UJMD/ MPE						
Name of person/ official met:	Gender		Village	Designation	Contact (Tel/cell)	Sign/ Initial
	M	F				
DIABO JAMES	<input checked="" type="checkbox"/>		Lugala		070 77695321	JD
WAKABILI MOSES	<input checked="" type="checkbox"/>		Lugala		0773830146	WM
MALABA WILLS THOMAS	<input checked="" type="checkbox"/>		Lugala		0776676060	MT
KIANDERA HEMERT	<input checked="" type="checkbox"/>		Lugala		0777234783	KH
HANDERA JULIET		<input checked="" type="checkbox"/>	Lugala			HP
FUSMIRA ACRET	<input checked="" type="checkbox"/>		Lugala		07007963233	FA
MANGEM KILLATI	<input checked="" type="checkbox"/>		Lugala		0740296674	MANGEM
MANGEM KIALTE	<input checked="" type="checkbox"/>		Lugala			MK
OSUBA GERLAD	<input checked="" type="checkbox"/>		Lugala		0798828375	OG
SULAIKU MARVIN	<input checked="" type="checkbox"/>		Lugala		0759701995	SM

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP	<input type="checkbox"/>	Environmental Audit		<input type="checkbox"/>	
	RPF	<input type="checkbox"/>	RAP		<input type="checkbox"/>	
	ESIA	<input checked="" type="checkbox"/>	Other (specify)			
Date: 05/05/2022						
Location: BANDA TOWN COUNCIL NAMAYINGO DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES						
Proponent: IUMDP / MWE						
Name of person/official met:	Gender	Village	Designation	Contact (Tel/email)	Sign/Initial	
						M
MUGIBU JENNIFER		<input checked="" type="checkbox"/>				
TETA MOSA				0704982978		CTY
IATA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
OLAMBO KENNETH	<input checked="" type="checkbox"/>	Lugala		0775035052		KLH
MAWEE JULIET		<input checked="" type="checkbox"/> Lugala				MTT
OKUMU OTAMBA OHYARINO	<input checked="" type="checkbox"/>	Lugala		0770624659		JKM
OSIHANA ANDREW	<input checked="" type="checkbox"/>	Lugala		0706479215		OSI
AGHENTI FLAVIA		<input checked="" type="checkbox"/> Lugala		07833444		AGH
OKUMU JUSTUS		Lugala		0783344485		OKU
MUNE STEVEN	<input checked="" type="checkbox"/>	Lugala				MUN

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP	<input type="checkbox"/>	Environmental Audit		<input type="checkbox"/>	
	RPF	<input type="checkbox"/>	RAP		<input type="checkbox"/>	
	ESIA	<input checked="" type="checkbox"/>	Other (specify)			
Date: 05/05/22						
Location: LUOTALA BEACH NAMAYINGO DISTRICT BANDA TOWN COUNCIL						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES - LUOTALA BEACH						
Proponent: MWE						
Name of person/official met:	Gender	Village	Designation	Contact (Tel/email)	Sign/Initial	
						M
Wandera Charles	<input checked="" type="checkbox"/>	Lugala		0700928389		WAN
Mageni Augustus	<input checked="" type="checkbox"/>	Budhia		0780304173		MAG
Mukaga Evans	<input checked="" type="checkbox"/>	II		0721032352		MUK
OLAMBO JOHN LERICK	<input checked="" type="checkbox"/>	Budhia		070747808		OLM
Timuka Albert	<input checked="" type="checkbox"/>	II		0754099851		TIM
OLAMBO JOHNSTONE	<input checked="" type="checkbox"/>	II		077178170		OLM
Tuma Francis	<input checked="" type="checkbox"/>	II		0752548644		TUM
OKUKU WANDERA	<input checked="" type="checkbox"/>	II		0752434518		OKU
MABONGALAN/DAA DAVIES	<input checked="" type="checkbox"/>	II		0716512007		MAB
HAMARA PATRICK	<input checked="" type="checkbox"/>	II		0789955285		HAM

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP			Environmental Audit		
	RPF			RAP		
	ESIA		<input checked="" type="checkbox"/>	Other (specify)		
Date: 31/01/2022						
Location: Buhima						
Project name:						
Proponent:						
Name of person/official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
ES/MS/MS/MS/MS	<input checked="" type="checkbox"/>		Buhima	Business	0704-531007	MS

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP			Environmental Audit		
	RPF			RAP		
	ESIA		<input checked="" type="checkbox"/>	Other (specify)		
Date: 31/01/2022						
Location: Lugala Bwera Mwanungu District, Bwera Town Council						
Project name: Local Food and Water Supply and Sanitation Facilities - Lugala RC						
Proponent: MWS						
Name of person/official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
Wanda Mwanungu	<input checked="" type="checkbox"/>		Mwanungu	Business	0754100400	Wanda
Bwera Mwanungu	<input checked="" type="checkbox"/>		Mwanungu	Business	0770624494	Bwera
Orlando Mwanungu	<input checked="" type="checkbox"/>		Mwanungu	Farmer	070312327	Orlando
Orlando Mwanungu	<input checked="" type="checkbox"/>		Mwanungu	Business	070270599	Orlando
Subandu Mwanungu	<input checked="" type="checkbox"/>		Mwanungu	Farmer	0759701995	Subandu

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP			Environmental Audit		
	RPF			RAP		
	ESIA		<input checked="" type="checkbox"/>	Other (specify)		
Date: 05/10/2022						
Location: BANDA TOWN COUNCIL, HAMAMUNGU DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES - LUWALA RCE						
Propositor: MWF						
Name of person/official met:	Gender		Village	Designation	Contact (Tel/Email)	Sign/Initial
	M	F				
Mabwire Poniab		<input checked="" type="checkbox"/>	Buthira	CHAMAKO	0757736620	
BABILE CATHERINE			HADARE	CHAMAKO		chairperson
KANDOLA SARKAS CYRUS	<input checked="" type="checkbox"/>		Sidack		0756949355	
NABWAL NINAH		<input checked="" type="checkbox"/>	Lupala		0758891948	
DANOKI MICHAEL	<input checked="" type="checkbox"/>		Buthira		0740835645	
BANIS JAMFUL		<input checked="" type="checkbox"/>	Buthira		0789357902	
MUGENI HUMPHREY	<input checked="" type="checkbox"/>				0756865195	
LUWALA RONALD	<input checked="" type="checkbox"/>					
JUMA SIGVEN	<input checked="" type="checkbox"/>					

