REPUBLIC OF UGANDA

MINISTRY OF WATER AND ENVIRONMENT

INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONSTRUCTION OF THE PIPED WATER SUPPLY AND SANITATION SYSTEM FOR LWENTULEGE RURAL GROWTH CENTRE IN KAGAMBA SUB-COUNTY, RAKAI DISTRICT, UGANDA

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ACRONYMS

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

ICRs	Implementation Completion Reports
IEC	Information Education and Communication
IFC	International Finance Corporation
ILO	International Labour Organization
IPF	Investment Project Financing
ISRs	Implementation Status Reports
IUCN	International Union for Conservation of Nature
IWMDP	Integrated Water Management and Development Project
IWRM	Integrated Water Resources Management
KII	Key Informant Interview
Km	Kilometre
LAeq	Average Noise Level
LA_{MIN}	Lowest Noise Level
LA_{MAX}	Highest Noise Level
LC	Local Council
MoGLSD	Ministry of Gender, Labour and Social Development
MoLHUD	Ministry of Lands, Housing and Urban Development
MWE	Ministry of Water and Environment
NDP III	Third National Development Plan
NEA	National Environment Act
NEMA	National Environment Management Authority
NGOs	Non-Government Organizations
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NPHC	National Population and Housing Census
NSSF	National Social Security Fund
NWIS	National Wetland Information System
NWSC	National Water and Sewerage Corporation
OPs	Operational Policies
OSH	Occupational Safety and Health
O&M	Operation and Maintenance
PAHs	Project Affected Households
PAPs	Project Affected Persons
PAYE	Pay As You Earn
PCDP	Public Consultation and Disclosure Plan
PCRs	Physical Cultural Resources
PMT	Project Management Team
PPE	Personal Protective Equipment
PWDs	Person With Disabilities
RAP	Resettlement Action Plan
RDLG	Rakai District Local Government
RFP	Resettlement Policy Framework l
RGC	Rural Growth Centre
RWSRCs	Rural Water and Sanitation Regional Centres
SDGs	Sustainable Development Goals
SEHS	Social Economic and Health Survey
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections

S/C	Sub-County
SOx	Sulfur Oxides
TN	Total Nitrogen
TOC	Total Organic Carbon
ToR	Terms of Reference
TP	Total Phosphates
TSS	Total Suspended Solids
UAs	Umbrella Authorities
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings
UN	United Nation
UNBS	Uganda National Bureau of Standards
URA	Uganda Revenue Authority
UWSD	Urban Water and Sewerage Department
UTM	Universal Transverse Mercator
VAT	Value Added Tax
VES	Visual Encounter Survey
VIP	Ventilated Improved Pit latrines
WB	World Bank
WHO	World Health Organization
WHT	Withholding Tax
WMD	Wetland Management Department
WMZ	Water Management Zone
WSS	Water Supply System

ESIA TEAM COMPOSITION

Table 1 presents the composition of the Environmental and Social Impact Assessment (ESIA) team that undertook the ESIA for the proposed Lwentulege piped Water Supply system in Lwentulege RGC, Kagamba Sub County (currently Lwentulege Town Council) in accordance with the provisions of the *National Environmental Act No. 5 of 2019* of the Laws of Uganda, the *Environmental and Social Impact Assessment Regulations (2020)* and the *National Environment (Conduct and Certification of Environmental Practitioners) Regulations (2003).*

Table 1: ESIA Team Composition

Name of Key Specialists	Assigned Position	Signature
Mr. Pius Kahangirwe, MSc. *NEMA Certified Environmental Practitioner* ***(CC/EIA/159/22) – Team Leader***	Team Leader / Environmental and Natural Resources Management Specialist	
Dr. Denis Byamukama, PhD. *NEMA Certified Environmental Practitioner* ***(CC/EIA/073/22) – Team Leader/Member***	Water Quality and Waste Management Specialist	
Mr. Andrew Nkambo, BSc. *NEMA Certified Environmental Practitioner* ***(CC/EIA/273/22) – Team Member***	Plant Ecologist	
Contributing Specialists		
Dr. Eng. Alex Katukiza	Overall Team Leader for Project Coordination	
Eng. Kenneth Musabe	Water and Wastewater Expert	
Ms. Esther Nassonko	Sociologist	
Dr. Philip Nyenje	Hydrologist	
Mr. Samuel Kasozi	Hydro geologist	
Ms. Sheila Akatukunda	Faunal Studies	
Ms. Hamidah Namatovu	Occupational Health and Safety	
Mr. Kibirango Moses	GIS Expert	
Ms. Natasha Atukunda	Environmentalist	

Client's Reviewers

Name	Title
Cate Namyalo	Senior Environmental Health Officer
Maurice Madra Edema	Environmental Safeguards Specialist IWMDP
Jonan Kayima	Social Safeguards Specialist IWMDP

EXECUTIVE SUMMARY

Lwentulege RGC Piped Water System is being proposed by the Ministry of Water and Environment (MWE)/Directorate of Water Development (DWD) in Kagamba Sub County (currently Lwentulege Town Council), Rakai District. Rakai district which is located in south western region of Uganda, west of Lake Victoria about 65.5 km by road to the south west of Masaka Municipality, the largest metropolis in the central sub region and about 192 km to the south west of Kampala, the capital city of Uganda. The investment cost for the Water Supply and Sanitation System is approximated at **UGX 3,852,278,003 (Three Billion, Eight Hundred Fifty-Two Million, Two Hundred Seventy-Eight Thousand, Three Shillings Only)**. Adequate safe water is a pre-requisite for a healthy society, which in turn, among other factors, makes it feasible for the majority of the population to engage in meaningful socio-economic activities that would increase household income and thereby reduce poverty. In Uganda, most of the rural growth areas and upcoming small towns access water from point water sources like boreholes, protected springs and shallow wells. These point water sources are in many cases characterized by low level of service, poor functionality and poor water quality in addition to diminishing water resources.

Lwentulege RGC is one of the potable water stressed rural growth centres in Rakai district within the region. Currently, the water service level for Lwentulege RGC is low and mostly from boreholes within the rural area. These boreholes are prone to contamination due to the urbanization and related pit latrine sinking. The situation is expected to become worse if no intervention is made.

This report presents the findings of an Environmental and Social Impact Assessment (ESIA) that has been undertaken at the proposed project sites and surrounding areas of Lwentulege RGC Piped Water sources and other water infrastructures. One (1) borehole was sited, drilled and test pumped as a potential water source of water for the proposed Water Supply System in Rakai District.

The project components of Rakai Lwentulege Piped water supply system include: One (1) Production well (Borehole, DWD 60878), One pump station for the borehole i.e. Lwentulege borehole in Lwentulege RGC estimated to yield 36m^3/h, One elevated cold pressed steel water tank, with an effective capacity 121m^3, Water offices, disinfection facility, Pump power and energy, Transmission Network, Distribution Network.

In compliance with the National Environment Act 2019, the Environmental and Social Management Framework (ESMF) and the National Environment (Environmental and Social Assessment) Regulations 2020, MWE undertook an ESIA at the proposed subproject sites and this report presents the findings. The ESIA study was conducted in consideration of the policies, legal and institutional frameworks relevant to this proposed project. Various policies and laws were reviewed in relation to the proposed project activities e.g. construction and operational requirements, environmental quality, land use, public health, occupational safety, labour standards and other legal obligations. World Bank Safeguard Policies have also been reviewed during this detailed ESIA study to ensure that the proposed development meets E&S requirements and some of the clauses that are likely to be triggered were identified and the corresponding mitigation and enhancement measures proposed.

The total population of Rakai District as per the 2015 Rakai District Planning Unit was **237,889** composed of **115,975** males and **121,914** females. When the 2014 population census was compared to the 2002 population census results, the population in the district grew by 2.06 % over a period of 12 years. In addition, the 2014 Census indicated that the National total fertility rate was 6.2 % and the total average Household size being 4.4 persons for Rakai District. Rakai District can be categorized as an ethnically rich district. The dominant tribe is the Baganda followed by the Banyankole. There is also a large number of

people of the Rwandese origin and a significant number of other tribes like Barundi, Baziba and Banyambo people. Notwithstanding the heterogeneity, most of the people in the district can communicate in Luganda making packaging of development messages easier, less costly and more effective. About 96% of the population is rural, a situation which reflects the basically agricultural nature of the district economy. In this rural environment, settlement pattern varies, depending on a number of factors such as climate, vegetation, water supply, terrain, soil fertility, disease agents etc.

The key policies and legislations applicable to the project included among others:

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.

World Bank Environmental and Social safeguard policies**,** namely; 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.

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) and the District Local Administration Structures.

In preparation of this ESIA, the following methodology was applied;

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

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.

A comprehensive stakeholder engagement was carried out during ESIA specifically with Rakai District Local Government Officials, Sub-County/Town Council Officials and Local Community Representatives and Community members among others.

Lwentulege RGC Piped Water System is envisaged to bring an end to water stress and overreliance on a few low yielding boreholes within Kagamba Sub County (currently Lwentulege Town Council) and neighbouring community. Further still, the project will also address the focal area of access to clean water as stipulated under the Uganda Vision 2040 and the National Development Plan III. The project also contributes towards achieving SDG *(specifically SDG 6 on clean water and sanitation)*. Several beneficial impacts envisaged will include: Improved quality of water supplied to communities; Improved quality of water supplied to communities; Provision of employment opportunities during construction and operation phases; Improved health and sanitation due to improved water quality and quantity; Improved local economies and induced development especially sourcing of raw materials for construction activities; An increase in revenue for the sub county from water project collections. The project will further, initiate the move away from the status quo of rural women and children's perpetual carrying of water on their heads from unprotected and distant point water source and allow them to engage in income generating activities and to improve the image of the women and children.

However, the ESIA findings indicate that the anticipated negative impacts will be mitigated and are limited to the project area where construction works will be undertaken. These negative impacts are summarized below and discussed in detail under Section 8.4 of this ESIA report and these include:

Environmental and Social Component	Potential Negative Impacts	Potential Mitigation Measures
Design Phase		
Groundwater Resources	Local lowering of water table levels, due to abstraction of groundwater for the water supply system.	▪ Undertake a hydrological study of boreholes to determine water table depths, borehole yields and local use of groundwater.
Groundwater Quality	The groundwater could become polluted as a result of pit latrines and indiscriminate waste disposal practices.	▪ Avoid prospecting in areas that are prone to flooding, waste disposal sites and pit latrines.
Soils	Soil erosion/damage due to survey activities and vehicle tracks. Soil contamination from oil and diesel spills.	▪ Minimize number of tracks. ▪ Use right angle intersections & use bunding. ▪ Avoid seasonally marshy areas & floodplains.
Flora	Disturbance or loss of endangered plant species or communities (terrestrial, wetland, aquatic) due to survey activities.	▪ Discourage any wanton destruction of vegetation and habitats beyond the designed project works.
Fauna	Disturbance or loss of protected/endangered animal species/communities and their habitat.	▪ Minimize vegetation clearance. ▪ Protect water & soils from pollution.
Noise	Noise generated by survey activities, especially vehicles, pump testing activities	▪ Working hours should be restricted from 7am – 6pm.
Air quality	Dust from vehicle movements.	▪ Avoid excessive vehicle movements. ▪ Limit vehicle speeds on unsurfaced tracks to 20kph.
Health and safety	Risk of accidents and ill health as a result of the project.	▪ Hold safety talks with workers before work.
Public nuisance	General nuisance such as noise, waste and dust.	▪ Minimize number of workers at site.
Construction Phase		
Land acquisition for infrastructure	The land-take would be permanent where all the project components would be constructed and temporary along the pipeline network. However, both the transmission and distribution lines would be confined to the road reserves where possible	▪ The district and local authorities in Sub County have already been engaged together with the local land lords and they agreed with communities whose land will be used for the proposed project construction. No grievances were reported and are envisaged. ▪ Compensation (where possible) to land owners as project affected persons.
Loss of vegetation cover and top soil	The existing vegetation and top soil will be cleared to give way to the construction	▪ After construction, there should be landscaping and re-vegetation.

	process on all sites. This is likely to cause loss of habitat and disturbance to faunal communities in the affected sites but at an insignificant level.	The premises will be planted with vegetation/grass and ornamental trees. ▪ The water source should be fenced off to reduce on going agricultural activities around the borehole to avoid pollution entering it especially when it rains heavily. ▪ Minimize vegetation clearance by clearly demarcating work areas. ▪ Provide environmental awareness training to all employees. ▪ Rehabilitate all disturbed areas.
Increase susceptibility to Soil Erosion	Increased soil erosion is likely to occur in the vicinity of project sites during the construction of the water source points, pump stations, installation of the water pipe reticulation and other related construction works. The site earthworks will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season.	▪ The sites will be hoarded off to intercept any eroded material and any soil material will remain within the site. ▪ The project proponent will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion. ▪ Use proper techniques for trenching and shoring
Increased siltation of the aquatic habitats	Some of the excavated sediments from the project site and the construction spoils emanating from the excess excavated material and construction debris are likely to increase siltation especially in the nearby seasonal swamp to the motorized borehole and therefore affecting the associated aquatic habitat.	▪ Ensure that the site is at all times drained adequately and surface run off is directed appropriately to avoid water logging of adjacent area and the undulating drainage channel
Effects of Poor Solid Waste Management	Waste will be generated during the construction of the WSS. The waste stream from the construction will include cement bags, timber and pipe cuttings, empty water bottles, food remains from workers onsite and other forms of waste. If not well managed, the area could be prone to nuisance from foul smell, breeding of vermin and vectors, and lead to outbreak of diseases.	▪ Waste collection bins will be provided at strategic positions at the 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 proponent will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA/KDLG/ Sub County. ▪ Burning of waste on-site shall not be allowed.

Increased incidences of diseases.	The increase of people involved in the project activities is likely to increase the incidences of diseases in the area. Consequently, there will be potential risk of contracting sexually transmitted diseases (STDs) especially the Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome (HIV/AIDS) among the program workers and the local communities. This will be increased due to influx of people seeking for employment.	▪ The contractor should liaise with the District and Sub County CDO to mobilise communities during the recruitment process to reduce on influx of people who are unskilled. ▪ The contractor should emphasise equal opportunities for both men and women. ▪ The Contractor should, in conjunction with local health authorities, undertake to educate and sensitise the workforce on communicable diseases such as cholera, STDs and HIV/AIDS. ▪ Condoms must be made available to the workforce
Visual intrusion	This will mainly arise from the erection of service reservoir tanks on the high altitude (hills). In addition, visual intrusion will occur where project activities are likely to create disfigured landscapes in the project area especially where the construction activities will result in deposition of large spoils and digging of the trenches.	▪ The contractor should maintain as much as possible the existing landscapes and plant trees and vegetation to enhance the visual aspect. ▪ Rehabilitate all areas disturbed by construction and landscape with trees, grass and shrubs.
Increased accidents and occupational hazards	Implementation of the project will definitely increase volume of human and motor traffic in the project area. The increase in human and motor traffic will be aggravated by the transportation of construction materials, water pipes and other equipment required in constructing the water supply facilities. This is likely to result in a higher risk of accidents and occupational hazards occurring in the area of operation.	▪ The contractor should ensure that workers are provided with adequate personal protective wear to mitigate injuries such as gloves, helmets, overalls and gumboots. ▪ Traffic guides and signs should be utilized to avoid accidents on busy roads and junctions especially with vehicles transporting materials ▪ Fence all construction sites. ▪ Place warning signs. ▪ Enforce maximum traffic speeds to 20kph
Sourcing of Construction Materials	Sourcing of materials such as sand, gravel bricks/blocks and timber if not well regulated and controlled can have a significant impact in the points of sourcing.	▪ The Contractor should liaise with local authorities to ensure that materials such as sand and gravel are only taken from quarries and borrow pits with the necessary environmental permits.
Occupational Health and Safety Risks for the Workforce	Construction traffic, excavation machinery, blasting of rocks and trenches may pose accident risk to workers either when equipment is operated by inexperienced	▪ All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them.

	workers or when in a poor mechanical condition or falls into the trenches.	▪ Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency. ▪ Regular drills will constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in the case of incidences. ▪ Signage will be used to warn staff and/ or visitors that are not involved in construction activities of dangerous places.
Social Misdemeanour by Construction Workers	▪ While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships, with attendant risk for spread of HIV/AIDS. ▪ Labour influx in the project community such as increase in irresponsible activities that may increase HIV/AIDS due sexual relations between project workers and the local community; workers taking advantage of young girls in the community due to high poverty levels and vulnerability, teenage pregnancies and dropping out of school etc. ▪ Violence Against Children such as potential use of child labour; sexual relationship with underage children, teenage pregnancies, school drop outs etc. ▪ Conflict in the community/families (social cohesion and disruption) due to project workers engaging in sexual relationships with married women in	▪ Framework (responsible staff, action plan, etc.) to implement during project execution. ▪ A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation. ▪ A code of conduct (appropriate to behaviours in workplace and with respect to relations with local community) will be developed and approved by MWE which will be signed by all workers on the project. ▪ Local workers will preferentially be employed, paid directly through their banks and access to bars by workers from outside the project area in the local communities controlled. ▪ All construction workers shall be orientated and sensitized about responsible sexual behaviour, GBV, Violence Against Children, HIV/AIDS etc. in project

	the community etc.	communities. ▪ Contractor(s) will maintain a complaints redress mechanism for all complaints that will arise from the interaction between construction workers and the communities within the project sites/areas including a record of how these complaints have been addressed.
Archaeological / Historical Sites	Throughout the consultations with the locals and local leaders, no known archaeological or historical sites exist on the proposed project routes, and proposed construction sites. Therefore, no impacts on any features of importance to national heritage are expected.	▪ The Contractor shall ensure that key members of his staff are briefed. Any such features that may be found that were not apparent on surface investigation will be reported by the project management and appropriate procedures followed to hand them over to the authority responsible for national heritage and antiquities.
Groundwater Quality	The groundwater could become polluted as a result of construction activities, pit latrines and indiscriminate waste disposal practices.	▪ The borehole should be covered and sealed so that dirt, water, sand and other debris cannot fall in. ▪ The boreholes should have concrete aprons around their base to prevent dirty water seeping back into the hole. ▪ Do not develop pit latrines close to boreholes. ▪ Dispose of all wastes in an approved disposal site.
Fauna	Disturbance or loss of protected/endangered animal species/communities and their habitat due to construction activities (noise, dust, fumes, pollution, vehicles)	▪ Minimize vegetation clearance. ▪ Protect water resources from pollution. ▪ Protect soils from contamination. ▪ Rehabilitate all disturbed areas.
Operation Phase		
Water quality and pollution	The quality of water recommended is that which is physically, chemically and bacteriologically safe for human consumption. When not thoroughly treated, water could be a source of water related diseases which could affect the project communities, thereby causing an epidemic in the area. Transmission of water can also result into pollution and pollution	▪ The borehole should be covered and sealed so that dirt, flooded water, sand and other debris cannot fall in. Transmission and distribution pipes should also be covered underground to reduce exposure. ▪ The boreholes should have raised concrete aprons around their

	entering the boreholes	bases to prevent dirty water seeping back into the holes. ▪ The drilled borehole areas should be raised well-head by building earthworks to prevent the flooded water, dirt and other debris to accumulate around it
Water quantity and yield	This could be due to declining groundwater recharge and over pumping. The project sites are prone to suffering from rapid land use change (deforestation, soil erosion, etc.) thus the recharge of the ground water supplying the borehole may be affected in the long run.	▪ Get involved with Water source catchment protection and management planning that could improve land management and restore groundwater recharge. ▪ Encourage contour ploughing, mulching and other agricultural practices that increases soil water retention and percolation into the underlying aquifer. ▪ Reduce the amount of water being taken – if demand in the area is growing then look at developing new water sources. ▪ Keeping records of how much is being pumped (either volumes or number of hours for which the pump is being used per day). Find out if sudden drops in level correspond to pumping activity.
Water Supply System failure	Insufficient cost/funding for operation and maintenance would lead to poor maintenance of the system which eventually could lead to frequent breakdowns of the water supply system and consequent shut down, which further could require major and costly rehabilitation. Other sources of failure in the water system could be due to sabotage (possibly by the water vendors who envisage loss of livelihoods), illegal connections which could result in decreased water pressure, and vandalism (theft of water system parts)	▪ Payment for water supply services is the only way to keep the service running continuously and therefore tariffs would be designed to ensure financial viability. Cost recovery would be achieved through service fee payments. ▪ Put in place a water user committee to oversee the operations of the water system. ▪ Fence off the areas like water abstraction points, pump houses, water storage reservoir tanks and other water supply structures like the community taps like kiosks to mitigate trespass and sabotage
Water pollution due to cutting of the pipes	Digging and construction of water facilities within close vicinity/on the water transmission network could result in pollution and loss of water	▪ The developer should hire services of security guards to monitor and guard the water supply system facilities.

		▪ Sensitization and awareness about the dangers of vandalizing the water supply system facilities should be done especially by the local leaders. ▪ Legal and applicable punitive measures like arrests and prosecution should be taken to those caught vandalizing the water system facilities in order to curtail and to serve as an example to those who would want to engage themselves in such acts.
Noise levels from Generators	Using of generators to boost the pumping of the water at the pumping stations may lead to moderate noise levels around the project area	▪ Installation of solar system instead of generator ▪ Service the generators regularly to minimize on the noise. ▪ Switch on generators only for few hours to boost on the pumping hours but always use the solar systems
Decommissioning Phase		
Surface Water Quality	Pollution of water bodies from erosion of unconsolidated materials, contaminated soil, wastes (solid and liquid), etc. As a result of demolition activities.	• Rehabilitate all areas e.g. grass/tree planting. • Take samples of the runoff water into the receiving water body nearby and ensure free pollution. • Remove all contaminated soil identified and dispose of it in an approved site. • Close any waste disposal facility on site and make provision for drainage in such a way as to prevent future pollution.
Flora	Disturbance or loss of plant species or communities (terrestrial, aquatic) due to dust fall-out onto leaves and soil, dump erosion.	• Rehabilitate or stabilize all cleared areas using indigenous vegetation until handover of the site.
Fauna	Disturbance or loss of animal species/communities and their habitat due to the lack of rehabilitation etc.	• Rehabilitate or stabilize all cleared areas using indigenous vegetation where possible.
Soils	Re-use of soils in rehabilitation and re-instatement of pre-project capability.	• Replace subsoil and overburden first and then cover with saved topsoil. Do not use heavy equipment to replace topsoil because this can cause compaction.

	Soil erosion from denuded areas and demolition activities.	• Maintain erosion protection works. • Rehabilitate or stabilize all disturbed areas.
Topography	Reinstate the topographic profile.	• Backfill, contour and landscape.
Air quality	Dust from un-rehabilitated sites and demolition activities.	• Avoid dusty activities e.g. loading and dumping on windy days & monitor dust emissions.
	Odours from waste dump.	• Avoid activities that can lead to pilling of wastes in the project area. • Dispose of all the wastes in gazetted sites
Noise and vibration	Noise generated by demolition equipment and earth moving equipment	• Prescribe noise reduction measures if appropriate e.g. restricted working and transport hours and noise buffering.
Health and safety	Risk of accidents and ill health as a result of the project	• Fence all unsafe and dangerous areas & monitor environmental health (air quality, water quality).
Aesthetic and amenity values	Improvement of the visual impact of the site on scenic views.	• Rehabilitate with trees, grass and shrubs where possible. • Consult with the local community and tourist industry.

No physical relocation issues are anticipated however; a Resettlement Action Plan (RAP) has been prepared to address all compensation issues that are anticipated and an Environment and Social Management Plan (ESMP) has also been presented in this ESIA report to ensure positive impacts are enhanced while negative impacts are avoided and or mitigated.

This ESIA report provides NEMA with the necessary information required for approval of the E&S aspects of the project, as well as providing guidance to MWE to improve the project design and implementation, in compliance with the proposed project ESMP. Therefore, the proposed project is environmentally and socially feasible for implementation provided the recommended mitigation and monitoring measures are implemented, and the proposed implementation arrangements are upheld.

1. INTRODUCTION

1.1 Background

The Government of Uganda (GOU) received credit from the World Bank (WB) towards implementation of the Integrated Water Management and Development Project (IWMDP) under the Ministry of Water and Environment (MWE). 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 (NDP III) objectives, Vision 2040 and Sustainable Development Goals. Under the IWMDP, funds have been provided for ESIA, RAP and SPPs.

The Project will support WSS infrastructure investments in small towns located primarily in Uganda's Northern and Eastern regions and in RGCs in the country's Central and Midwestern regions. The water resources activities are designed to consolidate IWRM in overall water sector planning and infrastructure development. Specific water resources measures will be conducted in the Upper Nile and Kyoga WMZs where Catchment Management Plans (CMPs) have been prepared for sub-catchments and where most of the WSS infrastructure investments proposed under this Project are located. The Project will integrate infrastructure investment, water source and catchment protection measures, and comprehensive sanitation planning to ensure sustainability and increased resilience to climate change and variability. The Project will provide Technical Assistance (TA) aimed at consolidating water sector reforms to support efficient and effective service delivery models for small towns and RGCs.

Component 1 will support Water Supply and Sanitation in Small Towns and Rural Growth Centres and support to Districts Hosting Refugees. Sub Component 1.1 Support to Small Towns and Rural Growth Centres (RGCs) will support activities designed to improve the sustainable provision of water supply and sanitation services in small towns and RGCs in the Recipient's territory. The sub-component targets the districts of Buyende, Kaliro, Namayingo, Mayuge, Jinja, Namutumba and Kamuli in Eastern Uganda; Mityana, Mubende, Kassanda, Kyankwanzi, Nakasongola, Rakai, Lyandonde, Sembabule, and Mukono in Central Uganda; and Kagadi, Kakumiro, Kiruhura, Kazo, Kisoro, Kyegegwa, Kyenjonjo in Western Uganda.

In order to address the water supply and sanitation gap in the above districts, the then 32 solar powered piped water supply systems now revised to 26No. have been proposed. These water supply and sanitation infrastructure will be implemented as part of the strategy to improve access to clean water, improved sanitation and hygiene in the selected RGCs. The main components of the large solar piped water systems will include; a production well as a water source, a raw water pumping main to a reservoir, an elevated storage reservoir on a steel tower, Solar Pumps, Solar Panels, chlorine dosing unit, pump motor, pump house, distribution network, and service connections. The project will also support water sources protection activities in all the project areas. The Directorate of Water Development under the Ministry of Water and Environment as an implementing agency of the Client, intends to apply a portion of the proceeds of this credit for the Consultancy Services for feasibility studies, detailed designs and environmental impact assessments for the Lwentulege Water Supply and Sanitation System with geographic UTM coordinates 36 N 310891East, 69408North location.

MWE specifically the Rural Water and Sanitation Department (RWSD) under the Directorate of Water Development (DWD) therefore has carried out an ESIA of the proposed construction of the piped water supply and sanitation system for Lwentulege Rural Growth Centre in Kagamba Sub-County, Rakai District in accordance with the requirements of the National Environment Management Authority (NEMA) for approval before implementation.

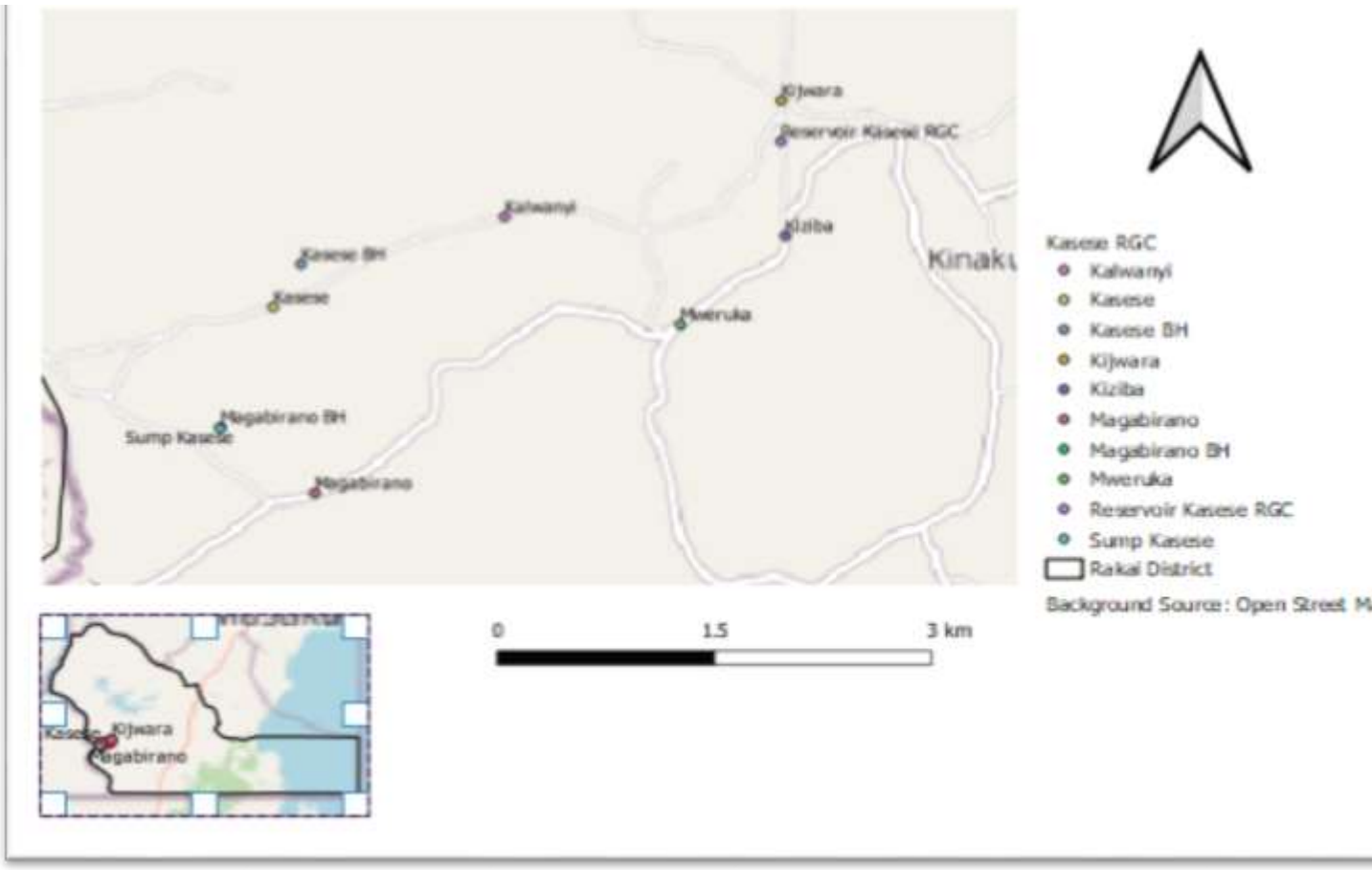

Figure 1: Location of Lwentulege Water Supply Area in Rakai District

1.2 Justification of the Project

The people in Lwentulege RGC and the surrounding areas depend on wells, boreholes, open rivers/ streams and shallow wells as sources of water. This water is unreliable and not safe for drinking. Using the mixed method approach which combined detailed insights and understanding obtained from using qualitative approaches with the ability to generalize to a wider population offered by quantitative data collection, a Social Economic and Health Survey was conducted in the project area. According to the Socio-economic Survey that was carried out in the project area as part of the ESIA study, a total of 409 households were surveyed with the vast majority (99%) of the survey respondents being head of their households. The majority of the respondents were male at 76% and with female at 24%. Qualitative data was gathered to provide supporting details for the quantitative data collection surveys. Qualitative data collection was based on KIIs, FGs, and participatory methodologies including village transect walks.

All the sources are point based in the form of boreholes, rainwater harvesting facilities, ponds, valley dams or natural streams. Collection of water from the sources is by generally with jerry cans. Of the 409 households that use a private pit latrine, 70.6% of the respondents share pit latrines and the remaining 29.4% do not share, that is, have a pit latrine exclusively for their family use. Furthermore, the current water sources are not safe and the quality of the water here is poor for drinking and therefore implementation of the project will relieve women from wasting time at water sources, school going children will be able to go to school and the quality of water will improve hence improving the quality of life among the population.

The increasing population in the proposed project area has resulted in the need to increase on the accessibility and provision of safe and clean water as well as sanitation services for the local communities. In the view of the above, MWE, specifically the RWSD under DWD is implementing a project whose overall objective is to sustainably increase access to safe water supply and improve on sanitation to the communities of Lwentulege RGC in Rakai district thereby contributing to Sustainable Development Goals (SDGs) 6 and 12, the PDO, NDPIII, and Vision 2040.

1.3 Project area

The locations of the RGCs that will constitute the project lie in Kagamba Sub-county in Rakai District. Rakai district is located in south western region of Uganda, west of Lake Victoria about 65.5 km by road to the south west of Masaka Municipality, the largest metropolis in the central sub region and about 192 km to the south west of Kampala, the capital city of Uganda. The district lies west of Lake Victoria between longitudes 31oE, 32oE and at a latitude of 0oS. It is bordered by Lwengo and Lyantonde districts to the North; Kiruhura district to the North-West; Isingiro district to the West and South-West; and Kyotera district to the east and South-East. The district has got its headquarters at Rakai Town where the Town Council offices are located. It is connected through Masaka district with a tarmac road from Kampala. The district is also accessed by an all season earthed based road from the Lyantonde district headquarters. There is electricity power from UMEME and telephone by all service providers save for the rural areas.

Kagamba Sub-county (SC) is one of the nine (9) Sub-counties in Kooki County, Rakai District. It is located North of Rakai district headquarters, 13km along the Lumbugu-Lyantonde road. Its boarders with Lwanda Sub-county in the east, Lwamagwa SC in the west, Ddwaniro SC in the north, and Byakabanda SC in the south. Initially, Kagamba was part of Buyamba in Ddwaniro Sub-county before it became an autonomous local government in early 1980s. The Sub-county is comprised of five (5) parishes and fifty (50) number villages.

With reference to the updated scope of works, Lwentulege RGC is the centre of focus within the Sub-County. All other centres (forming the Cluster) to be considered are within 5 km of the RGC. We note that most of the settlements under consideration in Kagamba Sub-county (currently Lwentulege Town Council are linear settlements of permanent structures. The water source to be developed is based on the drilled Production well (Borehole), the pump station for the borehole i.e. Lwentulege borehole estimated to yield $36m^3/h$.

1.4 ESIA Requirements

The proposed construction of a water piped system in Lwentulege RGC falls under Schedule 5 of the National Environment Act No.5 of 2019, which requires mandatory ESIAs specifically under Utilization of water resources and water supply (No. 4) and abstraction or utilization of ground water (b) and support facilities (k) (i.e. ground water resources including water abstraction). The proposed intervention is in the category of projects requiring mandatory ESIA before implementation. It is in this regard that in accordance with the National Environment Act (NEA), the Scoping/Terms of Reference (ToR) were prepared and submitted to NEMA for consideration, which paved way for undertaking a full ESIA for the project. A copy of the letter approving the scoping report and TOR is attached in Annex 1. In preparing this report, particular attention was paid to the issues specified in the EIA Regulations of 2020. This ESIA presents information required for the protection of the environment and affected communities during the design, construction and operation stages of the proposed project. This will enable NEMA and other lead agencies take a decision on whether to approve the progress of the project in light of the identified E&S impacts or not. Specific attention was also paid to the Environmental Impact Assessment Guidelines and the specific EIA guidelines for water sector for Uganda.

In compliance with World-Bank Operational Safeguards Operational Policies (OPs), The ESMF was prepared to provide guidance to the implementing agency (MWE) on the E&S screening and subsequent assessment of subprojects required during implementation such as the preparation of this ESIA, including the relevant subproject specific ESMP that must be developed in compliance with Bank safeguards policies. The RPF was prepared because the exact subproject sites were unknown at the time and provided a guiding framework to help MWE in identifying and managing potential project impacts and risks on project affected persons/communities associated with loss of land/livelihoods (physical or economic displacement/resettlement), property, cultural resources and/or restrictions on land use (RAP preparation) during project implementation. Overall, the project is likely to trigger five (5) World Bank OPs which included Environmental Assessment (OP/BP/GP 4.01), Natural Habitat (OP 4.04), Physical Cultural Resources (OP 4.11), Involuntary Resettlement (OP/BP 4.12), and Forests (OP 4.36). Safety of Dam (OP 4.37) and International Water Ways (OP 7.50) will not be triggered by the project. In addition, safeguards implementation should comply with the requirements of investment project financing (IPF) and the World Bank Group Environmental, Health, and Safety (EHS) Guidelines for general Construction and Decommissioning as well as the EHS guideline for Water and Sanitation.

1.5 Objectives of the ESIA

This ESIA report has been prepared following Uganda's and the World Bank's Environmental and Social requirements, sets out to identify potential environmental and social impacts of the proposed Lwentulege RGC Water Supply and Sanitation Project, with a view of informing the final engineering design and recommending mitigation measures to be implemented during construction and operational phases of the project. The main objective is to carry out an ESIA for the proposed construction of Lwentulege RGC piped water supply system in Lwentulege RGC in Kagamba Sub-County (currently Lwentulege Town Council), Rakai district. Specific objectives include the following:

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

This ESIA focused on the following scope for the proposed project components:

- Pump stations
- Storage reservoir
- Guard house
- Water office
- Sump and Booster station
- Transmission and distribution network

Section 3.2 on project description and design elaborates the details of each of the above mentioned project components assessed under the scope of this ESIA. The proposed the 6 stance waterborne toilet does not require an elaboration of the ESIA in reference to the thresholds provided under Schedule 5 of the National Environment Act No.5 of 2019 for sanitation facilities.

1.6 Details of Developer and Investment Cost

The project is to be implemented by MWE. The investment cost of the project is approximately Uganda Shillings Three Billion, Eight Hundred Fifty-Two Million, Two Hundred Seventy-Eight Thousand, and Three Shillings only inclusive of all taxes **(UGX 3,852,278,003).** The address/contact person of the Developer is presented below:

Permanent Secretary
Ministry of Water and Environment,
Headquarters, Plot 3-7, Kabalega Crescent, Luzira,
P. O. BOX 20026, Kampala, Uganda

1.7 Response to NEMA Approval of ToR comments

SN.	REQUIREMENT	COMMENT
1.	Carry out comprehensive consultations with all the relevant stakeholders including Rakai District Local Government Authorities, Directorate of Water Resources Management, and the local community in the neighbourhood of the proposed project sites. The views of the stakeholders consulted should be well documented/ addressed and lists of persons consulted appended in the EIA report. In addition, ensure that the local government departments including, the environment, water, physical planning and engineering departments consulted and concerns that may arise taken into account and incorporated in the design, construction and operation of the project.	Feedback from stakeholder consultations is presented in Chapter 7 and Annex II
2.	Ensure that the project description is comprehensive for each of the project components, including the designs of the different project components, including the proposed incinerator. In addition, clearly indicate the chemicals that will be used in the water supply system and how these will be stored, handled.	Chapter 3 gives a comprehensive project description.
3.	Undertake geotechnical and hydrogeological investigations of the proposed project sites/water sources so as to inform the design and construction of the Water Supply and Sanitation System.	Chapter 3 gives a comprehensive project description.
4.	Study the land tenure and identify potential project affected persons/properties at the proposed sites. Propose plans for land acquisition and/or compensation where required, including resettlement action plans, where applicable.	RAP has been prepared and an executive summary of the RAP is presented under Annex VIII.
5.	Provide current baseline information of the project sites, accurate GPS coordinates clearly indicating the boundaries of the project sites and the associated components and images/maps of the project sites.	Environment and social baseline is presented under Chapter 5.
6.	Provide site specific baseline information. In particular, assess site baseline noise, soils and air quality taking into account key parameters relevant to the nature of the project. Append to the ESIA report the results of the baseline analyses from an accredited laboratory.	Environment and social baseline is presented under Chapter 5 and water quality analysis results are presented under Annex V.
7.	Carry out an evaluation of all the potential negative impacts associated with the proposed Piped Water Supply and Sanitation System	Presented under Chapter 8.
8.	Provide detailed mitigation and environmental management and	Presented under Chapter 8

	monitoring plans that relate to the identified environmental impacts from the proposed project. In particular, the following issues should be comprehensively assessed and appropriate mitigation actions provided in the ESIA: a. potential waste streams associated with the construction and operational phases of the Piped Water Supply and Sanitation System, and management of such waste, as well as measures for preventing pollution of the environment and degradation of any sensitive ecosystems that may be within the vicinity of the project sites; b. potential emission sources of particulate matter including volatile organic matter and proposed mitigation measures; c. potential noise emission sources, impacts and proposed mitigation measures; d. occupational health and safety issues associated with the construction and operational phases of the Project.	and Chapter 9 presents the ESMP.
	Provide a clear and legible copy of the project site layout plan (preferably on A-3 sized paper) showing the equipment, clear boundaries of the project area in relation to its environs.	Presented under Annex IV.
	Include in the ESIA report comprehensive analysis of alternative /options to selected project location, design and technology among others.	Presented under Chapter 6.
	Append to the ESIA report authentic copies of land ownership and acquisition documents.	Presented under Annex III
	Indicate the project cost of the project and append a copy of the certificate of valuation issued by a qualified and registered valuer in accordance with the provisions of Schedule 5, 3(f) of the National Environment (Environmental and Social Assessment) Regulations, 2020.	Presented under Annex IX.
	Provide evidence of payments of the 30% ESIA fees as required under regulation 49 (2) of the National Environment (Environmental and Social Assessment) Regulations, 2020.	To be provided upon submission.

1.8 Structure of the report

This ESIA report is concise and limited to the significant environmental and social issues. It focuses on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting the data. The report contains, but not limited to the following major contents:

1) Cover Page (Title of the proposed project, Location, Name, Address and information of the developer)
2) Table of content
3) Declaration by ESIA team and their details
4) List of acronyms
5) Executive Summary
6) Introduction
7) Policy, Legal and Administrative/Institutional Framework.
8) Description of the Proposed Project.

9) Description of methodology and techniques used in the assessment and analyses of project impacts,
10) Baseline conditions of the physical, biological and socio-economic environment of the project area, including results of relevant studies and other geophysical and geotechnical studies.
11) Description/Assessment of the potential Environmental and social impacts of project activities.
12) Analysis of Alternatives.
13) Potential Environmental and Social Impacts and Mitigation Measures.
14) Environmental and Social Management Plan (ESMP) matrices detailing measures for addressing potential negative environmental and social impacts of the project. In addition, the ESMP should clearly identify institutional arrangement, roles, responsibilities, implementation schedules and costs in addressing the mitigation measures proposed in this ESIA, including capacity building requirements; and
15) Propose an E&S Monitoring Plan with clear monitoring indicators and institutional roles to be used in tracking the implementation and compliance of the proposed mitigation measures;
16) List of References.
17) Appendices:
    - Approved Scoping Report/Terms of Reference
    - Land ownership documents
    - Records of Stakeholder meetings
    - Data and Unpublished Reference Documents.
    - Map, drawing and pictorial complement, especially to convey information on the project affected area and proposed project activities
    - Chance Finds Procedure
    - Grievance Redress Mechanism

2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Introduction

Key legislation governing an ESIA study in Uganda includes the National Environmental Act (NO. 5 of 2019) of the laws of Uganda and the Environmental and Social Assessment Regulations, S.I. No. 143 of 2020. The National Environment Act established NEMA and entrusts it with the responsibility to ensure compliance with ESIA process and procedures in planning and execution of development projects. The procedures require that a project proponent prepares an ESIA report with a clear assessment of relevant potential impacts, based on ToRs developed from a scoping exercise. This requires that the ESIA addresses potential direct and indirect socio-environmental impacts during the pre-construction, construction, operation and decommissioning phases and an environmental and social management plan (ESMP) has also to be prepared.

Policies, legal and institutional framework considered relevant to this proposed project are discussed in this section. Various laws here reviewed relate to minimum acceptable construction, operational requirements, environmental quality, land use, public health, occupational safety, labour standards and international legal obligations.

2.2 Policies relevant to the Proposed Project

Table 2 below presents the Policy framework related to the project

Table 2: Policy framework related to the Project

Policy	Goal	Relevancy
National Environment Management Policy, 2014	The overall policy goal is sustainable development which maintains and promotes environmental quality and resource productivity for socio-economic transformation. The Policy provides a system of Environmental Impact Assessment (EIA) and environmental monitoring so that adverse environmental impacts can be foreseen, eliminated or mitigated.	Environment and development are interrelated, and this policy requires that environmental aspects are considered in all development projects such as the construction activities. Therefore, this ESIA study has been conducted to take into consideration any adverse social and environmental impacts of the construction activities of the proposed Lwentulege RGC piped Water Supply System.
The National Water Policy, 1999	To manage and develop 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 of the present and future generations with the full participation of all stakeholders.	Water abstraction permits should be obtained from DWRM before operation phase. Water source protection measures have been proposed under the ESMP and full WSPP will also be prepared as part of the assignment and should be implemented to ensure safe water quality and quantity.
The National Gender	Provides a framework and mandate for all stakeholders to address	This policy would especially apply in the recruitment

Policy, 2007	and implement the gender imbalances within their respective sectors.	process of labour, both during construction and operation phase. Men and women should have equal opportunities for available jobs. This policy also requires provision of a work environment that is safe and conducive to women, as it is for men, considering gender-disaggregated differences and vulnerabilities.
The Occupational Health and Safety (OHS) Policy, 2006	This policy seeks to: Provide and maintain a healthy working environment; Institutionalize OHS in the power-sector policies, programs and plans; and Contribute towards safeguarding the physical environment. The OHS Policy also takes into consideration the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.	This policy will be especially relevant for OHS of construction crews and subsequently, operation and maintenance personnel. The policy will also have relevance in mitigation measures that protect the public from health and safety impacts as a result of project construction and subsequent operation and maintenance activities.
The Environmental Health Policy, 2005	The policy provides a framework for the development of services and programs at National and Local Government levels that establish the environmental Health priorities.	Analysis of water quality was done since the water source is an artisan well and at the design stage and during the pump testing where the water quality analysis report was prepared. The results of the analysis have been used and are presented under the Section on Water Quality as part of the baseline information.
The National Land Policy, 2013	The goal of this Policy is: "to ensure an efficient, equitable and optimal utilization and management of Uganda's land resources for poverty reduction, wealth creation and overall socio-economic development". One of its objectives is to ensure sustainable utilization, protection and management of environmental, natural and cultural resources on land for national socio-economic development.	By undertaking an ESIA for the proposed project, the developer is ensuring planned and environmentally friendly infrastructure development. Enhancement and mitigation measures should be implemented by the developer and the contractor(s) to ensure that all land use practices conform to land use plans and the principles of sound environmental management such as biodiversity preservation, soil and water protection, conservation and sustainable land management.
The National Health Policy, 2010	To reduce mortality, morbidity and fertility, and the disparities therein.	Contribute to the reduction of water borne diseases thereby improving on the health of communities, especially the girl child and mothers who are mainly involved in collection of water.
Uganda National Climate Change	The overarching objective of the policy is to ensure that all stakeholders address climate change impacts and their causes	ESIA promotes the wise use of water resources to minimize harmful effects to the environment and water

Policy, 2015	through appropriate measures, while promoting sustainable development and a green economy including integration of climate change issues into planning, decision making and investments in all sectors.	resource monitoring. It promotes and strengthen the conservation and protection against degradation of watersheds, water catchment areas, river banks and water sources in order to increase their resilience to climate change impacts.
The National Policy on HIV/AIDS and the World of Work, 2007.	To ensure HIV/AIDS is addressed in the workplace, the policy encourages employee awareness and education on HIV/AIDS. To protect the infected and affected persons from discrimination, employers are required to keep personal medical records confidential. Employees living with, or affected by, HIV and AIDS, and those who have any related concerns, are encouraged to contact any confidant within the organization to discuss their concerns and obtain information.	This policy is relevant to the project if implementation of proposed construction activities leads to influx into the project area by people seeking construction jobs and indulging in prostitution or irresponsible sexual fraternization associated with HIV/AIDS risk. The provisions of this policy are expected to be fulfilled by the construction contractors or their subcontractors, especially in regard to having an in-house HIV Policy, worker sensitization and provision of free condoms.
National Orphans and other vulnerable children's Policy, 2004	The goal of the Policy is full development and realization of rights of orphans and other vulnerable children. The policy provides support to vulnerable children and families such that their capacity to sustain themselves is strengthened; and provides residential care for orphans and other vulnerable children as a last resort	The project Developer (MWE/DWD) and the contractor(s) including their sub-contractor(s) will ensure that the project activities do not compromise or in any way affect the lives and livelihood of all the vulnerable groups like the orphans and children in general during the project implementation.
National Equal Opportunities Policy, 2006	The National Equal Opportunities Policy provides a framework for re-dressing imbalances, which exist against marginalized groups while promoting equality and fairness for all. With a goal of: providing avenues where individuals and groups' potentials are put to maximum use by availing equal opportunities and affirmative action.	The Water supply projects come along with a lot of opportunities including service delivery, trainings and employment. The project will avail equal opportunities and affirmative action such as employing both men and women including marginalised groups like disabled people who are local residents during construction and operation phases, sourcing of construction materials locally etc.
The National Child Labour Policy, 2006	The policy provides an enabling environment for the prevention, protection and elimination of child labour. It is intended to establish guiding principles in Uganda's effort to eliminate child labour and priorities for government and stakeholder action. This policy is based on recognition that all human beings, adults and children, have rights. Children by virtue of their age and needs	The project management including all the contractors will ensure that all employees are above 18years and not school going students or pupils.

	are entitled to specific rights, including education, health, survival development, protection and participation	
The National Policy for Older Persons, 2009	The policy seeks to achieve equal treatment, social inclusion and empowerment of older persons. The values of the policy are: i. Equity; Fairness, fair play, impartiality and justice in the distribution of benefits and responsibilities in society. ii. Respect; Views, opinions and rights of older persons will be upheld while they are also expected to exhibit high sense of self- respect. Commitment; The willingness to work hard and give all the energy and time to meet the vision. iii. Accountability; All stakeholders are expected to fulfill their obligations towards one another iv. Equality; All older persons will be accorded same opportunity and rights as other individuals.	Persons above 65 years old are categorized as old. These should be incorporated in the compensation process where necessary and will be treated with Equity and respect; all their views will be considered regarding the execution of the project.
The National Policy for the Conservation and Management of Wetland Resources, 1995.	The goal of this Policy is to curtail the rampant loss of wetland resources and ensure that benefits from wetlands are sustainable and equitably distributed. Wetlands acting as sources of wastewater treatment should be fully protected. This policy outlines guidelines for wetland resource developers.	The proposed project is aimed at Conservation and Management of Wetland Resources within the catchment area. The designs will adhere to the principles of sustainability such that areas within wetlands are left intact, as much as possible.
The National Policy on the Elimination of Gender Based Violence in Uganda, 2019	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 common forms of Sexual Gender Based Violence (SGBV) include; sexual advances, assault, rape, fraud and verbal abuses.	The Contractor should have a sexual harassment policy that is communicated to all workers as well as continuous sensitization on GBV, risk and prevention mechanism.
Uganda Vision 2040	Water Development is stated as one of the opportunities that can foster the socio-economic transformation of Uganda from a peasant to a modern and prosperous country.	The project will increase access to safe potable water thus contribute to improved health, sanitation and hygiene.
National Development Plan III	The plan focuses on increasing access to safe water, sanitation and hygiene levels, functionality of water supply systems and	The project focuses on providing access to safe and clean water, increasing the functionality of the water

	promoting catchment based integrated water resources management during the planning process in order to achieve the middle income status by 2025.	supply systems within the Rural Growth Centre and the Sub-County.
Sustainable Development Goals (SDG)	The 2030 agenda for Sustainable Development envisions a world where we reaffirm commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene.	The project will specifically support SDG 6 on ensuring clean water and sanitation is attained. This focuses on ensuring availability and sustainable management of water and sanitation for all.

2.3 Laws relevant to the Proposed Project

Table 3 below presents the Legal framework related to the project

Table 3: Legal framework related to the project

Legal Framework	Relevancy	Requirement
The Constitution of the Republic of Uganda; 1995; amended as at 15th February 2006, Government of Uganda.	The State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations. The Constitution is the cardinal law in Uganda upon which all environmental laws and regulations are founded. The constitution provides some relevant social dimensions such as advancement of women (Article 33: rights of women); protection of children (Article 34 on the rights of children); persons with disabilities (Article 35: protection of People with Disabilities - PWDs); and access to information (Article 41: right of access to information).	All environmental impact actions of the project are therefore meant to conform to the broader objectives of the Constitution which requires a healthy environment for all citizens. ESIA report has been prepared for NEMA's consideration before implementation of the project. Therefore, this Project will be implemented in a manner that will incorporate the appropriate safeguards for environmental and social issues, especially land take. Any land required for the implementation of the construction activities will be obtained within the confines of the law, after a Resettlement Action Plan (RAP) has been conducted where possible.
The National Environment Act No. 5 of 2019	This act provides for various strategies and tools for environment management, which also includes the ESIA for projects likely to have significant environmental impacts. The Third Schedule of the National Environment Act, No. 5 of 2019 lists projects to be considered for environmental impact assessment. Under that categorization, most water resources related projects fall under two ground and surface water resources.	The Act governs and guides environmental management in Uganda. This ESIA is prepared to conform to the Act's requirement that projects likely to have significant environmental impact undertake an ESIA before they are implemented. ESIA report has been prepared for NEMA's consideration before implementation of the project.
The Water Act, Cap	Management of water resources Regulation and issuing of water	Water abstraction permits should be obtained from

152 and The Water Resources Regulations, 1998	use, abstraction and wastewater discharge permits; Prevention of water pollution. Managing and monitoring and regulation of water resources	DWRM before operation phase. Water analysis was done since the water source is an artisan well and during the design stage and pump testing where a water quality analysis report was prepared. Water analysis was done under ESIA and results captured in section 5.8 (see Annex V) compared to those obtained at design stage and national standards for portable water. The quality of treated water will be regularly monitored to ensure it meets portable water standards.and these results have been used during this ESIA and results compared to those of national standards for portable water.
The Land Act, Cap 227	Section 74 (i) states that where it is necessary to execute public works on any land, an authorized undertaker shall enter into mutual agreement with occupier or owner of the land in accordance with Act.	These land tenure systems will be important during resettlement planning. The extent of works designed to ensure the construction of the Lwentulege RGC WSS will necessitate land take in the Project Area. Any land required for the implementation of this Project will be acquired in accordance with the provisions of this Act and Bank Safeguards Policies.
The Land Acquisition Act (1965)	This law elaborates on land acquisition procedures for early entry into the delineated land as compensation matters are finalized with the objective of timely Project delivery. Reference to this Act has been made while proposing strategies for addressing unreasonable speculative persons who may jeopardize Project delivery by demanding exorbitant compensation.	MWE will issue Notices of Entry at the start of RAP disclosures.
The Occupational Safety and Health Act, 2006	Provision of Occupation Health and Safety of workers and Inspection of places of works. This Act requires that employers provide and maintain safe working conditions and take measures to protect workers and the public from risks and dangers of their works, at his or her own cost (Section 13). Employers with more than 20 workers should prepare and often revise a written policy with respect to safety and health of workers (Section 14). The contractor therefore is obliged to provide employers with washing facilities, First Aid, facilities for meals and safe access to workplaces	An ESMP has been prepared and the Contractor will ensure the workplace is registered under the Ministry of Gender, Labour and Social Development (MoGLSD) under the Department of OHS. The construction activities will require workers during the construction, and operation and maintenance phases. Therefore, the Act requires that MWE and all contractors must ensure that workers have a safe working environment at all times and that their health is not at risk whilst at work.

The Workers' Compensation Act, 2000	This requires compensation to be paid to a worker injured or acquired an occupational disease or has been harmed in any way in the course of his/her work.	This Project will require workers during construction, operation and maintenance phases. Any injury or illness resulting from Project related activities will be subject to conditions of the Workers' Compensation Act. Rakai District Labour officers will also be involved in ensuring compliance of the Contractor's' with labour laws. The developer shall ensure that all contractors and sub-contractors provide personal protective equipment (PPE) to employees to minimize accidents and injuries and ensure workers safety onsite.
The Physical Planning Act, 2010 The Physical Planning (Amendment) Act 2020	Section 37 requires an EIA permit for developments before they are implemented. It states: "Where a development application related to matters that require an environmental impact assessment, the approving authority may grant preliminary approval subject to the applicant obtaining an EIA certificate in accordance with the National Environment Act". 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.	MWE shall use established guidelines to acquire land and compensate where possible for acquired lands, as well as safeguarding the natural environment, in line with the provisions of this Act. Where necessary RAP will be prepared for the Water transmission lines in fulfilment of the above provisions before construction activities are implemented.
The Public Health Act, Cap 281	The Public Health Act aims at avoiding pollution of environmental resources that support health and livelihoods of communities. It gives local authorities powers (Section 103) to prevent pollution of watercourses.	The disposal of waste from the proposed project will have to be appropriately managed so as to prevent risk to public health, in line with the provisions of this Act.
The Local Governments Act, Cap	Provides for the system of local governments based on the decentralization of district for the enforcement of environmental	The developer will work closely with the District Water Officer (DWO), District Natural Resources Officer (DNRO)

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Investment Code Act, Cap 92	Section 18(2) (d) of the Act requires an investor to take necessary steps to ensure that development and operation of an investment project do not cause adverse ecological and socio-economic impacts.	MWE is the implementing agency for the project that received funding from the World Bank. This ESIA is in partial fulfilment of the requirements of this Act, since adverse ecological and socio-economic impacts as a result of the project implementation have been identified and mitigation measures developed.
Employment Act, 2006	This Act is the principal legislation that seeks to harmonize relationships between employees and employers, protect worker's interests and welfare and safeguard their occupational health and safety through: i) Prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV). ii) Providing for labour inspection by the relevant ministry (Part III). iii) Stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI). iv) Continuity of employment (continuous service, seasonal employment, etc. (Part VIII). This Act is relevant to both construction & operation phases.	The Act will govern labour arrangements and conditions under which persons hired by the project work. It prohibits Child labour (a condition the contractor must comply with) as well as providing guidance on work rights during the post-construction phase.
The Mining Act, Cap. 148	Stone quarry sites and gravel borrow pits will be necessary for materials needed to construct the concrete works of the project components. Therefore, applicable licenses shall be obtained from the Commissioner of the Geological Survey and Mines. The Mining Act of 2003 regulates mining developments including set up of new quarries and/or sandpits. Relevant environmental studies required for this license application are described in Part XI.	This Act will apply to the project's contractor(s) who will be required to obtain license for extraction of stone/ aggregate and murram materials required for construction. The extraction of stone/aggregate and murram materials will be undertaken in line with the provisions of this Act. Issues of restoration of the sites after extraction of murram will be of key importance after construction of the proposed project.
The Children's Act, Cap 59	This is an Act to reform and consolidate the law relating to children; to provide for the care, protection and maintenance of children; to make provision for children charged with offences and for other connected purposes. Part II of the second schedule of this Act defines a child as a	This Project will require workers during construction, operation and maintenance phases. No child should be employed under project work force requirement however, any employment or engagement of children will be done in line with the restrictions of this Act and the Employment Act to ensure that risks to children are

	person below the age of eighteen (18) years. In the same schedule under Section 8 of this Act provides that no child shall be employed or engaged in any activity that may be harmful to his or her health, education or mental, physical or moral development.	either eliminated, or reduced to as low as reasonably practicable. In addition, the contractor will confirm age of potential labourers prior to hiring through National Identity card, birth certificate or confirming with LC and community elders. Rakai District Probation Officers will provide guidance to Contractors and their employees' areas of compliance.
The Equal Opportunities Commission Act, 2007	An Act to make provision in relation to the Equal Opportunities Commission pursuant to articles 32 (3) and 32 (4) and other relevant provisions of the Constitution; to provide for the composition and functions of the Commission; to give effect to the State's constitutional mandate to eliminate discrimination and inequalities against any individual or group of persons on the ground of sex, age, race, colour, ethnic origin, tribe, birth, creed or religion, health status, social or economic standing, political opinion or disability, and take affirmative action in favour of groups marginalised on the basis of gender, age, disability or any other reason created by history, tradition or custom for the purpose of redressing imbalances which exist against them; and to provide for other related matters.	MWE, the contractor and the operator will work hand in hand with ensure that that there is no discrimination and inequalities against any individual or group of persons on the ground of sex, age, race, colour etc. Local recruitment of workers among others will be prioritised for men, youth and women. A complaints mechanism will be put in place to ensure there is redress of registered grievances.
The National Council for Disability Act, 2003	The Act provides for the establishment of a National Council for Disability, its composition, functions and administration for the promotion of the rights of persons with disabilities set out in international conventions and legal instruments, the Constitution and other laws, and for other connected matters. Part IV provides for the establishment of lower councils for disability.	MWE, the contractor and the operator will work hand in hand with the already formulated District and Sub County Council for Disability in ensuring that the needs of the persons with disabilities are observed.
The Historical Monuments Act, 1967	Sub-section 12(1) requires that any portable object discovered in the course of an excavation shall be surrendered to the Minister who shall deposit it in the Museum. The Act adds that, notwithstanding provisions of the subsection, where any object is discovered in a protected site, place, or monument, the owner of the protected site, place, or monument shall be entitled to reasonable compensation.	This Act requires that any chance finds encountered during project construction shall be preserved by the Department of Museums and Monuments in the Ministry of Tourism, Wildlife and Heritage. Any chance find objects, material or infrastructure that may be identified as falling under the category of 'archaeological pale-ontological ethnographical and

		traditional interests' during the Project implementation will therefore, be reported to the Department of Museums and Monuments for advice and where necessary undergo a forensic assessment
The National Environment (Environmental and Social Assessment) Regulations, 2020	According to sections 15 of the Regulations, the developer of any project that has or is likely to have a significant impact on the environment is required to undertake an ESIA process after approval of the ToRs.	ESIA report has been prepared for NEMA's consideration after the approval of the Terms of References before implementation of the proposed project.
The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000	In Regulation 17 (1), every landowner, occupier or user who is adjacent or contiguous with a wetland shall have a duty to prevent the degradation or destruction of the wetland and shall maintain the ecological and other functions of the wetland. The tool used under these Regulations to ensure compliance is the permit.	Prior to any works at the discharge of effluent back into the environment or any wetland, MWE will seek permission from NEMA, as provided for in these Regulations. Water source protection measures and an independent WSPP have been prepared to protect any wetland resources within the catchment area from being polluted.
The National Environment (Waste Management) Regulations, 2020	Regulation 5 (1) stipulates that a person who generates waste, a waste handler or product steward has a duty of care and shall take measures to ensure that waste is managed in a manner that does not cause harm to human health or the environment among other provisions.	These regulations apply to both construction and operation-phase waste which should be managed in a way such as to avoid environmental and public health impact. Therefore, all the generated various types and volume of waste should be managed and conform to these regulations.
The National Environment (Noise Standards and Control) Regulations, 2000.	Part III Section 8 (1) requires facility operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible noise levels. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for eight hours in a day should be provided with requisite hearing protection.	All construction activities should be carried out between 7am – 6pm by the Contractor as working hours. No construction activities to be carried out at Night. Noise levels should also be monitored and not to exceed 85dB as per Regulation.
The Water Resources Regulations, 1998	With regard to water abstraction, Part II: Section 3 Sub-section (1) of these regulations requires application for Water Permits by anyone who: (a) Occupies or intends to occupy any land; (b) Wishes to construct, own, occupy or control any works on or adjacent to the land referred to in regulation 10; may apply to the Director for a water permit.	Water abstraction permit will be obtained by the developer from the Directorate of Water Resources Management (DWRM) before operation phase.

<table>
<tr><td>The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020</td><td>Section 5 details that a person shall not discharge effluent into water or land except in accordance with the Act, the Water Act, the National Environment (Waste Management) Regulations, 2020, the Petroleum (Waste Management) Regulations, 2019, the Water (Waste Discharge) Regulations, these Regulations and environmental standards. For this project, this standard is applicable to liquid waste/ sewage treatment plant and public toilets.</td><td>Effluent/liquid waste (such as human waste, food scraps, oils, soaps and chemicals) should not be discharged into any wetland or in the River water resources and should be managed in a manner that does not cause harm to human health or the environment.</td></tr>
<tr><td>Draft National Air Quality Standards, 2006</td><td>The draft national air quality standards provide Uganda's regulatory air quality standards.<table><tr><th>Pollutant</th><th>Averaging time for ambient air</th><th>Standard for ambient air</th></tr><tr><td>Carbon dioxide (CO_2)</td><td>8 hour</td><td>9.0 ppm</td></tr><tr><td>Carbon monoxide (CO)</td><td>8 hour</td><td>9.0 ppm</td></tr><tr><td>Hydrocarbons</td><td>24 hour</td><td>5 mg m^{-3}</td></tr><tr><td>Nitrogen oxides (NO_x)</td><td>24 hour
1 year arithmetic mean</td><td>0.10 ppm</td></tr><tr><td>Smoke</td><td>Not to exceed 5 minutes in any one hour</td><td>Ringlemann scale No.2 or 40% observed at 6m or more</td></tr><tr><td>Soot</td><td>24 hour</td><td>500 µg Nm^{-3}</td></tr><tr><td>Sulphur dioxide (SO_2)</td><td>24 hour</td><td>0.15 ppm</td></tr><tr><td>Sulphur trioxide (SO_3)</td><td>24 hour</td><td>200 µg Nm^{-3}</td></tr></table>Note: ppm = parts per million; 'N' in µg/Nm-3 connotes normal atmospheric conditions of pressure and temperature (25oC and 1 atmosphere).</td><td>These standards will apply particularly during construction of the pump station and reservoirs.</td></tr>
<tr><td>The National Environment (Audit) Regulations, 2020</td><td>Part III on Environmental Compliance Audit, Section 12, Sub-section (1) requires the developer of a project or activity listed in Schedule 3 to these Regulations to carry out an environmental compliance audit.</td><td>The project will involve construction and operation of water supply and sanitation facilities that have a potential to impact negatively of the environment. Therefore, MWE should conduct Environmental Audits to assess if there are impacts, to what extent and mitigate them.</td></tr>
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2.4 World Bank Safeguard Policies and Requirements

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

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

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment during the development process. These policies provide guidelines for bank and borrower staff in the identification, preparation, and implementation of programs and projects. Safeguard policies provide a platform for the participation of stakeholders (World Bank, 2006). The triggered safeguard policies are presented in the Table 4 below:

Table 4: World Bank Operational Policies to be triggered by the project

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

	All project adverse impacts are expected to be mitigated with known technology, good practices and management solutions, resulting in residual impact of minor significance. With respect to AC, the environmental management plan will include management measures for the removal, packaging, transportation and disposal of existing asbestos waste. Works and equipment will be designed based on technical studies to ensure safe yield from groundwater and surface water resources. The water and sanitation facilities are relatively small. The Project is classified as Category B because it will not generate any potential large scale, significant and/or irreversible impacts, it is not located in environmentally sensitive areas, and impacts can be mitigated with relatively standard mitigation measures. Safeguards instruments: Compliance will be ensured through diligent application of Environmental and Social Management Framework (ESMF) and site specific Environmental and Social Impact Assessments (ESIAs)/Environmental and Social Management Plans (ESMPs) during implementation. The Project will follow the WB- EHS Guidelines for Water and Sanitation.
√	Natural Habitats (OP/BP 4.04) While no significant negative impacts on natural habitats are anticipated by project works, the policy is triggered because most of the sanitation facilities may discharge their effluent into wetlands. In addition, the project will also involve catchment management and some of the investments may involve afforestation, reforestation and improvement of watersheds. Depending on the subprojects and potential negative impacts to the natural habitats (forests, wetlands, lakeshores, and riverbanks), these subprojects will include/encompass natural habitats assessment and mitigation under the given sub-project ESIA/ESMP to protect or preserve any flora & fauna species identified at risk of being affected. If a subproject can cause irreversible damages, it will be excluded.
√	Forests (OP/BP 4.36) OP 4.36 is triggered due to potential project impacts on health and quality of forests, especially in the catchment areas where the project will support afforestation, reforestation and improvement of watersheds. Compliance will be ensured through the site specific ESIAs/ESMPs that shall ensure inclusion of forests assessment and mitigation.
X	Pest Management (OP 4.09) The project will not involve or support the purchase, manufacture or use of pesticides. The Project will not lead to increased/changed use of pesticides.
√	Physical Cultural Resources (OP 4.11) The policy is triggered due to the possibility of chance finding of physical cultural resources during construction. Any potential physical cultural resources will be addressed by incorporating reporting and handling procedures as part of site specific ESIA and dealt with in the context of the ESMF. The ESMF has provided a generic Chance Finds Procedure that will guide handling accidental encounter of archaeological resources.
√	Involuntary Resettlement (OP/BP 4.12) The purpose of this policy is to avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior

	to the beginning of project implementation, whichever is higher. The key objectives of this operational policy are to: a. Avoid or minimize involuntary resettlement scenarios, where possible and examine all viable alternative project designs; b. Support affected persons in restoring/improving their former living standards, income generation and production capacities, or at least in restoring them; c. Encourage community involvement in planning and implementing resettlement actions, and provide assistance to affected people regardless of the legality of land tenure. The policy does not only cover physical displacement, but also any loss of land or other assets associated to the proposed actions resulting in: a. relocation or loss of shelter; b. loss of assets or access to assets; and loss of income sources or means of livelihood, whether or not the affected person is to reallocate to a new area. The policy is therefore triggered because of the potential negative social impacts that might result from the need for land acquisition and/or the loss of access to economic assets and livelihoods due to Integrated Water Resources Management (IWRM) and WSS activities. The RAP for the project was prepared as guided by the RFP which was prepared by MWE and disclosed in 2018. A RAP executive summary is annexed. Both instruments will be disclosed by MWE on its website and on that of the World Bank. For sub-projects covered under the RPF, these shall be subjected to social screening and where necessary their RAP shall be prepared and implemented before commencement of implementation of any such activities.
X	Indigenous Peoples (OP 4.10) There are no areas occupied by indigenous people in the project area.
X	Safety of Dams (OP/BP 4.37) OP 4.37 is not triggered as the project will not finance rehabilitation and construction of small dams (i.e. dams smaller than 15m, as per OP 4.37). The Project does not support the construction or rehabilitation of large dams and subprojects do not include structures that will rely on the performance of an existing dam or dam under construction (DUC).
X	Projects in Disputed Areas (OP/BP/GP 7.60) OP 7.60 is not triggered as there are no known disputed areas in the project districts. If any, the project will not support any activities in disputed areas.
X	Projects on International Waterways (OP/BP/GP 7.50) This policy is not triggered since the water source is not an International Waterway.

2.4.1 WORLD BANK POLICY ON DISCLOSURE OF INFORMATION

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

responsibility of the borrower, in this case of the project proponent through the steering committee or the individual institutions that will be implementing a project, in this case the MWE. Disclosure at the Bank's website is the responsibility of the World Bank. Documents that need to be disclosed include:

- Integrated Safeguards Data Sheet;
- All Safeguard mitigation plans: (i). ESIA, and/or ESMPs; and (ii). RAP.

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

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

2.5 World Bank Project Classification

The proposed project is classified as Category B as per WB project classification. The proposed construction and operation of Lwentulege RGC piped water supply facilities will be restricted within the user-communities. The project will not directly affect ecosystems such wetlands, forests, grasslands and other natural resources. World Bank classifies a proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental and social impacts as presented below in Table 5.

Table 5: World Bank Project Classification

Category A	A project is classified as Environmental Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. The project impacts may affect an area broader than the sites or facilities subject to physical works. Environmental assessment for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives including the "without project" situation, and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
Category B	A project is classified as Environmental Category B if it's potential adverse environmental impacts on human populations or environmentally important areas, including wetlands, forests, grasslands, and other natural habitats, are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects. Here the project is required to develop an ESMP that outlines potential negative and positive environmental impacts and measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
Category C	A project is classified as Environmental Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment is required for a Category C project.

Category FI	A project is classified as Environmental Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

2.6 Environmental Health and Safety Guidelines Specific to Water Supply and Sanitation Projects

The World Bank Group (WBG) Environmental Health and Safety (EHS) General Guidelines are recommended to be used by the project. This section provides an overview on how the general approach to be taken with regards to the management of EHS issues at the sub-project or project level. The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They shall be referred to and used to guide EHS issues in specific industry sectors, and they should be used together with the safeguard policies. These shall govern both workers' (occupational) safety and public safety. However, the application of the EHS Guidelines to existing facilities that will be rehabilitated/expanded may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines shall be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific factors are taken into account. Effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations into corporate- and facility-level business processes through the following steps:

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

The following were considered when assessing the potential risks related to health, safety and security: Infrastructure and Equipment Safety; Hazardous Materials Safety; Environmental and Natural Resource Issues (such as floods/ landslides etc.); Community safety and exposure to project related risks; Emergency Preparedness and Response. The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. This document should be used together with the relevant Industry Sector Guideline(s). The General EHS Guidelines (2007) relevant to this Project are summarized in Table 6:

Table 6: World Bank General EHS Guidelines relevant to this Project

Aspect	Relevancy to the proposed project
Environmental	
Air Emissions and Ambient Air Quality This guideline applies to facilities or projects that generate emissions to air at any stage of the	This guideline is relevant because fugitive emissions are expected during the construction phase of this Project.

project life-cycle. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts.	These guidelines will be referenced for acceptable air quality levels during Project implementation, particularly for fugitive sources.
Wastewater and Ambient Water Quality This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or storm water to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.	This Project is primarily about water abstraction, treatment, supply and management. As the guidelines state, any wastewater discharge, even of uncontaminated will be managed properly before discharge. These guidelines will be referenced for principles of HSE regarding wastewater management, to improve efficiency and sustainability of the Project.
Waste Management These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors. Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste); and residual waste from industrial operations, such as boiler slag, clinker, and fly ash. Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.	This Project will produce waste during the construction period. The operation and maintenance phase also have an insignificant element of waste management since the operation will only involve the water abstraction, treatment and supply. These guidelines will be referenced for principles of HSE regarding waste management during the life of this Project.
Noise This guideline addresses impacts of noise beyond the property boundary of the facilities. Noise prevention and mitigation measures should be applied where predicted or measured noise	The pump station is far away from residential areas and houses and it is not close to schools and health care institutions which are considered to be very sensitive receptors. Noise emissions shall be monitored against the WB's

impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception	guidelines during construction, operation and maintenance:
Contaminated Land This guideline provides a summary of management approaches for land contamination due to anthropogenic releases of hazardous materials, wastes, or oil, including naturally occurring substances. Releases of these materials may be the result of historic or current site activities, including, but not limited to, accidents during their handling and storage, or due to their poor management or disposal. Contaminated lands may involve surficial soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and adjacent sites. When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts	The Contractor(s) will ensure that hazardous materials, wastes, or oil will not be discharged or released onto soils and land. All servicing and maintenance of construction vehicles such as trucks and equipment shall not be done on site.
Occupational Health and Safety	
Communication and Training This includes guidelines for OHS Training, Visitor Orientation, New task employee and contractor training, Area signage, labelling of equipment, communicate hazard codes, among others. Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees.	Supervising Consultants and Contractors for the Project will have to ensure that OHS requirements for the Project are met in line with these guidelines
Physical Hazards Physical hazards represent potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries, from minor and medical aid only, to disabling, catastrophic, and/or fatal. Multiple exposures over prolonged periods can result in disabling injuries of comparable significance and consequence.	During the construction of the Lwentulege RGC WSS such as dredging, equipment and machinery which generate noise and vibrations will be used. These operations will be guided by these guidelines.

Sources of potential for such injury include rotating and moving equipment, noise, vibration, eye hazards, industrial vehicle driving and site traffic, ergonomics, repetitive motion, manual handling, among others.	
Personal Protective Equipment (PPE) Personal Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems. PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of personal protection.	Supervising Consultants and Contractors for the Project will have to ensure that PPE requirements for the Project are met in line with these guidelines. PPE will be provided (as required) for eye and face protection, head protection, hearing protection, foot protection, hand protection, respiratory protection, body/leg protection
Monitoring Occupational health and safety monitoring programs should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies	Stringent monitoring of HSE aspects will be crucial for the successful implementation of the Project, to have risks reduced to levels that are as low as reasonably practicable.
Community Health and Safety	
Water Quality and Availability Groundwater and surface water represent essential sources of drinking and irrigation water in developing countries, particularly in rural areas where piped water supply may be limited or unavailable and where available resources are collected by the consumer with little or no treatment. Project activities involving wastewater discharges, water extraction, diversion or impoundment should prevent adverse impacts to the quality and availability of groundwater and surface water resources. Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand	In the project area, there's no potential for the Project to impact on water quality and availability. There are no other water pipes crossing or traversing near the proposed project area which could cause disruption during Project implementation to guarantee measures in line with these guidelines to be put in place.
Structural Safety of Project Infrastructure Hazards posed to the public while accessing	This guideline will be referenced in line with the integrity of the structures and any hoarding installed. PPE will be provided to persons accessing the project facilities. For all public roads and access roads used

project facilities may include: Physical trauma associated with failure of building structures; Burns and smoke inhalation from fires; Injuries suffered as a consequence of falls or contact with heavy equipment; Respiratory distress from dust, fumes, or noxious odors; Exposure to hazardous materials; Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily.	by the construction activities, dust suppression using water will be carried out by the Contractor(s). All visitors will be inducted in EHS requirements before accessing any construction site/area. Safety signs and safe systems of work will be developed for each workstation.
Traffic Safety Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents. Road safety initiatives proportional to the scope and nature of project activities.	Accessibility to the Lwentulege RGC WSS is along the Rakai community roads and work at the proposed site will disrupt traffic. Delivery of materials and movement of equipment for the Project will also impact traffic. This guideline will be referenced in line with traffic safety during Project implementation
Disease Prevention Communicable diseases pose a significant public health threat worldwide. Health hazards typically associated with large development projects are those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections. Communicable diseases of most concern during the construction phase due to labor mobility are sexually transmitted diseases (STDs), such as HIV/AIDS. Recognizing that no single measure is likely to be effective in the long term, successful initiatives typically involve a combination of behavioral and environmental modifications. Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease.	The risk of spread of communicable and vector-borne diseases exists, particularly due to potential influx of Project workers and water impoundment in some cases, as required during construction. This guideline will be referenced in line with disease prevention in the Project communities.
Emergency Preparedness and Response All projects should have an Emergency	On any construction site, there is a potential that risks will occur. It is important to have measures in place to readily contain and respond to any risks when they

Preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements: Administration (policy, purpose, distribution, definitions, etc.); Organization of emergency areas (command centers, medical stations, etc.); Roles and responsibilities; Communication systems; Emergency response procedures; Emergency resources; Training and updating; Checklists (role and action list and equipment checklist); Business Continuity and Contingency.	occur. This guideline will be referenced in line with emergency preparedness and response.
Construction and Decommissioning	
Environment Guidelines on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities include: Noise and vibration, soil erosion, sediment mobilization and d transport, air quality, solid waste, hazardous materials, wastewater discharges, and contaminated land.	These impacts are applicable to this Project, and will be addressed in line with these specific guidelines
Occupational Health and Safety Guidelines are provided on aspects of OHS including over-exertion, slips and falls, work in heights, struck by objects, moving machinery, dust, confined spaces and excavations, and other site hazards.	These impacts are applicable to this Project, and will be addressed in line with these specific guidelines
Community Health and Safety Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards	These impacts are applicable to this Project, and will be addressed in line with these specific guidelines.

2.7 Institutional Framework

Table 7 below presents the institutional framework.

Table 7: Institutional framework related to the project

Institution	Mandate
Ministry of Water and Environment (MWE)	MWE is responsible for policy formulation, setting standards, strategic planning, coordination, quality assurance, provision of technical assistance, and capacity building. The ministry under its Water Development directorate – DWD, is carrying out the ESIA for the proposed Lwentulege RGC Piped Water Supply system. The ministry also monitors and evaluates sector development programmes to keep track of their performance, efficiency and effectiveness in service delivery. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MWE is the lead agency for water Development and construction of the Water Supply System.
National Environmental Management Authority (NEMA)	The National Environmental Act, NO.5 of 2019 establishes NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental conservation activities. NEMA is under the MWE but has a cross-sectoral mandate to oversee the conduct of ESIAs through issuance of guidelines, regulations and registration of practitioners. It reviews and approves environmental impact statements in consultation with any relevant lead agencies. NEMA works with District Environment Officers and local environment committees at local government levels who also undertake inspection, monitoring and enforce compliance on its behalf. NEMA will therefore review and approve the ESIA report and through the District Environment Officer, undertake environmental monitoring during project implementation.
Directorate of Water Resources Management (DWRM)	DWRM is responsible for issuing of water abstraction and wastewater discharge permits. The primary goal of the directorate is to promote sustainable development of Uganda's water sector. The directorate is into design and implementation of water quality assessments, monitoring ground and surface water resources, laboratory and field works and ultimately water pollution control.
Ministry of Lands, Housing and Urban Development (MLHUD)	Through the Chief Government Valuer (CGV) in the Valuation Department, MLHUD is responsible for reviewing and approving the Valuation Report developed as part of the RAP. The valuation report is critical in ensuring timely payment of fair and adequate compensation as well as ensure that the Project Construction and next steps commence in time.
Ministry of Tourism, Wildlife and Antiquities (MTWA)	In-charge of protecting and preserving the sites with remain of cultural or archaeological importance when identified during construction activities for conservation, preservation, restoration and salvage.
National Water and Sewerage Corporation (NWSC)	The National Water and Sewerage Corporation Statute establishes the NWSC with a mandate to operate and provide water and sewerage services in areas entrusted to it on a sound commercial and viable basis. NWSC operates in cities and larger towns as well as decentralization and private sector participation in small towns.
Directorate of Water Development (DWD)	Lead agency responsible for policy guidance, coordination and regulation of all water sector activities including provision of oversight and support services to the local governments and other water supply service providers. DWD has the mandate to promote the provision of clean and safe water to all persons,

	investigate, control, protect and manage water in Uganda for any use in accordance with the provisions of the Water Statue, 1995
Directorate of Environmental Affairs (DEA)	The Wetlands Management Department (WMD) within DEA is mandated to manage wetland resources and its goal is to sustain the biophysical and socio economic values of wetlands in Uganda for present and future generations. Wetlands are under a lot of pressure from conversion for industrial development, agriculture, wastewater treatment facilities. WMD has an inventory of the major wetlands in country in the National Wetlands Information System (NWIS). The inventory provides an overview of wetland resource, their values, threats and possible management options.
Ministry of Gender, Labour & Social Development (MoGLSD)	MoGLSD sets policy direction and monitoring functions related to labour, gender, social inclusion and general social development. Its OHS Department in the ministry is responsible for inspection and mentoring of occupational safety in workplaces and this could be during project construction and operation of the laboratory facilities. The OHS Department in this Ministry is responsible for undertaking inspections of construction sites to ensure safe working conditions.
District Local Administration Structures	The proposed subproject is within the jurisdiction of Rakai District Local Government (RDLG), headed by a Local Council V (LC V) Chairman and Chief Administration Officer (CAO) who are the political and technical heads respectively. Various district offices whose functions would be relevant to the project include offices of Natural Resources/Environment, District Health Inspector, District Planner, Community Development Officer, District Director of Health Services, District Water Officer, District Engineer. Equally important are village-level local council administration (LC I and LC III). Leaders at these levels of local administration are closer to residents and therefore important in effective community mobilization, sensitization and dispute resolution given that the water supply project will serve communities. 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.