ANNEX E: WATER QUALITY RESULTS



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

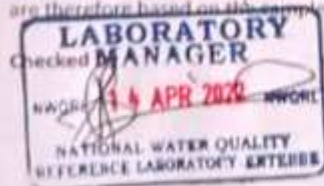
TEST RESULTS

Source Name	SWI Lake Victoria		Drinking water standards (IDEAS 12 2018 Maximum permissible for Natural Potable Water)
Village	Lugala		
Subcounty	Banda		
District	Namayingo		
Date Sampled	10-Mar-22		
Lab Identifier code		E51489	
Turbidity	NTU	0.92	25
pH	Units	7.21	5.5 - 9.5
Electrical Conductivity	µS/cm	160	2500
Total Dissolved Solids	mg/L	112	1500
Total Hardness as CaCO ₃	mg/L	36	600
Fluoride	mg/L	0.06	1.5
Sulphates	mg/L	7.4	400
Chlorides	mg/L	10	250
Nitrates as N	mg/L	0.18	10
Nitrites as N	mg/L	<0.002	0.003
Manganese	mg/L	<0.01	0.01
Total Iron	mg/L	0.08	0.5
E. Coll	CFU/100mls	8	<1

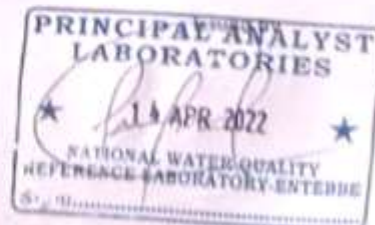
Notes;

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



Water Quality Management Department
 Directorate of Water Resources Management
 Waterquality@crdrcd.com.ug
 P.O. Box 18, Entebbe
 Tel: 041-321142



ANNEX F- LIST OF PLANTS

S/N	Family	Species	Budala Reservoir	Pipeline 1	Pipe line 2	Pipe line 3	Intake & Treatment	Lifeform	Status
1	Acanthaceae	<i>Asystasia gangetica</i>		1			1	Herb	LC
2		<i>Barleria ventricosa</i>			1			Herb	LC
3		<i>Dyschoriste radicans</i>		1	1	1		Herb	LC
4		<i>Justicia anselliana</i>					1	Herb	LC
5		<i>Justicia exigua</i>			1		1	Herb	LC
6		<i>justicia flava</i>				1	2	Herb	LC
7	Aizoaceae	<i>Mollugo nudicaulis</i>	1					Herb	LC
8	Amarantaceae	<i>Alternanthera sessilis</i>		1				Herb	LC
9		<i>Psilotrichum majus</i>			1			Herb	LC
10	Amaranthaceae	<i>Alternanthera sessilis</i>		1	1		1	Herb	Invasive
11		<i>Amaranthus spinosus</i>				1	1	Herb	Invasive
12		<i>Gomphrena celosioides</i>					1	Herb	LC
13	Anacardiaceae	<i>Anacardium occidentale</i>				1	2	Tree	LC
14		<i>Rhus natalensis</i>		1				Shrub	LC
15	Apiaceae	<i>Centella asiatica</i>					3	Herb	LC
16	Apocynaceae	<i>Cascabela peruviana</i>			1	1		Shrub	LC
17		<i>Catharanthus roseus,</i>					4	Herb	Invasive
18	Asphodelaceae	<i>Aloe dawei</i>			1			Herb	LC
19	Asteraceae	<i>Acanthospermum hispidum</i>	1					Herb	Invasive
20		<i>Ageratum conyzoides</i>		1	1	1	1	Herb	LC
21		<i>Aspilia kotschyi</i>	1			1		Herb	LC
22		<i>Bidens pilosa</i>	1		1	1	3	Herb	Invasive
23		<i>Chromolaena odorata</i>					1	Liana	LC
24		<i>Conyza sumatrensis</i>				1	1	Herb	Invasive
25		<i>Conyza tigrensis</i>					1	Herb	LC
26		<i>Melanthera scandens</i>					2	Herb	LC
27		<i>Schkuhria pinnata</i>	1		1		1	Herb	LC
28		<i>Tithonia diversifolia</i>					1	Herb	Invasive
29		<i>Tridax procumbens</i>		1			1	Herb	LC
30		<i>Xanthium strumarium</i>					3	Herb	Invasive
31	Bignoniaceae	<i>Markhamia lutea</i>	1				1	Tree	LC
32	Canaceae	<i>Cana indica</i>					1	Herb	Invasive

S/N	Family	Species	Budala Reservoir	Pipeline 1	Pipe line 2	Pipe line 3	Intake Treatment &	Lifeform	Status
33	Capparidaceae	<i>Capparis erythrocarpos</i>		1				Liana	LC
34		<i>Maerua oblongifolia</i>			1			Shrub	LC
35	Celastraceae	<i>Maytenus heterophylla</i>					1	Shrub	LC
36	Commelinaceae	<i>Commelina benghalensis</i>	1		2		2	Herb	Invasive
37		<i>Commelina diffusa</i>	1				4	Herb	LC
38		<i>Commelina purpurea</i>					1	Herb	LC
39		<i>Cyanotis lanata</i>			1			Herb	LC
40	Convolvulaceae	<i>Cuscuta australis</i>					1	Herb	Invasive
41		<i>Dichondra micrantha</i>			1			Herb	LC
42		<i>Evolvulus alsinoides</i>			1	1	1	Herb	LC
43		<i>Ipomoea cairica</i>					2	Liana	Invasive
44		<i>Ipomoea hederifolia</i>	1			1		Liana	LC
45		<i>Ipomoea obscura</i>	1				1	Liana	LC
46		<i>Ipomoea wightii</i>					1	Liana	LC
47	Cucurbitaceae	<i>Lagenaria sphaerica</i>				1	2	Liana	LC
48		<i>Zehneria thwaitesii</i>					1	Herb	LC
49	Cyperaceae	<i>Cyperus denudatus</i>					2	Herb	LC
50		<i>Cyperus difformis</i>					1	Herb	LC
51		<i>Cyperus dives</i>				1	1	Herb	LC
52		<i>Cyperus papyrus</i>					4	Herb	LC
53		<i>Cyperus rotundus</i>				1	4	Herb	LC
54		<i>Cyperus ssp</i>					2	Herb	LC
55		<i>Kyllinga appendiculata</i>					2	Herb	LC
56		<i>Kyllinga bulbosa</i>					2	Herb	LC
57		<i>Kyllinga odorata</i>		1				Herb	LC
58		<i>Mariscus dubius</i>			1			Herb	LC
59		<i>Mariscus sumatrensis</i>			1			Herb	LC
60		<i>Pycreus pumilus</i>			1		2	Herb	LC
61	Euphorbiaceae	<i>Acalypha fruticosa</i>					2	Herb	LC
62		<i>Croton megalocarpus</i>		1				Tree	LC
63		<i>Euphorbia heterophylla</i>	1					Herb	LC
64		<i>Euphorbia hirta</i>					1	Herb	LC
65		<i>Euphorbia tirucalli</i>				1		Shrub	Invasive