3. PROJECT DESCRIPTION

3.1 Location of the Proposed Project

The locations of the RGC that will constitute the project lie in Kagamba Sub-county (currently Lwentulege Town Council) in Rakai District. Rakai district is located in south western region of Uganda, west of Lake Victoria about 65.5 km by road to the south west of Masaka Municipality, the largest metropolis in the central sub region and about 192 km to the south west of Kampala, the capital city of Uganda. The district lies west of Lake Victoria between longitudes 31°E, 32°E and at a latitude of 0°S. It is bordered by Lwengo and Lyantonde districts to the North; Kiruhura district to the North-West; Isingiro district to the West and South-West; and Kyotera district to the east and South-East. The district has got its headquarters at Rakai Town where the Town Council offices are located. It is connected through Masaka district with a tarmac road from Kampala. The district is also accessed by an all season earthed based road from the Lyantonde district headquarters. There is electricity power from UMEME and telephone by all service providers save for the rural areas.

Kagamba Sub-county (SC) is one of the nine Sub-counties in Kooki County, Rakai District. It is located North of Rakai district headquarters, 13km along the Lumbugu-Lyantonde road. Its boarders with Lwanda Sub-county in the east, Lwamagwa SC in the west, Ddwaniro SC in the north, and Byakabanda SC in the south. Initially, Kagamba was part of Buyamba in Ddwaniro Sub-county before it became an autonomous local government in early 1980s. The Sub-county is comprised of five parishes and fifty number villages. With reference to the updated scope of works, Lwentulege RGC is the centre of focus within the Sub-County. All other centres (forming the Cluster) to be considered for water supply are within 5 km of the RGC. We note that most of the settlements under consideration in Kagamba Sub-county are linear settlements of permanent structures. Figure 3 and Figure 4 show the Google earth view of the centres and the points of interest for the project implementation.

Table 8: Project Sites in Relation to Lwentulege

Aspect	Observation	Remarks
District: District HQs to RGC	Within 20.5Km	
Type of settlement	Clustered within 6km of Lwentulege	Mweruka, Kasansula, Kakenke, Kitambuza, Kimuli 1, Kagamba, Bwavumpologoma, Kimindi, Kizira, Butandiga, Kasambya, Kyalimuka, Kirangira, Kyabakazi and Kenjoki

Figure 2: Map of Uganda showing Rakai District.

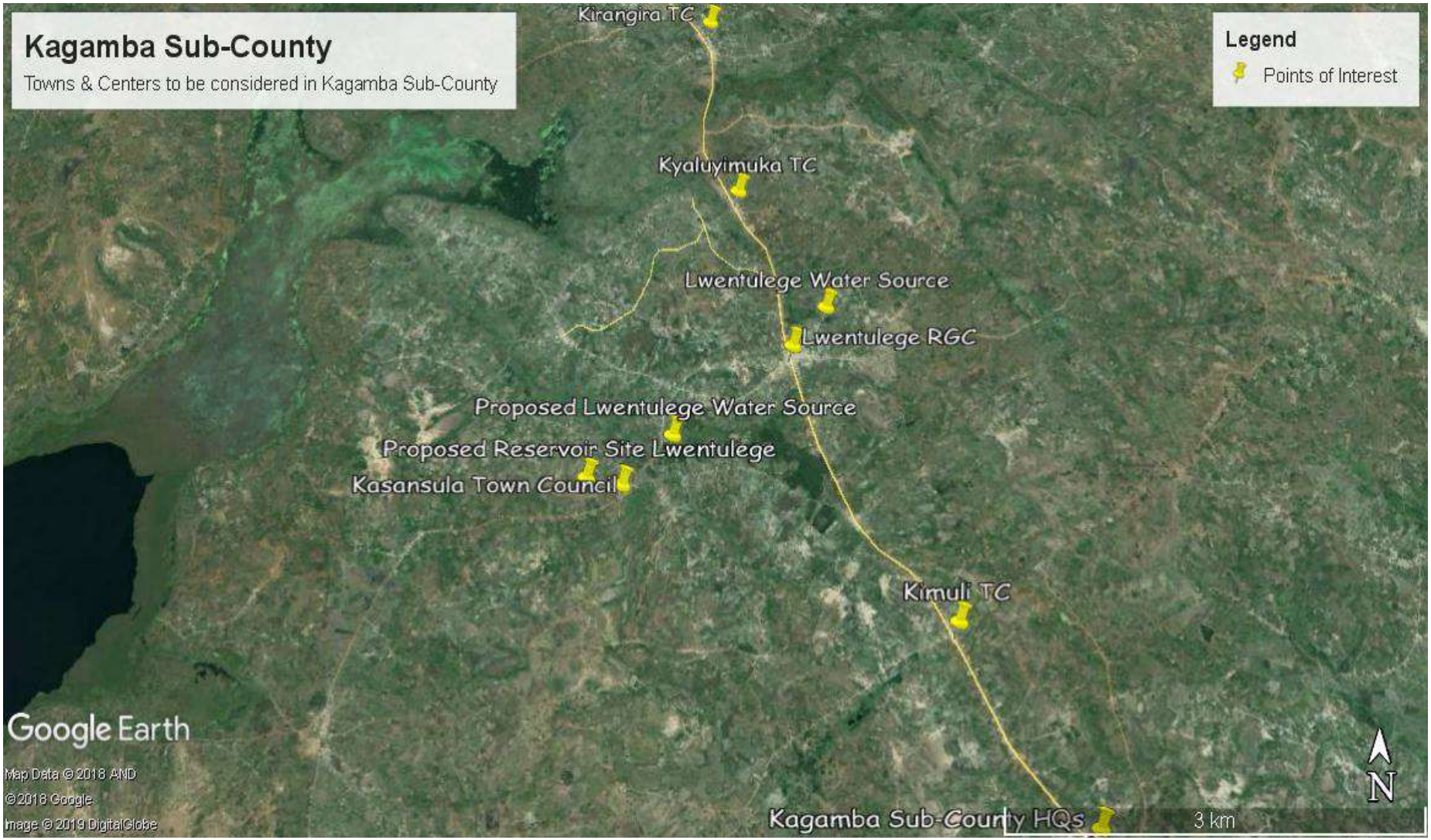


Figure 3: Google Map of Kagamba Sub-County Centres under Consideration

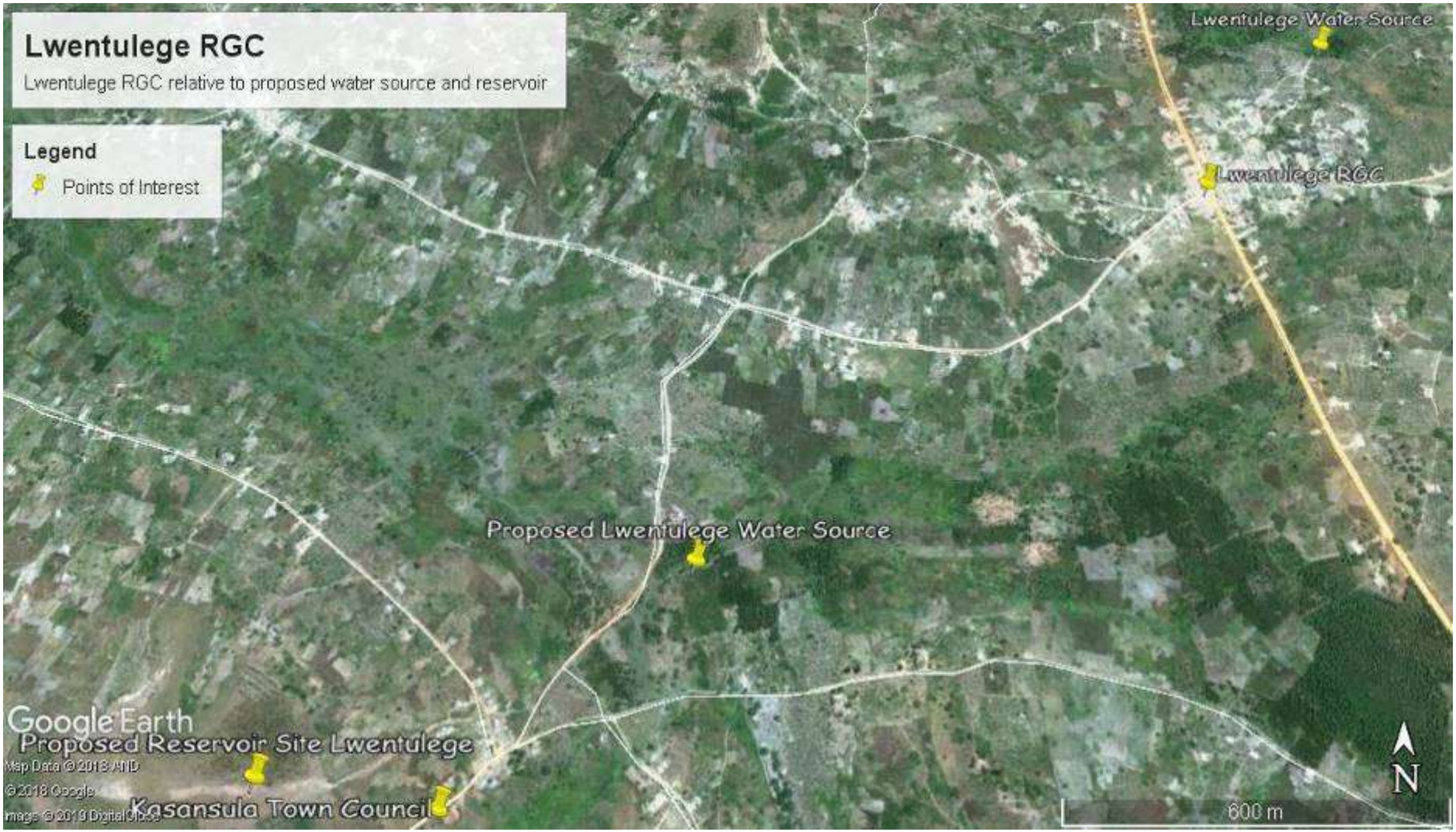


Figure 4: Lwentulege RGC in relation to proposed water source

3.2 Project Description and Design

3.2.1. Design Criteria

This section is concerned with the establishment of design parameters and standards, for water supply and sanitation, to be used in the design of the project interventions. The criteria have been adopted from the Ministry of Water and Environment (MWE) Water Supply Design Manual, 2nd Edition (2013). The summary of the water supply design criteria along with comparison details from the MWE Water Supply Design Manual, 2nd Edition, 2013 and previous studies criteria is also given in Table below:

Table 9: Summary of Water Supply Design Criteria

Design Criteria	Abbreviations and Dimensions	DWD Design Manual (2013)	Adopted Design Criteria
Baseline Data- Population			
Design Period	Years	NA	20
Design Horizon	Year	NA	2044
Population at Design Horizon	P [inh.]	NA	9,560
Maximum Day Demand	m^3/day	NA	378
Hydraulic Criteria			
Max Day Factor		1.1 - 1.3	1.3
Peak Hour Factor		2.0	2.0
Maximum flow velocities in the pipes	m/s	-	0.75 - 2.5
Maximum Head losses in the main pipes	m/km	-	10
Operating Pressures			
Minimum in Distribution Network	m	-	5
Maximum in Distribution Network	m	-	150
Water Losses			
In Distribution System (UfW)	% of Total Average Day Demand	20% – 25%	20%
Intake & Treatment Plant Use	% of Maximum Day Demand	0% - 10%	0%
Pipe Material Selection			
Large Diameter (>250mm ND)			Ductile Iron or Steel
Medium Size Diameter (100-250mm ND)			uPVC
Small Size Diameter (< 90mm OD)			HDPE
Minimum Pipe Cover			
General Pipe Laying	m	0.6 -3.0	~ 0.9
Pipes laid below roads and reserves	m	0.9	1.2
Storage Capacity			
Sizing of Reservoirs - Balancing Storage	% of Maximum Day Demand	50%	30%
Sizing of Reservoirs - Emergency Storage (Firefighting)	% of Maximum Day Demand	50%	10%
Other Design Criteria			
Water Treatment Plant Operation Time	hour/day	-	-
Pumping Stations Operation Time	hour/day	-	10
Distribution System Operation Time	hour/day	-	24
Water Treatment Quality Standards- Drinking Water		Uganda (US - 201: 1994)	Uganda (US - 201: 1994)
Specific Water Demand			
Domestic Consumption			
House Connection			

Design Criteria	Abbreviations and Dimensions	DWD Design Manual (2013)	Adopted Design Criteria
High Income Housing	l/c/d	200	50
Medium Income Housing	l/c/d	100	
Yard Tap			
Multiple Households	l/c/d	50	40
Single Household	l/c/d	40	
Public Stand Post	l/c/d	20	20
Part Time Users (Urban Poor)	l/c/d		5
Institutional Consumption			
Schools			
Day			
With pit latrine	l/std/d	10	5
With water closet	l/std/d	20	10
Boarding	l/std/d	100	20
Hospitals / Health Centres			
Health Care Dispensaries	l/visitor/d	50	20
Health Centre I- No modern facilities			
In patients	l/bed/d	50	50
Out patients	l/c/d	NA	5
Non-Resident staff	l/c/d	NA	10
Resident staff	l/c/d	NA	10
Health Centre II- with maternity and pit latrine			
In patients	l/bed/d	70	70
Out patients	l/c/d	NA	10
Non-Resident staff	l/c/d	NA	10
Resident staff	l/c/d	NA	20
Health Centre III- with maternity and pit latrine			
In patients	l/bed/d	100	100
Out patients	l/c/d	NA	10
Non-Resident staff	l/c/d	NA	10
Resident staff	l/c/d	NA	20
Health Centre IV- with maternity and water closet			
In patients	l/bed/d	150	100
Out patients	l/c/d	NA	10
Non-Resident staff	l/c/d	NA	10
Resident staff	l/c/d	NA	40
Hospital, District- with surgery unit			
In patients	l/bed/d	200	100
Out patients	l/c/d	NA	10
Non-Resident staff	l/c/d	NA	10
Resident staff	l/c/d	NA	100
Hospital, Regional Referral- with surgery unit			
In patients	l/bed/d	400	150
Out patients	l/c/d	NA	10
Non-Resident staff	l/c/d	NA	10
Resident staff	l/c/d	NA	100
Administrative Offices			
With pit latrine	l/worker/d	-	5
With water closet	l/worker/d	70	40
Mosque	l/c/d	NA	20
Church	l/c/d	NA	5
Prisons	l/inmate/d	NA	50
Commercial / Industrial Consumption			
Hotels / Lodges			
High class	l/bed/d	600	600
Medium class	l/bed/d	300	300
Low class	l/bed/d	50	50
Bars / Restaurants			

Design Criteria	Abbreviations and Dimensions	DWD Design Manual (2013)	Adopted Design Criteria
High class	l/bar/d	1000	1000
Low class	l/bar/d	700	700
Shops			
Small Town	l/shop/d	150	50
Fuel Station/Washing Bays			
Small Town	Station/d	5000	500
Markets	l/ha/d	20000	500 l/market/day
Public Sanitation			
Small Town	l/person/d	50	20
Food Industry			
Dairy	Milk received (m3)	2 - 5	200 l/d
Abattoir	Animals slaughtered (ton)	5 -10	200 l/abattoir/day
Butchery	l/d	NA	50
Grain millers (Dry processing mills)	Grain received (ton)	2 - 5	30 l/d
Other Industries			
Tannery	Raw skins (ton)	50 - 150	50
Cotton mill	Cotton thread (tufi)	50 - 150	50
Medium Scale (water intensive)	m3/ha/d	40	40
Medium Scale (medium water intensive)	m3/ha/d	15	15
Small Scale (dry)	m3/ha/d	5	5

3.2.2 Design Horizon

The MWE Water Supply Design Manual (2013) gives the following timeline for the determination of the Design Horizon:

1) Initial Year - Year of Commissioning Water Supply System taken to be 5 years after commencement of Feasibility Studies.
2) Ultimate Year- 20 years Design Horizon from Initial Year.

The consultant has taken 2024 as the initial year. Therefore, in summary, the design is based on:

a) Base Year- 2019;
b) Initial Year- 2024; and
c) Ultimate Year- 2044.

3.2.3 Hydraulic Peak Factors

The Average Day Demand which depicts the daily water consumption by domestic and non-domestic consumers is subject to seasonal climatic variations, harvest seasons, and other factors such as transient population, and religious and cultural festivals. To allow for increased demands during these seasons, a maximum day peak factor of 1.3 is proposed, so long as the source(s) has/have a higher output(s) than the demand.

Application of the above factor to the Average Day Demand gives us the Maximum Day Demand which may be used to design the capacities of the water source works, raw and treated water transmission mains, pumping stations, water treatment plants, and reservoirs. If, however the source(s) is/are a borehole(s) then the design of the above components will be based on the maximum volume of water that can be extracted from it/them save for the reservoir. This latter scenario is what is obtaining in this project and therefore the factor will only apply to the sizing of the reservoirs.

Hourly fluctuations in demand vary depending on water usage. These fluctuations are catered for by peak hour factors which tend to be high for small rural communities and lower for larger communities. Distribution mains have to be designed with adequate capacity to meet the peak hour demands of the consumers being supplied. To accommodate the peak hourly flow in the major distribution mains from the reservoir(s) to the RGC a peak hour factor of 2.0 is proposed.

3.2.4 Transient Population

This population is allowed for within the maximum day factor of 1.3 as discussed above.

3.2.5 Pipe Flow Velocities

In order to limit hydraulic forces on bends in the distribution networks and to limit water hammer effects, it is proposed that the maximum flow velocities should not exceed 0.75 – 2.5 m/s. For water pumping mains the flow velocities at the optimum pipe diameter shall apply. Head losses in the main pipelines will be limited to maximum of 10 m/km.

3.2.6 Operating Pressures

In line with the MWE Water Supply Design Manual, 2nd Edition (2013), the pressures in the distribution system will, where possible, be kept below PN 6 (60m of Water Head) and above PN 1 (10m of Water Head).

3.2.7 Un-accounted for Water (UfW)

Allowance must be made in the feasibility study and detailed design for losses, and other unaccounted for water use. This is also known as Non-Revenue Water (NRW). According to IWA1, this is the difference between System Input Volume and Billed Authorized Consumption. This NRW is a result of Unbilled Authorised Consumption, Apparent, and Real (Physical Water) Losses which include:

1) Unbilled Metered and Unbilled Unmetered Consumption (Unbilled Authorized Consumption);
2) Unauthorized Consumption (Apparent Losses). This includes meter bye passes, illegal connections, meter reversals, etc.
3) Metering Inaccuracies and Systematic Data Handling Errors (Apparent Losses);
4) Water Pipe leakages and bursts on Transmission and Distribution mains, and service connection pipes up to the consumer meter (Real Losses);
5) Storage Reservoir leakages and overflows (Real Losses).

Many studies have been carried out in Uganda on NRW. The NRW can be given either as a percentage of the average daily water consumption or of water production (System Input volume). The latter ratio has been selected. In this approach, the UfW is assumed to be constant and not subject to seasonal variations. The Water Supply Design Manual[2] also recommends that an allowance of 17 m^3/km/day be allowed to cater for leakages, water demand for flushing pipelines, storage tanks and other ordinary internal waterworks usage. However, experience with new systems though tend to put the NRW at between 15% -

1 The International Water Association, 2014

[2] Water Supply Design Manual, Ministry of Water and Environment, 2nd Edition, 2013

25% of the plant output. Accordingly, we propose that a figure of 20% UfW is used in the determination of the water demand.

3.2.8 Raw Water Intake / Treatment Plant Water Usage

Water losses also occur at the intake and water treatment plant where water is used for cleaning screens, backwashing the rapid gravity filters, cleaning the water structures, general intake and treatment plant water usage e.g. laboratory and sanitation facilities, etc. Where a system has components stated above, the generally acceptable percentage is 10% of the Maximum Day Demand to cater for these losses. However, in the case of this project where the sources are boreholes and plant use is negligible, we shall adopt zero percent (0%) for plant use.

3.2.9 Selection of Pipe Materials

Choice of material for the laying of pipes and replacement of old pipework installations will be based on commonly used pipe material sizes in the country as follows:

1) Large diameter (>300mm ND) – Ductile Iron or Steel
2) Medium size diameter (110 – 300mm ND) – uPVC
3) Small size diameter (< 90mm OD) – HDPE

3.2.10 Storage Capacity

Storage reservoirs are designed to fulfil the following functions:

a) To provide for fluctuations in consumer demand during the day (e.g. the peak hour flow), without having to design the treatment plant and pumping mains to match this peak flow. It thus provides a balance between the demand rate of transmission (at maximum day demand) and consumption rate (peak hour flow). This is the balancing storage. Additionally, the storage reservoir provides for a fairly constant residual pressure and flow to the consumers; and
b) The storage reservoir also provides a reserve capacity for firefighting, power interruptions, and allows time for system repairs and essential maintenance upstream of the storage to be made without interrupting flow to the consumers. This is the Emergency Storage.

A cold pressed steel reservoir tank of 142m^3 representing 40% of the maximum day's demand placed on a 1m high steel tower has been proposed

3.2.11 System Operation Time

The distribution system is assumed to operate 24 hours per day. The pumping stations will however operate for a maximum of 16 hours/day.

3.2.12 Water Treatment and Quality

The World Health Organization's (WHO's) Guidelines for Drinking Water Quality, set up in Geneva in 1993, and lately revised in the 4th Edition, 2011; are the international reference points for the establishment of national regulations and standards for drinking water.

It should be mentioned that though WHO recognises that drinking water should be acceptable to consumers in appearance, taste, and odour. No guideline values have been set for constituents influencing water quality that have no direct link to adverse health impacts.

In the case of the Water and Sanitation Programme, the quality of water to be delivered to the end consumer should conform to Uganda Drinking Water Standard (US-201: 2008, 2nd Edition). The Uganda

Standard US-201 was first declared a National Standard in 1994 and revised in 2008 in line with the WHO guidelines and other market requirements.

This is given in Table below along with the WHO 2011 standards for comparison purposes.

Table 10: Drinking Water Quality Standards Uganda (2008) & WHO (2011)

Characteristic	**Unit**	**US-201: 2008 Requirement**	**WHO 2011 Requirement**
Physical Requirements			
Colour	**Hazen units, max. Pt scale**	**15**	**No Guideline**
Odour		Acceptable to consumers and no abnormal changes	No Guideline
Taste		Acceptable to consumers and no abnormal changes	No Guideline
Turbidity	NTU	5	1
Dissolved Solids	mg/l	700	No Guideline
Suspended Solids	mg/l	0	No Guideline
Electrical Conductivity (EC)	µS/cm	1500	250
Chemical Requirements			
pH		6.5 - 8.5	6.5 – 8.5
Total Hardness (as CaCO3)	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 Fl)	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 NO3)	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 (C6H5OH)	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

Characteristic	Unit	US-201: 2008 Requirement	WHO 2011 Requirement
Pesticides		Trace	Trace
Carbon chloroform extracts (CCE, organic pollutants)	mg/l	0.2	No Guideline
Source: Uganda Bureau of Standards, WHO Guidelines, 2011			

3.2.13 Specific Water Demand

3.2.13.1 Domestic Consumption Rates

The per capita domestic consumption rates are based on the level of service being offered. In determining the rates of consumption for the water demand, a comparison of the rates used in previous studies in the country with those in the MWE Water Supply Design Manual, 2nd Edition, 2013 was carried out and summarized in Table below.

Table 11: Comparison of Unit Demands for Domestic Consumption

Source	House Connections (l/c/d)	Yard Tap (l/c/d)	Stand Post (l/c/d)	Urban Poor (l/c/d)
MWE Design Manual, 2013	100 - 200	40 - 50	20	0
Adopted	80-120	40-50	20	0
Source: Ministry of Water and Environment: Water Supply Design Manual, 2nd Edition, 2013				

3.2.13.2 Service Levels

Four levels of service and corresponding per capita consumption rates are proposed and these are summarized below and in Table below.

1) For House Connections in the town, medium income housing is predominant therefore the rate of 50 l/c/d from the MWE Water Supply Design Manual, 2013 has been adopted.
2) The rate of consumption at the yard tap shows little variation across the various towns. A single household figure of 40 l/c/d from the MWE Water Supply Design Manual, 2013 has been adopted.
3) The stand post consumption of 20 l/c/d is considered the minimum to sustain healthy existence and is therefore adopted.

Table 12: Per Capita Domestic Consumption Rates

No	Domestic Consumer Category	Description	Per Capita Consumption (l/c/d)
1	House Connection (HC)	Low income housing with no inside installation. i.e. low income, single household with yard tap.	50

No	Domestic Consumer Category	Description	Per Capita Consumption (l/c/d)
2	Yard Tap (YT)	Medium income consumers- single / multiple households using yard taps. This connection with no internal plumbing or water borne sanitation.	40
3	Public Stand Post (SP)	Low Income Users- usually offsite supply, either from a stand post or purchase from a neighbour.	20
Source: Project Estimates, Ministry of Water and Environment, Water Supply Design Manual, 2nd Edition, 2013			

No.	Consumer Category	Description of Customer category	Per Capita Consumption (l/c/d)	
			WSDM	Adopted
1	Public Stand Post (SP)	Low Income Users- usually offsite supply, either from a stand post or purchase from a neighbour.	20	20
2	Low income using kiosk or public stand taps	Most squatter areas, to be taken as the minimum	20	20
3	Low income, multiple households with yard tap	Low income housing with no inside installations	20	40
4	Low income, single household with yard tap	Low income housing with no inside installations	50	50
5	Medium income household	Medium income group housing, with sewer or septic tank	100	80
6	High income household	High income group housing, with sewer or septic tank	200	120
Source: Project Estimates, Ministry of Water and Environment, Water Supply Design Manual, 2nd Edition, 2013				

3.2.14 Non-Domestic Consumption Rates

This category covers the institutional, commercial, and industrial consumers. The proposed rates have been adopted from the DWD design manual (2013) and rates used in other similar schemes designed recently. They have been determined from within the specified ranges to suit the socio economic and socio-cultural conditions in the town.

3.2.15 Design Economic Life

Annual maintenance cost factors and Design Economic life of the various design components have been adopted from the MWE Water Supply Design Manual, 2nd Edition, 2013. The relevant factors are summarized in Table below.

Table 13: Annual Maintenance and Economic Life of Design Components

Component	Economic Life (Years)	Annual Maintenance Cost (% of Construction Cost)

Component	Economic Life (Years)	Annual Maintenance Cost (% of Construction Cost)
Intake Works, Treatment Works	40, 30	1%
Boreholes and Wells	20	1%
Mechanical and Electrical Items	10	5%
Pipelines, Water Meters	30, 15	1%
Masonry / Concrete Storage reservoirs	30	1%
Steel storage reservoirs including Towers	20	2%
Masonry Buildings	30	1%
Gantries, Water Kiosks, Latrines	20	2%
Site Works: Roads, Fences	20	1%
Source: MWE Water Supply Design Manual, 2nd Edition, 2013 and Project Estimates		

3.2.16 Formula for Design of Transmission Mains

The transmission mains will be designed using the Hazen-Williams Formula using an excel spread sheets to design the main requirements in the ultimate design year. The formula is as follows:

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

Where:
- Q = Discharge in the section (m^3/s)
- C = Hazen Williams roughness coefficient (unit less) 120 for Steel Pipes, 140 for HDPE and uPVC
- A = Flow area m^2
- S = Friction slope (m /m)
- K = Constant (0.85 for SI)
- R = Hydraulic radius (m)

and

$$R = D/4$$

Where:
- R = Hydraulic radius (m)
- D = Diameter (m)

3.2.17 Development Strategy

Following the recommendation of the design review report and as a cost reduction measure, the following development strategy was proposed:

a) The water supply system will be from boreholes only. The surface water option was abandoned, because it was the biggest cost-driver;
b) It is envisaged to have an entirely solar powered system. This can only be made possible by extending the pumping duration to 11 hours to supply water up to the year 2044; thus, calling for an additional power source and
c) Unit consumptions are scaled down to reflect the reality of small and seasonal consumption in these types of socio-economic setting.

3.2.18 Basis of Design

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

i) The population projections from the domestic and non-domestic consumers;

ii) The water demand from the water use patterns of the population; and
iii) Household incomes used to set the tariff and the Ability to Pay for water bills.

3.2.19 Design Considerations

In general, all system components have been designed for convenient operational and maintenance procedures. This includes, but is not limited to the following:

a) A convenient layout of the system components with ample space to allow repair and replacement of equipment;
b) Placing equipment to facilitate visual inspections and routine maintenance;
c) Considering vehicular access to equipment locations to allow for tool and parts transport;
d) Considering potential future expansions and make provisions for such;
e) Design of an adequate control and alarm system to enable operators to react quickly and properly in emergencies;
f) Equipment sizing and selection that facilitates a long service life, low operational costs and low maintenance requirements;
g) Keeping the system as simple as possible but as sophisticated as necessary, considering the different implications due to a rural versus an urban setting.

3.2.20 Demand

The water demand computation has been made on the basis of the ability to pay (5% of Income); with the demand based on the revised unit consumption rates as pointed out during the Feasibility Design Review, the levels of service and the served population figures. The water demand has been calculated at the water tariffs of UShs 36, 53, 60 and 83 per 20 litres for comparative purposes. The results of the Average Day Demand computation are summarised in the chart in Table below. These are inclusive of un-accounted for water (UfW), but without the application of the maximum day factor.

Table 14: Summary of Average Day Demand Computations

Parish	Consumer Category	Initial Year,2024		Future Year, 2034			Ultimate Year, 2044			
		Demand m^3	Percent Total	Demand m^3	Percent Total	Growth since 2024	Demand m^3	Percent Total	Growth since 2024	Growth since Future Year
Summary for the System	Domestic	74	58%	93	58%	0.05%	116	59%	0.17%	0.11%
	Institutional	44	35%	54	34%	-0.54%	67	34%	-1.13%	-0.59%
	Commercial	8	6%	10	6%	-0.10%	12	6%	-0.41%	-0.31%
	Others	1	1%	2	1%	0.58%	2	1%	0.55%	-0.03%
	Total Average Demand	127	100%	159	100%		198	100%		
Source: Field Studies and Investigations										

The details of the demand calculations projected over the design period was as summarized in Table below.

Table 15: Water Demand by Tariff- ATP (5% Income)

RGC	Average Day Demand, m^3/d			Maximum Day Demand, m^3/d			Peak Hour Demand, m^3/d		
	2024	**2034**	**2044**	**2024**	**2034**	**2044**	**2024**	**2034**	**2044**
Lwentulege	26.22	32.66	40.76	40.65	50.63	63.17	74.74	93.09	116.16
Mpaama	4.74	5.92	7.41	7.34	9.18	11.49	13.50	16.87	21.12
Kasansula	5.33	6.70	8.45	8.26	10.39	13.10	15.19	19.10	24.09
Kakenke	4.93	6.20	7.83	7.64	9.61	12.13	14.05	17.68	22.31
Kitambuza	4.99	6.21	7.75	7.73	9.63	12.02	14.21	17.71	22.10
Kimuli 1	19.72	24.26	29.85	30.56	37.60	46.26	56.20	69.13	85.06
Kagamba	14.12	17.44	21.56	21.89	27.04	33.42	40.25	49.71	61.46
Bwavumpologoma	2.10	2.64	3.31	3.26	4.09	5.14	5.99	7.51	9.45
Kimindi	2.61	3.28	4.14	4.04	5.09	6.42	7.43	9.35	11.81
Kizira	4.14	5.17	6.48	6.41	8.02	10.05	11.79	14.74	18.48
Butandiga	3.47	4.36	5.50	5.38	6.76	8.52	9.90	12.44	15.67
Kasambya	10.98	13.73	17.21	17.01	21.28	26.68	31.28	39.13	49.05
Kyalimuka	4.18	5.26	6.62	6.48	8.15	10.26	11.92	14.98	18.87
Kirangira	7.90	9.86	12.33	12.25	15.28	19.11	22.53	28.10	35.13
Kyabakazi	7.04	8.85	11.16	10.91	13.72	17.30	20.06	25.23	31.81
Kenjoki	4.92	6.12	7.62	7.63	9.49	11.82	14.03	17.45	21.73
Total	**127.39**	**158.67**	**197.99**	**197.45**	**245.94**	**306.89**	**363.06**	**452.22**	**564.28**
Source: Field Studies and Investigations									

The system has therefore been designed on the basis of the maximum day demand of 307m^3/d and Peak hour demand of 564m^3/day.

3.2.21 Water Supply System Capacity

A borehole was drilled in Lwentulege RGC and recommended for utilisation as the water source. The safe yields (80% of the test pump/maximum yields as recommended by the client) of the borehole is 28.8m^3/hr and the total borehole yield is 201.6m^3/day over a 7-hour pumping regime. Hence proposing an additional power source (HEP) to enable extending the pumping duration.

Plate 1: The drilled artisan borehole as the potential water source in Lwentulege RGC

a) Ground Water Supply and Pump Testing

The test pumping results from the drilled borehole were analysed and results from the analysis of the test pumping reports are discussed below. It can be seen in Figure below that the well reached a drawdown of 108.45m after step 4 (pump rate of 50m^3/h). The well however recovered 98% in 90 minutes.

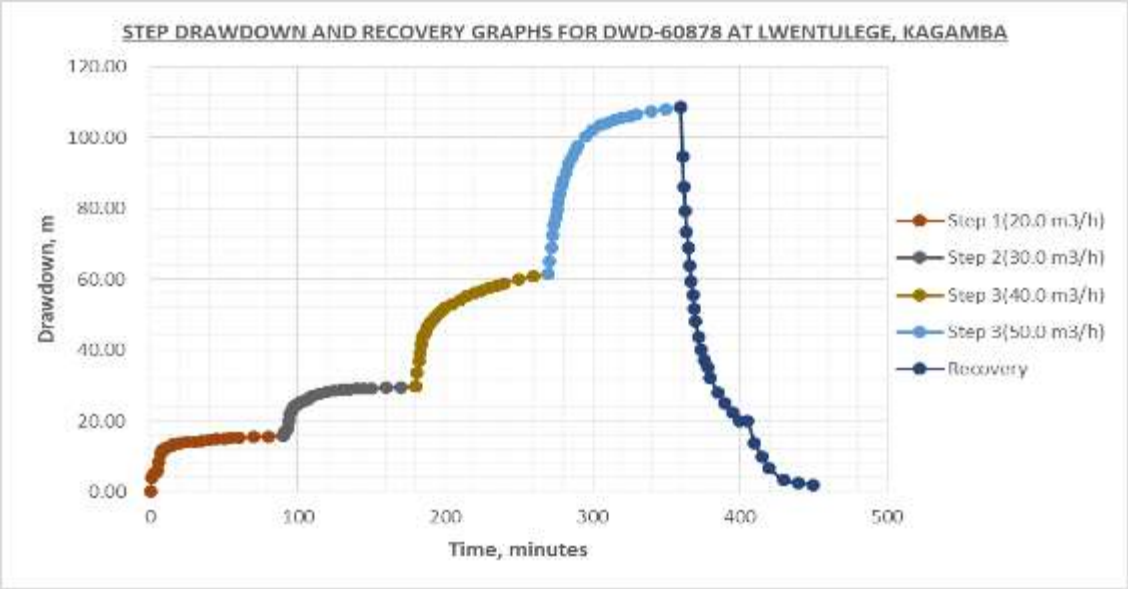


Figure 5: Step Tests Drawdown and Recovery for DWD-60878 Lwentulege Borehole

After 72 hours of constant pumping at 36m^3/h, the well reached a drawdown of 61.52m. It recovered 98% in 1 hour. The constant test pump drawdown and recovery is shown in Figures below.

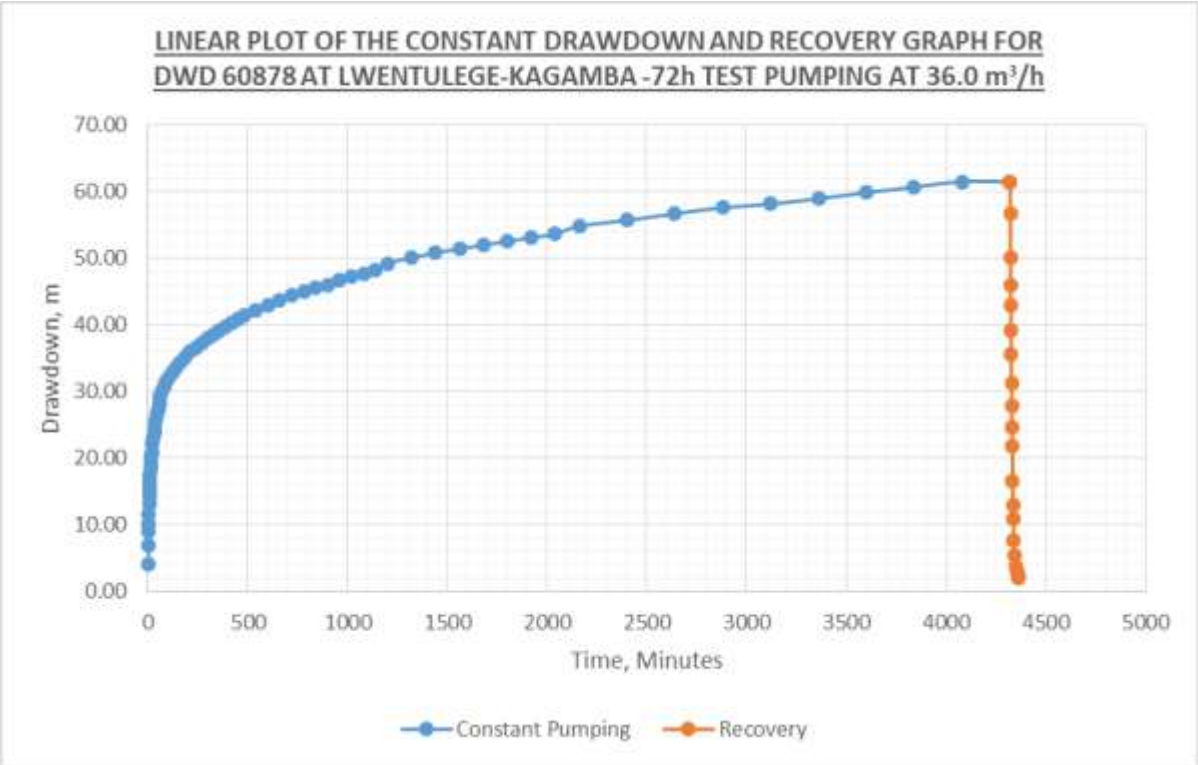


Figure 6: 72-HourTest Drawdown and Recovery for DWD-60878 Lwentulege Borehole

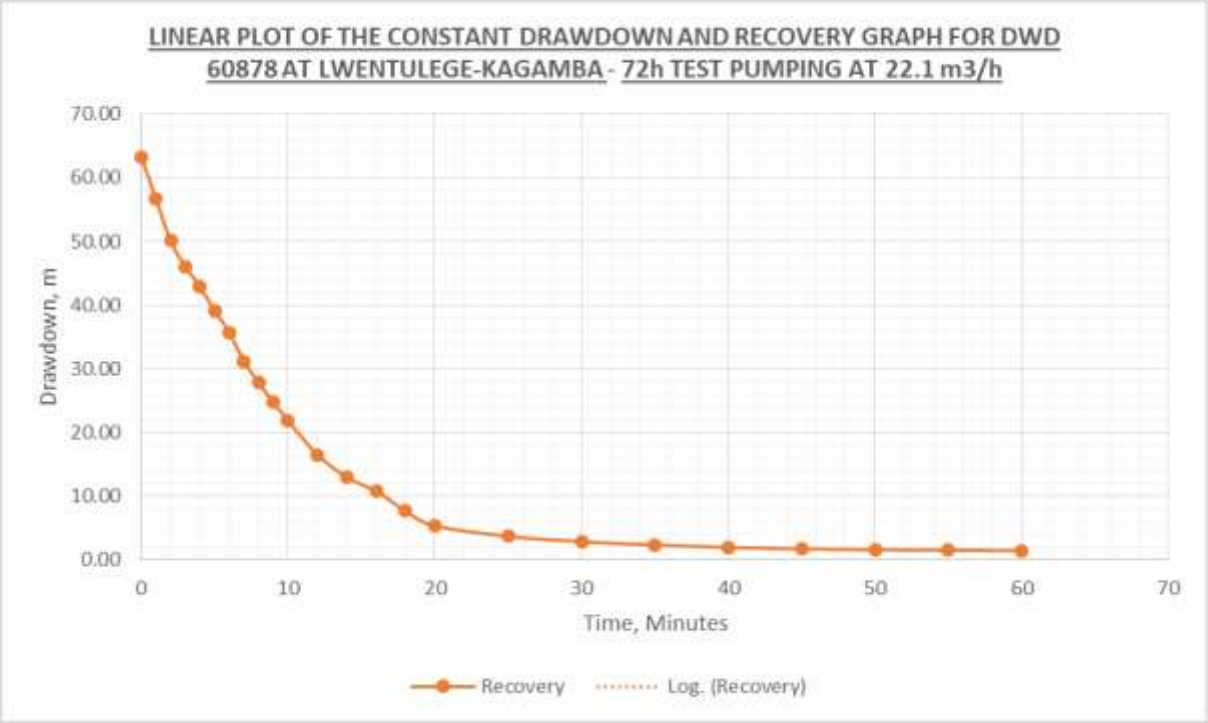


Figure 7: 72-HourTest Recovery for DWD-60878 Lwentulege Borehole

According to the recovery time, it can be seen that it's safe to withdraw 36m^3/h. However, a yield of 29m^3/h (80% of the test pump yield) has been used for sizing the pump. This is because the future year demand of 231m^3/d can be satisfied by pumping 29m^3/d, over an 8-hour pumping regime, requiring an additional hour of grid power. The summary of the test pumping report is shown in Table below.

Table 16: Summary of Test Pumping Results

Summary of Data from test pumping operation	
Parameter	**Data**
Measured current Depth(m)	125
Pump Depth, (m)	120
Static water level (mbgl)	0.0m
Dynamic Water Level (mbgl)	63.29
Draw Down (m)	63.29
Recommended Pump Installation Depth (mbgl)	63 or 75
Discharge Rate (m^3/h)	36
Total Test Time (hrs)	72
Available draw down	120
Created Draw down out of Available drawdown	52.8%
Recovery	95% in 1hr.

According to the test pumping report, it was recommended to install pump at 63m or 75m. A pump installation depth of 80m was therefore used in the design.

b) Ground Water Supply and Pumping Regimes

An analysis of the available ground water vis-à-vis the required pumping regime was carried out as shown in the table below.

Table 17: Analysis of Available Water vs Demand

Borehole No.	Location (Village)	Well Status	Borehole Yield (m^3/hr)	Abstraction Rate (m^3/hr)	Pumping Duration (hrs)	Groundwater Supply (m^3/day)	Groundwater Supply Vs. Maximum Day Demand		
							2024	2034	2044
							Water Demand (m^3/day) per Year		
							197	246	307
Supply Vs Demand									
Pumping Duration									
DWD-60875	Lwentuleg e	Existing	36.0	28.8	7	201.6	102%	82%	66%
Total for All Available Wells (1No.)			**36.0**	**28.8**	7	**201.6**	**102 %**	**82%**	**66%**
Surplus (Deficit)(m^3/day)							***4***	***-44***	***-105***
Surplus (Deficit)(m^3/h)							***0.6***	***-6.3***	***-15.0***
Alternative Pumping Duration									
DWD-60875	Lwentuleg e	Existing	36	28.8	11	316.8	160%	129%	103%
Total for All Available Wells (1No.)			**36.0**	**28.8**	**11**	**316.8**	**160 %**	**129 %**	**103 %**
Surplus (Deficit)(m^3/day)							***119***	***71***	***10***
Surplus (Deficit)(m^3/h)							***10.8***	***6.4***	***0.9***
Source: Field Study Estimates									

Table 18: Analysis of various pumping regimes (Based on 28.8m^3/h)

System Flow	Unit	Years					
		2024	2025	2029	2034	2039	2044
		0	1	5	10	15	20
Maximum Day Demand	m^3/d	197.5	202.3	221.7	245.9	276.4	306.9
Production Capacity, 7h regime	m^3/d	201.6	201.6	201.6	201.6	201.6	201.6
Surplus (Deficit)	m^3/d	4.15	(0.70)	(20.10)	(44.34)	(74.82)	(105.29)
Production Capacity, 8h regime	m^3/d	230.4	230.4	230.4	230.4	230.4	230.4
Surplus (Deficit)	m^3/d	32.95	28.10	8.70	(15.54)	(46.02)	(76.49)
Production Capacity, 9h regime	m^3/d	259.2	259.2	259.2	259.2	259.2	259.2
Surplus (Deficit)	m^3/d	61.75	56.90	37.50	13.26	(17.22)	(47.69)
Production Capacity, 10h regime	m^3/d	288	288	288	288	288	288
Surplus (Deficit)	m^3/d	90.55	85.70	66.30	42.06	11.58	(18.89)
Production Capacity, 11h regime	m^3/d	316.8	316.8	316.8	316.8	316.8	316.8
Surplus (Deficit)	m^3/d	119.35	114.50	95.10	70.86	40.38	9.91

The following should be noted from the Tables above that:

a) Pumping 28.8m^3/h (80% of the test pump yield) over an 7-hour pumping regime will deliver 201.6m^3/d. This will be sufficient to satisfy the future year demand of 197.5m^3/d.
b) In order to meet the ultimate year demand of 307m^3/d, a pumping duration of 11 hours at 28.8m^3/h will be sufficient. Thus, an additional power source (HEP) is required.

The consultant has therefore designed sized the pump stations to abstract 28.8 m^3/h, over a 11- hour pumping regime. Provisions has therefore been made for the extension of grid power to the pump stations, to gradually extend the pumping duration from 7 to 11 hours in the ultimate year.

c) Development Scenario

This development scenario will consist of utilising ground water in form of a production well of 36m^3/h (safe yield of 28.8m^3/h) as the source. The following aspects will constitute the basic components of the system:

- Construction of 1No. new borehole pumping house;
- Installation of 1No. submersible pump;
- Construction of pumping mains from the borehole to the reservoir;
- Provision of online disinfection facilities in the pumping main;
- Construction of a storage reservoir;
- Construction of a distribution network for the project area;
- Making new consumer connections;
- Construction of water office to support the management functions; and
- Chain link fencing to secure the sites for boreholes, sump, reservoir and possibly water office.
- Construction of 100 m of access road from the main road to the pump house.

d) Water Quality assessment

Water quality testing of the samples obtained from the drilled Lwentulege borehole was undertaken and the results availed to the consultant. The water samples were analysed for physio-chemical parameters at the National Water and Sewerage Corporation (NWSC) laboratory in Bugolobi, Kampala.

Based on the detail engineering design report (April 2022), the suitability of the proposed sources for drinking was characterized in accordance with the Uganda National Potable water standards (specifically US EAS12, 2014). Annex V shows the results of the water quality tests of the proposed Lwentulege borehole. The samples generally showed satisfactory results with all the parameter values meeting the National Drinking Water Quality Standards, hence no need for any treatment process. However, only chlorine disinfection has been proposed to ensure a residual chlorine to guard against contamination of the water in the extremity of distribution mains.

3.2.22 Design of Water Supply Interventions

a) Borehole Design Elements

The design of the production boreholes includes:

- Construction of 1No. pump houses;
- Installation of 1No. submersible pump and the associated pipework;
- One Pumping main from the borehole to the storage reservoir;
- Installation of 1No. disinfection system;
- Supply and installation of power requirements for the pump house;
- Associated borehole pump house site works.

b) Borehole Pump and Pumping Mains

The pump for the production well and size of the transmission main were designed using Hazen-Williams Formula and a spread sheet was used to design the main requirements in the design year 2044. The details of the calculation for the design of the borehole pumps and the main sizing are summarised in Table below.

Table 19: Raw Water Pump Details

Borehole Number	DWD 60878
Borehole Yield (m^3/hr)	**36.0**
Abstraction Rate (m^3/hr)**(80% of Borehole Yield)**	**29.0**
Hours of Pumping (hr)	8
Efficiency Pump (%)	75.2%
Efficiency Motor (%)	84.0%
Total Daily Delivery (m^3/day)	232
Pumping Main Section No. 01 (From Pump Installation Point to Ground Level at Borehole)	
Ground Level at Borehole (m AMSL)	1221.672
Depth of Borehole (m BGL)	133.400
Dynamic Water Level (m BGL)	63.290
Pump Installation Depth in Borehole (m BGL)	80.000
Cwh	120
Pipe Details	**DN 65 GI PN30**
Pipe Diameter ND (mm)	65.00
Pipe Diameter ND (m)	0.065
Flow in Pipe (m^3/hr)	29.000
Flow in Pipe (m^3/s)	0.008
Velocity (m/s)	2.43
Length of Pipe Section No. 01 (m)	**80.00**
Total Static Lift from DWL to the ground	63
Friction Loss (m)	9.66
Fittings losses - 10% (m)	0.97
Total Head loss in Section 01 (m)	**10.63**
Pumping Main Section No. 02 (From Ground Level at Borehole to Ground Level at Reservoir)	
Ground Level at Reservoir (m AMSL)	1335.48
Inlet Level at Reservoir (m AMSL)	1340.140
Ground Level at Borehole (m AMSL)	1221.672
Cwh	140
Pipe Details	**DN 100 ST PN30**
Pipe Diameter ND (mm)	100.00
Pipe Diameter ND (m)	0.100
Flow through pipe section 02 (m^3/hr)	29.000
Flow through pipe section 02 (m^3/s)	0.008
Velocity (m/s)	1.03
Chainage at Reservoir	1+286
Chainage at Borehole	0+000
Length of Pipe Section No. 02 (m)	**1,286.00**
Static Lift from Borehole Ground Level at Borehole to Reservoir	118
Friction Loss (m)	14.32
Fittings losses - 10% (m)	1.43
Total Head loss in Section 02 (m)	**16**
Total Pumping Head from Borehole to Reservoir	
Total Static Lift from DWL to Reservoir	182
Total Head loss from Borehole Installation Point to Reservoir	26
Total Pumping Head from Borehole to Reservoir	**208**

Summary of the Design	
Total Length of Transmission	
DN 65 ST PN30	**80**
DN 100 ST PN30	**1286**
Capacity of pump in each borehole	
Head (m)	208
Flow (m^3/hr)	29.0
Power (KW)	**26.0**
Source: Project estimates.	

The borehole will have a pump and transmission main with the following characteristics:

- Drilled borehole (DWD 60878) - Flow of 29m^3/h at 199m head;
- borehole riser pipe of DN100 ST PN30, 80m long; and
- pumping main of GI DN100 ST PN30, 1286m long up to the storage reservoir.

A simple cost analysis was performed to determine the least cost pipe size. The graph below shows the selection of the least cost pipe size.

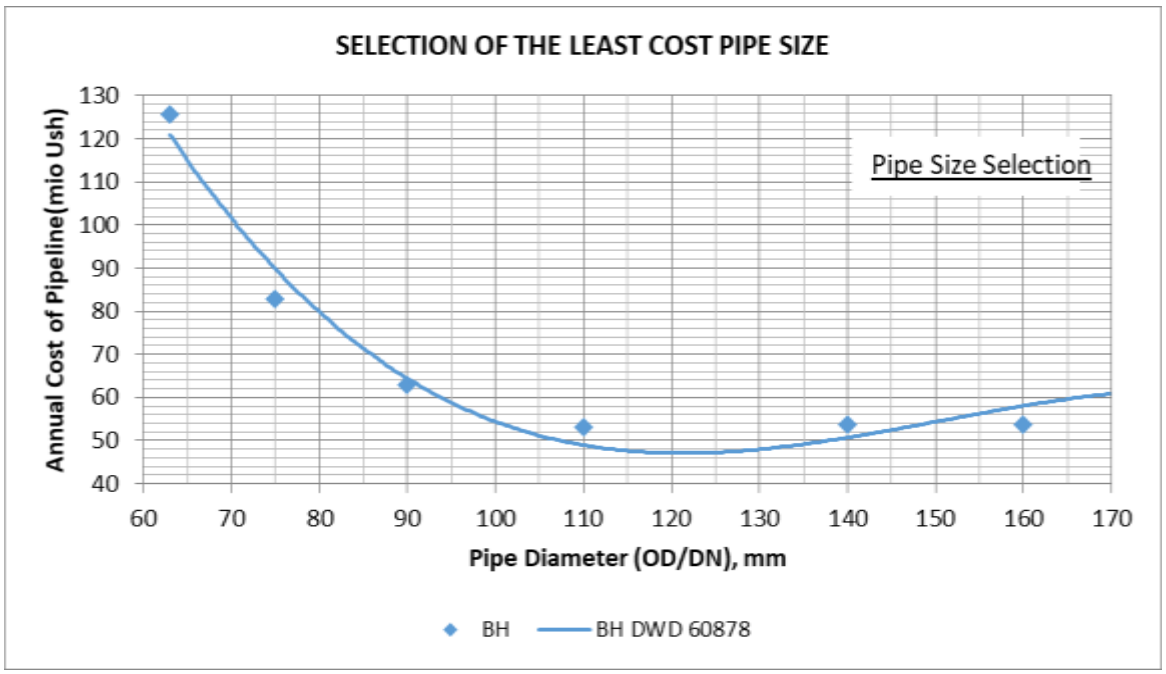


Figure 8: Pipe size selection

The borehole pump house will be the standard 3.5m X 3.0m floor area, pump house with a semi-detached office/store room giving a total floor area of 7.2m X 3.0m. The pump house will contain the associated pipework, fittings and electrical switch gear. A single roomed 3.0m X 3.0m floor area pump attendant and guard house with an Ecosan toilet will also be constructed at the borehole site.

The pump house will have the following characteristics:

- The pump houses are to be made in block work.
- The pump houses and all necessary auxiliary facilities are envisaged to fit on a size of land of about 81m^2.

- Fencing in chain link of about 40m with 1No. double leaf access gate.
- Solar security/street lighting to ensure 24hr security of the facilities.

The borehole pumping mains will deliver water directly to the reservoir tank.

c) Energy and Power Provision Costs

The power supply option agreed to power the pumps and energy requirements is solar power augmented by HEP. The characteristics of the power requirement of the pump has been calculated using the formula seen in Table below.

Table 20: Pump Power Requirement Equation

P= [ρ x g x h x Q/3600]/ (e1 x e2)	
Where;	
P is required input power (Watts)	
ρ is water density (kg/m^3)	= 1000
g is gravity constant (m/s^2)	= 9.81
h is pump head (m)	
Q is pump capacity (m^3/hr)	
e1 is efficiency of pump	= taken from selected pump details
e2 is efficiency of pump motor	= taken from selected pump details

The pump power requirement is summarized in Table below.

Table 21: Pumps Requirements

Item	Head (m)	Flow (m3/hr)	Power (kW)
DWD 60878	199	29	28

The solar isolation of Rakai which is about 4.45kWh/m^2/day (equivalent to 6.5 peak sun-hours) was used for calculating its solar energy demand. Solar radiations have daily and seasonal variations. It can be seen from Table that November is the worst-case month with the lowest average monthly radiation of 133.42kWh/m^2/month. The design month for the solar components was therefore November.

The calculation of the required was performed using the equations shown below and the required solar components are shown in Table overleaf.

$$Required\ Number\ of\ Solar\ Panels = \frac{Pump\ Energy\ Requirement}{Energy\ Captured\ by\ 1\ Solar\ Panel} \times F.O.S$$

$$Pump\ Energy\ Requirement = Motor\ Power \times No.of\ Peak\ Sun\ Hours\ per\ Day$$

$$Energy\ Captured\ by\ 1\ Panel = Panel\ Power\ Rating \times \frac{Solar\ Irradiance}{1000} \times No.of\ Peak\ Sun\ Hours$$

Table 22: Monthly Averaged Radiation for Rakai (kWh/m^2/day)

Global Monthly Radiation at a Slope of 100(kWh/m2)										
Month	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Total**	**Average**
January	159.8	158.6	146.63	134.73	134.86	157.57	145.76	177.05	1215	**151.875**
February	160.84	141.96	133.09	138.49	142.75	137.21	163.97	156.91	1175.22	**146.9025**
March	146.37	148.36	175.67	155.98	158.3	161.47	156.54	171.11	1273.8	**159.225**

April	162.62	129.99	150.87	153.4	145.17	160.9	156.69	143.54	1203.18	**150.3975**
May	143.99	154.42	146.48	157.17	157.79	153.35	151.4	141.24	1205.84	**150.73**
June	160.63	172.04	148.46	169.75	179.28	157.38	170.07	165.79	1323.4	**165.425**
July	178.76	162.7	159.7	173.27	188.12	181.53	185.83	184.88	1414.79	**176.84875**
August	167.98	166.74	160.67	147.82	176.85	178.68	149.74	163.04	1311.52	**163.94**
September	163.42	156.23	146.87	154.86	142.62	157.58	141.86	152.64	1216.08	**152.01**
October	157.83	154.72	143.03	146.05	143.07	151.94	143.68	153.44	1193.76	**149.22**
November	137.42	110.28	140.44	136.43	129.83	138.91	139.06	135.01	1067.38	**133.4225**
December	154.88	125.3	142.08	143.18	119.89	144.6	140.9	137.44	1108.27	**138.53375**
Source: EU Photovoltaic Information System (PVGIS)										

Table 23: Pumps Solar requirements

	Parameter	**DWD 60878**
	Pump	
	Head, m	199
	Flow, m^3/h	29
	Efficiency of Pump+Motor	63%
	Calculated Motor-Pump Power, kW	24.94
	Rated Power of Motor, kW	28
	Hours per day	7
	Daily Energy Requirements, kWh/day	196
	Voltage, V	3phase-440
	Sun Radiations	
	Design Month	November
	Location	Rakai
	Total Monthly Radiation (November), kWh/month	1067.38
	Average Monthly Radiation, kWh/month	133.42
	Average Daily Radiation, kWh/day	4.45
	Peak Sun Hours	6
	Average Hourly Radiation, kW	741.24
	Solar Array	
	Selected Panels	275wp
	Nominal Voltage, V	24
	Maximum Power Voltage	31
	Short Circuit Current	9.36
	Rated Maximum Power (at standard test conditions ($1000w/m^2$),W	275
	Actual power (at $684w/m^2$), W	203.8
	Daily Energy Captured (7 hours), Wh/day	1426.88
	Safety Factor	1.2
	Required Number of Panels	165
	Provided Number of Panels	180
	Array Configurations/Solar Panel Strings	
	Number of Panels in Series	18
	No of Panel Parallel Strings	10
	Total Voltage, V	432
	Total Current, A	93.6
	Inverter	

	Rated Power, kW	30.8
	Cables	
	Rated Voltage of Motor, V	440
	Maximum Voltage Drop, DU, V	5%
	Rated Current of Motor, A	65.1
	Cable Length, m	140
	Power Factor, cos(phi)	0.85
	sin(phi)	0.53
	Inductive Resistance, W/m	0.000078
	Specific resistance, W mm^2/m	0.02
	Minimum Cable Area, mm^2	12.19
	Provided Cable Area, mm^2	16

The power requirement includes the supply and installation of mono crystalline PV Solar panels rated at 275pW 24 Volts DC, including: PV solar panel support structure (solar array) for mounting solar panels; all electrical accessories; complete as per specifications. It is assumed that the solar power will be operational for 7 hours and since there exist HEP which will also be utilised to extend the pumping regime.

The HEP power will include the extension of power to the borehole, supply and installation of one 200kVA 3 phase transformer and all accessories.

A cost analysis for the available energy (solar alone, HEP alone and Hybrid system) was performed as shown in Table below. A 20-year energy cost of energy required from H.E.P was also calculated as shown in Table below. It is assumed that the grid power will be used for the extra pumping hours required, stretching from 0 in the initial year to 3.7 hours in the Ultimate year. It can be observed that Solar energy requires a relatively high capital cost of Ush 248 million but a small operation and maintenance cost of Ush 2million amounting to a total of 250million. However, water produced is insufficient to meet the demand since pumping is limited to utmost 7hours. Grid power on the other hand has a lower capital investment cost of Ush 110 million, but high operation costs of Ush 753 million, in terms of utility bills amounting to Ush 863million. A hybrid system (Solar and HEP) on the other hand, has a combined investment of Ush 358million with a relatively small operation costs of Ush 144 million, in terms of utility bills amounting to a total of 502million. This is because the H.E.P will not be required for long hours of operation, and a maximum of 3.7 hours only in the Ultimate year. Hence a hybrid system is the best option and thus recommended.

Table 24: Pumps H.E.P requirements

Item	**2024**	**2029**	**2034**	**2039**	**2044**
Water Produced (in '000 m^3 / year)	72.1	80.5	89.8	100.3	112.0
Losses (in '000 m^3 / year)	14.4	16.1	18.0	20.1	22.4
Water Sold (in '000 m^3 / year)	57.7	64.4	71.9	80.3	89.6
Pumping hours per day	6.9	7.7	8.5	9.5	10.7
Hours of HEP per day	0.0	0.7	1.5	2.5	3.7
Percentage of Hours of HEP per day	0%	9%	18%	27%	34%
Energy Costs (USh mio. / year)	0.0	2.7	6.4	10.6	15.2
Chemical Costs (USh mio. / year)	2.5	2.8	3.1	3.4	3.8
Maximum Day Demand (in m^3/day)	197.5	220.5	246.2	274.9	306.9
Cost of Water Produced (in USh/m^3)		1,311	1,219	1,137	1,063
Source: Project Estimates					

Table 25: Capital Investment and Operation& Maintenance Costs of the Energy Sources

Option	SOLAR ENERGY ONLY						Remarks
1	**Cost**	**Component**	**Unit**	**Quantity**	**Rate (millions)**	**Amount (millions)**	Insufficient to meet Demand
	Investment Costs	Solar Panels and Accessories	No.	180	1.375	248	
	Operation and Maintenance	Operation and Maintenance	%	1	1%	2	
	Total					**250**	
2	**H.E.P ONLY-16 hours**						Sufficient to meet demand
	Investment Costs	Extending HEP	km	1.6	38	60	
		Transformer and Accessories	No.	1	50	50	
		Sub Total				110	
	Operation and Maintenance	Energy Cost	year	20	38	753	
		Sub Total				753	
	Total					**863**	
3	**H.E.P + SOLAR (HYBRID)**						
	Solar Components						Sufficient to meet demand
	Investment Costs	Solar Panels and Accessories	No.	180	1.375	248	
	Operation and Maintenance	Operation and Maintenance	%	1	1%	2	
	Total					250	
	H.E.P Components						
	Investment Costs	Extending HEP	km	1.6	37.5	60	
		Transformer and Accessories	No.	1	50	50	
		Sub Total				110	
	Operation and Maintenance	Energy Cost	year	20	7	142	
		Sub Total				142	
	Total					**502**	
Source: Project Estimates							

d) Disinfection Facilities

The disinfection of the water from the boreholes will be effected by the installation of online chlorine dozers at the first pump station. This is necessary as a residual chlorine concentration is required in the water to guard against contamination that may happen in the distribution mains.

Water from both boreholes will have the chlorine solution injected into their respective transmission lines. This means that the transmission line from the second borehole yet to be drilled would be routed close to the first borehole in order to facilitate this operation. The decision to use only one point for disinfection was taken in order to minimize operational challenges that would accrue with two disinfection locations in a small system like this one. The boreholes are not going to be operated simultaneously and therefore the disinfection machine procured for the higher yielding borehole will be adequate for the small borehole as well.

3.2.23 Detailed Design of Other Facilities

a) Storage Reservoir

The required storage capacity has been computed as 40% of the maximum day demand since these are small rural settings whose water demand will rapidly increase with increase in income levels as the areas develop into bigger trading centres. The required storage capacity is therefore 122.8m^3. However, a 121m^3 main reservoir has been adopted due to the fact that the 122.8m^3 tank does not exist on the market. The storage tank will require 15 metres X 30 metres of permanently acquired land. This new tank represents a storage capacity of 39% in the ultimate year maximum day demand and the storage capacity at various stages of the design period is reflected in the Table below.

The proposed location of the reservoir is on top of a hill in Kasansula RGC. The coordinates of the proposed reservoir locations are 9,930,539.24N, 309,880.65E. This is the location that would ensure that every part of the network receives water with at least a pressure of 10m, even at hours of peak flows. It is proposed to place the reservoir on a 1 m high steel tower. This is because it would be less costly and easier to erect the steel tower compared to a reinforced concrete plinth wall.

Table 26: Reservoir Storage Capacity

Item	2024	2034	2044
MD Demand- m^3/day	197	246	307
Storage Capacity (m^3)	121	121	121
Hours of Storage	15	12	9
Storage Capacity (%)	61%	49%	39%
Source: Project Estimates			

Plate 2: The proposed hill/site for the Reservoir tank

The reservoir tank on a will be placed on 1m high steel tower. The reservoir will be made of square cold pressed steel panels of length 1.0m and shall be provided with inlet, overflow, outlet, and drainpipe work. The following fittings shall also be provided for the reservoir:

- Internal ladder of aluminium;
- Wall mounted level indicator;
- Vents on the tank roof;
- Roof level access cover of galvanised steel; and
- 1 No. Lightning Arrestor.

The access covers shall be at least 100 mm above the finished level of the roof and shall be lockable. The roof vents shall be similarly set out and shall be fitted with vermin proofing and mosquito proofing fabric. The overall internal dimensions of the reservoir (121m^3) are as follows: -

- Length - 7.0m;
- Width - 6.0m; and
- Depth - 3.0m.

The pipe work (rated PN10) of the reservoir shall be in Epoxy Coated Steel Pipe work as follows;

- Inlet - DN 100;
- Outlet - DN 100;
- Overflow - DN 150; and
- Drain - DN 100.

b) Main Reservoir Site Works

The site works at the reservoir consists of the following:

- The general earthworks;
- The site pipe work;
- The site drainage; and
- Miscellaneous works.

The outlet from the main reservoir shall be fitted with new bulk flow meters. The site layout drawing for the respective reservoir is presented in Annex IV.

c) Distribution Network

The downstream of the distribution system reservoirs has been modelled using EPANET 2.0. A peak hour factor of 2.0 was used. The smallest size of pipe chosen is OD 50 HDPE. Pipes smaller than OD50, will be laid as Network Intensification lines. Table below shows the estimated sizes and length of the distribution pipes while Figure below shows the Epanet Model whose details are attached in Annex IV.

Table 27: Distribution Mains

Pipe Type	Diameter (mm)	Length(m)
HDPE PN10	OD 50	9,202
HDPE PN16	OD 50	13,552
	OD 75	5,151
	OD 90	4,025
uPVC PN10	OD 110	800
uPVC PN16	OD 110	1,917
Total		34,647

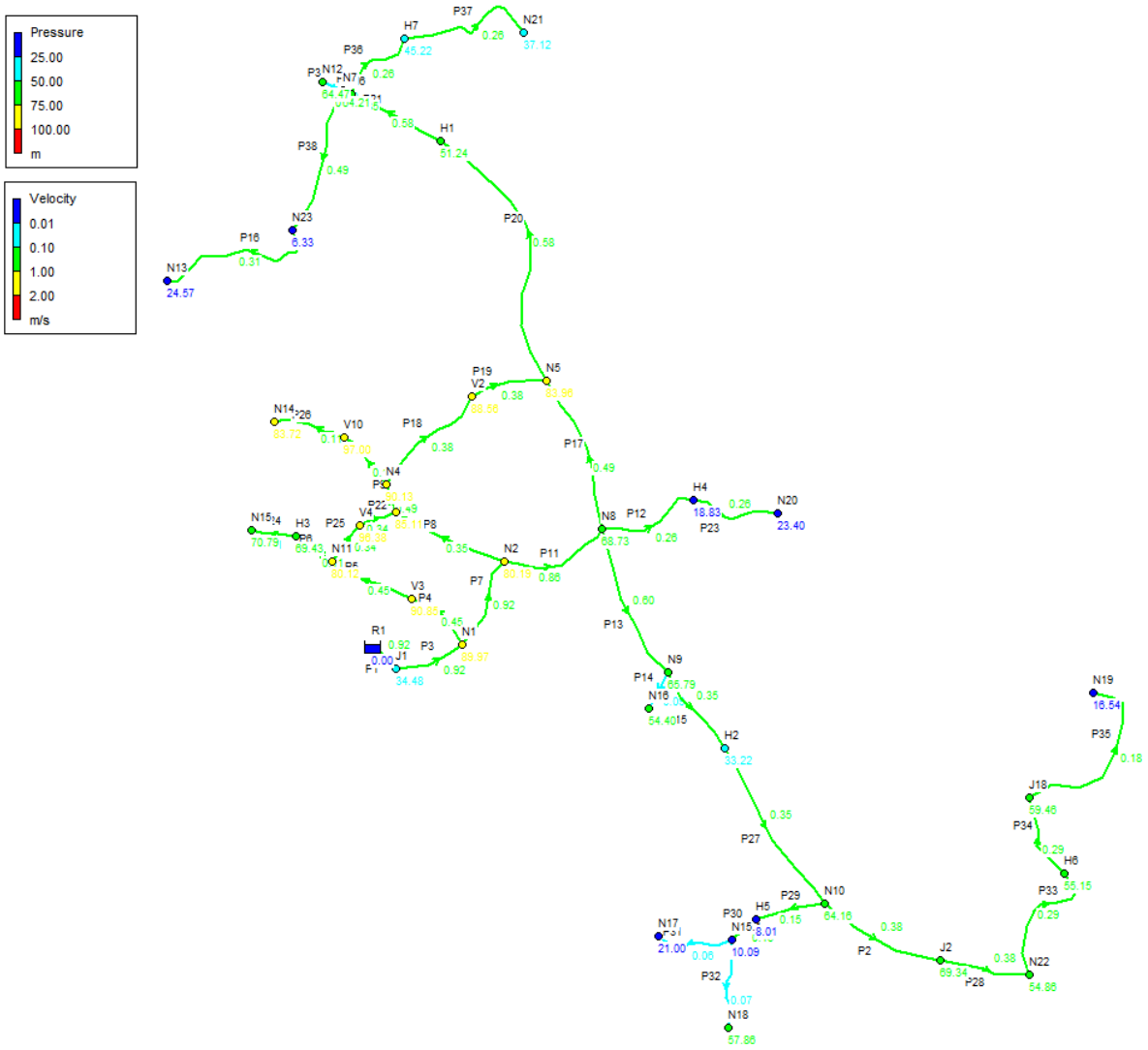


Figure 9: Lwentulege Cluster Epanet Distribution Network Model

d) Service Connections

The location of the service pipes will not be known until applications for connections are received. At this stage, only an estimate of the sizes, quantities and costs can be given. On the basis of the population to be served, the total number of connections required in the ultimate 2044 has been estimated as in Table below. The population served by the system is given in above. The criteria used to determine the number of service connections for each served population category is as follows.

The population served by the system is given in above. The criteria used to determine the number of service connections for each served population category is as follows.

Table 28: Population per Category Criteria

Category	Population Served	Source of Criteria
House Connection	5 persons per household	Socio-Economic Study Data
Yard Taps	1 Households per yard tap	Project Estimates
Standpipes	200 persons Per Standpipe	Maximum Number- DWD Water Manual 2013
Urban Poor	200persons per Standpipe	Standpipe coverage

The required number of service connections is given Table below.

Table 29: Required Service Connections

2044 Served Population				
Year	**House Connection**	**Yard Tap**	**Stand Pipe**	**Total**
2024	67	135	3,164	**3,366**
2034	91	198	3,838	**4,127**
2044	127	299	4,635	**5,060**
Number of service connections				
Year	**House Conn**	**Yard Tap**	**Stand Pipe**	**Total**
2024	13	27	16	**56**
2034	18	40	19	**77**
2044	25	60	23	**108**

A total of 108 No. service connections are to be made in Lwentulege Cluster in the ultimate year 2044 as seen in Table above while 56 will be made in the initial year 2024. It has been assumed that the connection materials will be supplied by the project on the payment of the connection fees. The number and location of the public stand posts will be determined during the construction period.

e) Network Intensification

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

3.2.24 Geotechnical Investigation and Structural Design

In order to ensure the structural integrity of the storage reservoir, geotechnical investigations were carried out for at the reservoir and sump locations. The primary purpose of this study was to determine the stratigraphic characteristics of the site based on field observations and laboratory tests for the proposed development including the bearing capacities of the site from the Light-Weight Dynamic Penetrometer (DPL) results. The field work involved intrusive site works, in-situ testing and sampling. The field work was followed by geotechnical laboratory testing of the sampled materials. The detailed report of the geotechnical study is presented in the Detail Engineering Design Report (April 2022).

The two sites that were investigated have soil properties that will support the structures to be installed without any modification, save for earth works, especially at borehole sites and landscaping. The Consultant was able to design in details the tank structures based on the bearing capacity obtained for the site. The access road to the borehole site and the corresponding raising of the ground to provide platform on which the infrastructure at the borehole site will be installed has also been provided and costed.

3.2.25 O&M Tools and Equipment

Part of the investment will be used to supply new O & M tools and equipment. Equipment will be supplied for the running the water supply system and well as equipping the water office. These will include: Plumbing Tools and Equipment, Miscellaneous Tools, and Chemical Equipment and Chemicals.
The proposed tools and equipment are listed in Table overleaf

Table 30: Tools and Equipment

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY
PE 2.1	Blowlamp: pump action, pressure type, approx. 0.5 litre capacity, complete with wind proof nozzle and one set of replacement parts	No.	1
PE 2.2	Brushes, wire type for cleaning parts, 300 mm long, 3 rows of approximately15 tufts with 25 mm long steel bristles	No.	2
PE 2.3	File, flat machinist's, length 250 mm, second cut	No.	1
PE 2.4	File, flat machinist's, length 250 mm, smooth cut	No.	1
PE 2.5	File, flat machinist's, length 250 mm, bastard cut	No.	1
PE 2.6	File, half-round machinist's, length 250 mm, smooth cut	No.	1
PE 2.7	File, half-round machinist's, length 250 mm, but bastard cut	No.	1
PE 2.8	File handles, 100 x 27 mm	No.	2
PE 2.9	Hammer, mechanic's, 200 & tempered forged steel head, ash or white hickory handle, polished face	No.	1
PE 2.10	Mattocks	No.	2
PE 2.11	Pliers, arc joint, minimum 5 adjustments, 240 mm long	No.	2
PE 2.12	Saw, Plumbers, 400 mm, fine tooth edge for cutting metal and coarse teeth for cutting wood, complete with 5No. blades	No.	2
PE 2.13	Screw drivers, assorted, hammer-proof, non-inflammable plastic handle	Set	2
PE 2.14	Shovels	No.	2
PE 2.15	Tape measure, Stanley type steel, metric units, 5 m	No.	2
PE 2.16	Tapping machine, furnished with ratchet crank for manual operation, for making tappings from DN 15 (1/2") to DN 50 (2") on mains of DN 25 (1") to DN 300 (12")	No.	1
PE 2.17	Die set with stock, for threading from DN 15 to DN 150	No.	1
PE 2.18	Vice with parallel jaw 100 mm as Peddinghaus, Matador 10203, portable type, with tripod stand	No.	1
	WATER QUALITY TESTING KIT		
QE 3.1	Portable analysis kit such as Potalab 1 (Wag-WE10010) of M/s Wagtech International or similar with reagents to carry out 300 tests for microbiological and physico-chemical testing	Set	
	MISCELLANEOUS TOOLS		
MT 4.1	Contractor's pick axe with point and chisel steel end, length 800 mm	No.	2
MT 4.2	Steel hoe, blade width 200 mm, 1.5 kg complete with good wooden handle	No.	2
MT 4.3	Seamless pressed tray wheelbarrow, steel frame, with pneumatic wheels, 80 litres	No.	2
MT 4.4	33CC 2-Cycle Petrol-Powered engine Straight Shaft Attachment Capable String Lawn Trimmer with 17-inch cutting path (including 10No. replacement trimmer lines)	No.	1
MT 4.5	Steel rakes	No.	3
	CHEMICAL EQUIPMENT AND CHEMICALS		
CE 5.1	Stainless steel graduated (metric) buckets (10 litres)	No.	2
CE 5.2	Stainless steel scoops for scooping chemicals - 1 kg capacity	No.	2
CE 5.3	Food Quality Common Salt (NaCl) in 50Kg Sacks	No.	4

3.3 Construction Activities

a) Project Phases

- *Mobilization Phase* - This phase will involve mobilization of the construction human resource, equipment, construction materials, erection of temporary worker's camp and storage yard. The location of the project temporary camp will be agreed upon with the local leadership, landowners and contractor.
- *Construction Phase* - All project activities under this phase are supposed to be carried along the tracks, route and access paths within the boundaries of the identified project sites without disturbing or obstructing the neighbors and businesses. To ensure this, the contractors will seal off the site perimeter with corrugated iron sheets or other suitable material during project implementation. In case of trenches, proper barricade have to be applied to warn and protect the people of impending dangers of falling into open pits and trenches. Upon completion of preliminary activities and on-site investigations, actual construction of the project components and facilities will start which will involve:
    - Setting out to demarcate rights of way, work areas, clearing limits. Access paths, detours, bypasses and protective fences or barricades should all be in place before construction begins.
    - Excavation of trenches for water pipe lines;
    - Trench sheeting and bracing to protect collapsible trench side walls;
    - Placing concrete to bases of foundations;
    - Laying of mains water pipes; and
    - Backfilling, disposal of overburden and surface restoration to at least match the condition that existed prior to the water works construction.
- *Demobilization Phase* - Demobilization phase will involve clearing of the project site of all construction and unwanted material. The disposal of any unwanted material will be done by the contractor. The waste materials may include packaging, wood, steel crates, cardboard, wrapping materials, construction debris, boxes, sacks, drums, cans and chemical containers, etc. Damaged areas will need to be restored before commissioning the project. Upon completion of the contractor's obligations, the contractor will hand over the project to MWE, the client.
- *Operation Phase* - This will involve employment of operators both skilled and unskilled, operation of the water supply system, maintenance of the facilities put in place, etc.

b) Construction Method

The actual choice of construction method and resources will be the Contractor's responsibility as dictated by the site conditions, productivity and construction schedule. The choice has a bearing on the cost implication. In all construction activities safety of operations is paramount. It entails carrying out of construction activities and operation of equipment by experienced personnel under supervision of experienced and qualified staff and use of well serviced construction equipment in good working condition. Safety on site will be managed by close supervision of the contractor's Health & Safety Officer and the Engineer's construction Supervision staff of the site activities with regard to the working environment in accordance with the applicable Environment, Safety, Health and Social Safeguard Policy.

c) Plants and Equipment

Because of the nature of the construction activities that will be undertaken, a number of plants and equipment will be used to execute the assignment by the contractor or the sub-contractor(s) and these will include among the following: Graders, Vibrators /Rollers, Water Trucks, Bulldozers, Front End Loader, Vehicles, Containers, Excavators, Water Pumps, Mechanical Tool Boxes, Civil Plate Compactors, Dump truck, Concrete Mixer, Crane and Compactor.

d) Earthworks

The earthworks including site clearance, general filling and excavation, and trenching can be carried out either by manual labor or mechanical equipment where large quantities are involved.

e) Concrete works

Concrete production is expected to be by the use of concrete mixers and/or manual production for the small works and where use of a mixer may be impractical.

f) Structural Steel

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

g) Reinforcement Steel fixing

Various sizes of reinforcement steel bars will be cut to required lengths and bent to design shape either manually or by machines and will be placed and fixed for the works by manual labour.

h) Masonry

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

i) Pipe laying

Pipe laying is expected to be carried out by manual labor using the necessary hand tools and pipe lifting equipment for the heavy pipes.

j) Electro-Mechanical Installations

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

k) Implementation Schedule

The main objective is to determine a total duration of the project, which equals a "critical path" of events that determine the total duration. The anticipated implementation schedule is as per Table 31.

Table 31: Implementation Schedule

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

3.4 Quality Assurance

It is the responsibility of the supervising consultant to ensure that the desired quality of work is achieved. The materials supplied for the works should not deviate from those specified. At each stage during the construction process, samples of materials have to be taken to the Materials Laboratory for testing to ensure conformance to the specifications.

4. ESIA METHODOLOGY

4.1 Introduction

This section outlines the methodology that was used to assess the E&S baseline and to identify, predict & assess the E&S impacts of the project on each relevant environmental and social component. It also covers the methodology for the identification of mitigation and monitoring measures that was recommended to address these impacts and identification of relevant stakeholders. The methodology consists of a review of Uganda's institutional arrangements, regulations and policies. Environmental and social impacts of the proposed project will be predicted in relation to environmental and social receptors and natural resources while comparing prevailing pre-project conditions and post-project situations.

The requirement for environmental impact assessment in Uganda is set out by the *National Environment Act No. 5 of 2019* and the *Environmental and Social Impact Assessment Regulations of 2020*. This process was guided by the Environmental Impact Assessment (EIA) Guidelines (NEMA, 1997) and the process is schematically presented in Figure 9 overleaf.

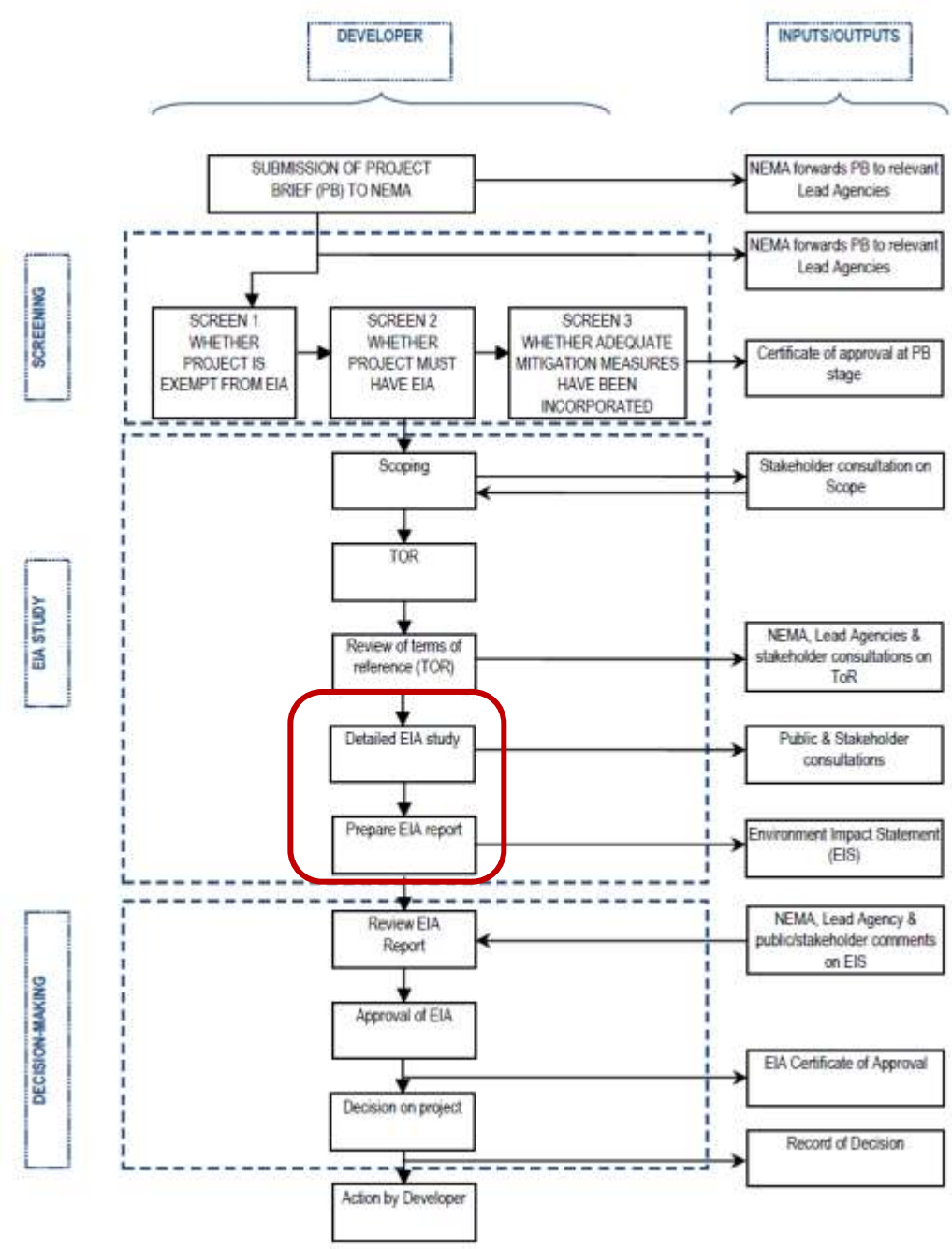


Figure 10: ESIA process that was adopted as provided for under the Laws of Uganda

4.2 Physical Environment

Baseline noise levels and air quality were measured, not only to inform construction contractors about pre-construction conditions existing at proposed sites, but also the first annual environmental audit. Water quality analysis results obtained at the design stage have been adopted in this ESIA report. These were determined through the following actions:

4.2.1 Ambient Noise Assessment

Baseline noise measurements were undertaken at locations around the proposed facility sites with potential receptors. Measurement of ambient noise levels were carried out using a precision integrating

sound level meter, with an active range of 0-130 decibels (dB) and complying with IEC 651 and ANSI S4 standards. A Casella CEL-621C digital noise logger will be set to record for a sample period of 10 minutes at each of the selected locations. The assessment procedure will involve recording the LA_{MAX} and LA_{MIN} decibel levels. Measurement points were recorded using a GPS receiver and the noise sources together with the ambient environment at each location noted. The obtained results have been compared against the National Environment (Noise Standards and Control) Regulations, 2003. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for eight hours in a day should be provided with requisite hearing protection.