S/N	Family	Species	Budala Reservoir	Pipeline 1	Pipe line 2	Pipe line 3	Intake Treatment &	Lifeform	Status
66		<i>Flueggea virosa</i>		1		1		Shrub	LC
67		<i>Phyllanthus amarus</i>	1			1		Herb	LC
68		<i>Phyllanthus reticulatus</i>		1				Herb	LC
69	Fabaceae	<i>Abrus precatorius</i>		1			1	Liana	LC
70		<i>Acacia brevispica</i>			1			Shrub	LC
71		<i>Acacia polyacantha</i>					2	Tree	LC
72		<i>Acacia seyal</i>		1				Tree	LC
73		<i>Acacia sieberiana</i>			1			Tree	LC
74		<i>Albizia coriaria</i>		2		1		Tree	LC
75		<i>Albizia zygia</i>				1	1	Tree	LC
76		<i>Alysicarpus rugosus</i>				1	1	Herb	LC
77		<i>Canavalia africana</i>					1	Liana	LC
78		<i>Cassia didymobotrya</i>					1	Shrub	LC
79		<i>Cassia hirsuta</i>		1	1	1	2	Herb	LC
80		<i>Cassia obtusifolia</i>				1	1	Herb	LC
81		<i>Cassia occidentalis</i>	1				4	Herb	Invasive
82		<i>Cassia siamea</i>				1	1	Tree	Invasive
83		<i>Crotalaria microcarpa</i>					1	Herb	LC
84		<i>Desmodium hirtum</i>				1	1	Herb	LC
85		<i>Indigofera microcalyx</i>				1	1	Herb	LC
86		<i>Senna spectabilis</i>					2	Tree	Invasive
87		<i>Sesbania microphylla</i>					1	Shrub	LC
88		<i>Tephrosia elata</i>	1					Herb	LC
89		<i>Tephrosia nana</i>	1					Herb	LC
90		<i>Tephrosia pumila</i>	1		1	1		Herb	LC
91		<i>Vigna oblongifolia</i>					1	Herb	LC
92	Lamiaceae	<i>Acmella mauritiana</i>					1	Herb	LC
93		<i>Hoslundia opposita</i>		1				Herb	LC
94		<i>Hyptis suaveolens</i>		1	1	1	1	Herb	LC
95		<i>Leonotis nepetifolia</i>	1				1	Herb	Invasive
96		<i>Ocimum gratissimum</i>		1	1		1	Herb	LC
97		<i>Ocimum lamiifolium</i>			2	1		Herb	LC
98		<i>Pycnostachys eric-rosenii</i>					1	Herb	LC
99		<i>Solanestemon ssp</i>			1			Herb	LC
100	Malvaceae	<i>Abutilon longicuspe</i>					1	Herb	LC

S/N	Family	Species	Budala Reservoir	Pipeline 1	Pipe line 2	Pipe line 3	Intake Treatment &	Lifeform	Status
101		<i>Corchorus olitorius</i>	1					Herb	LC
102		<i>Grewia trichocarpa</i>		1				Shrub	LC
103		<i>Hibiscus diversifolius</i>					1	Herb	LC
104		<i>Hibiscus ovalifolius</i>					1	Herb	LC
105		<i>Pavonia procumbens</i>					2	Herb	LC
106		<i>Sida acuta</i>		1		1	3	Herb	Invasive
107		<i>Sida cordifolia</i>		1			3	Herb	LC
108		<i>Sida rhombifolia</i>	1			1	2	Herb	LC
109		<i>Triumfetta tomentosa</i>					3	Herb	LC
110		<i>Urena lobata</i>	1			1	1	Herb	LC
111		<i>Waltheria indica</i>	1					Herb	LC
112		<i>Wissadula hernandioides</i>		1		1		Herb	LC
113	Meliaceae	<i>Melia azedarach</i>	1					Tree	Invasive
114		<i>Trichilia emetica</i>					1	Tree	LC
115	Menispermaceae	<i>Chasmanthera dependens</i>		1				Liana	LC
116		<i>Cissampelos mucronata</i>					1	Liana	LC
117	Mimosaceae	<i>Dichrostachys cinerea</i>		1				Shrub	Invasive
118	Moraceae	<i>Artocarpus heterophyllus</i>	1			1		Tree	LC
119	Myrtaceae	<i>Syzygium cumini</i>					1	Tree	LC
120	Oleaceae	<i>Jasminum fluminense</i>		2				Liana	LC
121	Onagraceae	<i>Ludwigia abyssinica</i>					1	Herb	LC
122	Poaceae	<i>Bothriochloa insculpta</i>					2	Herb	LC
123		<i>Brachiaria documbens</i>		1				Herb	LC
124		<i>Chloris pycnothrix</i>			1			Herb	LC
125		<i>Cynodon dactylon</i>				1	2	Herb	LC
126		<i>Cynodon nlemfuensis</i>			1	1	2	Herb	LC
127		<i>Dactyloctenium aegypticum</i>	1		1			Herb	LC
128		<i>Digitaria longiflora</i>	1		1	1		Herb	LC
129		<i>Digitaria ternata</i>			1			Herb	LC
130		<i>Digitaria velutina</i>	1			1		Herb	LC
131		<i>Echinochloa pyramidalis</i>					1	Herb	LC
132		<i>Eleusine indica</i>			1		1	Herb	LC
133		<i>Eragrostis mildbraedii</i>					1	Herb	LC
134		<i>Eragrostis tenuifolia</i>	1			1		Herb	LC