4.2.2 Air Quality Assessment

Baseline air quality was measured using a pair of digital MX6 iBrid™ portable gas meters (Industrial Scientific-Oldham) and a Microdust 880nm digital aerosol monitor (Casella®). Measurement points or locations were selected basing on presence of potential receptors and an averaging period of 8 hours was used.

For gaseous emissions.

- The equipment was powered on and left in measuring mode for the first two minutes to allow zeroing and self-calibration. This was followed by ten minutes of measurement to allow digital readings to stabilize before they could be recorded.
- Measurements were conducted at each of the selected points to determine whether there would be any gaseous emissions detected.
- Values for Lower Explosive Limit (LEL), Carbon monoxide (CO), Oxygen (O_2), Hydrogen sulphide, H_2S, volatile organic compounds (VOCs) will be noted.

For particulate matter.

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

4.2.3 Water Quality

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

Water samples for physical, chemical and bacteriological quality were further collected at the source of raw water. Water samples were transported in a cooling box on ice to the laboratory for analysis. The water samples were analysed at the Directorate of Government Analytical Laboratory, Ministry of Internal Affairs, Wandegeya and the Test Results of the Water Quality Analysis are presented in this ESIA report. Metal ions were quantified from an acidified sample, at respective wavelengths, using Atomic Adsorption Spectrometry technique, Shimadzu 6300. A five-point calibration curve was used to get the concentration of each metal ion. Nitrates, phosphates, sulphates, chlorides and ammonia were determined by UV-VIZ Spectrometry technique, Shimadzu, 1601 at respective absorption wavelengths. Coliforms and *E. coli* were determined by Membrane Filtration technique at 37^0C and 44^0C respectively. All determinations were done in duplicate. The tests were measured in conformity to US EAS 12: 2014 Specification of natural

Potable Water and in conformity to Uganda's National Standards for Potable Water, which are within World Health Organisation (WHO) standards.

4.3 Biological Environment

4.3.1 Flora

Transect walks were taken along the areas planned for the water supply and sanitation systems and records were made of the vegetation. While some plant species were identified on site, specimens of others were collected and taken for confirmation at the Makerere University Herbarium. Additional information was obtained through consultation with communities on the local names, use and importance of some plant species. An inventory of the impacted vegetation was taken. The International Union for Conservation of Nature's Red List of Threatened Species (IUCN 2022) was utilized for categorization of species. Some of the tools that were used included: Plant press, Secateurs, Ivy tags, Measuring tape, Diameter tape and camera.

4.3.2 Fauna

- *Birds* - Bird species occurrences were surveyed through point count surveys using observations, hearing and consultations during which all species detected and encountered were recorded. Great emphasis was placed on species of conservation importance. Species identification were based on Stevenson and Fanshawe (2002). While some species were categorised according to IUCN (2015). Some of the tools used included: Binocular and camera.
- *Butterflies* - Random sweeping using sweep net were done (Biodiversity Rapid Assessment) and it involved a transect walk through the areas recording all butterfly species encountered on wings. Sample specimens were taken for most of the species, except for those whose identification could be easily confirmed in the field. Opportunistic observations were included to help build the species list. Each of the butterfly species was assigned to one of the ecological categories (Akite, 2008). Some of the tools used included: insect net and camera.
- *Herpetiles* - Both reptiles and amphibians were surveyed using Visual Encounter Survey (VES) method (Rodda *et al.,* 2007). Visual Encounter Surveys were conducted by observation while walking through a designated area for a prescribed period of time, visually searching systematically along transects for animals. VES involved a search on the ground, trees and grasslands. Herpetiles were surveyed during the day from 08:00 am to 07:30 pm (Spawls *et al.,* 2006). Some of the equipment that was used include: camera and snake stick.

4.4 Social Environment Survey

Key stakeholders were identified at the national, regional, district, Sub County and community level through interviewing experts, brainstorming and document review. Stakeholder identification and engagement is an on-going process that requires regular review and updating. Therefore, the stakeholder list can be updated from time-to-time. The consultant collected and analysed data and held consultations with various stakeholders and other interested and affected parties involved, to ensure that all existing data relevant to the assignment is available to us. We undertook site survey to determine the area of influence and gather information under several key areas such as: (a) Socio-economic conditions in the surrounding communities such as health and infrastructure and (b) Current land use in the proposed project sites. Participatory stakeholder identification was used in identifying and analysing the key stakeholders, including planning for their participation. Therefore, it was the starting point of our

participatory processes and provides the foundation for the design of subsequent stakeholder activities throughout this study. Identified stakeholders include:

Table 32: Categorization of Stakeholders engaged during ESIA

Category	Stakeholders targeted	Method of engagement	Roles and responsibilities
National	National Environment Management Authority; Ministry of Gender, Labour and Social Development	Key Informant Interviews (KIIs)	-NEMA is responsible for the review and approval of TORs, ESIAs, post-implementation audits and monitoring of approved projects. -Coordinate, inspect, supervise and monitor project activities to ensure that the environment and natural resources are not depleted but managed sustainably. -MGLSD under department of Occupational Health and Safety (OHS) is responsible for inspecting and registering the workplace and monitoring of conditions under which employees on the project are subjected.
Regional	Regional offices of the Ministry of Water and Environment including: Rural Water and Sanitation Regional Centres (RWSRCs), Umbrella Authorities (UAs), NEMA, Water Management Zones (WMZs	KIIs	Construction supervision including the implementation of the proposed ESMP and implementation of the WSPP.
District	District Local Government of Rakai. Specifically, the following offices of Water, Natural Resources, Planning, Health, Production and Community Development and the political wing including the Chairperson LC V and Councillors representing the beneficially areas, NWSC	KIIs	Mobilize support for the project. Monitor social-environmental impacts both during construction and operation phases
Sub County	Sub county Chief, Community Development Officer, LC III Chairpersons	Focused Group Discussions (FGDs and KIIs	Mobilize local communities and key stakeholders to participate in EIA consultations and/or public hearings.
Community	Local Council I, Landlords of sites where the water infrastructure will be constructed and any CBOs or local NGOs in the sector	FGDs and KIIs	Develop construction (works) schedules in their respective areas. -Participate in the scheduled

			meeting regarding the project activities and progress -Identify mitigation measures of the environmental and social issues -Monitor the progress of the project activities Input in the planning and identification of water and sanitation facilities.

4.4.1 Sampling and Selection of Respondents

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

Socio-economic surveys were conducted to define impacts and to provide a monitoring baseline following an initial desktop data review. The survey used a questionnaire comprised of 81questions aimed at capturing the full range of livelihood Capitals based on the Sustainable Livelihoods Framework.The data was collected via a mixed-method approach incorporating both quantitative and qualitative assessments, as well as an assessment of available secondary resources. Quantitative surveys were conducted for all Project Affected Households (PAHs) whereas the qualitative data was gathered to provide supporting details for the quantitative data collection surveys. Qualitative data collection was based on KIIs, FGs, and participatory methodologies including village transect walks. Household socio-economic surveys was undertaken alongside the cadastral and asset surveys. The land and asset component measured and described fixed assets for each household including land holdings, land type, buildings, crops, and trees. This information was collected to inform compensation agreements and to assist in resettlement impact assessments. Details of the household survey are presented in the RAP and Valuation Report.

4.4.2 Study Methods

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

i. *Primary data source* - Primary data sources included Focused Group Discussions (FGDs and Key Informant Interviews (KIIs) with local technocrats and leadership[3].

[3] Primary sources can be described as 'a first-hand testimony or direct evidence concerning a topic under investigation whose nature cannot be determined without reference to the topic and question it is meant to investigate' or 'primary sources are those items that are original to the problem under study'.

ii. *Key Informant Interview (KII)* - targeted civil servants, political leaders and representatives of the management structures who are responsible for environmental management activities on various levels. Key informants were selected and interviewed on the basis of their roles as leaders, specialized knowledge and experience on the subject under study.

iii. *Focused Group Discussions (FGDs)* – targeted stakeholders at Sub County, Parish and Village levels. FGDs were used as a qualitative approach to gain an in-depth understanding of social issues. The method aimed at obtaining data from a purposely selected group of individuals on the proposed project activities.

iv. *Secondary sources* - These included: existing data, existing environmental data, existing reports/documents, pre- and post- implementation of management/construction decisions, EIA reports and ESMPs in place. Examples of these documents include: Rakai District Development Plan, District State of Environment Report, and Engineering Design Report for Lwentulege Water Supply and Sanitation System etc.

4.5 Impact Assessment and Evaluation Method

Based on the project details and the baseline E&S status, potential impacts as a result of the construction, operation and decommissioning of the proposed project activities were identified. We therefore proposed an impacts analysis criteria that took into account the magnitude or intensity of impacts based on project activities and sensitivities in the project area that were identified in the environmental and social baseline. Impact characteristics that were considered are described in Table 33 and include:

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

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

Table 33: Impact Assessment and Evaluation

Criteria	Description
Type of Impact	▪ Direct - An impact that appears immediately as a result of an activity of the project. For example, the loss of vegetation is a direct impact of site clearing. The direct impacts would be experienced mainly during the construction process, and include effects on the physical environment, health and safety of the construction workers including community members within the project area. ▪ Indirect - An impact that is related to the project but that arises from an activity of the project at a secondary level. For example, the demand for supplies and services may cause indirect impacts on the local economy by increasing indirect employment opportunities.
Nature	▪ Positive ▪ Negative
Duration	▪ The lifetime of the impact; this is measured in the context of the life-time of the proposed development. Whether the Impact will be: ▪ Intermittent – not occurring at all times. ▪ Temporary-only for a short period.

	▪ Short term - the impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase. ▪ Medium term - the impact will last for the period of the construction phase, thereafter it will be entirely negated. ▪ Long term - the impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter ▪ Permanent
Intensity	▪ Whether or not the intensity (magnitude) of the impact would be high, medium, low or negligible (no impact). An attempt to quantify the impacts of components on the affected environment will be described as using following definitions: ▪ Negligible ▪ Low - where impact alters the affected environment in such a way that natural processes of functions are not affected in any significant way. ▪ Moderate - where the affected environment is altered, however, function and process continue, albeit in a modified manner. ▪ High - where function or process of the environment is seriously altered and disturbed to the extent where it temporarily or permanently ceases.
Spatial Extent	▪ The physical and spatial size of the impact; a description of whether the impact would occur on a scale described as follows: ▪ Site - whether the impact will be within limited locale of the project site / study area affecting the whole or measurable portion of the area. ▪ Local - whether the impact will affect the environment or communities along the border of the study area or in the extended area adjacent to the site or perhaps outside the immediate environment. ▪ Regional - whether the impact extends beyond the study area affecting areas on a regional scale.
Likelihood	▪ The probability or likelihood of the impacts occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The probability that a certain impact will occur on scale described below: ▪ Uncertain - insufficient information to determine its probability. Because the precautionary principle is followed, this increases the significance of the impact. ▪ Improbable - the impact is unlikely to occur. ▪ Probable - the impact could possibly happen, and mitigation planning should be undertaken. ▪ Highly probable - it is most likely that the impact will occur at some or other stage of the development. ▪ Certain - the impact will take place regardless of any prevention plans, and only mitigatory actions can be relied on to contain the effect.
Sensitivity	▪ Degree of change effected on natural processes or people's livelihoods; the sensitivity of the receptor of the impact to change ▪ Very low ▪ Low ▪ Moderate ▪ High

Table 34 below presents a quantitative format for ranking impacts based on parameters above, summarized as magnitude and sensitivity.

Table 34: Quantitative Rating of Impacts

Significance			Sensitivity			
			Very low	Low	Medium	High
			1	2	3	4
Magnitude	Very low	1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	3	3 Minor	6 Moderate	9 Moderate	12 Moderate
	High	4	4 Minor	8 Moderate	12 Moderate	16 Severe

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

Table 35: Overall Impact Rating and Description

Overall Impact Rating	Description of Impact	Significance
Severe	▪ Non-compliance with national policy, environmental laws and regulations ▪ Highly noticeable, irreparable effect upon the environment ▪ Significant, widespread and permanent loss of resources ▪ Major contribution to a known global environmental problem with demonstrable effects ▪ Causing mortality to individuals of a species classified as globally or regionally endangered ▪ Major exceedance of water/air quality and noise guidelines representing threat to human health in the long and short term ▪ Causing widespread nuisance both on and off site ▪ Extensive property damage or loss, ▪ Widespread effects on livelihoods.	>12
Moderate	▪ Frequent breaches of national regulations, including water/air quality and noise guidelines, wetlands and river banks regulations causing localized nuisance both on and off site ▪ Noticeable effects on the environment, reversible over the long term. ▪ Localized degradation of resources restricting potential for further usage ▪ Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behaviour but returning to normal in the medium term ▪ Elevated contribution to global air pollution problem partly due to preventable releases ▪ Unplanned immigration flows ▪ Increased traffic in sensitive environments ▪ Increased serious crime rates ▪ Widespread physical resettlement, affecting livelihoods	6 – 12
Minor	▪ Noticeable effects on the environment, but returning naturally to original state in the medium term ▪ Slight local degradation of resources but not jeopardizing further usage	2 – 4

Overall Impact Rating	Description of Impact	Significance
	▪ Disruption/disturbance to normal behaviour of a globally or regionally endangered species returning to normal in the short term ▪ Small contribution to global air problem through unavoidable releases ▪ Elevation in ambient water/air pollutant levels greater than 50% of guidelines ▪ Infrequent localized nuisance ▪ Population increase not expected to stress existing infrastructure	
Negligible	▪ No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action ▪ Unlikely to affect resources to noticeable degree ▪ No noticeable effects on globally or regionally endangered species ▪ No significant contribution to global air pollution problem ▪ Minor elevation in ambient water/air pollutant levels well below guidelines ▪ No reported nuisance effects. ▪ Temporary or intermittent changes to livelihoods or life quality aspects	< 2

4.6 Identifying Mitigation Measures and ESMP Preparation

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

The ESMP is well defined with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources and responsibilities for implementation. The ESMP format is flexible to ensure the integration of project specific mitigation, enhancement and monitoring requirements. The ESMP's scope and level of details is proportional to the number and complexity of the measures required to ensure the project's environmental and social sustainability.

The following components constitute the minimal contents of an ESMP:

a) *Objectives of the ESMP* - This section specify what the ESMP aims to bring the project into compliance with applicable national environmental and social legal requirements and the Bank's safeguards policies and procedures. The other objective of the ESMP is to outline the mitigating/ enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts. It also addresses capacity building requirements.
b) *Context the ESMP* - briefly describes project activities and major environmental and social components that will likely be affected positively or negatively by the project. It describes and analyses the physical, biological and human/social conditions prevailing in the project area, highlighting relevant environmental and social issues among others.
c) *Beneficial and Adverse Impacts* - This section focuses on beneficial impacts that can be enhanced to improve the project environmental and social performance as well as on adverse impacts that require mitigation measures to be minimized or compensated.
d) *Enhancement/Mitigation Measures and Complementary Initiatives* - This section proposes feasible and cost effective measures to address the impacts previously defined, in order to accrue project

benefits through enhancement measures or to reduce potentially adverse environmental and social impacts to acceptable levels (mitigation measures).

e) *Environmental and Social Monitoring Program* - A monitoring program aims to ensure that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced when inappropriate.
f) *Responsibilities and Institutional Arrangements* **-** The implementation of enhancement and mitigation measures and the completion of the monitoring program require to clearly establish responsibilities among the various organizations involved in project implementation and operation. The ESMP proposes support to the organizations that may have insufficient capacities to fulfill their obligations. This support could be provided through various means including technical assistance, training and/or procurement.
g) *Estimated Cost* - This section estimates the capital and recurrent cost associated with the various proposed measures (enhancement and mitigation), the monitoring program, consultations, complementary initiatives and institutional arrangements.

Table 21 provides a summary template for Monitoring Requirements.

Table 36: Summary Template for Monitoring Requirements

Phasing	Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency	Responsibilities	Cost
Pre-Construction Phase							
Construction Phase							
Operation and Maintenance Phase							

A monitoring program aims at ensuring that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced when inappropriate. Further, it allows assessing compliance with national environmental and social policies and standards. A monitoring program include two parts:

a) *Surveillance activities* - The surveillance aims to ensure that the proposed mitigation and enhancement measures are effectively implemented during the construction phase.
b) *Monitoring activities* - These activities consist of measuring and evaluating the project impacts on some environmental and social components of concern and to implement remedial measures, if necessary.

The program defines as clearly as possible the indicators for monitoring the mitigation and enhancement measures that need to be assessed during project implementation and/or operation. The monitoring program also provides technical details on monitoring activities such as methods to be used, sampling locations, frequency of measurements, detection limits, and definition of thresholds that will signal the need for corrective actions. The process for establishing a monitoring programme consists of the following actions as provided for in this ESIA:

- Specific management and monitoring objectives;
- Identification of the scope of monitoring;
- Recommend appropriate monitoring environmental and social aspects and technology;

- Specify how the information collected should be used in decision-making;
- Define the spatial boundaries and select map scales and sites for observation, measurement or sampling;
- Select key indicators for direct measurement, observation or sampling;
- Define how the data will be analysed and interpreted and how it should be presented in monitoring reports;
- Define the precision and accuracy required in the data;
- Consider compatibility of data to be collected with historical data and with related contemporary data;
- Set minimum requirements for monitoring.

5. ENVIRONMENTAL & SOCIAL BASELINE

5.1 Climate

The project area are in semi-arid climatic zone with orographic and a bimodal average rainfall going up to about 875 mm per year. Rakai district, the host of project RGC, is clustered under Zone CE in the Uganda Meteorological Map[4] as shown in Figure 5. Within this zone there is significant variation irrespective of the amount of rain, thus the pattern of seasonal variation is the same within this Meteorological Zone as illustrated in Figure 10. The climatic representation given in this Section is applicable to the project RGCs since there is little variation in observed climatic conditions in the district.

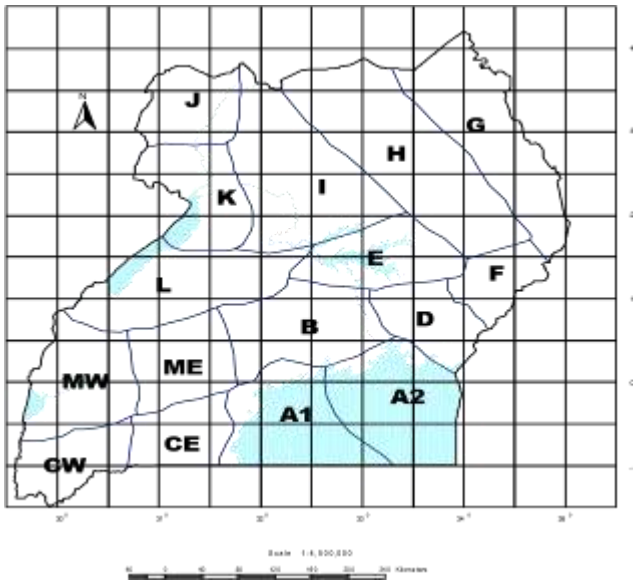


Figure 11: Rainfall Zone in Uganda

Monthly average rainfall for the project area varies between 14 mm in January and 230 mm in August. The mean annual rainfall varies from 1,350mm to 2,125mm. The wet season extends from April to October with peaks during the months of May, August and October. The project area displays fair distributions of rainfall throughout the year.

Two dry seasons occur with the more pronounced one in June to early September, while the other is between December and early March. There is a relatively dry season around January and February, and another in June, July and August. However, these dry periods are occasionally mitigated by a few light rain falls. A principal peak is due around March-April and May, whereas the minor peak is around October and November.

[4] Uganda National Meteorological Authority Historical Rainfall Data Base

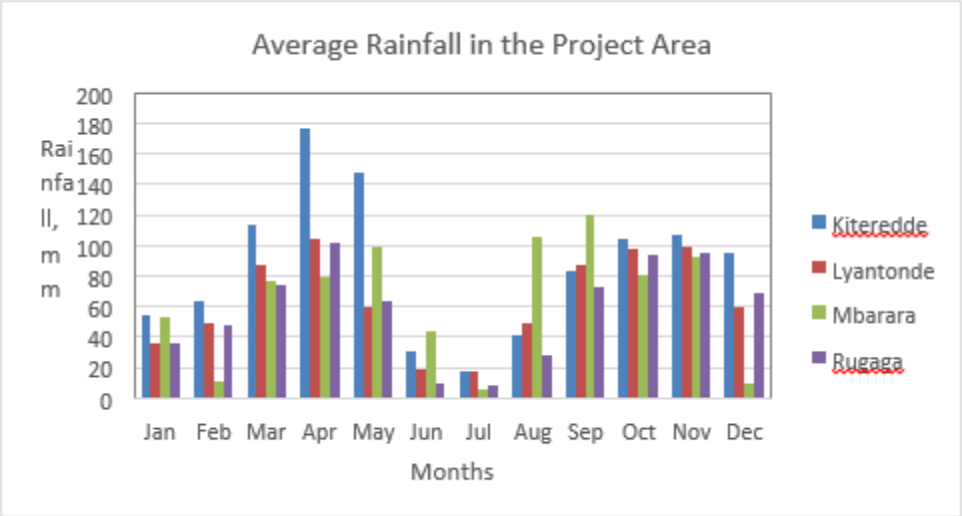


Figure 12: Average Rainfall Pattern in the Project Districts

The average temperatures typically varies from 15°C to 27.8°C within the project area. These are very insignificant variations and hence indicate that there are generally high temperatures within the project area throughout the year.

Relative humidity ranges between 80-90% in the morning and decreases to between 61% and 66% in the afternoons during the months of January and May. From June to August, the morning recordings decrease to around 77% and so, are the afternoon recordings that decrease to around 56% and 57%. The implication is that though the morning recordings are always within reasonable limits to induce rainfall, they normally reduce unfavourably in the afternoons resulting in poor chances of getting rainfall. However, it should be noted that relative humidity is so variable with time and thus liable to change any time in relation to other climatic conditions.

Considering a wet day being one with at least 1.0 mm of liquid or liquid-equivalent precipitation, the wetter season lasts 8.8 months, from about August 28 to May 23, with a greater than 42% chance of a given day being a wet day. The chance of a wet day peaks at 71% on or around April 12. The dry season stretches over a 3.2month period, from about May 23 to August 28. The least chance of a wet day during this time being 13% on or about July 4. The most rain falls during the 31 days centered around April 16, with an average total accumulation of 135 mm. The least rain falls around June 28, with an average total accumulation of 20 mm.

The length of the day in project area does not vary substantially over the course of the year, staying within 10 minutes of 12 hours throughout. The earliest sunrise is at 6:33 am on November 5, and the latest sunrise is 31 minutes later at 7:04 am on February 12. The earliest sunset is at 6:41 pm on November 1, and the latest sunset is 31 minutes later at 7:12 pm on February 9.

Considering the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground, the windier part of the year lasts for 4.1 months, from May 4 to September 6, with average wind speeds of more than 10.4 mm per hour. The windiest day of the year is July 4, with an average hourly wind speed of 13.1 mm per hour. The calmer time of year lasts for 7.9 months, from September 6 to May 4. The calmest day of the year is November 18, with an average hourly wind speed of 7.5 mm per hour.

5.2 Topography

The landscape of project area corresponds to Wetlands Pen Plain II. It is part of the mid-tertiary or Buganda surface, which is essentially a plateau land. The same landscape is represented in large parts of East, Central and Southern Africa. The landscape is the result of a long period of quiescence from the end of the Karoo era to early tertiary, during which sub-aerial erosion reduced the plateau land to a very low relief. This almost perfect pine plantation was followed by slow uplift, which commenced in the early tertiary and the consequent dissection by the rejuvenated drainage system. As a result, an elevated and dissected plateau consisting of flat-topped hills or their remnants and intervening valleys was formed.

Today the remnant of this surface are well preserved in the hill areas of the District, with some of the hill ranges rising to between 1402 mAMSL and 1463 mAMSL with some peaks attaining 1520 mAMSL. Such a range in altitude is thought to have been caused by the warping in the late tertiary times and localized arching induced by rift valley formation. However, another most likely cause is the differential resistance of rocks to weathering. The rocks that have given rise to these hills are more resistant to weathering and erosion than the adjacent geological formation so that the difference in height is a product of differential erosion. The North eastern and Western parts of Rakai District are hilly (Rakai highlands) only interrupted by two major lake depressions (Kijanebalola and Kacheera) and occasional wide flat valleys (pseudo-plains). The southern eastern and north western parts of the District comprise almost flat to undulating plains topography. Therefore, Rakai District can be divided into three main topographic zones – the Lake Victoria shores, the North – Eastern and Western hills and the North – Western plains.

The geomorphology of the district renders some areas especially those that are hilly difficult to access and makes service delivery a great challenge. It also leads to soil erosion, accelerated degradation of the infrastructure and flooding of the low areas.

Plate 3: The topographic view of the project area (Lwentulege RGC)

5.3 Geology and Soils

Over 75% of the project area soils are ferralitic representing an almost final stage of weathering with little or no mineral reserve left. Some "heavy" clay varieties have some fertility but sandy varieties are particularly poor. Other types include lithosols, alluvial and lacustrine sands and alluvial clays. Generally, lithosals and humus loams are the dominant upland components while the grey sandy soils derived from hill wash or river alluvium, grey clays of the valley bottoms and lacustrine sands dominate the lowland component. Lithosols are soils without horizons and thus young and stony or bare rocks. Generally, the soils within the project area can be classified into four soil catenas, four soil series and peat soils. Taking a

rough estimate of the District aerial coverage it will be noted that the Kooki catena is the dominant soil type accounting for over 40% and dominant in most of Kooki County and parts of Kyotera County of the dry land in the District where the project area falls. This is followed by Teloro series about 14% mostly in Buyamba and Lwamaggwa, Bukora series about 8%, Sango series about 4%, Mulembo series. Some of the soils especially in Kooki are loose and often collapse making the construction of sanitation facilities very difficult and more expensive.

Plate 4: Examples of the soils within the project area.

5.4 Flora

The vegetation of the project area is as varied as the different ecosystems that characterize the area that is modified for agricultural activities. Three broad categories can be used to classify the vegetation of the district, namely: forests, swamps and savannas. Generally, the project area is dominated with grass species of *Eragrostis sp, Hyparhenia filipendula, Sprobolus africana, Sprobolus pyramidalis*, *Paspalum notatum, Cymbopogon nardus* and *Imperata cylindrica* in some areas. Some small thickets were observed to be sparsely distributed. Bushy habitats constituted of *Solanum mauritianum, Acanthus pubscens, Solanencio angulatus, Eriosema glomeratum, Triumfetta spp, Hyparrhenia spp and Imperata cylindrica, Microglossa pyrifolia, Acalypha spp* and *Alchornea spp*, mixed with several herbaceous weedy species. The bushy marshy habitat is characterized by *Leersia hexandria* and *Triumfetta macrophylla* as the dominant ground vegetation cover with some *Phoenix reclinata*, *Alchornea* and *Measa lanceolata* dominating the woody species layer. Generally, the project areas have a pure savanna woodland type of vegetation characterized by short eucalyptus trees, acacia species and short grass.

Wetlands have developed an adaptive vegetation like shrubs, grasses and *Phoenix reclinata* trees. *Cyperus papyrus* swamps communities are on sites with impeded drainage and have less tree cover with perennial grasses and sedges. The vegetation communities found in these include the *Echinochloa, Sorghastrum, Alchomea cordifolia, Sesbania sesban, Ficus con gensis, Thelypterus extensus, Thelypterus Dentata, Merramia subcordata, Miscanthus species* and *Typha latifolius*, *Typha domingesis* is among dominating species.

Plate 5: Some of the vegetation around the production well in the project area

Part of the District. They occupy part of the Kagera River floodplain, and are surrounded by swamp and seasonally flooded grassland communities. They generally cover about 151 sq km of un-demarcated reserves, with Kaiso and Malabigambo reserves being continuous with the Minziro forest in Tanzania. The boundary of these forests appears to be natural, and follows the limits of areas of seasonally inundated grassland and swamp, which surround the forest. The Sango Bay forests are rather of homogeneous nature and can be broadly classified as swamp forests. The vegetation of the District provides potential for eco-tourism. However, the forests are heavily encroached due to increased demand for forest and wood products and land for cultivation.

5.5 Fauna

Bird Species recorded within the project area included: *Scopus umbretta (Hamerkop), Ploceus pelzelni (Slender-billed Weaver), Moticilla agiump (African pied wagtail), Melocichla mentalis (African moustachad warbler), Lagonosticta rubricate (African firefinch), Turdus piaggiaes (Abyssinian ground thrush), Eupodotis melanogaster (Black-bellied bustard), Francolinus sephaena (Crested francolin), Merops variegaster (Blue-breasted bee-eater), Pyconotus barabatus (Yellow-vented bulbul), Colius macrourus (Blue-naped mousebird).* Most of the above bird species are forest and grassland birds thus live in the forest, forest edge or a degraded forest and in grassland habitats and sometimes in cultivations.

The drilled borehole is located in an area that is habitant areas for different species. Butterflies are increasingly being recognised as valuable environmental indicators, both for their rapid and sensitive responses to subtle habitat or climatic changes and as representatives for the diversity and responses of other wildlife. A number of butterfly species were encountered within the project areas mainly around wetland and forested areas and these included: *Papilio bromius, Papilio dardanus, Lachnoptera anticlia, Metisella orientalis, Ceratrichia flava, Acleros mackenii, Neptidopsis ophione, Salamis parhassus, Junonia Sophia, Sarangesa lucidella*.

The most common and abundant Mammalian species recorded within the project area was *Rattus* (House rat) followed by *Crocidura olivieri* (African Giant Shrew). The low mammalian species recorded in the project area could be attributed to human disturbance mainly through cultivation, grazing and settlement. Thus, widely distributed and not habitat specific, but very adaptive to a wide range of habitats.

None of the faunal species in the project area is of conservation concern with regard to IUCN Red list of threatened species.

5.6 Noise Levels

There are no cases of noise pollution at the proposed project areas. Thus the project site indicates a generally pristine environment with respect to ambient noise. However, as would be expected due to the increased human activities and construction activities noise levels are likely to increase. Noise levels recorded at selected locations within the proposed project area are presented in Table 37.

Table 37: Noise levels measured at the proposed project sites.

Area	Location	LA_{min} dB	LA_{max} dB	LA_{Eq} dB	Comments
Lwentulege BH area	0°50'10.95"S, 31°14'31.89"E	30.7	31.5	31.1	Swishing tree leaves, twittering birds and human conversations
Lwentulege RGC area	0°50'11.24"S, 31°14'24.73"E	34.6	38.2	36.4	Swishing tree leaves, twittering birds and human conversations
Reservoir tank area	0°50'6.86"S, 31°14'22.03"E	30.0	32.2	31.1	Swishing tree leaves, twittering birds and human conversations

The levels are based on land use Category D (Residential plus Industry or small scale production and commerce) for which daytime and night limits are 60 and 50 dBA, respectively according to the National Environment (Noise Standards and Control) Regulations 2003. All measurements were conducted during daytime.

5.7 Air Quality

The ambient air quality is assumed to be good as there are no major industrial sources of air emissions. The primary sources of air emissions in the area are automobiles (vehicles and motor cycles). Fugitive dust is attributed to vehicular movements along loose surface/murram roads, which dust levels, are exacerbated during dry, sunny and windy periods. Air quality measurements indicated a reasonably clean environment with respect to air quality as presented in Table 38.

Table 38: Results of air quality measurements taken in the project area

Area	Location	*O_2 (%)*	*CO (ppm)*	*VOC (ppm)*	*$PM_{2.5}$ ($\mu g/m^3$)*	Air pollutant
NEMA (Draft Air Quality Standard for Ambient Air)		*19.5-23.5*	*9.0*	*15*	*25*	
IFC, 2007 Standard					*25*	
Lwentulege BH area	0°37'39.63"S, 31°18'2.39"E	20.0	0.0	0	Max 0.000 Ave 0.000	Dust elevated by wind
Lwentulege RGC area	0°50'11.24"S, 31°14'24.73"E	21.0	0.0	0	Max 0.021 Ave 0.210	Dust elevated by wind
Reservoir tank area	0°37'51.74"S, 31°17'34.94"E	20.1	0.0	0	Max 0.000 Ave 0.000	Dust elevated by wind

All the assessed parameters were within the within permissible values in accordance with the NEMA (Draft Air Quality Standard for Ambient Air) and IFC, 2007 Standard. There were no detectable levels of NO, NO_2, CO, H_2S, Cl_2, ClO_2 and SO_2 at all measurement locations.

5.8 Ground Water Resources

Water resources are based on borehole DWD 60878 that have a total test yield of 36.0m^3/within the town. Pumping is to be powered by the grid power and solar system in order to meet the ultimate water demands. Figure 8 shows the Lwentulege water supply pump.

Plate 6: Lwentulege water supply production well.

5.9 Water Quality Analysis

Water quality tests (physical, biological and chemical) were carried out in May 2021 and analysed at the Ministry of Internal Affairs Central Analytical Laboratory (GAL) for the proposed water source (production well) during the detailed engineering design stage (Detail Engineering Design Report, 2022). The proposed water source was subjected to water quality tests in order to establish the suitability for domestic use in May 2021.

During ESIA stage, a raw water sample was collected at the proposed water source point (artisan production well) in April 2022 and delivered to the Government Analytical Laboratory in Wandegeya, Kampala for analysis. Annex V presents the analysis report.

Note that, the water sample was collected from the water oozing out of the artesian well (as agreed with the client during the inception report presentation) and not collected directly from the aquifer thus the presence of suspended solids, Total Coliforms and E Coli, This is attributed to contamination from the surroundings as the borehole is sited in an area susceptible to flooding and collection of the run-off. Table 39 below presents a summary of a comparison of the water quality analysis results for the samples that were collected during site visits by the ESIA team in April 2022 from the proposed water source (artisan production well) and compared with those that were taken in May 2021 during the Detailed Engineering Design stage.

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

Characteristic	Unit	ESIA Stage	US-201: 2008 Requirement	WHO 2011 Requirement
pH		6.5	6.5 - 8.5	6.5 – 8.5

Turbidity	NTU	22	25	25
Dissolved Solids	mg/l	1258	1500	No Guideline
Suspended Solids	mg/l	**8**	0	No Guideline
Electrical Conductivity (EC)	µS/cm	242	1500	250
Total Hardness (as CaCO3)	mg/l	86	500	No Guideline
Calcium (as Ca)	mg/l	38.8	75	No Guideline
Sodium (as Na)	mg/l	88.8	200	200
Magnesium	mg/l	32.6	50	No Guideline
Arsenic (as As)	mg/l	≤0.01*	≤0.05	≤0.01
Copper (as Cu)	mg/l	0.8	1.0	2.0
Chloride (as Cl)	mg/l	128	250	250
Chromium (as Cr 6+)	mg/l	≤0.01*	0.05	0.05
Fluoride (as Fl)	mg/l	1.2	1.0	1.5
Iron (as Fe)	mg/l	**4.8**	0.30	No Guideline
Manganese (as Mn)	mg/l	**1.8**	0.1	0.1
Nitrates (as NO3)	mg/l	6.4	50	50 (Total Nitrogen)
Barium	mg/l	-	1.0	0.7
Aluminium (as Al)	mg/l	-	0.1	0.2
Sulphates	mg/l	114	200	250
Zinc (as Zn)	mg/l	-	5.0	3.0
Lead (as Pb)	mg/l	≤0.001*	0.05	0.01
Selenium (as Se)	mg/l	-	0.01	0.01
Cadmium (as Cd)F	mg/l	0.01	0.01	0.003
Mercury (as Hg)	mg/l	-	0.001	0.001
Cyanide	mg/l	-	0.01	0.07
Total Coliforms cfu/100	mg/l	**18**	nil	No Guideline
E. Coli cfu/100	mg/l	**3**	Absent	Absent
Mineral oil	mg/l	-	0.01	No Guideline
Anionic detergents	mg/l	-	0.2	No Guideline

From the analysis done, all parameters were found to be within acceptable limits for potable water except TSS, iron, manganese, total coliforms and E. Coli. The interpretation for the existence of these parameters is as follows:

Total Suspended solids consist of an inorganic fraction (silts, clays, etc.) and an organic fraction (algae, zooplankton, bacteria, and detritus) that are carried along by water from the ground. The geology of a catchment affects the amount of suspended solids.

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

Manganese is one of the most abundant metals in the Earth's crust, usually occurring with iron. Of most importance and concern are the oxidative states Mn^{2+}, Mn^{4+} and Mn^{7+}. Manganese is naturally occurring in many surface water and groundwater sources, particularly in anaerobic or low oxidation conditions.

Levels of manganese in fresh water typically range from 1 to 2 mg/litre, although levels as high as 10 mg/litre in acidic groundwater have been reported; higher levels in aerobic waters are usually associated with industrial pollution. Manganese can be removed by chlorination followed by filtration.

Total coliform bacteria (excluding E. coli) occur in both sewage and natural waters. Some of these bacteria are excreted in the faeces of humans and animals, but many coliforms are heterotrophic and able to multiply in water and soil environments. Total coliforms can also survive and grow in water distribution systems, particularly in the presence of biofilms. Total coliforms should be absent immediately after disinfection, and the presence of these organisms indicates inadequate treatment.

Faecal Coliforms in a drinking water sample often indicates recent faecal contamination, meaning that there is a greater risk that pathogens are present than if only total coliform bacteria are detected. This could be as a result of human waste as a result of poor sanitation within the area since the water source is located near the urban centre of Lwentulege Town Council.

Although the water quality analysis presented in the Detail Design Engineering Report (April 2022) indicate that the samples generally showed satisfactory results with all the parameter values meeting the National Drinking Water Quality Standards, hence no need for any treatment process. Its further recommends that, only chlorine disinfection has been proposed to ensure a residual chlorine to guard against contamination of the water in the extremity of distribution mains.

Generally, the water sample picked from the oozing out of the artesian well do not met the national drinking water standards. **As such, water from artisanal well is not suitable for direct consumption and would therefore need conventional treatment (aeration, coagulation, sedimentation, filtration and disinfection) and boiling to make it suitable for that primary purpose**. In that regard, a conventional water treatment system is the suitable option given the eminent seasonal variations in the raw water quality. Further still, based on experience, most of the nation's surface water sources can best be treated by the conventional water treatment works, with the proposed source not being exceptional. There is thus need for further water quality testing and analysis if the well is to be developed for domestic water use purposes.

5.10 Socio-economic Environment

5.10.1 Socio-Economic Baseline Results

A household survey was undertaken as part of the ESIA and RAP where a total of 409 households were surveyed with the vast majority (99%) of the survey respondents being head of their households. The majority of the respondents were male at 76% and with female at 24%. In Uganda, even though there are more female than male in terms of population, most of the land and property assets are owned by male. This could explain why there are more male respondents than female respondents. Whereas the male own land, women will mostly farm on the land. Women who owned land in the project area either had purchased it with their own money or were widows. According to the 2015-2020 District Development Plan, in Rakai District, many landless potential farmers especially women cannot easily access land because of costs, cultural norms and threats.

Majority of the survey respondents are below 49 years (64.8%) with 34.5% above 49 years and 0.7% below 18 years. According UBOS, majority of the population lies below 45 years of age. Majority of the respondents 83.4% are married, followed by the widows 10.7%, separated 2.9%, widower 1.5% while only 1.5% of the respondents surveyed are single. This implies that most of the respondents have families that

will be affected by the Lwentulege RGC Water Supply and Sanitation Project. Additionally, it implies that there will be more demand for water after project implementation.

69.9% of Project Area surveyed respondents are Protestants, followed by Catholics 18.3% and Moslems 7.6%. Other religions include; 4.2% Born Again among others. The presence of these different religions determines a lot when and how sensitizations and consultations should be carried out within the project area and which religious leaders to be involved. The majority 94.9% of Project Area households surveyed were born in the project area while 4.2% have lived in the community for ten or more years. This implies that majority of the respondents have knowledge about the project area and can be direct beneficiaries to the Lwentulege RGC Water Supply and Sanitation Project.

The majority of households surveyed are very supportive of the Lwentulege RGC Water Supply and Sanitation Project at 99.3%, 0.5% of the households are somewhat in support of the project and 0.2% don't support the project at all. The very high support of the project implies that water is very much needed in the project and surrounding areas and that there will be minimal disturbances during the construction phase. However, more sensitization is needed to engage the 0.2% so that there is full support for the project. It's important to take note of the fact that even if the community is need of water and supportive of the Lwentulege RGC Water Supply and Sanitation Project, they are not agreeable to the proposed ground water supply system given the prevalence of iron oxide within the bedrocks and would prefer surface water system.

5.10.2 Administrative and Social Set-up

Rakai District is comprised of only one County, Kooki in which there are 9 (nine) Sub-counties and one Town Council. The District is the higher local, while the 10 (ten) are the Lower Local Governments (LLGs). The District Council is the highest political authority, headed by the Chairman LC V, while the Speaker presides over the Council meetings. The Council has an Executive arm comprised of five members headed by the District Chairperson.

The Chief Administrative Officer heads the administrative and technical wing of the District. A Technical Planning Committee (TPC), comprised of Heads of Departments and Sections coordinates the activities and functions of the District. The Service Departments in the district include: Health, Works and Technical Services, Production and Marketing, Education, Statutory Bodies, Gender and Community Services, Finance, Planning, Internal Audit, Management Support Services and Natural Resources.

5.10.3 Population

The total population of Rakai District as per the 2015 Rakai District Planning Unit was **237,889** composed of **115,975** males and **121,914** females. When the 2014 population census was compared to the 2002 population census results, the population in the district grew by 2.06 % over a period of 12 years. In addition, the 2014 Census indicated that the National total fertility rate was 6.2 % and the total average Household size being 4.4 persons for Rakai District.

Table 40: Population distribution by County/Sub-county in Rakai District

Sub County	Males	Females	Total	Household
Byakabanda	9,228	9,257	18,485	4,057
Ddwaniro	16,015	17,006	33,021	7,149
Kacheera	11,656	12,033	23,689	5,041
Kagamba	16,308	17,550	33,858	7,196
Kiziba	9,999	10,621	20,620	4,131
Kyalulangira	13,478	14,342	27,820	6,022

Lwamaga	21,534	22,663	44,197	9,494
Lwanda	14,049	14,558	28,607	6,427
Rakai TC	3,708	3,884	7,592	1,647
Total	**115,975**	**121,914**	**237,889**	**51,162**

Source: 2015 Rakai District Planning Unit.

Rakai District can be categorized as an ethnically rich district. The dominant tribe is the Baganda followed by the Banyankole. There is also a large number of people of the Rwandese origin and a significant number of other tribes like Barundi, Baziba and Banyambo people. Notwithstanding the heterogeneity, most of the people in the district can communicate in Luganda making packaging of development messages easier, less costly and more effective. About 96% of the population is rural, a situation which reflects the basically agricultural nature of the district economy. In this rural environment, settlement pattern varies, depending on a number of factors such as climate, vegetation, water supply, terrain, soil fertility, disease agents etc.

Basing on the 2014 National Population and Housing Census (NPHC), the district which now comprise of Kooki County only is densely populated with a density of 196 people per km^2 which increased from 102 people per km^2 as per 2014 and 2002 NPHC, respectively. The level of Urbanization is determined by the proportion of the population living in gazetted urban areas. The 2014 census defined urban areas to include gazetted cities, Municipalities, and town councils. Basing on NPHC 2014, 93.0% of the population in Rakai District is found in rural areas whereby only 7.0% of the population lives in urban areas. This percentage of urbanization in the district was still low despite the fact that it increased from 4.0% of 2002 NPHC to 7.0% when compared to the National urbanization average of 18.4% which portrays a slow pattern of development. This situation reflects that agriculture is the major activity of the district economy. In this rural environment, settlement pattern varies, depending on a number of factors such as climate, vegetation, water supply, terrain, soil fertility, disease agents hence imposing difficulties to service delivery.

The population growth rate of 2.06% is which has a major implication on the demand for social services and places a huge burden on the already limited budget of the sector. It is recommended that the district steps up policies and programmes to manage the population growth. Migration is an important factor that affects both the population size and social economic development. Unlike birth and death (the other two factors that affect the population size of a country) migration, especially emigration is not easy to monitor. This is also true if migrants use non-gazetted entry exit points. It becomes difficult to accurately estimate the district's population growth if the full picture of the migration is not fully ascertained. It is therefore recommended that the legal requirement that all immigrants should register on arrival, should be enforced and monitored.

5.10.4 Economic Activities

The major occupation of the household livelihood in the Project areas is subsistence farming (95.4%) growing crops that include cassava, Irish potatoes, maize, beans, ground nuts, sweet potatoes among others. Being largely peasant farmers, they consume domestically what they produce and sell the surplus in local markets for cash. Other activities include petty businesses in the village and trading centres, operating small kiosk grocery shop, road side sale of farm products, casual labour and formal employment. Since most of the households consider farming as the main source of income, the farmers should be encouraged to replant the affected crops and trees in the project area. The huge percentage of the population that is engaged in agriculture implies that people's economic livelihoods are dependent on exploitation of natural resources with all its attendant effects including exploitation and degradation.

The surveyed population indicated that bad weather (98.0%) and poor soil quality (1.0%) alongside the ever-rising cost of inputs (0.5%) equally equated to limited market access as the leading factors limiting their HH incomes among others.

The main economic activities include peasantry farming, and wide range of livestock rearing of indigenous cattle, pigs and goats all of local breed. There are no significant differences in economic activities among the RGCs/Parishes. The main livestock market (cattle market and abattoir) is located in Rakai while other weekly markets in Lwentulege, Kituntu, Rugando, Kirangira, Kyenwa, Lwebitakuli, Nankondo and Kyemamba trading centres who have also engaged in the same economic activity. Consequently, a number of traders have been attracted to these RGCs. There are only weekly markets (no daily central market) controlled by vendors dealing in vegetables and other consumables where all road side vendors are located. The most grown crops are matooke, maize, sweet and potatoes, beans, cassava and coffee. Industrial growth is mainly agro-related and is slow hinging mainly on maize crop, coffee processing, fish processing, furniture works and carpentry.

77.6% of people living in rural depend on subsistence farming. The economy is basically reliant on crop production and livestock production. Main food crops include finger millet, maize, beans, bananas, sorghum, sweet potatoes, Irish potatoes, cassava and groundnuts. Coffee is the major cash crop in the district. Fruits and vegetables such as passion fruit, tomatoes, pineapples, onions and cabbage are also grown. Others are fishing and the upcoming fish farming, agro-forestry, sand excavation, and brick making. The huge percentage of the population that is engaged in agriculture implies that people's economic livelihoods are dependent on exploitation of natural resources with all its attendant effects including exploitation and degradation.

Plate 7: Maize as one of the crops grown within the project area

Plate 8: The commercial Centre of the project area of Lwentulege Town Council

5.10.5 Land Area and Use

Rakai district now comprising of only Kooki County is approximately 4,989 km^2 with undefined shape from the mountain to the regional road. The geographical location as well as the physical characteristics of Rakai District give it a peripheral shape. In spite of the fact that it does not have an international border, it occasionally gets influx of refugees, spilling over from Isingiro District, in search of pastures and water for their animals, which makes the District exposed to the spread of diseases. The land tenure system among the Project Affected Persons (PAPs) is Customary and is characterized by local customary regulation and management of individual and household ownership, use and occupation of, and transactions in, land. Providing for communal ownership and use of land in which land parcels may be recognized as subdivisions belonging to a person, a family, or a traditional institution. Land is considered as owned in perpetuity. Otherwise, the main activities to which the land is put to use are the small scale farming, cattle keeping and minor economic activities like quarrying and brick making.

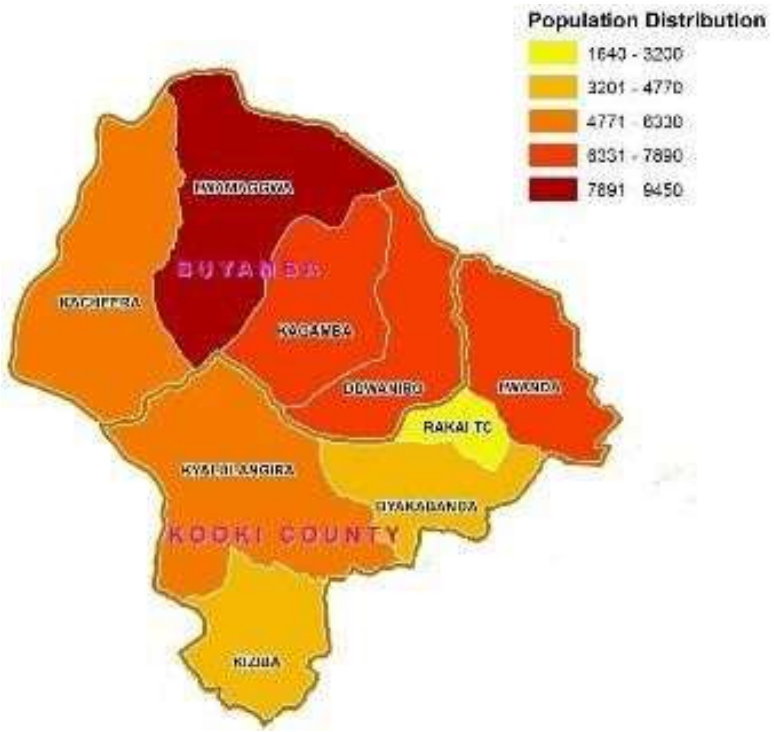


Figure 13: Exploded Map of Rakai also showing Population Density

5.10.6 Land area

This includes areas of seasonally flooded grassland, swamp forest, permanently flooded papyrus and grass swamp plus upland bog. Out of a total district area of 4,898km^2, wetlands (both permanent and seasonal) occupy 1,234km^2. This represents approximately 25.2% of the total land area that is under the wetland system.

The National Wetland Policy and the Sustainable Development Goals state "***to promote the conservation of Uganda's wetlands in order to sustain their ecological and social economic functions for the present and future well-being of the people***". According to the wetland inventory report, inaccessibility to most of the permanent wetlands may be the only one factor that is preventing them from heavy degradation. A case in point is the Sango Bay wetland forest area that also has very sparse population and covers approximately 151 km^2. So far, therefore, there is serious wetland degradation and the rate at which it is increasing is worrying if not checked immediately.

Dumping especially near urban centres has become the order of the day. Swamp reclamation and conversion for agricultural usage is increasing as the weather patterns change towards having more and prolonged droughts. Population growth has also contributed to wetland encroachment as residents and immigrants seek more land for production. Wetland conversion in respect of economic activities has so far reached an alarming stage and spreading very fast. This calls for a concerted effort to curb the misuse before it spreads to uncontrollable levels.

Most abuse is around urban centre of Rakai where construction and cultivation is taking place in various spots of the wetlands near and around the town but this practice is now spreading to the areas around RGCs where people are moving to these quasi-urban settings. The Bukola river catchment is also being converted at high rate for agricultural production. During prolonged drought the wetlands are cultivated and seasonal crops are planted like horticultural crops (cabbages, tomatoes, etc.), potatoes, beans and maize. The overall effect is that the original natural vegetation, flora and fauna are permanently lost.

Eucalyptus planting is on the increase and many seasonal wetlands are rapidly being turned into eucalyptus woodlots. In Kooki County the riverine swamps are often drained for the production of sweet potatoes, millet, Irish potatoes and maize cultivation and Eucalyptus tree planting. Long term strategies must therefore be found to combat the threat of wetland degradation, given the inevitable consequences coming as a result of climate change.

5.10.7 Roads

Kagamba RGC is located approximately 13km North of Rakai Town. Access is through the main road to Lyantonde District. The road is unpaved but motorable throughout the year. The adjacent RGCs are connected with poorly maintained unpaved roads that are sometimes difficult to navigate during the rainy season. The district has one major paved all-weather road from Kyotera Town to the district Headquarters and this boosted the economic situation of Kooki County as it joins other murram roads managed by both the Uganda National Roads Authority and the district. There is poor road network in the entire Sub-County. This has been as a result of poor road maintenance, lack of management policies, and lack of resources. Poor road network has resulted into low income and children reaching schools late.

Plate 9: The Lyantonde-Rakai Road through Lwentulege Town Council

Plate 10: One of the community roads within the project area 100m away from the production well

5.10.8 Telecommunications and Postal Services

The project area is well covered with mobile network services such as; Airtel and MTN. The television reception is extremely poor though various FM radios are received. Lwentulege RGC is connected to the national electricity grid. Communication in the area is good, with the two (2) major mobile phone operators (MTN and Airtel) in Uganda providing services in the area. There are no postal services and the project area and can only access such services in Kyotera Town, some 45km away from the Rakai Town.

Plate 11: MTN and Airtel services within the Lwentulege Town council

5.10.9 Energy

There is national electricity grid at Lwentulege RGC and some of the surrounding RGCs in the project. Nonetheless many of households are not connected but depend on solar power. Opportunities to attract the agro based small-scale industries in the area are high. 94.1% Households in the project area use firewood as a source of energy for cooking. This is supplemented with charcoal at 5.9%. The use of firewood is mainly due to its cost effectiveness and availability.

Plate 12: Lwentulege Town Council is connected to the national grid and has fuel station

5.9.10 Agriculture and Food Security

A poor household is faced with landlessness or has little land that is not productive. In some cases a poor household rent land and hire or borrow farm implements like hoes and pangas. Such households also lack seeds for planting. A baseline survey conducted by RACA May 2006 in Byakabanda, Ddwaniro, Lwanda, Kyalulangira and Rakai Town Council to assess the livelihood of female headed household revealed that the households owned an average of 0.5 acre of banana plantation; 0.3 acre of coffee, 0.2 acre of eucalyptus. Yet most of the households did not own any other land that could have been redundant. Each household had an average of 2 hoes, but hardly owned a bicycle. This gives an insight of productive assets owned by most of the households in the community.

Increased deforestation, overgrazing, vermin's, pests, poor farming methods, lack of farm inputs, and inadequate water for animals has led to poor and low production, malnutrition, low income and high school drop out because of lack of school fees. There is no food security in households because of low yield as everything is consumed and sold off to get money to meet other household obligations.

Plate 13: Agriculture as the source of food security in the project area

5.11 Institutions

Rakai District has over four hundred both secondary and primary schools, the district has two hundred eight four government aided the rest are privately owned and these have built human capacity in terms of literacy levels and employment to our communities. The District has 112 Health facilities of which is the overall goal of the department is to provide good quality services to the people of Rakai district so as to make them attain good standards of health in order to live a healthy and reproductive life. The department's objective is to reduce morbidity and mortality from the major causes of ill health and premature health and disparities therein". Rakai district has 107 Health Units of different categories. Some of them are Government hospitals while others are owned by Non -Government Organizations and Private for Profit (PFP). The distribution is fair, but some of them lack the basic equipment to offer reasonable services. Many rural units require rehabilitation and equipping. Besides diseases, poor nutrition has contributed to worrying situation. Because of cross cutting nature of health issues, there is need for an integrated approach to health. There are various NGOs both Local and International that are involved in AIDS prevention and control in the district. Such activities include blood screening and counselling, medical treatment, home care, pastoral education, health education, AIDS research and orphan support.

Table 41: Development Partners in Rakai District

Development Partners	Location(s) of Operation (sub county)	Type(s) of Support Provided
UNICEF	Entire district	VHT Training, PMTCT and emergency support to Sango Bay camp, Nutrition & EPI programs
World Vision	Kyalulangira, Kagamba, Lwamaggwa, Dwaniiro Sub-counties	OVCs, Sanitation and hygiene, advocacy, integrated outreaches
MARISTOPES	Entire District	Reproductive health

Source: Rakai District Development Plan, 2015-2020

5.12 Cross cutting issues

5.12.1 Poverty

Poverty is the biggest problem in in the entire Rakai district. Poverty has many dimensions. It certainly involves lack of human and physical basic needs/assets; inadequate material means to acquire food and other necessities. But it also means, the poor is vulnerable to ill health, drought and its consequences, job loss, economic decline, violence and societal conflict. This is a situation where the poor lack the opportunity to convert their enormous energy and hard work into a higher standard of living, and they systematically suffer from lack of influence and voice to express their situation. Despite impressive social and economic growth reported in Uganda, poverty remains widespread in most parts of Uganda, with 35% of the population reported to be living below the poverty line. Households in poverty do not usually sit idle, waiting for growth of programme benefits to come their way. Rather, they adapt numerous coping strategies that ultimately interact with national policies.

In Rakai poverty is generally perceived differently by the different categories of people. For example, women in fishing communities and urban areas define poverty as the inability to spend on luxurious items. The youth on the other hand consider poverty as lack of skills that can enable them to earn a living or the inability to transform the acquired skills into practice. However, many of them perceived it as the lack of basic goods and services such as housing, clothing, land, productive assets, and markets. This condition is also associated with isolation, powerlessness, physical weakness, weak family institutions and indebtedness.

A big proportion of the population is peasants whose livelihood is basically ensured through subsistence crop farming. Majority of the population is involved in agriculture on a small scale using labour intensive technologies, which are greatly vulnerable to the adverse effects of HIV/AIDS and other socio-economic and physical conditions. A few other households live off income generated through livestock keeping, hiring out labour, trading, cottage product, and social support. For many reasons (e.g. lack of labour and the attendant reduced production, high medical and funeral costs, distress sale of assets), HIV/AIDS impacted families tend to have very few opportunities for income earning or saving. The emerging family structure distortions such as child headed and female headed households undermine family income generating mechanisms; affect the nutritional situation and food security of the families, resulting into compromised productivity capacities of the affected families. Labour intensive farming systems employed by the households, with a low level of mechanization and agricultural input are particularly vulnerable to the effects of adverse conditions. Generally, the poverty situation in Rakai district can be assessed in a

number of areas and these include Health, Housing and Shelter, Education, Water, Sanitation, Economic environment, Agriculture and food security, Roads and Security.

5.12.2 Geographical Inequalities

Poverty in the District varies across Sub-counties with high levels experienced in certain areas. Sub-counties such as Lwamaggwa, Ddwaniro, Kyalulangira and Nabigasa that are prone to poor weather conditions such as drought or little rains usually experience low agricultural productivity. Given that the district is predominantly agricultural with over 70% of the population involved in subsistence farming, it's therefore possible that the district is at high risks of external shocks. The external shocks usually experienced by these sub counties lead to low household income, affecting the revenue base of the district. This consequently affects the capacities of both communities and local governments to contribute towards co-funding for development projects. The district with support from NGOs like World Vision, VI Agro-Forestry and Community Enterprise Development Organization (CEDO) are running food security programmes.

5.12.3 Vulnerability

The most vulnerable groups in the sub county are the:

i) Aged: This group is unable to work, illiterate in most cases and are vulnerable to diseases;
ii) PWDs: This group is discriminated from jobs and are illiterate in most cases;
iii) Widows: Loss of property, unemployed, lack money to educate the children and are discriminated in society;
iv) Non-going school youths: Unemployment, lack assets lack skills and are vulnerable to diseases; and v) Orphans: Unemployed or uneducated, have no assets and lack care.

The majority of the PAPs had no vulnerabilities except the 22 PAPs identified whom necessary support should be accorded to elderly with limited support (16 PAPs), elderly females with limited support who are widowed (6 PAPs). All these will need extra support during project implementation to ensure the benefit from the Lwentulege RGC Water Supply and Sanitation Project.

5.12.4 Health

Across all communities, malaria was the most commonly reported illness. Respondents admitted the existence of other diseases flu, cough, and stomach disorders but insisted that malaria is the most rampant within their community. Despite the prevailing common diseases and vulnerability in the project area, several factors were forwarded by the surveyed population as the causes that limit their access to healthcare. 34.2% of the surveyed population attach cost as their highest limitation to access healthcare, while the distance to the healthcare facility equally affected 42.9% of the surveyed population. Only 2.3% cited the absence of medicine or medical personnel at the healthcare facility among other reasons that limited them from seeking healthcare services. With the implementation of the Lwentulege RGC Water Supply and Sanitation Project, many people will have at least access to better sanitation as the area develops further for them to equally access better healthcare within reach.

5.12.5 Housing and Shelter

Due to poverty, people here, live under very poor conditions. The majority live in temporally shelters. This has greatly impacted on children and women and the consequences have been broken homes, child abuse, defilement coupled with early marriages and poor health.

5.12.6 Education

Majority of the respondents had attained up to primary six (P6) level of education (57.8%). These include all respondents that attained between P1 up to P6. 29.9% completed primary seven and attained the Primary Leaving Certificate awarded by the Uganda National Examination body (UNEB). Only 8.8% attained up to secondary level of education (between S1 up to S3) but did not complete the Ordinary Level of education. 2.4% completed the Ordinary Level of education. 0.2% attained a diploma in various fields while 0.7% had completed advanced level of education. 0.2% had attained a certificate in different fields of study either after completing A-Level (Advanced Level of education) or through the other options that are left open to anyone who desires to attain the same.

From the findings, majority of the respondents started education but did not complete primary education. The survey results align with the national dropout rate according to UNICEF's 2016 Annual Report, which indicates that 33% of students drop out before completing primary school. The level of education affects the mode of communication in the project area and how implementation of the Lwentulege Water Supply and Sanitation Project will be done. It is paramount for all engagements with PAPs at both the ESIA and RAP implementation phase be conducted in local languages so that they fully understand the messages being passed on. **5.12.7 Water and Sanitation**

According to the 2015-2020 Rakai District Development Plan, the safe water coverage is 45%, latrine coverage is 76% and good latrine coverage is 64%. Additionally, the greatest distance is approximately 16km from the water source. According to the RAP household surveys, lakes constitute 68.2% as the main water source for the surveyed population followed by ponds /dams at 31.3% and the river only at 0.5%. Much as these boreholes are located sometimes as far as 5km from some people, it remains the best alternative for water as shown in the table below;

Distance	Frequency	Percentage
0-1 km	87	21.3%
2-3 km	104	25.4%
4-5 km	128	31.3%
6-7 km	16	3.9%
7+ km	74	18.1%
Total	**409**	**100%**

Figure 14: Distance people travel to fetch water

The overwhelming majority of survey participants (99%) have access to a pit latrine only, 1% use communal pit latrine, none in the project area has a flushing toilet. Urban households are more likely than rural households to use improved sanitation. Eight in ten households use unimproved sanitation: 20% use a shared facility, 55% use an unimproved facility, and 7% have no facility. The households without any form of sanitation and use neighbours or communal pit latrines is mainly due to the expenses and difficulty involved in the construction of sanitation facilities. Some of the soils in the project area are loose and often collapse making the difficult and more expensive. Therefore, the Lwentulege RGC Water Supply and Sanitation Project will supplement sanitation efforts by constructing 4 public toilet facilities.

Plate 14: Residents fetching water from unprotected dam shared with animals as the only source of water

5.12.10 Security

Due to low incomes resulting from high level of unemployment especially the youth, there is a very high level of moral degeneration culminating into insecurity in the area. People have lost lives and property causing a low morale to work thus a setback in personal development at household level.

5.12.11 HIV/AIDS

Rakai District HIV prevalence rate is 12%, which is very high compared to the National average of 7.3%. This high prevalence rate has contributed to persistent poverty in the district because of its effect on the productive workforce. Among the ultimate effects of HIV/AIDS is the distortion of the institution of the family leading to the emergence of child headed households and female headed households. Other factors at interplay for the formation of child and/or female-headed households are cultural, demographic and social-economic. High mortality rates among adults are threatening economic and social well-being. Women and children are bearing the heavy burden of nursing the sick and managing households with over-stretched resources. Observations show that when a husband dies of AIDS in a family, the mother is also often living with HIV/AIDS and dies shortly thereafter, leaving children as orphans. This phenomenon has resulted into a lot of child-headed households in Rakai. Approximately 10.59% of the district population being orphan manifests a high rate of dependency thus further constraining the meagre resources available to households. Majority of the population is involved in agriculture on a small scale using labour intensive technologies (Child Headed Households and Female Headed Households Baseline Survey Report, 2006). The other few households were living off income generated through hiring out labour, cottage products, and external family support. For many reasons (e.g. lack of labour and the attendant reduced production, high medical and funeral costs, distress sale of assets), HIV/AIDS impacted families tend to have very few opportunities for income earning or saving, and survive basically on rudimentary means. The labour intensive farming systems employed by the households, with a low level of mechanization and agricultural input are particularly vulnerable to the effects of AIDS.

5.13 Gender Aspects

In Rakai District, issues of gender mainstreaming still require concerted efforts. Women participation in leadership is still hampered by cultural beliefs and perceptions. Most women who have actively participated politically are on affirmative action basis. There are low levels of education among women. The current district top science jobs are dominated by men. Many parents in Rakai do not prioritize girl-

child education. Because of disparities and need to empower women, there are a number of partners like the World Vision in Rakai to empower girl child and Women. 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, 51.7% mentioned male spouses, 40.6% female spouses and strangers as the main perpetrators of gender-based violence. Strangers were also revealed as some of the perpetrators 7.7%. At RAP implementation, collective participation and decision making at the household level needs be encouraged to minimize cases related to gender based violence and domestic related violence.

6. PROJECT NEED AND ANALYSIS OF ALTERNATIVES

6.1 Introduction

This Section evaluates available options to the proposed action, so as to arrive at the most environmentally friendly alternative, which maximizes economic, social and technical benefits resulting into minimal or insignificant environmental impacts. The comparison of alternative was done to evaluate and address the design alternatives that were examined and proposed during the feasibility and pre-design study of the proposed project. Therefore, according to the 2011 EIA Guidelines for water resources-related projects, the following alternatives/options were considered:

a) Project or No Project Alternatives;
b) 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.

6.2 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. This alternative means that the water supply systems will be left in their original states. The alternative ignores all positive impacts likely to be realized in the project area, like the increased access to safe and clean water, livelihood improvement, creation of both skilled and un skilled employment, induced development among others. This option is mostly applicable in situations where the proposed project area is in ecologically or socially sensitive areas and the negative impacts will be of significance and no proper mitigation measures can be formulated to eliminate or minimize the impacts to manageable or acceptable levels. The land on which the water supply system infrastructure will be put is less ecologically sensitive and no households will be displaced. The No Project Option is the least preferred option from both the socio-economic and partly environmental perspective because individuals, institutions, other water users and the business communities would be deprived of increased accessibility to clean and suitable water.

6.3 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 Lwentulege 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.

6.4 Water Supply Alternatives

Two options that were assessed. The first option was from the groundwater source while the second option was surface water. All the water supply options were explored and those that were deemed feasible based on financial, environmental and social requirements was considered as possible source to supply Lwentulege RGC Cluster.

A) Groundwater for the System

The design established that there were existing boreholes in the project area. The borehole that was drilled for the project (No. DWD60878) was found to be yielding $36M^3/Hr$ that was meeting the designed demand. This borehole development is not in a sensitive ecological are and required small land. This became a potential water source option.

B) Surface Water

The communities rely on water sources such as; springs, shallow wells, streams and the two lakes (L. Kijanebarola and L. Kachera). The design established that apart from the two lakes, the other surface water sources are seasonal; thus, remaining with lakes as the option under surface water. Of the two lalkes, Lake Kachera is far away from the RGC (20 Km) compared to L. Kijanebalola which is located 4 Km. Hence consideration the economic investment Kijanebalola would be a preferred option to Kachera. However, the water development of the surface water supply system would be costly as it is located in sensitive ecological area, unregulated activities like farming, fishing, artisanal works that affect water body. In addition stakeholders pointed of the unstable water levels especially during the dry seasons.

C) Overall Preferred Option

Overall, even the surface water source of Lake Kijanebalola will require more financial resources for development. This is because the high contamination levels of the lake and the water treatment cost will be on a higher side. This leaves the groundwater sources in the form of production well as the most viable source of water for the piped water supply system for Lwentulege RGC.

7. STAKEHOLDER ENGAGEMENT

7.1 Introduction

Consultation with relevant stakeholders and regulatory institutions was carried out to ensure participation of relevant stakeholders, as recommended by the National Environment Act, No.5 of 2019, EIA Regulations (2020), and conduct of Environmental Practitioners (2001) and guidelines for EIAs in Uganda. The consultations aimed to identify and take note of environmental and social concerns and views of all the stakeholders at an early stage so that appropriate mitigations are incorporated in the final implementation plan for the proposed project.

Stakeholder meetings were held at Rakai District, Kagamba Sub County (currently Lwentulege Town Council). The consultation process ensured that their concerns were captured and have been addressed during ESIA. A wider intensive consultation process was carried out during the Environmental and Social Assessment. These include stakeholders freely expressing their concerns on the project's environmental and social risks, impacts and mitigation measures. Informal conversational interviews, FGDs, KIIs and observations were the key data collection methods applied. The consultation process ensured that their concerns were captured and addressed. All consulted stakeholders supported the project and found it to be beneficial.

7.2 Objectives of Public Disclosure and Consultations

The primary purpose of the stakeholders' consultations was to provide an overview of the project to the relevant agencies, stakeholders and all the communities where the Lwentulege Water Supply System components are to be located and therefore impact on the communities. It further helps them to understand how the MWE and the project team will operate to the highest possible environmental, social, health and safety standards prior, during and after the construction of the Water Supply System related infrastructure.

The specific objectives of the Consultations were;

i) To obtain an understanding of the number and types of stakeholders in the socio-economic study area
ii) To provide information about the project and to tap stakeholders' information on key environmental and social baseline information in the project area
iii) To get views of the stakeholders/public regarding the environment and social concerns and opinions about the project.
iv) To manage expectations and misconceptions regarding the project
v) To discuss potential impacts and verify significant or major environmental, social and health impacts identified.
vi) To inform the process of developing appropriate mitigation and management measures as well as institutional arrangements for effective implementation.
vii) inform stakeholders about the engagement process and grievance management
viii) provide a mechanism for ongoing stakeholder engagement and ways in which the stakeholders can continue to participate in the stakeholder engagement process
ix) Ensure regulatory requirements and project standards are met.

Stakeholder consultations and public participation during the ESIA process were conducted in line with the requirements of the National legislation and regulations. According to the National Environment (Environmental and Social Assessment) Regulations, 2020, Part III under section "*Procedure for*

Undertaking Scoping and Environmental and Social Impact Study", Sub-section 16; "*Stakeholder consultation during the environmental and social impact study"*, stakeholder consultation is crucial during the ESIA study.

7.3 Stakeholder identification and analysis

7.3.1 Stakeholder Identification

A stakeholder may be defined as 'any individual or group who is potentially affected by the project or can themselves affect the project. To develop an effective stakeholder involvement programme, it is necessary to determine exactly who the stakeholders are based on their roles, influence, objectives and priorities specific to the project. The ESIA team formulated a stakeholder matrix and identified key stakeholders who were engaged during the study. A stakeholder engagement plan was drafted and populated with additional stakeholders during the ESIA study. The study targeted individuals, groups/institutions and communities that have a stake in the water project. Thus, only such entities as identified in the stakeholder analysis were selected to participate in the consultation process. The following aspects were considered when identifying and prioritizing stakeholders for this ESIA:

(i) Who could be adversely affected by environmental and social impacts of the project ?
(ii) Who are the most vulnerable among the potentially impacted, and are special engagement efforts necessary?
(iii) Which stakeholders can best assist with the early scoping of concerns and impacts?
(iv) Who strongly supports or opposes the changes that the project will bring and why?
(v) Who is it critical to engage with first, and why? (IFC 2007)

7.3.2 Stakeholder analysis

The stakeholder categories and sub categories identified are presented in table below.

Table 42: Stakeholder Matrix

Group	Stakeholder	Description and key attributes
Funder	World Bank	✓ To ensure that the Banks Safeguard Operational Policies have been observed and implemented as appropriate. ✓ Support the project with funding and implementation support
National Level Stakeholders	Ministry of Lands Housing and Urban Development (MoLHUD)	✓ Approves all reports presented by the consultant regarding valuation
	Ministry of Gender, Labour and Social Development (MoGLSD)	✓ Protection of human rights and vulnerable social groups. ✓ Occupational and community health and safety of workers. ✓ Approval and monitoring of the social safeguards ✓ Approval of permits like workplace permits, OHS
	Ministry of Water and Environment (MWE)	✓ Overall mandate to monitor, assess and regulate water resource ✓ Monitor and guide the use of wetlands for sustainability and other water bodies within the project areas

		✓ Approval of the Water abstraction permits ✓ The implementer of the proposed Project ✓ Overseeing and monitoring the proposed project activities
	NEMA	✓ Regulation of the environmental aspects of the project(s). ✓ Legally mandated to handle certain critical environmental issues ✓ Provide the necessary permits and approvals for quarries, borrow pits and other auxiliary sites ✓ Work closely with the project team to handle all matters related to environmental protection ✓ Overall clearance of ESIA and other project briefs about the project facilities. ✓ Monitor and supervise the ESIAs compliance
Local Governments	District (Rakai District Local Government)	✓ Mobilize various stakeholders including the communities/beneficiaries ✓ Monitoring and supervision support for the implementation of the projects. ✓ Offer security to the project team (RDCs Office) ✓ Review the ESIA and give comments (Environment and Community Development Offices)
	Kagamba Sub Counties (Technical and political staff)	✓ Make decisions that may affect the project, ✓ Offer support and supervision of the project ✓ Help in the identification of the location of the water and sanitation facilities.
	Local Councils	✓ Mobilize communities ✓ Offer support in the planning, implementation and operation of the project ✓ Offer support in the identification of the locations of the water and sanitation facilities ✓ Monitoring of the projects ✓ Provide social justice to vulnerable communities ✓ Incorporate information about the project in their teachings, gatherings/meetings for acceptance especially regarding water and hygiene-related information.
Different Community groups,	Traders, landlords, tenants, business people, affected persons (Landowners who offered land for the pro-poor facilities' installation)	✓ Develop construction (works) schedules in their respective areas. ✓ Participate in the scheduled meeting regarding the project activities and progress ✓ Identify mitigation measures of the environmental and social issues ✓ Monitor the progress of the project activities ✓ Input in the planning and identification of water and sanitation facilities.

7.4 Stakeholder engagements

Different methods were espoused to undertake the stakeholder engagements on this project. These were taken up depending on two major premises; the type of information required and the number of participants involved in the data collection process. These methods were used to inform the development of an appropriate water supply system within this proposed project area. Here-under are the methods that guided the stakeholder engagement process.

Target Group	Engagement Method
Regulators (NEMA), CGV, Ministerial Zonal Offices (MZOs)),	• Consultative regulatory matter meetings • Exchange of emails and letters.
Policy-makers (MWE, MLHUD, CGV)	• Sensitization meetings to create project implementation process awareness • Exchange of emails and letters.
Local Governments (CAO, LC V, RDC, City, Councillors, Area Members of Parliament, District Land Boards, LCIII Chairpersons, Subcounty Chiefs, CDOs	• Sensitization meetings to create awareness • Courtesy calls to update district leaders • Consultative livelihood restoration and community development program meetings.
Project Affected Persons/Communities	• Sensitisation meetings to create Project process awareness • Consultative compensation package meetings with PAPs • Focus Group (FG) discussions with vulnerable PAPs, women, and children • Group meetings on PAH verification and compensation package disclosure • Family meetings with PAPs regarding land and property disputes, Letters of Administration, and grave relocations • Individual PAP meetings to disclose compensation packages and notices to vacate • Sensitization materials (posters, radio messages, leaflets) • Consultative livelihood restoration meetings.

7.4.1 Meetings with the Stakeholders

The project had an inception workshop where all the stakeholders were invited as a start meeting to inform all the stakeholders about the project. MWE organized the meeting to inform all stakeholders about the project, its objective, the intended activities, the project extent, and the related studies to be undertaken, including the RAP and ESIA, water-related studies, source of water among others. The main object was to solicit, potential impacts and possible mitigation measures and also solicit initial community responses. The stakeholders were able to express comments and queries during this meeting as seen in the minutes under table 28.

7.4.2 Key informant interviews

Key informant interviews (KIIs) were held with individuals who were assumed to have specific information related to the project. Some of these were pre-set while others were identified during the interactions with other stakeholders. Some of such stakeholders included; The LCV Chairperson's office of Rakai, the District Engineers office, the Office of Public Health, DCDO, CDOs and Environmentalist among others.

Plate 15: Consultants engaging the Town Clerk and Health Assistant at the Sub County offices

Key informants at National level included staff from MoGLSD and Regional MWE officers and below were the issues raised and responses by the Consultant;

Table 43: Stakeholder engagement at National level

Stakeholder	Views and concerns	Response
MoGLSD, March 22, 2022	**Health and welfare:** ▪ Welfare provision based on gender ranging from accommodation and sanitation facilities. All employees should have written documentation of their contracts (explaining their salary/ wage, time-off duty etc.) ▪ HIV/AIDS services should be extended to the employees through provision of contraceptives and allowing them to optionally share among themselves.	MWE will ensure that the Contractor has all that lined up in the ESMP and comply to these standards
	Health and safety considerations: ▪ 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	The Contractor to provide PPE, sanitary facilities and clear signage at the construction sites. MWE to ensure the contractor complies.

	to cater for labour force to be employed different from public toilets planned for the communities.	
	Community engagement: ▪ 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.	The designs for the sanitary facilities will be gender segregated and cater for vulnerable groups. GRM will be in place at all levels (National, District, Sub county and village)
	Employment: ▪ The employment policy of the country should be followed; contracts, payment mechanisms, appointment letters should be in place. Children should not be employed.	These (employment and VAC) will all be captured in the contractor's ESMP and MWE to ensure the contractor complies.
MWE Regional offices RWSCR, NEMA and Wetlands) on 31st March, 2022	The meeting also confirmed that most of the boreholes around Rakai district are highly mineralized. Therefore, mitigation measures should be put in place before development of the Lwentulege source.	The developer (MWE/RWSSD) will put up measures to ensure the water is free of minerals during construction.
	Develop Water Source Protection Plans and ensure that they are implemented during the commencement period of the project such that the implementation activity takes place alongside the project so as everything is finalized at the same time and this will reduce on the man power required.	These have been developed for all the Sources for the 2RGCs in the region (Lwentulege and Kasese)
	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.	This will be incorporated in the ESMP
	The developer should not negate their responsibility of managing the entire ecosystem. They must work closely with the catchment management committee and wetland committee to ensure the catchments or the wetland are effectively managed and conserved without causing more harm.	This was noted and will be referred to the MWE for action

	The ministry has a policy of up to 3% of the project budget of any water intake/ source project to be used for the implementation, preparation of the source water protection and the developer should note this in the BOQs.	This will be forwarded to DWD as a recommendation.

7.4.3 Community Meetings

A total of five (5) community meetings were held within the project area targeting leaders from Kagamba and Kasankala Sub-counties, and Lwentulege and people to be affected by land acquisition for the borehole sites, reservoir sites, access roads, and sanitation facilities sites and land owners along existing community access roads along which the transmission and distribution pipes will be laid. The affected communities/PAPs were mobilized with support from the local leaders.

The meetings were conducted in the relevant local languages such as Luganda, Runyankore, and Kinyarwanda to cater for any linguistic barriers that would deter the opportunity to participate. The local community consultations followed the schedule shown in below.

Table 44: Schedule of Local Community Consultations

Subcounty	Parish	Village	Venue	Date
Kagamba	Kagamba	Buttandiga	Kagamba Subcounty	9 July 2022
		Kabusa A		
		Kabusa B		
		Kagamba		
		Kiyamba		
		Kizira		
		Kyakabugema		
		Nabubaale A		
	Kimuli	Kakenke	Mweruka Polling Station	12 July 2022
		Mweruka		
		Kitambuza		
		Kimuli	Full Gospel Church Lwentulege	9 July 2022
		Kigayaaza		
		Lwentulege		
		Lwentulege T/C		
		Kampisi		
		Nabizzi B		
Kasankala	Kirangira	Kenjoki	Kenjoki Trading Centre	12 July 2022

Subcounty	Parish	Village	Venue	Date
		Kirangira		
		Kyabakazi A	Kyabakazi Trading Centre	
		Kyabakazi B		
	Kiyumbakimu	Kasambya T/C	The Residence of Reverend Enock	10 July 2022

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

Plate 16: Stakeholder meeting held at the Lwentulege production well site with community members

7.5 Key findings from stakeholder consultations

In relation to the proposed project, the main findings from the engagements and public participation were largely categorized into two parts; the envisaged impacts (Both negative and positive) and general concerns on the project. The main findings from the engagements are presented below:

Views/Comments/Questions	Team's Responses
• We share water with animals; thus, this is a good project for us and we warmly welcome it	• Thank you for appreciating the government efforts
• Water is expensive here, how much is government going to levy for each jerrycan? • Apparently, we buy a jerrycan	• Utility tariffs charged are always affordable and somewhat similar to that charged in other areas. The charges usually ensure the sustainability of the project. • After the proposed project is completed, a jerrycan of

Views/Comments/Questions	Team's Responses
between UGX 1,000-2,000 depending on the quality of water.	water will be far way less than its current cost of UGX 2,000
• Do we pay for private connections to our homes?	• Yes, a connection fee will be applied based on distance from the existing water pipeline and this will drastically vary though the cost of a jerrycan will be the same
• The water we have is salty, how will that be handled	• Ministry intends to put an iron remover plant to ensure that the water supplied is up to standard for use.
• Given that the proposed distribution pipe is only on one side along the access road, will the community on the other side be able to get service lines	• The utility service provider will be responsible for installation of water service lines after application for water connection by a customer. Therefore, the community on the opposite side of the distribution pipe will also be connected to water upon fulfilment of the prerequisites
• We request for Jobs for the local communities during construction phase of the project	• The request is noted. And as already witnessed, our project coordinator is from the project area.
• Where is the source of the water?	• The water source will be a borehole within the community, the source has been tested and found to be safe and reliable to sustain the project for a desired period based on population growth statistics
• Why has government insisted on those boreholes despite the experiences in the area which have proven that boreholes cannot supply good water in this area?	• Indeed, several studies have been conducted and the necessary measures will be put in place to ensure that the water is treated to the standards that are recommended for it to be used.
• The water is too salty that even cows don't animals don't drink it neither can it be used for irrigation.	• This is noted and will be addressed to the ministry for further management.
• If the Water source is not Lake Kijanebarora, then the project is a waste of government money	• This option of Lake Kijanebarora will be further explored to ensure government doesn't waste money; however, studies have been conducted to inform the level of which we are for this project.
• How much are you paying for our crops?	• Compensation will be based on what one is likely to lose but more importantly on the updated Rakai District compensation rates.
• Will public stand taps be	• Yes, they will. The location of the service pipes will not

Views/Comments/Questions	Team's Responses
established in addition to service line extensions to private individuals	be known until applications for connections are received.
• Will the charge be much fair for those who are sacrificing their land for the project?	• A uniform unit charge will be applied. However, connection fees may vary since for you the pipe will be much closer to your home
• When will compensation payments come; before or after the project has started?	• The MWE will ensure that people are paid before construction phase. However, there are always remnant cases due to several reasons thus construction will proceed when some people have not yet been fully paid but still in process.
• Should we anticipate Jobs for our people?	• The people from the local community will be considered for these job openings when the construction phase commence. As you can see even our project coordinator is your very own.