S/N	Family	Species	Budala Reservoir	Pipeline 1	Pipe line 2	Pipe line 3	Intake Treatment &	Lifeform	Status
135		<i>Hemarthria uncinata</i>					1	Herb	LC
136		<i>Hyparrhenia collina</i>		1		1		Herb	LC
137		<i>Hyperthelia dissoluta</i>					2	Herb	LC
138		<i>Leersia hexandra</i>		1				Herb	LC
139		<i>Melinis repen</i>	1					Herb	LC
140		<i>Microchloa kunthii</i>			1		2	Herb	LC
141		<i>Panicum maximum</i>	1	1	2		1	Herb	LC
142		<i>Panicum repens</i>					4	Herb	LC
143		<i>Paspalum scrobiculatum</i>	1					Herb	LC
144		<i>Phragmites mauritanus</i>					3	Herb	LC
145		<i>Sorghum arundinaceum</i>	1					Herb	LC
146		<i>Sporobolus festinus</i>			1			Herb	LC
147		<i>Sporobolus pyramidalis</i>		2	1		2	Herb	LC
148	Polygonaceae	<i>Oxygonum sinuatum</i>	1			1	1	Herb	LC
149		<i>Polygonum pulchrum</i>				1	4	Herb	LC
150	Pontederiaceae	<i>Eichhornia crassipes</i>				1	1	Herb	LC
151	Portulacaceae	<i>Portulaca oleraceae</i>			1		1	Herb	LC
152		<i>Portulaca quadrifida</i>			1			Herb	LC
153	Rubiaceae	<i>Bathidavia</i>					1	Tree	LC
154		<i>Mitracarpus virosa</i>	1					Herb	LC
155		<i>Oldenlandia duemmeri</i>			1		3	Herb	LC
156		<i>Oldenlandia herbacea</i>			1			Herb	LC
157		<i>Richardia brasiliensis</i>					1	Herb	LC
158	Salvadoraceae	<i>Azima tetraacantha</i>			1			Shrub	LC
159	Simaroubaceae	<i>Harrisonia abyssinica</i>					1	Shrub	LC
160	Solanaceae	<i>Solanum incanum</i>				1	1	Herb	LC
161	Thelypteridaceae	<i>Thelypteris confluens</i>					1	Herb	LC
162	Tiliaceae	<i>Corchorus olitorius</i>				1	1	Herb	LC
163	Tribulaceae	<i>Tribulus terrestris</i>					1	Herb	Invasive
164	Typhaceae	<i>Typha domingensis</i>				1	2	Herb	LC
165	Verbenaceae	<i>Lantana camara</i>		1			1	Shrub	Invasive
166		<i>Stachytarpheta indica</i>					1	Herb	Invasive
167	Vitaceae	<i>Cayratia ibuensis</i>					1	Liana	LC
168		<i>Cissus rotundifolia</i>		1	1			Liana	LC

ANNEX G- RAP SUMMARIES

APPENDIX H: SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

The interviewer is part of development of LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES team assessing the socio-economic baseline conditions in the project area. The information collected will be used for environmental & social impact assessment (ESIA). Your responses to questions herein will be treated with utmost confidentiality.

1: Interview Details

- 1.1 Interviewer's Name: _____
- 1.2 Date of interview: ____/____/2021
- 1.3 Name of respondent: _____
- 1.4 Phone number of respondent: _____ (Upon permission)

2: General Information of Household

2.11 Type of household head

- Female headed
- Male headed
- Child headed below 18 years Male Female

2.12 Marital status of household head

- Single
- Married (No. of spouses): _____
- Divorced/separated
- Widowed

2.13 Household members living in the homestead

- | | |
|----------------------------|----------------------------|
| 0-4years: _____ persons | 20-24: years _____ persons |
| 5-9 years: _____ persons | 25-29: years _____ persons |
| 10-14 years: _____ persons | 30-34 years _____ persons |
| 15-19 years: _____ persons | 35-39 years _____ persons |

2.1 District: _____

2.2 Sub-county _____

2.3 Parish: _____

2.4 Village/zone/LC1 _____

2.8 Name of household head: _____

2.9 Nationality of the household head: _____

2.10 Age of household head

- (15-25)
- (26-35)
- (36-45)
- (46-55)
- (56 and above)

40-44 years _____ persons

50-54 years _____ persons

45-49 years _____ person

55-59 year _____ persons

60+ years _____ persons

2.14 What is the total number of person in your household: _____ persons?

2.15 Vulnerability of household head:

Physical Impairment

Old age

Hearing Disorder

Mental Disorder

child headed

Any other (specify)

Blindness

None of the above

2.16 Does your household have people with disability or chronically ill? YES / NO If YES, How many? _____

2.17 If YES: - Type of disability/illness: (Blind, deaf, lame, dumb, mental) (HIV/AIDS, Asthma, sickle cells, cancer, diabetes, Hypertension)

2.18 Of what Religious Affiliation is your household?

Catholic

Pentecostal/born again

Protestant

SDA

Islam

Others (specify)

2.19 Ethnic group

Basoga

Basamia

Bagwere

Banyole

Bagisu

Itesot

Japadhola

Other (specify)

2.20 What is your Homestead size? (acre).....

2.21 What is the nature of your dwelling?

Brick wall

Concrete blocks

Mud Block

Reeds, Thatch or Sticks

Mud and wattle

Stone

Mud Block with plaster

- 2.21 Tenure of homestead
- Customary
- Freehold
- Mailo
- Leasehold

2.22 Assets/property owned by household (Tick multiple answer)

- | | | | |
|------------------|--------------------------|--------------|--------------------------|
| Land | <input type="checkbox"/> | Car | <input type="checkbox"/> |
| House | <input type="checkbox"/> | Motorcycle | <input type="checkbox"/> |
| Domestic animals | <input type="checkbox"/> | Bicycle | <input type="checkbox"/> |
| TV set | | Mobile phone | |
| Radio | | | |

2.23 Are there any important cultural sites? 1=Yes 2=No

2.24 If yes, list sites: _____

3: Land Use, Land Ownership, and Crops

3.1 In what capacity do you live on this land?

- | | | | |
|------------------|--------------------------|-------------------|--------------------------|
| Landowner | <input type="checkbox"/> | Squatter | <input type="checkbox"/> |
| Tenant (Kibanja) | <input type="checkbox"/> | Licensee(renting) | <input type="checkbox"/> |
| Co-owner | <input type="checkbox"/> | Encroacher | <input type="checkbox"/> |

3.2 How did you own this land?

- Bought
- Inherited from parents
- Renting
- Squatter

3.3 How long have you used this land? _____ months/years Note if season, month, etc.

3.3 Do you use any other land apart from the one you own? 1=Yes 2=No (Household head)

3.4 If Yes, list location (village, parish, or sub-county) _____

Condition of rented land

3.5 If land is rented, from whom?

Relatives/clan members

Government

Land owner in the same community

Others (specify)

Land owner living outside

3.6 Duration of contract of renting _____ years/months Note if season, month, etc.

3.7 Rent in case of cash/acre UGX _____ per year Note if season, month, etc.

3.8 Rent in other forms of payment (e.g. crops, livestock and animal produce) _____ Describe

4: Livelihood activity

4.1 What is the Primary (main) Livelihood Activity of household head?

Farming

Student

Formal Employment

Fishing

Casual labour

Brickmaking

Trading

other (specify)

Service provision (salon, transport)

4.2 What is the secondary Livelihood Activity of household head?

Farming

Student

Formal Employment

Fishing

Casual labour

Brickmaking

Trading

other (specify)

Service provision (salon, transport)

4.3 If your primary livelihood is farming, specify the crops you grow?

Bananas crop

Other crop

Animal rearing

Tree farming

None

In case you grow **other crops** apart from rice, specify the other crops. (Tick Multiple answer)

Beans	<input type="checkbox"/>	Cassava	<input type="checkbox"/>
Maize	<input type="checkbox"/>	Sorghum	<input type="checkbox"/>
Irish Potato	<input type="checkbox"/>	Vegetables	<input type="checkbox"/>
Sweet potato	<input type="checkbox"/>	Others (specify)_____	

In case **you rear** animals, specify (Tick Multiple answer).