Stakeholder engagements will continue throughout the implementation and operational stage with different stakeholders. It is likely that more relevant agencies and stakeholders will be identified during these phases, and will be engaged accordingly.

7.6 Feedback from All Stakeholders Engaged

Many of the comments captured from stakeholders presented views on the expected benefits and concerns on the adverse impacts the proposed project may have on the environment, communities and the existing activities. A summary of key environmental and social issues and recommendations raised by stakeholders are presented in the table 45.

Table 45: Comments and concerns during the community stakeholder engagements

SN.	POSITION	COMMENTS
1.	Town clerk	▪ He's aware of the project ▪ The project has delayed we expected to have water project implemented by this time ▪ The local leadership is willing to support and take on the project. ▪ The political will is there ▪ The people are in position to pay for the water ▪ The main source of water are ponds, boreholes, the lake and rain water harvesting but the water is salty. ▪ The cost of water is high ranging from sh.1000-2000 per 20L jerry can of water in the dry season.
2.	Health assistant	▪ How will be issue of iron in water be dealt with because the water in the area is salty and can't do anything in terms of crop production and domestic work. ▪ He requested that surface water be considered was the source of water for the project because the cost of treatment may be too high
3.	Mayor	▪ He expects to get water which is not salty.

4.	LC 5 Chairperson	▪ He's aware of the project ▪ Our area is a cattle corridor but we have no water for animals. A 20L jerry can of water is 1000-2000 which is costly. ▪ The water can't cook, clean, wash cannot be used for cropping. The only option we have is piped water and you have answered our cry. ▪ The placed selected for the reservoir is a very good hilly place, so water can reach at any point.
5.	Chairperson LC I Kampasi	▪ He's gave the borehole land for free of charge ▪ Expects people of his LC to get water first because he gave land for free ▪ Water is life ▪ Expects the youth in his LC to get jobs like digging trenches
6.	Chairperson LC I Mweruka	▪ There is scarcity of water in our area ▪ There is no water in the village, and the pond water we use is too dirty ▪ We share pond water with animals, we drink from the same source. ▪ This piped water is delayed ▪ His worry is when some project components are vandalized, who will do the repairs. They need along lasting project ▪ He expects the youth in his community to be given job opportunities.
7.	Speaker Lwentulege T/C	▪ He welcomed every one ▪ There area is in a bad condition relating to water availability ▪ The project will us eliminate problems relating to walking long distances and rapes in the community ▪ Expect to get jobs ▪ He expects water to be treated an element of iron (salty) removed
8.	Community	▪ Piped water will attract development of businesses, Factory and improved farming techniques ▪ It will provide water for domestic, crop production and animal grazing ▪ Schools and home will access water easily ▪ Women have been suffering walking long distances but now they will have valuable to invest in productive activities ▪ The water project will lead to development of brick laying activities ▪ Water will encourage the growing of quick maturating crops like tomatoes, cabbage ▪ Accessing clean water has been a problem in this area, during the dry season the ponds dry up and we fetch water from L. Kijjanibabora which is 14kms away
		Qz. What will be done to remove the salty condition in water? Ans. A treatment plant is one of the project components and the issue of salty condition will be sorted
		Qz. Which activities what lead to decline of quality and quantity of water? Ans. Activities like farming with fertilizers, pit latrines near the source, sand mining in the vicinity of the water source.
		Qz. How many villages will the water project cover? Ans. All the administrative boundary of the old Kagamba Sub County.
		Qz. Is the water for paying or its free? Ans. There will be three types of water delivery to the people i.e. public, private and institutional. There will be a small cost set by the district, MWE, Town Council leaders.
		Qz. Since you talked about water bringing more developments, can you bring

		electricity to the area too? Ans. The projects which maybe lobbed are going to be water related.
		Qz. How much many will be paid person for the use of water? Ans. Payments will be according to the amount of water used.
		Qz. Is water going to reach every home? Ans. There will be public water stands in the centres for those who cannot afford to extend water to their homes.

All the stakeholders consulted supported the project on the basis that it would induce development in their area/district and lead to the establishment of more related projects. However, it was mentioned that the developer should be able mitigate all project related negative impacts such as waste generation, noise, destruction of crops during trench digging and pipe installations and any other negative impact as would be realized as seen in the Minutes from the stakeholder meetings.

7.7 Public Disclosure and Consultation Plan

Public Consultation and Disclosure Plan (PCDP) is a key element in the engagement and essential for collective involvement of stakeholders in the proposed development. Disclosure refers to the provision of relevant and adequate project information to enable stakeholders understand risks, impacts and opportunities of the project. Consultation is an inclusive and appropriate process that provides stakeholders with opportunities to express their views which should be considered, responded to and incorporated into the decision-making process. In the context of the proposed development, stakeholder consultation aimed at:

- Generating good understanding of the project;
- Enabling stakeholders to engage and participate in proposed project design;
- Understanding what local community expect throughout the life of the project;
- Optimizing local benefits of the project;
- Developing effective mitigation measures and management plan;
- Characterizing environmental, health and socio-economic impacts of the project.

Like stakeholder identification, public consultations and information disclosure is a continuous process throughout the ESIA exercise. KIIs and FGDs were utilized for PCDP. A scoping exercise was undertaken on 9th February and then the consultative meetings on 19th May 2022 at Kagamba Sub County (currently Lwentulege Town Council) and were aimed at disclosing key project information (such as changes in the water source etc.) and to generate a master list of Stakeholders to be consulted. Key stakeholder concerns were also identified so that they could be considered in the implementation of the project. Key issues identified are outlined in Table above.

Grievance Redress Mechanism

Grievance Redress Mechanism (GRM) as a key element of the PCDP to actively identify, manage and follow up grievances received to ensure that appropriate resolutions and actions are taken by the relevant authorities especially MWE, Rakai District Local Government and Kagamba Sub County (currently Lwentulege Town Council).

In order to ensure transparency and accountability, a GRM shall be established by the Project Support Team in line with the guidance provided in the ESMF. The GRM shall have a clear set of goals and objectives and a well-defined scope for its interventions, especially geographical area coverage to ensure its accessibility and effectiveness. A set of procedures for receiving, recording, and handling complaints shall be available in the GRM. This will be managed by a National Grievance Redress Committee (GRC)

consisting of a MWE Chair, the IWMDP Project Coordinator, the assigned Resettlement Social Development Specialist, the Project's Environmental Focal Point, the chair of the community mediation board, a member of a recognized non-government organization, and a community leader. The GRC members shall be qualified, experienced, and competent personnel who can win the respect and confidence of the affected communities.

Community Grievance Redress Mechanisms

GRCs shall also be established at District and Lower Local Government Levels as appropriate. For easy accessibility, GRCs shall also be formed at or closer to project implementation site at Rakai District. Grievances shall be first reported and handled at the lowest level or project site, and referred to the next level if not resolved. The GRM shall include procedures for:

- recording, registering, and sorting grievances;
- conducting an initial assessment of grievances;
- referring grievances to appropriate units or persons;
- determining the resolution process;
- making decisions, including parameters and standards for accurate and consistent decision making;
- directing relevant agencies responsible for implementing decisions;
- notifying complainants and other affected parties of eligibility, the resolution process, and outcomes;
- tracking, monitoring, documentation, and evaluation; and
- a Grievance Log, that shall summarize all grievances registered, resolution reached, and feedback provided.

Depending on the nature and the severity of the complaint/s, the GRC in consultation with the Project Affected Persons (PAPs) or Complainant, shall identify and decide on an approach for grievance resolution. Where appropriate, complainants shall be given the choice of selecting an affordable approach with which they are comfortable and confident and that is beneficial to them. For construction-related complaints, it will be the Contractor's responsibility to address them. Usually these kinds of complaints are described as environmental and social impacts and include issues related to dust, flooding, blasting (noise, vibration, and evacuation), lost access, and dangers to life, damage caused to public roads from heavy machinery, deteriorating water quality and quantity, damage to property and crops, soil erosion, workers' misbehaviour, defilement/child abuse, and others. The project GRMs will have other measures in place to handle sensitive and confidential complaints, including those related to Gender based violence, Sexual Exploitation and Abuse/Harassment (GBV, SEA/SH), Referral pathways based on the survivor centred approach will be incorporated in the GRM processes and disseminated in the stakeholder engagement plan. Existing legal and administrative structures will be contacted to resolve grievances of a criminal nature.

Workers Grievance Redress Mechanism

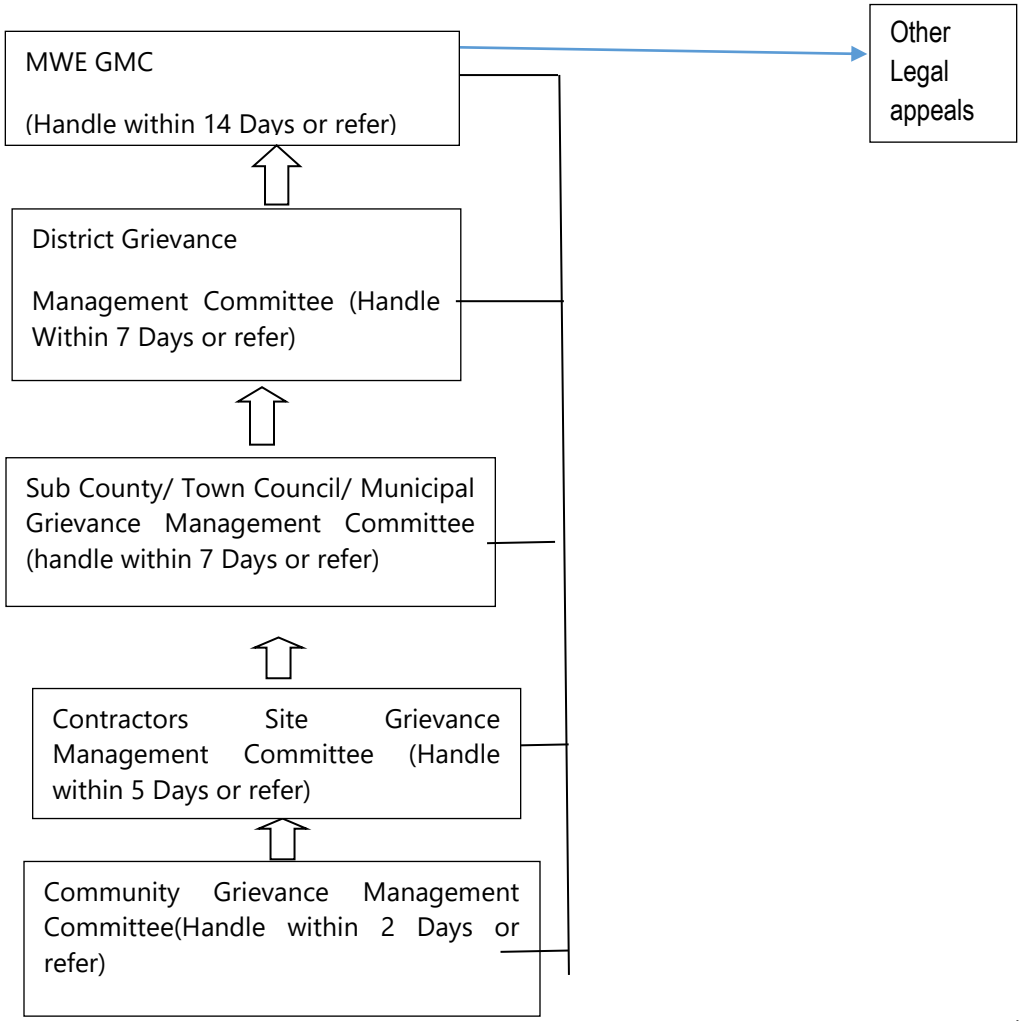
In accordance with the Employment Act (2006), the MWE/RWSSD shall ensure that the Contractor has provided contracts to all workers and has established a GRM and grievance redress committee with workers' representation. It is the responsibility of the Contractor(s) to ensure that Workers GRMs and with redress and appeal processes and institutions is in place and shared with MWE/RWSSD before the commencement of the Construction Phase.

The steps in grievance handling for the PAPs and the community in general are outlined in Table 48 below and once received, all grievances will be responded to in a maximum of 19 days.

Table 46: Grievance handling steps

#	Step	Responsibility
1	Receive Grievances and Provide PAPS with a Grievance Acknowledgement Form	MWE, RAP Implementation Consultant, and GMCs
2	Grievance Registration and Acknowledgement	MWE, RAP Implementation Consultant, and GMCs
3	Grievance Sorting and Logging in database and tracking system	MWE, and RAP Implementation Consultant
4	Grievance Assignment	MWE
5	Grievance Processing and Feedback (19 days)	MWE, RAP Implementation Consultant, and GMCs
6	Corrective Actions, Grievance Follow Up and Closure	MWE

Flow of Appeals or Referral of Grievances and Timelines



8.ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS

8.1 Introduction

Key potential E&S impacts of the proposed project for each stage of the project cycle are assessed in this chapter and an Environmental and Social Management Plan (ESMP) is provided in the Chapter 9.. Prediction and analysis of possible positive and negative impacts of construction works for the water system are discussed. Impact analysis involved determination of nature of impact, its magnitude, extent, duration of potential impacts. For the proposed development, potential positive and negative impacts were identified both for the construction phase and operation phases. Throughout this report, impacts have been characterized as:

a) "Positive" when they;
   - Enhance socio-economic welfare e.g. health, employment,
   - Enhance quality of existing environment.

b) "Negative" when they;
   - Reduce socio-economic welfare of people,
   - Reduce quality of existing environment,
   - Reduce economic value e.g. of surrounding property.

An improvement and increase in potable water supplies and sanitation may generate interrelated improvements in health, economic and social welfare of the community. However, in addition to the many possible beneficial impacts, adverse impacts may arise from these improvements. The impact of potable water supply and sanitation on health depends on the quality and quantity of the piped water supply; the proportion of population covered; and the utilization of the water and sanitation facilities by the population. In this chapter, prediction and analysis of possible positive and negative impacts of construction and operation of the water pump station, Sanitation facilities, Office block and the reservoirs is presented, with main focus on the proposed construction of the pump station at the motorized borehole. Table 47 below provides a summary of the Positive benefits that will be realised as a result of implementation of this project.

Table 47: Positive Impacts of the Proposed Project

No.	Impact	Remarks
1.	Increased access to clean water	▪ Reduction in current water shortages. ▪ Improvement of water quality. ▪ Reduction of the time spent and distance travelled to fetch water, which would signify an improvement in the general living conditions of the people. ▪ Improvements in public and household sanitation. ▪ Awareness of personal hygiene. ▪ Overall improved health conditions for the beneficiary population. ▪ Income generating activities for the poor will increase as result of availability of reliable supply of water in public places e.g. commercial water service providers.
2.	Employment opportunities and	▪ The use of appropriate labour-intensive methods for some of the construction activities (e.g. construction of the pump station, office

	increased household incomes and revenues	block and Reservoir) would present employment opportunities for local people and generate direct income benefits to local households. ▪ Some people will be employed in the digging of the transmission and distribution networks, sand and stone quarries, and sale of earth materials to the proposed project and in the service sector around the project site.
3.	Income to material/ equipment suppliers and contractors	▪ Earth materials needed for construction, for example, aggregate (stones and sand) will be obtained from quarry operations. ▪ Number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) will be sourced locally within Rakai district and the neighbouring districts.
4.	Increased Public Revenue / Taxes	▪ People who have never worked on such projects would acquire such skills, which they would use to seek employment in future. ▪ The Project would provide grassroots management opportunities for the local people to both be involved in the management of the water supply and protect their local environment.
5.	Boost to the local Economy	▪ Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community; ▪ Stimulation of business activities related to contracting works for local entrepreneurs (sub-contractors); ▪ Providing trading opportunities for local communities and other small enterprises in the area; ▪ Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.
6.	Gender Benefits	▪ The expected reduction in water collection distances and times would lead to a reduction of Gender-Based Violence (GBV) that women and girls experience while walking long distances to fetch water. It may also reduce conflict/fights that often occurs at water sources due to big crowds. ▪ It will mean more opportunities for girls to attend schools and more time for women to engage in other economically and educational beneficial activities and also more time for women to take care of their families including caring for the sick and elderly.
7.	Health Benefits	▪ Direct health benefits of the project to the affected population will result in a reduction in the incidence of water-related diseases particularly diarrhoea, typhoid, intestinal worms, skin and eye problems, and dysentery and cholera. ▪ Loss of productivity resulting from sickness related to water-borne diseases and expenditure on related medical care will therefore reduce.
8.	Improved service delivery	▪ The proposed project would result in bringing improved water and sanitation services closer to the people.
9.	Eradication of poverty and improved livelihoods of the local people	▪ The proposed project would result in an increase in the volume of water for production which could result in improved livelihoods of the local people. ▪ Water is indispensable for survival and improving the quality of life – for health (drinking, eating and bathing) and for economic

		development (agro-processing and business). The project would, therefore increase productive activities through reduced sick days and time saved in fetching water.
10.	Combat HIV/AIDS, malaria, typhoid, and other diseases	▪ The awareness campaigns for public health, hygiene and sanitation particularly targeted at women and girls would be widened to include measures for tackling HIV/AIDS and other diseases such as schistosomiasis and diseases related to excreta contaminated water and poor hygiene (cholera, typhoid, and diarrhoeal diseases).
11.	Ensure environmental sustainability	▪ Implementation of catchment and water source protection measures would ensure reliability to the water source.
12.	Develop a global partnership for development	▪ The Project would provide opportunities for the GoU through MWE/DWD to aim at achieving the Sustainable Development Goals (SDG) specifically SDG 6.
13.	Increase in investment in the area standard of living	▪ MWE/DWD will invest heavily in the construction and operation of the Lwentulege RGC water supply system which would involve use of locally available materials. ▪ The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without safe piped water.
14.	Develop a global partnership for development	▪ The project will provide opportunities for the GoU and in particular the Ministry of Water and Environment to work together to achieve the Sustainable Development Goals (SDGs) specifically SDG 6 and 12

8.2 Positive Impacts during Construction Phase

The anticipated positive impacts of the construction phase are discussed below.

a) Employment opportunities

The design, feasibility and planning phase provided financial benefit and employment for local consultants. This is a positive but short-term and reversible socio-economic impact. Contract provisions for the construction works require most of the labour force (at least 50%) to be drawn from the local population with particular emphasis on youth and women. Since construction is estimated to take a certain number of months, this phase will provide short-term job opportunities for local people. The project is estimated to employ around 70 workers during the construction phase.

Furthermore, indirect opportunities for employment will be stimulated in the other sectors related to construction, such as manufacturers of local raw materials and finished products and providers of services. It is also anticipated that indirect employment opportunities will be created within local communities through the provision of services to the construction teams, such as the sale of food and beverages.

Impact Enhancement

The contractor should involve local leaders in recruitment process to ensure full and fair participation of local communities. Wherever feasible, local people should be considered for job opportunities commensurate with their level of skills. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive. A training programme for artisans (builders, plumbers) in the project area could be facilitated by the project to ensure skills transfer during the construction period.

b) Income to material/ equipment suppliers and contractors

The scale of construction works is moderate in the proposed project area. Although some of the equipment and materials required for the project will be sourced nationally or even internationally to ensure quality is achieved, a number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) can be sourced locally within Kagadi district and the neighbouring districts. Local suppliers of materials and equipment involved in the project will benefit financially. This is a positive but short-term and reversible impact.

Enhancement measure

Earth materials needed for construction, for example, aggregate (stones and sand) will be obtained from quarry operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly promotes environmental degradation at illegal quarry sites and can cause medium to long-term negative impacts. It should therefore be a contractual obligation for contractors to procure construction materials from quarries legitimately licensed by the respective district authorities.

c) Acquisition/improvement of skills

People who have never worked on such projects would acquire such skills, which they would use to seek employment in future, and as a benefit from the capacity building incorporated in the program, the implementing authorities would have adequate capacity for managing the environmental and social assessment and permitting processes. The Project would provide grassroots management opportunities for the local people to both be involved in the management of the water supply and protect their local environment.

Enhancement measures

The Local leaders will play a vital role in screening and recommending those seeking for employment to weed out wrong elements who may instead cause serious setbacks to the project in terms of offering labour both skilled and unskilled.

d) Increased Public Revenue / Taxes

The implementation of the project will increase revenue and taxes for both the central and local authorities. This includes indirect taxes resulting from the construction project such as Value Added Tax (VAT) on materials and services, Pay As You Earn (PAYE) for construction workers and other formally employed persons who will form by far the majority of created employment opportunities) as well as revenue to pension funds such as National Social Security Fund (NSSF).

e) Impacts on Local Capacity

The scale of the construction of the project with the logistics involved and speeds of construction that will be required, while maintaining construction, health and safety standards will involve considerable management and planning skills and will contribute to capacity building within the country's engineering and construction sector. Co-operation between international suppliers of specialized equipment and contractors and local contractors and sub-contractors and companies will result in the transfer of skills and will also build additional local capacity.

f) Boost to the Local Economy

The workforce will get most of their food and other necessities from the surrounding area and this will provide a market for the local agricultural producers, and craft producers and other small businesses (local

shops). This will in turn increase the incomes of the local people, which can be invested in other (productive) activities and be used for paying school fees, medical expenses and other domestic needs. The project will stimulate local economic activities by:

- Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community;
- Stimulation of business activities related to contracting works for local entrepreneurs (sub-contractors);
- Providing trading opportunities for local communities and other small enterprises in the area;
- Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.

g) Capacity Building

It is expected that for the construction of the water source points, some degree of capacity building will be provided (organised and un-organised) through the transfer of new technologies and new skills to (un-skilled) labour. This will happen through on-the-job training as well as through exposure to modern water quality practices, management and logistics procedures. Local sub-contractors and companies will also benefit from the transfer of skills and will also build additional local capacity.

Enhancement Measures

To maximise capacity building for local communities, programs and technical training courses as well as on-the- job training will be provided in specific skills areas for suitable candidates from local communities to enhance minimum levels of education and the possibility of being employed during operational phase.

8.3 Positive Impacts during Operational Phase

a) Improved health status of households of the project host communities

The provision of an adequate, safe water supply and sanitation has positive impacts on the health of users by greatly reducing the incidence of communicable enteric and infectious related diseases, which, in many instances occur in communities due to lack of adequate sanitation and potable water supply. Both potable water supplies as well as safe disposal of human excreta are needed to break the chain of transmission diseases. Changes in water supply may affect different groups of disease in different ways; one group may depend on changes in water quality, another on water quantity and availability and another on indirect effects of standing water which is related to sanitation. Therefore, improvement in water supply in several of the poor informal settlements will directly contribute to improved public health within the project communities.

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

b) Educational enrolment and attendance

Construction and Operation of the water system will lead to considerably increased and consistent access to safe water for the project host communities. In relation to increased provision of potable water supply, time savings are the most immediate and easily measured benefits although its magnitude will depend on the conditions prevailing before the construction of the piped water supply. Consequently, time spent on searching and waiting for water by women and children will be saved. This will enable children, especially the girl child to attend school regularly and promptly, while mothers will

get more time to prepare their children for school. Assuming other factors are available (such a scholastic material, teachers) school attendance and performance will improve.

c) Acquisition of new skills

Most water supply and sanitation projects are built through the labour of local residents who are directed by a small cadre of sub-professional or supervisory personnel from outside the community. Community participation can also have a great impact on the effectiveness and sustainability of water supply and sanitation programs. It can also help to minimize many of the potential negative environmental impacts associated with them.

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

d) Improvement in household economic status

The increased provision of potable water supply and sanitation has positive beneficial impact on health and ultimately directly and indirectly on productive and economic benefits.

- *Livestock and poultry keeping:* Improved water supply would lead to an increase in poultry and livestock keeping in homesteads. A permanent water source near or on the farm will permit an increase in cattle and improve the production of milk and beef. Those farmers who previously felt water to be a crucial constraint preventing them from keeping such livestock as grade cows and pigs, poultry like chicken or expanding their activities in this regard, may find it feasible to do so.
- *Small scale gardens:* The increased provision of piped potable water supply may have positive beneficial impact on the irrigation of small-scale gardens around homes if there is excess water available and it can be used for irrigation of small-scale garden plots near each household or tap. This will have positive beneficial *impacts* on increasing agricultural productivity and perhaps also improving nutrition status of households.
- *Small scale industries:* The ample availability of piped potable water supply may lead to improvements in the small-scale industrial development and increased production.

Enhancement measures: Water supply should be set taking into consideration the different levels of users. The users should also be educated to avoid wasteful use of the resources.

e) Employment opportunities

Operation of the constructed water supply system will create additional long-term technical and non-technical job opportunities for professionals, casual labourers, etc. Staffing will be required in the Sub County and Rural Growth Centre (RGC) to operate the constructed water supply system by: Operating the system in accordance with the service standards; Maintaining the system; Developing the system; Billing the consumers; Collecting revenue; Receiving applications for and making new connections; Making extensions to the system or assets; Attending to all customers; Keeping records of the operations of the system; and Writing status reports for the operations of the system.

Enhancement measure: Wherever feasible, local qualified people will be considered for job opportunities. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive.

f) Promotion of gender equality and empowerment of women and the girl child

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

g) Attainment of the Sustainable Development Goals; SDGs

The effect of providing safe water and hygienic sanitation services would help in the attainment of all other Sustainable Development Goals (infant mortality, poverty reduction, improved health and increased school enrolment rate).

h) Increase in investment in the area

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

i) Environmental sustainability

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

j) Combat HIV/AIDS, malaria, and other diseases

The Project would result in prevention of vector borne diseases related to water sources (such as guinea worms, Onchocerciasis, and schistosomiasis) and diseases related to excreta contaminated water and poor hygiene (cholera, typhoid, and diarrhoeal diseases) due to the increased provision of safe and clean water. Safe drinking water, personal/household hygiene and improved sanitation would reduce infant/child morbidity and mortality; improve their nutritional status and their ability to perform better in schools. The marginal price of improved hygiene and sanitation promotion would make them cost effective health interventions.

8.4 Negative Impacts during Construction

a) Land acquisition for infrastructure and loss of structures/property

This is likely to be a moderate impact of the proposed project. It includes permanent land acquisition for the construction of the water source intake (Motorized borehole), office block, pipeline network and trenching to the detriment of land owners. The land-take would be permanent where all the project components would be constructed and temporary along the pipeline network. However, both the transmission and distribution lines would be confined to the road reserves where possible. The Lwentulege RGC Water Supply and Sanitation Project will require a permanent land take of 0.8785 acres and an Easement corridor of 24.6538 acres. The Project Area traverses 2 Sub counties, 4 Parishes, and 23 Villages with a total of 1,077 PAPs.

The Project will not impact any residential or commercial structures but for fixtures 24 fences belonging to 24 PAHs. The asset survey indicates that these structures are within the 3 metres of the easement corridor. However, the PAPs have sufficient land remaining outside the easement corridor to enable them to relocate their affected s on their existing plot but outside the easement corridor. Upon payment of cash compensations, PAHs will be given sufficient time to relocate these structures.

The Project Permanent Land Restrictions (Easement for Transmission and Distribution Pipes) will affect 24 fences of varying construction materials running 453.67 metres. The Project Permanent Land Restrictions (Easement for Transmission and Distribution Pipes) will affect 10 Properties owned by 9 religious institutions whereas 1 religious institution (Mweruka Full Gospel Church) will donate land for the construction of a sanitation facility. The religious institutions only have land, a fence and crops affected and not buildings.

The Project Permanent Land Restrictions (Easement for Transmission and Distribution Pipes) will affect 5 education institutions properties. The schools will only have land, crops and a fence affected. Note that no classrooms or buildings related to education will be impacted. The Project Permanent Land Restrictions (Easement for Transmission and Distribution Pipes) will affect 2 Properties owned by 2 associations but only land will be affected.

Mitigation Measures

- The district and local authorities in Sub County have already been engaged together with the local land lords and they agreed with communities whose land will be used for the proposed project construction (Consent forms were signed and they have been attached to this report; No grievances were reported and are envisaged.
- Land owners that require compensation (where possible) as project affected persons should be compensated before commencement of the project activities.
- MWE shall ensure that this land and any impacted assets are compensated for in accordance with the provisions of this RAP.

b) Loss of crops and vegetation cover and top soil

The existing vegetation and top soil will be cleared to give way to the construction process on all sites i.e. the borehole, water tank, pumping stations and pipeline network areas. The study team discovered that the project area will cover a small space and therefore limited flora of significant impact will be affected. However, clearing of this vegetation will lead to permanent loss of vegetation cover and likelihood of soil erosion due to removal of top soil. The project activities are likely to destroy vegetation with subsequent loss of some shrubs and grasses from the area of operation albeit on a small scale. This is likely to cause loss of habitat and disturbance to faunal communities in the affected sites but at an insignificant level. A corollary livelihood impact resulting from the loss of household land is the loss of crops and fruit trees planted on that land. There are also impacts related to loss of timber trees and woodland areas. The Project will impact 1,388 banana clumps and 667 coffee plants at various stages of maturity, the majority being in Kimuli parish. The Project land take will result in the loss of 81 fruit trees, the majority of which are avocado and mangoes, followed by jackfruit and passion fruits. The majority of the affected fruits are in Kimuli parish and the least in Kiyumbakimu. The Project will impact 1,280 timber-productive trees, most of which are bush trees followed by eucalyptus. The majority of these affected trees are in Kimuli parish followed by Kagamba parish, with the minority being in Kiyumbakimu parish.

Mitigation Measures

- After construction, there should be landscaping and re-vegetation. The premises will be planted with vegetation/grass and ornamental trees.
- The water source should be fenced off to reduce on going agricultural activities around the borehole to avoid pollution entering the boreholes especially when it rains heavily.
- Minimize vegetation clearance by clearly demarcating work areas.
- Provide environmental awareness training to all employees.

- Rehabilitate all disturbed areas
- MWE shall ensure that this land and any impacted assets are compensated for in accordance with the provisions of this RAP.

c) Fauna

Disturbance or loss of protected/endangered animal species/communities and their habitat due to construction activities (noise, dust, fumes, pollution, vehicles) at the borehole, water tank, pumping stations and pipeline network areas.

Mitigation / Enhancement Measures

- Minimize vegetation clearance to the project specific site.
- Protect water resources from pollution.
- Protect soils from contamination.
- Rehabilitate all disturbed areas.

d) Increase susceptibility to Soil Erosion

Increased soil erosion is likely to occur in the vicinity of project sites during the construction of the water source points and other related construction works. The site earthworks will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season.

Mitigation / Enhancement Measures

- The sites will be hoarded off to intercept any eroded material and any soil material will remain within the site until it is taken away for proper disposal or used for backfilling to avoid loose soil being washed away by storm water.
- The project proponent will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion.
- The Project Contractor should backfill all trenches immediately after laying the pipes for the transmission and distribution networks and compact such areas as to near level prior to excavation.
- Pursuant to Section 23(1) of The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, No. 3/2000 (under section 53 of the National Environmental Act NO.5 of 2019), the 100m protection strip is administered by NEMA and the developer shall apply for a permit from NEMA in order to undertake planting, to reduce erosion; and improve the biodiversity of the area by re-establishing indigenous grass/ tree species on site especially at the water sources/boreholes. Any replanting will be undertaken in consultation with the District Environment Office (DEO) and District Forestry/Natural Resources Office.
- Use proper techniques for trenching and shoring.

After application of the above mitigations, the impact significance was of a minor ranking. Therefore, no further mitigations are proposed at this stage.

e) Effects of Poor Solid Waste Management

Waste will be generated from the construction sites. The waste to stream from the construction sites will include Cement bags, timber and pipe cuttings empty water bottles, food remains from the construction workers and other forms of waste. If not well managed, the area could be prone to nuisance from foul smell, breeding of vermin and vectors, and lead to outbreak of diseases. Extent of this impact will be local to areas where waste is dumped or their immediate neighbourhoods. The impact intensity is assigned low due to the lack of a well streamlined waste management system in Kagadi. The sensitivity of receptors is assessed as

'low' given that similar activities have and are taking place in the area and that an experienced contractor will be hired. This gives rise to minor impact significance.

Mitigation Measures

- Waste collection bins will be provided at strategic positions at the construction 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 contractor will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA/KDLG/Sub County.
- Burning of waste on-site shall not be allowed.

f) Generation of Noise

Due to the nature of the construction process, noise levels will fluctuate in line with the combination of machinery or equipment being used at any one time. Noise and vibrations will mainly result from use of equipment like excavators and including bulldozers, graders and dump trucks during site preparation and construction activities. However, noise levels will also vary depending on time and distance as the construction spread progresses along the pipeline route thus the local residents will not, therefore, be continually exposed to the noise levels for extended periods. Construction traffic associated with the pipeline construction will be routed via main roads and along the ROW as far as is possible. Some minor roads will have to be used for access to the pipeline spread itself and some new access roads will be created.

The increase in traffic movements on minor roads may cause a noticeable increase in daytime noise levels through small villages; this effect will be localised and temporary, and will, for the most part, be restricted to the construction phase of the project. A number of roads will require repair prior to use for construction vehicle access. These repairs will help to reduce noise levels generated by such access, and other vehicular movements. Due to the intermittent and short-term nature of the activities, the intensity of impact is assessed as low and sensitivity of the receptors as medium, given that most of the proposed routes for the water pipelines are located in relatively noisy mixed residential and commercial areas of the project area and its neighbourhood. Roadside pipe laying activities (such as dust, noise, potential for accidents especially at night), access to schools, markets, shops, etc. night time safety, storage of excess excavated materials on road side, storage of pipes and supplies during pipe laying, equipment parking, etc. are envisaged however, the impact is assessed to be much lower than the construction site limit of 85 dB (A) including the receptor sensitivity.

Mitigation strategies:

- Contractor will ensure that equipment is properly maintained and fully functional in accordance with the manufacturer's recommendations.
- The contractor should ensure that noise levels emanating from machinery, vehicles and noisy excavation and construction activities are kept at a minimum for the safety, health and protection of people in the nearby areas. This will be done through regular monitoring of noise levels. Regular maintenance, monitoring and, where necessary, the use of silencing equipment will be employed with the aim of reducing noise emissions.
- The selected contractor will be required to submit detailed information on the noise levels which will be generated by the specific methods and equipment proposed and to identify actions required to minimise the noise impact.

- Pumps, generators and other mobile equipment will be sited as far as practicable from housing and other noise sensitive locations, work will not be carried out Sunday during service time or hours.
- During periods of inactivity, equipment will be switched off whenever possible. A limited number of construction activities may have to continue on a 24-hour basis. These include horizontal direction drilling, pipeline cleaning and hydrostatic pressure testing which are relatively low noise activities.
- Conduct noise monitoring and use of PPE where levels are beyond the recommended threshold

g) Increased siltation of the aquatic habitats

Some of the excavated sediments from the project site and the construction spoils emanating from the excess excavated material and construction debris are likely to increase siltation especially in the nearby seasonal swamp ecology if not managed well and therefore affecting the associated aquatic habitat.

Mitigation / Enhancement Measures

- Ensure that the site is at all times drained adequately and surface run off is directed appropriately to avoid water logging of adjacent area and of the undulating drainage channel in the Sub County.
- Pursuant to Section 23(1) of The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, No. 3/2000 (under section 53 of the National Environmental Act NO.5 of 2019), the 100m protection strip is administered by NEMA and the developer shall apply for a permit from NEMA in order to undertake planting, to reduce erosion; and improve the biodiversity of the area by re-establishing indigenous grass/ tree species on site especially at the water sources/boreholes. Any replanting will be undertaken in consultation with the District Environment Office (DEO) and District Forestry/Natural Resources Office.
- The project proponent will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion.

h) Increased incidences of diseases

The increase of people involved in the project activities is likely to increase the incidences of diseases in the area. The above situation will be aggravated by the entry of commercial sex workers into the area following the commencement of the project activities. Consequently, there will be potential risk of contracting sexually transmitted diseases (STDs) especially the Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome (HIV/AIDS) among the program workers and the local communities. This will be increased due to influx of people seeking for employment.

Mitigation / Enhancement Measures

- The contractor should liaise with the District and Sub County CDO to mobilise communities during the recruitment process to reduce on influx of people who are unskilled.
- The contractor should emphasise equal opportunities for both men and women.
- The Contractor should, in conjunction with local health authorities, undertake to educate and sensitise the workforce on communicable diseases such as cholera, STDs and HIV/AIDS. Condoms must be made available to the workforce.

i) Visual intrusion

This will mainly arise from the erection of service reservoir tanks on the high altitude. In addition, visual intrusion will occur where project activities are likely to create disfigured landscapes in the project area especially where the construction activities will result in deposition of large spoils and digging of the trenches for the pipeline network and site fencing activities.

Mitigation / Enhancement Measures

- The contractor should maintain as much as possible the existing landscapes and plant trees and vegetation to enhance the visual aspect.
- Rehabilitate all areas disturbed by construction and landscape with trees, grass and shrubs
- Keeping the site tidy including managing spoil/soil from excavations by spreading excavated soils

j) Increased accidents and occupational hazards

Implementation of the project will definitely increase volume of human and motor traffic in the project area. The increase in human and motor traffic will be aggravated by the transportation of construction materials, water pipes and other equipment required in the construction of the water supply facilities. This is likely to result in a higher risk of accidents and occupational hazards occurring in the area of operation. Factors that may exacerbate this situation are inadequate appropriate working gears for project workers including the helmets, overalls, boots and gloves. Accidents could cause considerable ecological damage, financial loss and harm to human life. While largely reversible, some impacts such as loss of human life are irreversible. The receptor sensitivity is considered high given that such impacts may be irreversible once they occur. The impact intensity is considered to be low since MWE will procure a qualified contractor who is aware of OHS measures.

Mitigation / Enhancement Measures

- The contractor should ensure that workers are provided with adequate personal protective wear to mitigate injuries such as gloves, helmets, overalls and gumboots.
- Traffic guides and signs should be utilized to avoid accidents on busy roads and junctions especially with vehicles transporting materials.
- Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or accident

k) Sourcing of Construction Materials

Sourcing of materials such as sand, gravel bricks/blocks and timber if not well regulated and controlled can have a significant impact in the points of sourcing.

Mitigation Measures

- The Contractor should liaise with local authorities to ensure that materials such as sand and gravel are only taken from quarries and borrow pits with the necessary environmental permits.
- Prepare separate Project Briefs as required by the National Environment Act (2019) for all new sites where materials like sand and stones are to be extracted/sourced.

l) Archaeological / Historical Sites / Cultural sites

Throughout the consultations with the locals and local leaders, no known archaeological or historical sites exist on the proposed project routes, and proposed construction sites. Therefore, no impacts on any features of importance to national heritage are expected. The Asset survey indicates that the Lwentulege RGC Water Supply and Sanitation Project will not impact any graves. However, the activities of the Lwentulege RGC Water Supply and Sanitation Project have the potential to trigger OP 4.11 Physical Cultural Resources. During excavation works for Project infrastructure, there might be chance finds. Any chance finds will be treated in line with the requirements of OP 4.11. The objective of OP 4.11 is to avoid,

or mitigate, adverse impacts on cultural resources from World Bank Funded Development Projects. Annex VI provides a Chance Finds Procedure on Physical Cultural Resources Management; reference is made to the chance find procedures annexed to this report.

Mitigation measures

- Although no archaeological features were observed or known to exist at the proposed project sites and on transmission routes & sites, the Contractor shall ensure that key members of his staff are briefed. Any such features that may be found that were not apparent on surface investigation will be reported by the project management and appropriate procedures followed to hand them over to the authority responsible for national heritage and antiquities.

m) Groundwater Quality

Disturbance or loss of protected/endangered plant species or communities (terrestrial, wetland, aquatic) due to construction activities of the different project components.

Mitigation measures

- The borehole should be covered and sealed so that dirt, flooded water, sand and other debris cannot fall in.
- The boreholes should have a raised concrete apron around its base to prevent dirty water seeping back into the hole.
- Do not develop pit latrines close boreholes. The recommended distance is 50m form the toilet to the water source.
- Dispose of all waste in an approved disposal site.

n) Risk of Accidents within the community

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

Mitigation measures

- Best transport safety practices will be adopted with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public by: employing safe traffic control measures, including road signs and flagmen/traffic guides to warn of dangerous conditions and children crossings; and setting speed limits on all access roads in the project area will be 30km/h for light vehicles and 20km/h for heavy vehicles.
- Service ducts installed by the road contractor will be used where applicable to avoid cutting through roads that have just been upgraded.

- All workers, including sub-contractors and casual labour, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules.
- The affected communities will be informed of the timing and duration of the construction activities across access roads and any uncertainties or potential for change and also sensitised on the dangers of construction sites and the need to keep away.
- Identifying optimum routes from pipe storage areas to the ROW to avoid sensitive receptors such as schools and hospitals, wherever possible and putting in place journey management plans.
- Restrictions on hours of driving (including night time restrictions where sensitive receptors may be affected) and timing of vehicle movements to avoid busy periods in urban areas, particularly the start and end of school and the working day
- Control over routes used by vehicles to avoid construction traffic using inappropriate roads and other road users gaining access to the pipeline spread and access roads.
- Ensuring adequate vehicle maintenance to ensure that vehicles do not produce significant emissions and that all safety features including brakes, lights etc. are in good condition.
- Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or accident

o) Social Misdemeanour by Construction Workers

While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships, with attendant risk for spread of HIV/AIDS. Irresponsible sexual relationships in project communities can break families and heighten risk of contracting HIV/AIDS. Illicit sexual relationships can be short-term but have long-term and irreversible effects.