Goat	<input type="checkbox"/>	Sheep	<input type="checkbox"/>
Cattle	<input type="checkbox"/>	Rabbits	<input type="checkbox"/>
Poultry	<input type="checkbox"/>	Others (specify)_____	
Pigs			

In case of **tree planting**, specify which trees grown (Tick Multiple answer).

Pine	<input type="checkbox"/>	Guava	<input type="checkbox"/>
Eucalyptus	<input type="checkbox"/>	Avocado	<input type="checkbox"/>
Grevillea	<input type="checkbox"/>	Orange	<input type="checkbox"/>
Others (specify)_____			

In case of **fishing**, specify the fishing place: (Tick Multiple answer)

River	<input type="checkbox"/>
Inland pond	<input type="checkbox"/>
Lake (specify)	<input type="checkbox"/>

4.8 Where do you sell your produce?

Local trading center	<input type="checkbox"/>	Cooperative	<input type="checkbox"/>
local produce buyer	<input type="checkbox"/>	Market	<input type="checkbox"/>
Farm gate	<input type="checkbox"/>	Others (specify)	<input type="checkbox"/>

5: Income and Expenditure

Income and Expenditure			
	Question	Answer	Remarks
5.1	Average Annual Income	UGX per year	Household head

Source of Income:			
5.2	Farming	UGX per month/season	
5.3	Formal employment	UGX per month	
5.4	Casual labour	UGX per month	
5.5	Trading	UGX per month	
5.6	Service provision	UGX per month	
5.7	Fishery	UGX per month	
5.8	Brick making	UGX per month	
5.9	Others (Specify)	UGX per month	
Expenditure:			
5.10	School fees	UGX per month (usually per term not month)	
5.11	Medical bills	UGX per month	
5.12	Food	UGX per month	
5.13	Transport	UGX per month	
5.14	Clothing	UGX per month	
5.15	Water	UGX per month	
5.16	Energy	UGX per month	
5.17	Rent	UGX per month	
5.18	Others (Specify)	UGX per month	

6: Health

6.1A what is the type of nearest health facility?

- | | | | |
|------------------------|--------------------------|----------------------------------|--------------------------|
| Referral Hospital | <input type="checkbox"/> | Maternity Clinic | <input type="checkbox"/> |
| Church run hospital | <input type="checkbox"/> | Community Health Centre | <input type="checkbox"/> |
| privately run Hospital | <input type="checkbox"/> | privately run clinic / Drug shop | <input type="checkbox"/> |
| Health centre III | <input type="checkbox"/> | Other (specify) | <input type="checkbox"/> |
| Health centre II | <input type="checkbox"/> | | |

6.1 What is the distance to nearest health facility?

- 100 meters
- 100-500 meters
- 1-1.5km
- Over 5km

What is the distance to health referral facility

- 100 meters
- 100-500 meters
- 1-1.5km
- Over 5km

What are the most common diseases that affect the family?

- | | | | |
|-------------------------------|--------------------------|--------------------------|--------------------------|
| Malaria | <input type="checkbox"/> | Intestine Infection | <input type="checkbox"/> |
| Cough | <input type="checkbox"/> | Ulcers | <input type="checkbox"/> |
| Water related diseases | <input type="checkbox"/> | Skin diseases | <input type="checkbox"/> |
| Sexually transmitted diseases | <input type="checkbox"/> | Other diseases (specify) | <input type="checkbox"/> |

7: Education

Education level of the household head

- | | | | |
|-------------------|--------------------------|--------------------|--------------------------|
| Primary Education | <input type="checkbox"/> | University/college | <input type="checkbox"/> |
| Ordinary level | <input type="checkbox"/> | None | <input type="checkbox"/> |
| A' level | <input type="checkbox"/> | Junior | <input type="checkbox"/> |
| Vocational | <input type="checkbox"/> | | |

Distance to the nearest primary school

- | | | | |
|----------------|--------------------------|----------|--------------------------|
| 100 meters | <input type="checkbox"/> | 1-1.5kml | <input type="checkbox"/> |
| 100-500 meters | <input type="checkbox"/> | Over 5km | <input type="checkbox"/> |

Distance to the nearest Secondary school

- | | | | |
|----------------|--------------------------|----------|--------------------------|
| 100 meters | <input type="checkbox"/> | 1-1.5kml | <input type="checkbox"/> |
| 100-500 meters | <input type="checkbox"/> | Over 5km | <input type="checkbox"/> |

8: Water supply and Energy

Primary (main) water source (Tick appropriate response)

- | | | |
|--------------------|--------------------------|--------------------|
| Communal borehole, | <input type="checkbox"/> | Unprotected spring |
| Protected spring | <input type="checkbox"/> | River/lake |
| | <input type="checkbox"/> | |
| | <input type="checkbox"/> | |

Piped water in house	<input type="checkbox"/>	Piped water
Open stand pipes	<input type="checkbox"/>	Rain water
	<input type="checkbox"/>	
	<input type="checkbox"/>	

Sufficiency of water source	
Sufficient throughout the year	<input type="checkbox"/>
Insufficient during dry seasons	<input type="checkbox"/>

Distance to water sourced	
100 meters	<input type="checkbox"/>
100-500meters	<input type="checkbox"/>
1-1.5km	<input type="checkbox"/>
Over 5km	<input type="checkbox"/>

Major Energy sources for cooking:

Firewood	<input type="checkbox"/>	Kerosene	<input type="checkbox"/>
Gas	<input type="checkbox"/>	Biogas	<input type="checkbox"/>
Charcoal	<input type="checkbox"/>	Electricity	<input type="checkbox"/>
Solar	<input type="checkbox"/>	Other	

Major Energy sources for lighting

Firewood	<input type="checkbox"/>	Kerosene	<input type="checkbox"/>
Gas	<input type="checkbox"/>	Electricity	<input type="checkbox"/>
Charcoal	<input type="checkbox"/>	Other	<input type="checkbox"/>
Solar			
Biogas	<input type="checkbox"/>		

9 Gender and domestic violence

How would you rate the prevalence of domestic violence in this area?

None
Very rear

Relatively common

Rampant

Don't know

What are common abuses in this community?

(Multiple response)

1=Battering/beating

2=Burning

3=Verbal abuses/insults

4=Attempted murder

5=Forced sex

6=Unwanted sexual touches

7=Marrying off girls early

8=Threatening violence against spouse or children

9=Use of proceeds/money without spouse consent

10=Preventing spouse from owning property

11=Preventing spouse from using family land

12=Stop spouse from talking/community meetings

12=Preventing spouse from working outside home

13=Engaging children in work instead of school

14=Not economically supporting family

15=Locking spouse or children out of house

16=Other.....

Who are the main victims of domestic violence in the area? *(Multiple responses allowed)*

Girls

Married women

Boys

Men

Children

Maids

Other _____

Don't know

Who are the perpetrators of the abuses?

(Multiple)

- 1=Male spouse
- 2=Female spouse
- 3=Other relative
- 4=Clan elder
- 5=Community leader
- 6=Stranger
- 7=Employer/boss
- 8=Male teacher
- 9=Community member
- 10=Police man/soldier
- 11=Other.....
- 12=Male teacher

Where are cases of gender and domestic abuses normally reported/referred?

(Multiple)

- 1=Police
 - 2=LC/community leaders
 - 3=Religious leader
 - 4=Clan leader
 - 5=NGO/CBO
 - 6=Sub-county/probation officer/CDO
 - 7=Courts of law
 - 8=Head-teacher
 - 9=Health worker
 - 10=Media
 - 11=Others
- HIV/AIDS

What is the prevalence of HIV/AIDS infection in this area?

1. Very low
2. Low
3. High
4. Very high
5. Don't know

What factors are likely to contribute to the spread of HIV/AIDS in this area?

1. Poverty
2. Lack of information
3. Peer pressure
4. Alcohol abuse
5. Drug abuse
6. Parental neglect
7. No antenatal care service
8. No HIV service providers
9. GBV
10. Prostitution
11. Early marriage
12. Other _____
13. Don't know

How can HIV/AIDS be controlled or reduce avoided? (Allow multiple responses)

1. Sensitization activities
2. Prevention of GBV
3. Bylaws against prostitution
4. Promotion of ABC
5. Bylaws against drug/alcohol abuse
6. Improve antenatal care services
7. Engage HIV service providers
8. Bylaws against early marriage
9. Gender empowerment
10. Testing & counselling

11. Other (specify)_____

What are the sources of information about HIV/AIDS?

(Multiple response)

1=Television

2=Radio

3=Newspapers

4=Billboards

5=Posters/brochures

6=Community outreaches

7=Drama performances

8=Health facilities

9=NGO/CBO/CSO

10=Religious leaders

11=Traditional leaders

12=Local leaders/Political leaders

13=Family members

14=Friends/peers

15=Others.....

10: Credit:

10.1 Most important form of saving 1=Crops in storage 2=Buy livestock 3=Deposit in bank

4=Save with a local SACCO, 5=Keep with a friend/relative/at home, 6=Other (specify)

10.2 For answer 3 in Q 9.1 (Deposit in bank), Please specify.

Bank name, location, distance (Answer all)

Bank name_____

Location_____

Distance_____

10.3 Do you have access to credit service 1=Yes 2=No

10.4 If yes, what is the main source of credit service? (Tick multiple answer)

Commercial banks

Moneylenders

Micro finance institutions

Input supply

Self-help group

NGO

Internal (family and friends)

Other (specify)

Government

Not available

SACCO

If yes, main purpose of credit service

Agricultural labor employment

Irrigation equipment

Seeds purchase

Livestock rearing

Fertilizer

Aquaculture

Agro-chemicals

Trading agricultural produce

Farm machinery

Other (specify)

0: Project Awareness and Remark or opinion on the impacts

10.1 Have you been informed about the project in your area? 1=Yes 2=No

10.2 If yes, from whom did you learn about the project?

NWSC

Neighbors/Friends

Local Government (Parish chief, LCs, District/SC officers)

Relatives

New

Others

10.3 What is the project impact? Positive Negative

A) If Positive,

will improve quality of life

will provide electricity accessibility

will improve agricultural productivity

will Increase job opportunity

will boost business in trading area

Others

B) Negative

will will displace people

will lose income/land

will invite community split/ conflict

Others

10.5 Are you in favor of the project? 1=Yes 2=No 3=Undecided

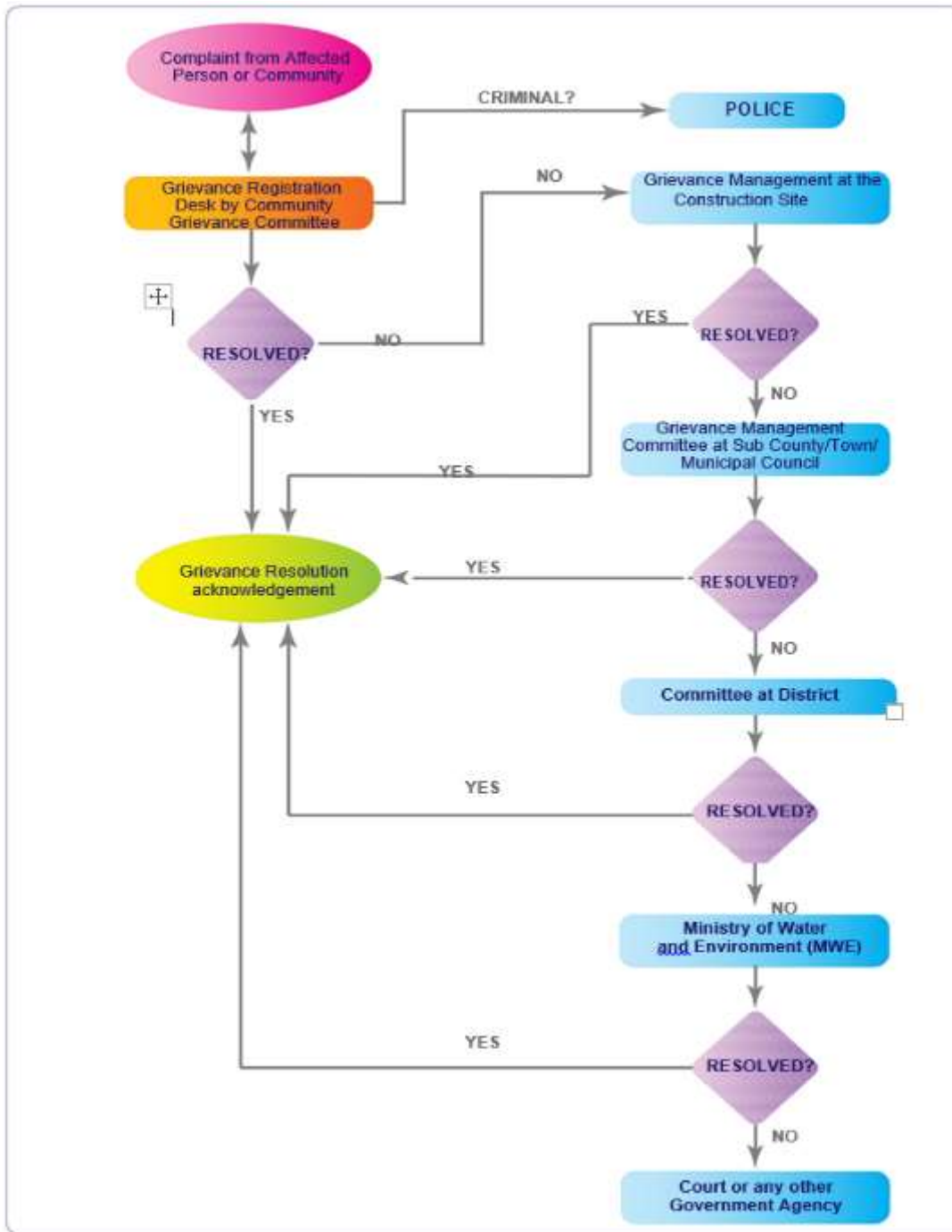
10.6 If yes, are you willing to join or cooperate with project activities? (If they don't understand easily, explain by giving e.g.) 1=Yes 2=No

10.7 Other concerns about project

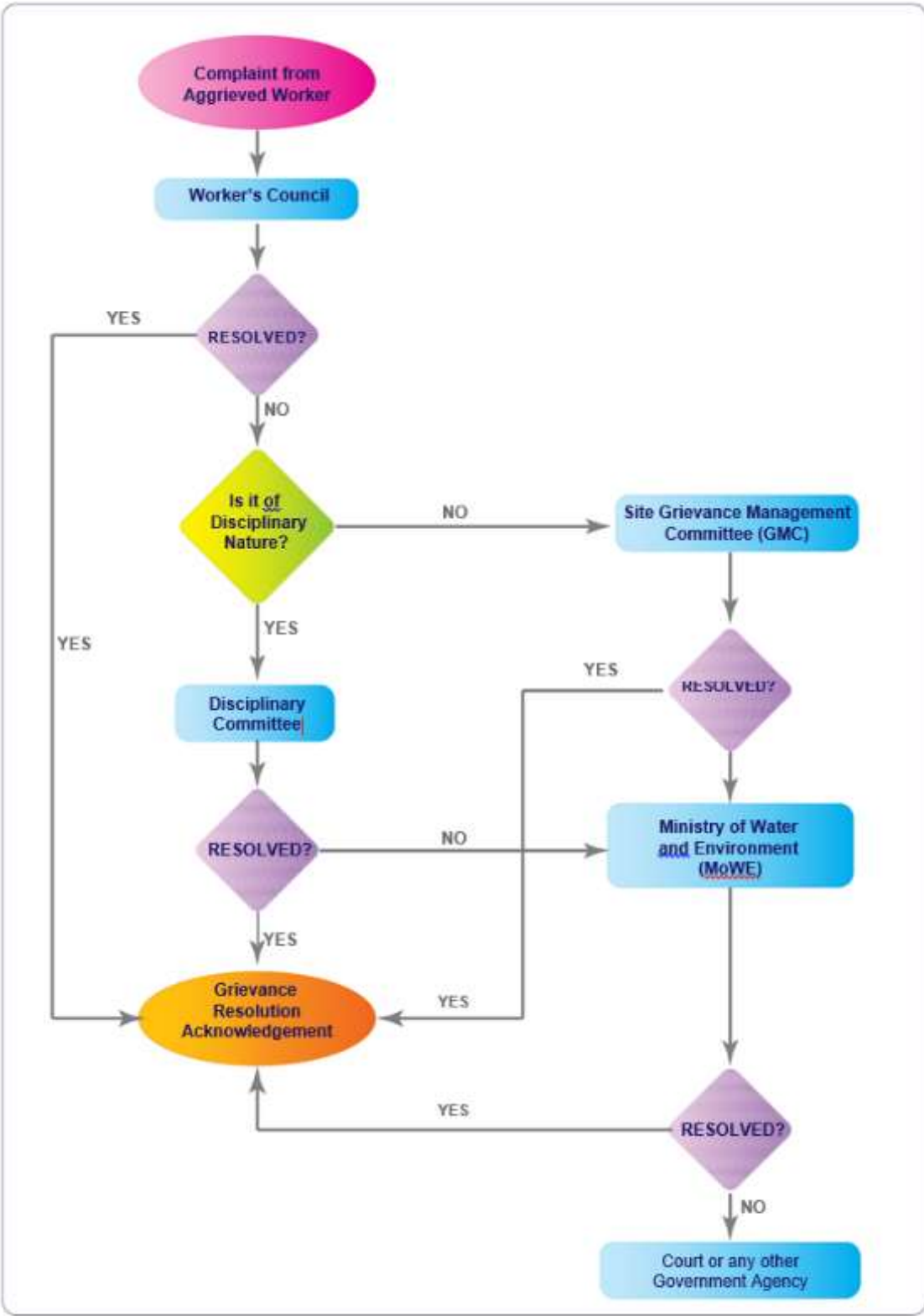
Thank you for your valuable responses

ANNEX I: GRIEVANCE REDRESS MECHANISMS AND FORMS

Community Grievance Flow Chart



Workers Grievance Flow Chart



Village Level GRC Reporting Template

District.....

Sub-county.....

Village.....

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 7 days)												
3.	Number of grievances received and addressed at village level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from village to sub-county level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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Subcounty Level GRC Reporting Template

District.....

Sub-county.....

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at sub county level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from sub county to district level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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National Level GRC Reporting Template

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No. of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at district level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from the district to national level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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REPORTING AND REFERRAL OF VAC, GBV AND OTHER SEXUAL RELATED CASES ON THE PROJECT.

Stakeholder	Action and support is to be provided	Where the case should be Referred?
VAC /GBV Victim	<p>Reports to immediate persons like relatives, friends, peers, and other resourceful persons such as teacher, religious leaders, CSOs, LC, Police</p> <p>Makes a statement providing details on what happened, form of violence, perpetrator, any witnesses.</p>	Immediately refer the case to LC and Police for recording and further investigation.
Community Persons including LCs, parents, guardians, Water user Committees, Project Management Committees, contractors' management teams, Grievance committees, Contractor's worker, Faith based member like church members, CSOs	<p>Reports the case and perpetrator immediately to nearby Local Council, Contractor's supervisor, Probation Officer/ CDOs and Police for further action.</p> <p>Liaises with other actors and ensures that the survivor gets support services such as medical care and check-up, counselling and other basic needs such as food.</p> <p>Follow-up the case with LCs, Police, health services and courts of law.</p>	Refers the case to Police for further investigation.
Police	<ul style="list-style-type: none"> Investigates the case, Signs the PF3 forms and other sources of evidence to support court proceedings, Supports the child survivor to access required support services and evidence such as a medical report. 	Refers the case to State Attorney for committing the perpetrator to courts of Law for hearing and sentencing
Designated Medical Centre	<ul style="list-style-type: none"> Medical Examination for bodily harm or other injuries caused, Produces medical report for police investigations and other evidence for the courts of law, Provides medical care for the victim survivor to ensure recovery. 	Reports to the Police and to the Courts of Law as evidence against the perpetrator.
Probation and Social Welfare Officer/ CDO	<ul style="list-style-type: none"> Assess the needs of the survivor/victim and refers the victim to services providers for appropriate support services, Collects data and information on the victim for processing and management 	Reports to Police

Stakeholder	Action and support is to be provided	Where the case should be Referred?
Courts of law	<ul style="list-style-type: none"> Hears the case, decides on support services to the child survivor or the parents of the child victim, Sentences the perpetrator according to the existing laws regarding the case. 	<p>Commits the person found guilty to serve his/her sentence and orders for any care and support to be provided to the victims</p>
Prison	<ul style="list-style-type: none"> Ensures that the person found guilty serves his/her sentence, Person is rehabilitated. 	<p>Freed at the end of serving the sentence.</p>
Contractors	<p>Ensure workers are well screened for VAC&GBV before employment with involvement of LC and Police</p> <p>Ensure workers files and background information is on file for future references</p> <p>Ensure workers are trained in company policies specifically on VAC & GBV</p> <p>VAC & GBV Tool box meetings organized</p> <p>Ensure that there is a site clinic and medical service provider for workers and other victims on referral by the site clinic</p> <p>Have MoU with Police to expedite any investigations and trainings</p> <p>Create awareness to the communities on VAC & GBV risks and referral pathways</p> <p>Cooperate with law enforcement agencies and officials in detecting, investigations and managing VAC & GBV cases</p> <p>Provide any other relevant support to victims</p>	<p>Refer all allegations of VAC & GBV to the Supervising Consultant, VAC&GBV Consultant for independent investigations and reporting to Uganda Police</p>
Local Government (CDOs and other relevant Officials)	<p>Monitors cases of any GBV/VAC allegations on the project</p> <p>Participate in GBV&VAC sensitizations to project workers and communities</p>	<p>Refers to Uganda Police and existing service providers to victims and survivors of VAC & GBV</p>

Stakeholder	Action and support is to be provided	Where the case should be Referred?
MWE	<p>Provides technical guidance to contractors and communities on any referral pathway for a specific incident</p> <p>Maintains a directory of services providers (Government and Civil Society Organizations) for survivors and victims</p> <p>Links victim and survivors for more support to existing service providers</p> <p>Follows up on the progress of judicial processes for the suspects</p> <p>Ensure that the Civil works contracts have strong penalties for contractors and workers involvement in VAC & GBV</p> <p>Provides effective orientation of contractors and their staff on safeguards management on the project</p> <p>Deploys dedicated service provider for VAC& GBV on the project sites</p> <p>Monitors VAC & GBV cases in the community and assesses any cases involving the contractors and their workers</p> <p>Provides reports to World Bank on any incidents related to VAC & GBV within 48 hours; provides root cause analysis (RCA) and safeguards correction action plans (SCAP)</p> <p>Make follow up to ensure that all cases are judiciously managed</p> <p>Liaise with other MDAs to ensure appropriate actions to the VAC & GBV victims and offenders</p>	<p>Ensures zero occurrence of VAC cases in relation to the Project.</p>

Reporting form for VAC and GBV incidents on the project.

Part I: Details of the Reporter

Name of the Person reporting the case	Address: Location:	Date of reporting the case:
Designation and relationship with the child victim and survivor	Contact details; Tel. No (Landline): Tel. No (Mobile): Email:	Time of Reporting:

Part II: Details of Victim/ Survivor

S/N	Indicators	Details captured
	Name of the victim	
	Sex	
	Date of birth and Age	
	Residence	
	Contacts- telephone	
	Reference number	
	Nature/type of the alleged act of violence:	
	Location: where the incident took place	
	Number of times the victim has encountered such a form of violence	
	Other associated forms of violence the victim has encountered by the alleged perpetrator	
	Relationship of the victim with the alleged perpetrator	

	Impact of the act of violence on the victim i.e. physical, mental, health etc	
	Date or time frame of the act of violence	
	Witnesses (if any) and their observations and their willingness to appear in case of further investigations and their telephone contacts	
	Status of reporting (if there are previous efforts of reporting the case and the person/officer reported to	
	Measures or actions taken	
	Outcomes of the measures if any	
	Recommended actions and support services for the survivor/victim	
	Witnesses Name: Address: Contact number:	Describe the event as witnessed:
	Any other information found necessary to support the case- photographic or recorded evidence	
	Form compiled by: Name: _____ Signature: _____	Position----- Date-----

Part III: Details of the alleged perpetrator

Notes	Attach all the necessary supporting information or documents and remember to retain a copy for follow-up	
S/N	Indicators	Details captured
1	Name of the alleged perpetrator (attach a photo) if available	
2	Sex	

3	Age (if known)	
4	Residence	
5	Marital status	
6	Contacts- telephone	
11	Consent or non-consent of the perpetrator on committing the act	
12	Previous incidents of violence committed by the alleged perpetrator	
13	Measures taken by the duty bearers and other stakeholders against the perpetrator	
14	Outcomes of the measures if any	
15	Recommended actions against the perpetrator	
16	Any other information found necessary	
17	Form compiled by: Name: ----- Signature: ----- Position:----- Date:-----	Contact details: Tel:-----Email:-----

ANNEX J: VALUATION CERTIFICATE OF INVESTMENT.