The 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. The Code of Conduct for Contractors shall be signed by contractor upon award of contract and copies displayed for workers to view. In addition, a Code of Conduct for workers must also be signed by each project worker, and adhered to by the contractors. It ought to be translated into predominant local language of the workforce. Labour influx in the project community is likely to increase HIV/AIDS due sexual relations between project workers and the local community; workers taking advantage of young girls in the community due to high poverty levels and vulnerability, teenage pregnancies and dropping out of school etc. Violence Against Children (VAC) such as potential use of child labour; sexual relationship with underage children, teenage pregnancies, school drop outs etc. Conflict in the community/families (social cohesion and disruption) due to project workers engaging in sexual relationships with married women in the community etc. is also anticipated.

Regarding GBV, 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. 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

- As a contractual obligation, contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution.
- A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation and the following issues should be included i.e. HIV/AIDS, VAC, GRM in place and conflict management.
- A code of conduct (appropriate to behaviours in workplace and with respect to relations with local community) will be developed and approved by MWE which will be signed by all workers on the project.
- Local workers will preferentially be employed, paid directly through their banks and access to bars by workers from outside the project area in the local communities controlled.
- All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.
- 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.

8.5 Negative Impacts during the Operation Phase

i) Water quality and pollution

The quality of water recommended is that which is physically, chemically and bacteriologically safe for human consumption. When not thoroughly treated, water could be a source of water related diseases which could affect the whole project communities, thereby causing an epidemic in the area. Transmission of water can also result into pollution entering the boreholes.

Mitigation Measures

- The borehole should be covered and sealed so that dirt, water, sand and other debris cannot fall in. Transmission and distribution pipes should also be covered underground to reduce exposure.
- The borehole should have raised concrete aprons around their bases to prevent dirty water seeping back into the hole.
- The drilled borehole areas should be raised well-head by building earthworks to prevent the flooded water, dirt and other debris to accumulate around them.
- Conduct regular water quality tests and analysis for raw water to inform the treatment options.
- Prepare and implement a water source protection plan (WSPP).

ii) Water quantity and yield

This could be due to declining groundwater recharge and over pumping. The project sites are prone to suffering from rapid land use change (deforestation, soil erosion, etc.) thus the recharge of the ground water supplying the boreholes may be affected in the long run.

Mitigation / Enhancement Measures

- Get involved with catchment management planning that could improve land management and restore groundwater recharge.
- Encourage contour ploughing, mulching and other agricultural practices that increases soil water retention and percolation into the underlying aquifer.
- Reduce the amount of water being taken – if demand in the area is growing then look at developing new water sources.
- Keeping records of how much is being pumped (either volumes or number of hours for which the pump is being used per day). Find out if sudden drops in level correspond to pumping activity.
- Prepare a water source protection plan.

iii) Water supply system failure

Insufficient cost/funding for operation and maintenance would lead to poor maintenance of the system which eventually could lead to frequent breakdowns of the water supply system and consequent shut down, which further could require major and costly rehabilitation. Other sources of failure in the water system could be due to sabotage (possibly by the water vendors who envisage loss of livelihoods), illegal connections which could result in decreased water pressure, and vandalism (theft of water system parts).

Mitigation / Enhancement Measures

- Payment for water supply services is the only way to keep the service running continuously and therefore tariffs would be designed to ensure financial viability. Cost recovery would be achieved through service fee payments.
- Put in place a water user committee to oversee the operations of the water system.
- Fence off the areas like water abstraction points, pump houses, water storage reservoir tanks and other water supply structures like the community tap stands to mitigate trespass and sabotage.

iv) Pollution of water due to cutting of pipes.

Digging and construction of water facilities within close vicinity/on the water transmission network could result in pollution and loss of water.

Mitigation / Enhancement Measures

- The developer should hire services of security guards to monitor and guard the water supply system facilities.
- Sensitization and awareness about the dangers of vandalising the water supply system facilities should be done especially by the local leaders and the developer (MWE/DWD).
- Legal and applicable punitive measures like arrests and prosecution should be taken to those caught vandalising the water system facilities in order to curtail and to serve as an example to those who would want to engage themselves in such acts.
- The developer should fence off all the premises of the different project components like the pumping stations, reservoir sites and any other erected structures.

v) Noise from Generators

Operation of the generators to boost the pumping of water for some hours will generate moderate levels of noise which may be a nuisance to the neighbouring communities and this must be handled appropriately.

Mitigation / Enhancement Measures

- Installation of solar system instead of the generator
- Regular servicing, maintaining and monitoring of the generators
- Switching on the generators for few hours just to boost the pumping of water but to always use the solar systems.

8.6 Environmental Impacts of Decommissioning

After the water system infrastructure has attained its lifetime, it will either be rehabilitated or decommissioned to return the affected area to a natural environment similar to that which would have existed prior to construction. However, some of the structures/facilities may still have other beneficial uses such as: run-off control, recreation, and water supply among others. Therefore, prior to destroying the structure it is crucial to know whether the structure can be reused through refurbishment of the structures and equipment. Decommissioning of the water system can have negative impact on environment of the area from the release of built up sediments into the neighbouring ecosystems. There will be changes in the quality of the seasonal swamp (physical and chemical characteristics). These will include:

- *Changes to aquatic ecology:* The smaller animals like the macro–invertebrate's population distributions would be affected especially during the rainy season, as their digestions would become slower leading to unfavourable conditions for reproduction. When the levels of suspended solids are in excess, the non–organic sediments loading increases where the sediment particles are ingested and becomes hard to digest.
- *Pollution:* Decommissioning will lead to temporary increase in noise and vibration as well as air pollution due to emissions of dust. The removal of concrete and similar non-recyclable construction materials may cause land degradation.
- *Socio-economic impacts:* Removal of structure may impact the socio-economic conditions such as loss of employment thus reduced livelihoods damage of land use.

Mitigation / Enhancement Measures

The water system infrastructure can always be rehabilitated from time to time and might not necessarily have a life span and with the passage of time social and environmental scenario will change. Therefore, the decommissioning plan discussed above cannot be framed in present scenario however; the various mitigatory measures should meet the following requirement in addition to decommissioning plan to be developed before decommissioning:

- Decommissioning will be undertaken in accordance with the legislation prevailing at that time, in liaison with the relevant regulatory authorities and adhere to the health and safety guidelines to ensure that the decommissioned facilities do not deteriorate to the point where they become a hazard to the public or the environment.
- Safe disposal of waste and concrete and similar non-recyclable construction materials, restoration of all disturbed sites to pre-construction conditions through bioengineering measures.

Tables 50, 51, 52 and 53 below presents a summary of an evaluation of the above envisaged impacts as a result of the implementation of the project.

Table 48: Identified Environmental and Social Impacts during Design Phase

Item	Environmental and Social Component	Potential Negative Impacts	Potential Mitigation Measures	Impact Rating before Mitigation	Impact Rating after Mitigation
D1.	Groundwater Resources	Local lowering of water table levels, due to abstraction of groundwater for the water supply system.	▪ Undertake a hydrological study of boreholes to determine water table depths, borehole yields and local use of groundwater.	Moderate	Minor
D2.	Groundwater Quality	The groundwater could become polluted as a result of pit latrines and indiscriminate waste disposal practices.	▪ Avoid prospecting in areas that are prone to flooding, waste disposal sites and pit latrines.	Moderate	Minor
D3.	Soils	Soil erosion/damage due to survey activities and vehicle tracks. Soil contamination from oil and diesel spills.	▪ Minimize number of tracks. ▪ Use right angle intersections & use bunding. ▪ Avoid seasonally marshy areas & floodplains.	Minor	Negligible
D4.	Flora	Disturbance or loss of endangered plant species or communities (terrestrial, wetland, aquatic) due to survey activities.	▪ Discourage any wanton destruction of vegetation and habitats beyond the designed project works.	Minor	Negligible
D5.	Fauna	Disturbance or loss of protected/endangered animal species/communities and their habitat.	▪ Minimize vegetation clearance. ▪ Protect water & soils from pollution.	Minor	Negligible
D6.	Noise	Noise generated by survey activities, especially vehicles, pump testing activities	▪ Working hours should be restricted from 7am – 6pm.	Moderate	Minor
D7.	Air quality	Dust from vehicle movements.	▪ Avoid excessive vehicle movements. ▪ Limit vehicle speeds on unsurfaced tracks to 20kph.	Moderate	Minor
D8.	Health and safety	Risk of accidents and ill health as a result of the project.	▪ Hold safety talks with workers before work. ▪ Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or	Moderate	Minor

			accident		
D9.	Public nuisance	General nuisance such as noise, waste and dust.	▪ Minimize number of workers at site.	Moderate	Minor

Table 49: Environmental and Social adverse/negative impacts during Construction Phase

Item	Environmental and Social Component	Potential Negative Impacts	Potential Mitigation Measures	Impact Rating before Mitigation	Impact Rating after Mitigation
C1.	Land acquisition for infrastructure	The land-take would be permanent where all the project components would be constructed and temporary along the pipeline network. However, both the transmission and distribution lines would be confined to the road reserves where possible	▪ The district and local authorities in Sub County have already been engaged together with the local land lords and they agreed with communities whose land will be used for the proposed project construction (MoUs/Consent forms signed as attached see **appendix III**). No grievances were reported and are envisaged. ▪ Compensation (where possible) to land owners as project affected persons.	Moderate	Minor
C2.	Loss of vegetation cover and top soil	The existing vegetation and top soil will be cleared to give way to the construction process on all sites. This is likely to cause loss of habitat and disturbance to faunal communities in the affected sites but at an insignificant level.	▪ After construction, there should be landscaping and re-vegetation. The premises will be planted with vegetation/grass and ornamental trees. ▪ The water source should be fenced off to reduce on going agricultural activities around the borehole to avoid pollution entering it especially when it rains heavily. ▪ Minimize vegetation clearance by clearly demarcating work areas. ▪ Provide environmental awareness	Moderate	Minor

			training to all employees. ▪ Rehabilitate all disturbed areas.		
C3.	Increase susceptibility to Soil Erosion	Increased soil erosion is likely to occur in the vicinity of project sites during the construction of the water source points, pump stations, installation of the water pipe reticulation and other related construction works. The site earthworks will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season.	▪ The sites will be hoarded off to intercept any eroded material and any soil material will remain within the site. ▪ The project proponent will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion. ▪ Use proper techniques for trenching and shoring	Moderate	Minor
C4.	Increased siltation of the aquatic habitats	Some of the excavated sediments from the project site and the construction spoils emanating from the excess excavated material and construction debris are likely to increase siltation especially in the nearby seasonal swamp to the motorized borehole and therefore affecting the associated aquatic habitat.	▪ Ensure that the site is at all times drained adequately and surface run off is directed appropriately to avoid water logging of adjacent area and the undulating drainage channel	Moderate	Minor
C5.	Effects of Poor Solid Waste Management	Waste will be generated during the construction of the WSS. The waste stream from the construction will include cement bags, timber and pipe cuttings, empty water bottles, food remains from workers onsite and other forms of waste. If not well managed, the area could be prone to nuisance from foul smell, breeding of vermin and vectors, and lead to outbreak of diseases.	▪ Waste collection bins will be provided at strategic positions at the 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 proponent will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA/KDLG/ Sub County. ▪ Burning of waste on-site shall not be allowed.	Moderate	Minor

C6.	Increased incidences of diseases.	The increase of people involved in the project activities is likely to increase the incidences of diseases in the area. Consequently, there will be potential risk of contracting sexually transmitted diseases (STDs) especially the Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome (HIV/AIDS) among the program workers and the local communities. This will be increased due to influx of people seeking for employment.	▪ The contractor should liaise with the District and Sub County CDO to mobilise communities during the recruitment process to reduce on influx of people who are unskilled. ▪ The contractor should emphasise equal opportunities for both men and women. ▪ The Contractor should, in conjunction with local health authorities, undertake to educate and sensitise the workforce on communicable diseases such as cholera, STDs and HIV/AIDS. ▪ Condoms must be made available to the workforce	Moderate	Minor
C7.	Visual intrusion	This will mainly arise from the erection of service reservoir tanks on the high altitude (hills). In addition, visual intrusion will occur where project activities are likely to create disfigured landscapes in the project area especially where the construction activities will result in deposition of large spoils and digging of the trenches.	▪ The contractor should maintain as much as possible the existing landscapes and plant trees and vegetation to enhance the visual aspect. ▪ Rehabilitate all areas disturbed by construction and landscape with trees, grass and shrubs.	Minor	Negligible
C8.	Increased accidents and occupational hazards	Implementation of the project will definitely increase volume of human and motor traffic in the project area. The increase in human and motor traffic will be aggravated by the transportation of construction materials, water pipes and other equipment required in constructing the water supply facilities. This is likely to result in a higher risk of accidents and occupational hazards occurring in the area of operation.	▪ The contractor should ensure that workers are provided with adequate personal protective wear to mitigate injuries such as gloves, helmets, overalls and gumboots. ▪ Traffic guides and signs should be utilized to avoid accidents on busy roads and junctions especially with vehicles transporting materials ▪ Fence all construction sites. ▪ Place warning signs. ▪ Enforce maximum traffic speeds to 20kph	Moderate	Minor

			▪ Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or accident		
C9.	Sourcing of Construction Materials	Sourcing of materials such as sand, gravel bricks/blocks and timber if not well regulated and controlled can have a significant impact in the points of sourcing.	▪ The Contractor should liaise with local authorities to ensure that materials such as sand and gravel are only taken from quarries and borrow pits with the necessary environmental permits.	Moderate	Minor
C10.	Occupational Health and Safety Risks for the Workforce	Construction traffic, excavation machinery, blasting of rocks and trenches may pose accident risk to workers either when equipment is operated by inexperienced workers or when in a poor mechanical condition or falls into the trenches.	▪ All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them. ▪ Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency. ▪ Regular drills will constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in the case of incidences. ▪ Signage will be used to warn staff and/ or visitors that are not involved in construction activities of dangerous places. ▪ Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of	Moderate	Minor

			the incident or accident		
C11.	Social Misdemeanour by Construction Workers	▪ While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships, with attendant risk for spread of HIV/AIDS. ▪ Labour influx in the project community such as increase in irresponsible activities that may increase HIV/AIDS due sexual relations between project workers and the local community; workers taking advantage of young girls in the community due to high poverty levels and vulnerability, teenage pregnancies and dropping out of school etc. ▪ Violence Against Children such as potential use of child labour; sexual relationship with underage children, teenage pregnancies, school drop outs etc. ▪ Conflict in the community/families (social cohesion and disruption) due to project workers engaging in sexual relationships with married women in the community etc.	▪ Framework (responsible staff, action plan, etc.) to implement during project execution. ▪ A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation. ▪ A code of conduct (appropriate to behaviours in workplace and with respect to relations with local community) will be developed and approved by MWE which will be signed by all workers on the project. ▪ Local workers will preferentially be employed, paid directly through their banks and access to bars by workers from outside the project area in the local communities controlled. ▪ All construction workers shall be orientated and sensitized about responsible sexual behaviour, GBV, Violence Against Children, HIV/AIDS etc. in project communities. ▪ Contractor(s) will maintain a complaints redress mechanism for all complaints that will arise from the interaction between construction workers and the communities within the project sites/areas including a record of how these complaints have been addressed.	Moderate	Minor
C12.	Archaeological / Historical Sites	Throughout the consultations with the locals and local leaders, no known archaeological or historical sites exist on the	▪ The Contractor shall ensure that key members of his staff are briefed. Any such features that may be found that	Minor	Negligible

		proposed project routes, and proposed construction sites. Therefore, no impacts on any features of importance to national heritage are expected.	were not apparent on surface investigation will be reported by the project management and appropriate procedures followed to hand them over to the authority responsible for national heritage and antiquities.		
C13.	Groundwater Quality	The groundwater could become polluted as a result of construction activities, pit latrines and indiscriminate waste disposal practices.	▪ The borehole should be covered and sealed so that dirt, water, sand and other debris cannot fall in. ▪ The boreholes should have concrete aprons around their base to prevent dirty water seeping back into the hole. ▪ Do not develop pit latrines close to boreholes. ▪ Dispose of all wastes in an approved disposal site.	Moderate	Minor
C14.	Fauna	Disturbance or loss of protected/endangered animal species/communities and their habitat due to construction activities (noise, dust, fumes, pollution, vehicles)	▪ Minimize vegetation clearance. ▪ Protect water resources from pollution. ▪ Protect soils from contamination. ▪ Rehabilitate all disturbed areas.	Minor	Negligible

Table 50: Operation Phase Adverse/Negative Impacts

Item	Environmental and Social Component	Potential Negative Impacts	Potential Mitigation Measures	Impact Rating before Mitigation	Impact Rating after Mitigation
OP1	Water quality and pollution	The quality of water recommended is that which is physically, chemically and bacteriologically safe for human consumption. When not thoroughly treated, water could be a source of water	▪ The borehole should be covered and sealed so that dirt, flooded water, sand and other debris cannot fall in. Transmission and distribution pipes should also be covered underground to reduce exposure.	Moderate	Minor

		related diseases which could affect the project communities, thereby causing an epidemic in the area. Transmission of water can also result into pollution and pollution entering the boreholes	▪ The boreholes should have raised concrete aprons around their bases to prevent dirty water seeping back into the holes. ▪ The drilled borehole areas should be raised well-head by building earthworks to prevent the flooded water, dirt and other debris to accumulate around it		
OP2	Water quantity and yield	This could be due to declining groundwater recharge and over pumping. The project sites are prone to suffering from rapid land use change (deforestation, soil erosion, etc.) thus the recharge of the ground water supplying the borehole may be affected in the long run.	▪ Get involved with Water source catchment protection and management planning that could improve land management and restore groundwater recharge. ▪ Encourage contour ploughing, mulching and other agricultural practices that increases soil water retention and percolation into the underlying aquifer. ▪ Reduce the amount of water being taken – if demand in the area is growing then look at developing new water sources. ▪ Keeping records of how much is being pumped (either volumes or number of hours for which the pump is being used per day). Find out if sudden drops in level correspond to pumping activity.	Severe	Minor
OP3	Water Supply System failure	Insufficient cost/funding for operation and maintenance would lead to poor maintenance of the system which eventually could lead to frequent breakdowns of the water supply system and consequent shut down, which further could require major and costly rehabilitation. Other sources of failure in the water system could be due to sabotage (possibly by the water vendors who envisage loss of livelihoods), illegal connections which could result in	▪ Payment for water supply services is the only way to keep the service running continuously and therefore tariffs would be designed to ensure financial viability. Cost recovery would be achieved through service fee payments. ▪ Put in place a water user committee to oversee the operations of the water system. ▪ Fence off the areas like water abstraction points, pump houses, water storage reservoir tanks and other water supply	Moderate	Minor

		decreased water pressure, and vandalism (theft of water system parts)	structures like the community taps like kiosks to mitigate trespass and sabotage		
OP4	Water pollution due to cutting of the pipes	Digging and construction of water facilities within close vicinity/on the water transmission network could result in pollution and loss of water	▪ The developer should hire services of security guards to monitor and guard the water supply system facilities. ▪ Sensitization and awareness about the dangers of vandalizing the water supply system facilities should be done especially by the local leaders. ▪ Legal and applicable punitive measures like arrests and prosecution should be taken to those caught vandalizing the water system facilities in order to curtail and to serve as an example to those who would want to engage themselves in such acts.	Moderate	Minor
OP5	Noise levels from Generators	Using of generators to boost the pumping of the water at the pumping stations may lead to moderate noise levels around the project area	▪ Installation of solar system instead of generator ▪ Service the generators regularly to minimize on the noise. ▪ Switch on generators only for few hours to boost on the pumping hours but always use the solar systems	Minor	Negligible

Table 51: Decommissioning Phase Adverse Impacts

Item	Environmental and Social Component	Potential Negative Impacts	Potential Mitigation Measures	Impact Rating before Mitigation	Impact Rating after Mitigation
DC1	Surface Water Quality	Pollution of water bodies from erosion of unconsolidated materials, contaminated soil, wastes (solid and liquid), etc. As a result of demolition activities.	• Rehabilitate all areas e.g. grass/tree planting. • Take samples of the runoff water into the receiving water body nearby and ensure free pollution.	Moderate	Minor

			• Remove all contaminated soil identified and dispose of it in an approved site. • Close any waste disposal facility on site and make provision for drainage in such a way as to prevent future pollution.		
DC2	Flora	Disturbance or loss of plant species or communities (terrestrial, aquatic) due to dust fall-out onto leaves and soil, dump erosion.	• Rehabilitate or stabilize all cleared areas using indigenous vegetation until handover of the site.	Minor	Negligible
DC3	Fauna	Disturbance or loss of animal species/communities and their habitat due to the lack of rehabilitation etc.	• Rehabilitate or stabilize all cleared areas using indigenous vegetation where possible.	Minor	Negligible
DC4	Soils	Re-use of soils in rehabilitation and re-instatement of pre-project capability.	• Replace subsoil and overburden first and then cover with saved topsoil. Do not use heavy equipment to replace topsoil because this can cause compaction.	Minor	Negligible
		Soil erosion from denuded areas and demolition activities.	• Maintain erosion protection works. • Rehabilitate or stabilize all disturbed areas.	Minor	Negligible
DC5	Topography	Reinstate the topographic profile.	• Backfill, contour and landscape.	Minor	Negligible
DC6	Air quality	Dust from un-rehabilitated sites and demolition activities.	• Avoid dusty activities e.g. loading and dumping on windy days & monitor dust emissions.	Minor	Negligible
		Odours from waste dump.	• Avoid activities that can lead to pilling of wastes in the project area. • Dispose of all the wastes in gazetted sites	Minor	Negligible
DC7	Noise and vibration	Noise generated by demolition equipment and earth moving equipment	• Prescribe noise reduction measures if appropriate e.g. restricted working and transport hours and noise buffering.	Minor	Negligible
DC8	Health and safety	Risk of accidents and ill health as a result of the project	• Fence all unsafe and dangerous areas & monitor environmental health (air quality, water quality).	Minor	Negligible

			• Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or accident		
DC9	Aesthetic and amenity values	Improvement of the visual impact of the site on scenic views.	• Rehabilitate with trees, grass and shrubs where possible. • Consult with the local community and tourist industry.	Minor	Negligible

Note:

- Mitigation measures were designed in order to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts and inform the ESMP.
- Closure and decommissioning of the project was identified as a key issue. An environmental management plan is developed during the assessment and it prescribes procedures for closure and post-operation to ensure that the environment is restored as much as possible to its original state.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

9.1 Introduction

The objectives of the ESMP include: compliance with applicable national ESS; propose mitigation, enhancing, management, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse E&S impacts and; address capacity building requirements. The Plan includes details such as the issue to monitor, the indicators, responsibility for collecting and checking data and reporting, costs of implementation (where applicable), responsibility for implementing the action and training or orientation of responsible person (if applicable). It should, however, be noted that the costs indicated in the ESMP are indicative only and the responsible implementing parties such as Contractors, Supervising Consultants, and respective MWE teams and other agencies responsible for monitoring should prepare budgets to include the aspects covered in this ESMP. The proposed project may have minimal adverse environmental effects, provided that recommendations and mitigation measures identified in this Chapter are incorporated into all project phases and are implemented by the developer and the contractors.

Table 55 presents management plan with specific mitigation measures to be implemented during Design, construction, operation and Decommissioning phases of the proposed project.

9.2 Role of the Ministry of Water and Environment

The developer will be responsible for:

- Disclosing and adopting the ESIA to guide project implementation.
- Implement the approval conditions provided by NEMA (approval certificate), and permits from lead agencies including DWRM (Ground Water Abstraction Permit), Moguls', (Workplace Inspection Certification), MWE (River bank), NEMA (Environmental Management).
- Costs related to complying with the Environmental and Social Safeguards as applicable to the construction and operation of the Water Supply System will be met by the developer.
- Implementing and complying with the conditions of the ESMP forms part of the conditions of appointment of all Consultants and Contractors throughout the life of the project;
- Appointing Independent environmental experts to audit the implementation of, and compliance with, the ESMP and monitoring plan, as well as the NEMA Approval conditions on an annual basis; and the independent environmental Compliance audits, together with other relevant monitoring information made available to the public, throughout the life of the project, summarized in lay person's terms and in a culturally accessible manner.
- Training and awareness creation in environmental and social management and the mitigation of impacts are provided to MWE Project staff, to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally and socially responsible manner

9.3 Role of Relevant Lead Agencies

Agencies such as NEMA, WMD, MGLSD, RDLG, Office of CGV, will be involved in the various phases through the life of the Project as proposed in the ESMP. The responsibilities of each respective agency will be those that are within their mandate, and as such, no extra costing has been included in the ESMP since it is expected that their annual operational budgets will be made to include the required works for this Project. For this reason, MWE should regularly update the respective lead agencies with

the Project progress, and challenges and opportunities presented during the implementation of the project.

9.4 Role of Construction Supervision Consultants

The Consultants to whom Supervision work is outsourced during project implementation will be responsible for the following:

- Reviewing project design, contractor's contract, BOQs and all other project documents like the ESMP, ESIA report, NEMA project certificate conditions, RAP so as to familiarize with the documents in order to build up an additional mechanism for enforcing compliance as per those in contract.
- Ensuring that contractors familiarize themselves with the environmental and social management framework for the project sites and activities.
- Reviewing and approving Contractor's plans as required in the above documents like; EHS Plans, Waste Management Plan, Traffic Management Plan, Emergency Response Plan, Gender Management Plan, Erosion and sediment control plan, Decommissioning and Restoration Plans of the site; among others.
- Following up on Contractor's obligation in acquiring the various permits in relation to the project works which then will be verified like; permit for excavation, permit for hoarding and scaffolding, Work registration permit.
- Monitoring the Contractor's performance in EHS aspects, particularly in regard to the above-mentioned plans; using the safeguards documents provided by MWE and NEMA, as well as permits from other Lead Agencies, using the safeguards documents provided.
- Ensuring that all the contractors and their subcontractors receive basic training or are sensitized on E&S matters, including acceptable conduct, storage and handling of potentially hazardous substances, waste management, and prevention of pollution of natural resources.
- Receiving daily, weekly and monthly reports from the Contractor on EHS aspects, and furnishing MWE with the information during monthly meetings or site visits. Any urgent issues will have to be reported to MWE immediately to allow appropriate timely action to be implemented.
- Preparing the environmental and social supervision statement and also approving of invoices or payments with consideration of ESMP performance.
- Regularly engaging with the local communities to ensure continued social acceptance in the areas where the Contractor is in operation, and also to ensure that Contractor adheres to the recommendations made in this ESMP.
- Instructing the contractor to correct within the timeframe determined as per contract in case of any corrective actions. If there is breach of contract or strong public complaints on contractor's environmental performance, the Supervision Consultants is obligated to order the contractor to correct, change or stop the work, reporting to relevant agencies and the MWE.

9.5 The Role of the Contractor.

- During sites preparation and construction, the contractor will be responsible for ensuring compliance with all relevant national legislation and World Bank Safeguard Operational Policies including adhering to all environmental and socio-economic mitigation measures specified in this ESIA.
- The contractor will also be responsible for managing the potential environmental, socio-economic, safety and health impacts of all contract activities whether these will be undertaken by themselves or by their subcontractors.
- The Contractor should prepare Environmental, Social, Health and Safety Action Plans to comply with the above requirements.
- Conduct day-to-day implementation of the ESMP

9.6 The Monitoring Team

It is recommended that a core team of people preferably headed by the Rakai District Natural Resources/Environment Office, District Water Office and composed of other officials from DWD and respective local environment committees will carry out monitoring activities. The monitoring team will start its work during the site preparation and construction process and continue throughout the operation phase and should ensure that the proposed mitigation measures are implemented as suggested and recommended in this EIA study. The monitoring team will most particularly check for the following issues among others:

- Changes in the water quality and quantity.
- Compliance with the conditions set out on the water abstraction permit.
- Compliance with the conditions on the issued Certificate of Approval from NEMA.
- The activities of this team are not a substitute to the obligations of the Contractor and Supervision Consultant.

9.7 Environmental and Social Monitoring Plan

A monitoring process will be established to check/assess the implementation progress and effectiveness of the mitigation measures suggested and the resulting effects of the proposed project on the environment. The process will begin during site preparations, construction stage and continue throughout the operation phase. It also includes regular reviews of the impacts that cannot be adequately assessed before the beginning of the project, or which arise unexpectedly. In such cases, appropriate new actions to mitigate any adverse effects will be undertaken.

The recommendations will provide a basis for tracking progress of the proposed project activities with regard to sound environmental and social practices and mitigation measures. This will be done with the support of supplementary documents such as specific architectural and engineering plans and designs for civil and mechanical works to be undertaken on the site.

Environmental Management and Monitoring Plan is presented below under Table 54.

Table 52: Environmental Management and Monitoring Activities and Criteria

Ref. No	Affected Environment	Mitigation Measures	Objective to Address Impact	Indicators	Monitoring Activity	Project Phase	Responsibility	Freq.	Mitigation Cost (UGX)	Monitoring Budget (UGX)
M1.	Ground water Resources	▪ Water source catchment protection and management planning that could improve land management and restore groundwater recharge. ▪ Encourage contour ploughing, mulching and other agricultural practices that increases soil water retention and percolation into the underlying aquifer. ▪ Reduce the amount of water being taken – if demand in the area is growing then look at developing new water sources. ▪ Keeping records of how much is being pumped (either volumes or number of hours for which the pump is being used per day). Find out if sudden drops in level correspond to pumping activity.	To minimise on the Local impact of lowering water table levels, due to abstraction of groundwater for the system	Changes in Ground water level	Hydrological study of boreholes to determine water table depths, borehole yields and local use of groundwater	Pre and post construction	MWE	Quarterly	-	5,000,000
M2.	Ground water quality	▪ The borehole should be covered and sealed so that dirt, water, sand and other debris cannot fall in. ▪ The boreholes should have concrete aprons around their base to prevent dirty water seeping back into the hole. ▪ Do not develop pit latrines close to boreholes. Dispose of all wastes in an	To minimise on the impact of ground water pollution	% of water tests parameters that meet the water quality standards	Water Quality Testing	Throughout project period	MWE	Quarterly	-	4,000,0000

Ref. No	Affected Environment	Mitigation Measures	Objective to Address Impact	Indicators	Monitoring Activity	Project Phase	Responsibility	Freq.	Mitigation Cost (UGX)	Monitoring Budget (UGX)
		approved disposal site.								
M3.	Soils	▪ Use right angle intersections & use bunding and avoid seasonally marshy areas & floodplains ▪ Replace subsoil and overburden first and then cover with saved topsoil. ▪ Do not use heavy equipment to replace topsoil because this can cause compaction.	To minimise on the Soil erosion/damage due to survey activities and vehicle tracks.	% of soil cover replaced	Field observations	Decommissioning	Contractor and MWE	Quarterly	-	2,000,000
M4.	Flora	▪ Mark endangered tree species and avoid cutting ▪ Minimize vegetation clearance and protect water & soils from pollution ▪ Rehabilitate or stabilize all cleared areas using indigenous vegetation until handover of the site.	To prevent disturbance or loss of endangered plant species or communities due to survey activities	% of trees conserved and restored	Field surveys	Pre-construction and Decommissioning	Contractor /MWE	Quarterly	-	3,000,000
M5.	Land acquisition	▪ Prepared and sign MoUs/Consent forms with land owners before construction activities ▪ Compensation (where possible) to land owners as project affected persons.	The land-take would be permanent where the water intakes, office block, pump stations and reservoirs would be constructed and temporary along the pipeline network	% of RoW aquired % of PAPs compensated	Review of RAP implementation reports and field engagements with PAPs	Pre and Construction	MWE	Daily	Presented in the RAP	3,000,000
M6.	Water quantity and yield	▪ Implementation of a water source protection plan	To improve on the water	-Water level	Water quantity and	Construction	MWE	Lump sum	60,000,000	3,000,000

Ref. No	Affected Environment	Mitigation Measures	Objective to Address Impact	Indicators	Monitoring Activity	Project Phase	Responsibility	Freq.	Mitigation Cost (UGX)	Monitoring Budget (UGX)
		(WSPP)	quality from the water source	changes -% of water tests parameters that meet the water quality standards	quality monitoring					
M7.	Loss of vegetation cover and top soil	▪ After construction, there should be landscaping and re-vegetation. The premises will be planted with vegetation/grass and ornamental trees. ▪ The water source should be fenced off to reduce on going agricultural activities around the borehole to avoid pollution entering it especially when it rains heavily. ▪ Minimize vegetation clearance by clearly demarcating work areas. ▪ Provide environmental awareness training to all employees. ▪ Landscaping and re-vegetation after construction and fencing off all the sites.	To minimize on the loss of vegetation cover and top soils along the project sites	% of vegetation cover conserved % of vegetation cover restored	Review of reports, field verification and observation	Construction	Contractor	Daily	-	2,000,000
M8.	Increase susceptibility to soil erosion	▪ The sites will be hoarded off to intercept any eroded material and any soil material will remain within the site. ▪ The project proponent will also ensure that proper landscaping and vegetation	To reduce on incidences of soil erosion at project sites	Level of stability of the soil	Soil conservation reports and field observation/ verification	Construction	Contractor / MWE	Quarterly	-	2,000,000

Ref. No	Affected Environment	Mitigation Measures	Objective to Address Impact	Indicators	Monitoring Activity	Project Phase	Responsibility	Freq.	Mitigation Cost (UGX)	Monitoring Budget (UGX)
		restoration is carried out to further reduce the possibility of soil erosion. ▪ Use proper techniques for trenching and shoring ▪ Soil conservation measures								
M9.	Increased siltation of aquatic habitats	▪ Draining sites adequately and directing surface run off appropriately to avoid water logging of adjacent area	To reduce on the impact of siltation in the nearby seasonal aquatic habitats	Turbidity level of water	Water quality tests	Construction	Contractor	quarterly	-	covered
M10.	Incidences of communicable diseases	▪ Educating and sensitising the workforce on communicable diseases such as cholera, STDs and HIV/AIDS and provision of Condoms to the workforce.	To prevent cases of potential disease risks within the project area	Number of Incidents of communicable diseases reported	Review of Clinical records	Construction	Contractor / MWE	Daily	5,000,000	1,000,000
M11.	Air Quality	▪ Provision of adequate and appropriate personal protective equipment (PPE) and air quality monitoring. ▪ Dust suppression by water, observe 30km/hr and covering of construction materials in transit	To minimise dust nuisance and exhaust pollution	% of air parameters that meet standards	Air quality tests	Construction	Contractor	Monthly	6,000,000	1,000.000
M12.	Construction Material Sourcing	▪ Liaise with local authorities to only source materials from legally registered suppliers	To regulate and control the impact in the points of sourcing materials.	No of legally authorized material	Review of documents and field inspections	Construction and decomissioning	Contractor	quarterly	-2,000,000	2,000,000
M13.	Noise Levels	▪ Proper scheduling of work ▪ Provision of PPE, Equipment and vehicle servicing and noise barriers	To minimise noise disturbance to communities	% of sites with permissible noise levels	Noise measurement	Construction	Contractor	Monthly	6,000,000	1,000,000

Ref. No	Affected Environment	Mitigation Measures	Objective to Address Impact	Indicators	Monitoring Activity	Project Phase	Responsibility	Freq.	Mitigation Cost (UGX)	Monitoring Budget (UGX)
M14.	Occupation Safety & Health	▪ Inspect all equipment to ensure that they are in good working condition. ▪ Barrier tape and warning signs will be used, install safety signage, fence off the area. ▪ First aid services in place ▪ PPE usage enforced ▪ Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or accident	To ensure Health and Safety at the site / Premises	No of OSH incidents recorded and managed	Review of reports and field observations	construction	Contractor / MWE	Daily	4,000,000	1,000,000
M15.	Community Health	▪ Implement community health awareness and service provision ▪ Promptly notifying serious and severe incidents and accidents (no later than 24 hours or immediately after learning of the incident or accident	To prevent spread of diseases and occurrence negative incidents	No of health programs implemented and no of incidents recorded	Review of reports, incident tracking and field visits	Construction	Contractor	Quarterly	5,000,0000	2,000,000
M16.	Misinformation of the project	▪ Prepare a comprehensive Stakeholder Engagement Plan (SEP	To minimize the risk of misinformation due to failure to engage stakeholders	No of stakeholders engaged	Review of reports, minutes and field visits	Construction	Contractor	Monthly	5,000,000	3,000,000
M17.	Risk of GBV and violence against children (VAC)	▪ Implement GBV and child protection action plan and enforce codes of conduct for SEA, SH, GBV and VAC	To prevent GBV abd VAC cases on the project	No of GBV and VAC cases recorded and managed	Review of reports and field visits	Construction	Contractor and consultants	Monthly	4,000,000	3,000,000
M18.	Risk of delayed	Implement grievance	To mitigate	% of	Review o	construction	Contractor	Monthly	4,000,000	3,000,000

Ref. No	Affected Environment	Mitigation Measures	Objective to Address Impact	Indicators	Monitoring Activity	Project Phase	Responsibility	Freq.	Mitigation Cost (UGX)	Monitoring Budget (UGX)
	management of grievances for workers and community	management, mechanisms for workers and community	project induced grievances	grievances managed for workers and community	reports and field visits		and consultants			

Note:
External Monitor can be a lead Agency and or Authorities like NEMA, DNRO/DEO/DWO or a NEMA Certified Consultant whom the developer and Contractor will contact on matters arising like noise, biodiversity, air and water quality monitoring. Lead Agencies will make their own arrangements on inspections on site to ensure compliance with set guidelines and standards.

CONCLUSION

Lwentulege RGC Piped Water System is being proposed by the MWE /DWD for Kagamba Sub County (currently Lwentulege Town Council) in Rakai district. This is envisaged to bring an end to water stress and overreliance on a few low yielding boreholes within the project area of Lwentulege Rural Growth Centre and neighbouring community. It is also envisaged that, the area experiences scarcity of safe clean water and high growing population. Further still, the project will also address the focal area of access to clean water as stipulated under the Uganda Vision 2040 and the NDP III. The project also contributes towards achieving SDG *(specifically SDG 6 on clean water and sanitation)*. Several beneficial impacts envisaged will include:

- Improved quality of water supplied to communities.
- Improved quantity of water supplied to communities.
- Provision of employment opportunities during construction and operation phases.
- Improved health and sanitation due to improved water quality and quantity.
- Improved local economies and induced development especially sourcing of raw materials for construction activities and tree seedling growing business boost during operation phase.
- Small scale irrigation farming especially in vegetables and flowers since most household heads are involved in subsistence agriculture.
- An increase in revenue for the sub county (Town Council) from water project collections.
- Initiate the move away from the status quo of rural women and children's perpetual carrying of water on their heads from unprotected and distant point water source and allow them to engage in income generating activities and to improve the image of the woman and children.
- Improved image of the Sub County (Lwentulege Town Council) and parishes in terms of providing good services to its people hence more funding from potential funders.

However, the ESIA findings indicate that direct impacts will be fairly compassionate and limited to the project area where construction works will be undertaken. Direct negative impacts will include:

- Soil erosion
- Destruction of vegetation and crops,
- Increased noise nuisance by construction works and equipment,
- Increased sediment loads into the downstream beyond water sources
- Improper disposal of generated waste
- Improper management of construction waste,
- Land loss and damage to property,
- Land pollution, waste and drainage problems,
- Landscape and land use impacts
- Loss of vegetation and soil degradation especially at the construction sites and trenching activities for the pipelines,
- Occupational health and safety risks for the workforce,
- Risk of accidents
- Social misdemeanor by construction workers (e.g. conflicts due to influx of labour in the project community such as increase in irresponsible activities that may increase HIV/AIDS due sexual relations between project workers and the local community; workers taking advantage of young girls in the community due to high poverty levels and vulnerability, teenage pregnancies and dropping out of school etc., Violence Against Children such as potential use of child labour; sexual relationship with underage children, teenage pregnancies, school drop outs etc. Conflict in the

community/families (social cohesion and disruption) due to project workers engaging in sexual relationships with married women in the community etc.

A RAP has been undertaken and elaborated to address all compensation issues that are anticipated and an ESMP has also been presented in the preceding Chapter to ensure positive impacts are enhanced while negative impacts are mitigated. Physical Resettlement issues are not anticipated.

During this ESIA study, comprehensive stakeholder consultations were conducted with relevant stakeholders and MWE/DWD will liaise with them to ensure effective implementation of the proposed mitigation measures for the anticipated negative impacts as indicated in the ESMP. MWE/DWD should work closely with the local leaders and Local Government to ensure smooth implementation of the ESMP and if impacts not contemplated during this ESIA arise, the management of DWD should immediately address them in consultation with NEMA. If any other structures/ expansion not described in this report takes place, it will be considered separately and an ESIA Report/Project brief will be prepared by DWD or the Contractor and submitted to NEMA for approval before implementation.

The following mitigation measures should be considered as conditions of approval as they are regarded as being essential in so far as rendering potentially significant impacts acceptable. Implement the EMMP for all provided project phases with special attention being given on:

- Undertake Annual Environmental Audits and submit reports to NEMA.
- Conduct regular water quality tests and analysis for raw water to inform the treatment options.
- Maintaining good house-keeping through the duration of the construction phase.
- Screening unsightly aspects from public view including excavations (where practical), construction material storage areas, waste storage areas and ablutions.
- Erect fencing around construction sites to act as screens minimizing the effect of wind in generating dust emissions.
- The re-vegetation of all areas of natural vegetation with indigenous species that have been disturbed as a result of construction activities and maintain the 200m buffer zone.
- Designation of construction materials and fuel storage areas.
- Effective control of waste and containment of storm water especially during rainy season.
- Implement dust suppression measures (use of water) when appropriate.
- Train workers on issues of HIV/AIDS, social cohesion and disruption and Violence Against Children should not be permitted.
- Adhere to Occupational Health and Safety Act, 2006 provisions e.g. monitoring noise levels and provision of protective equipment to staff.
- At least 75 % (subject to availability) local labour from Rakai district should be used and 95% (subject to availability and skills levels) local contractors should be used.
- The Developer (DWD) monitors compliance together with stakeholder wide monitoring group comprising technical staff from local government institutions.
- Fencing is recommended in order to prevent contamination of the water source and for security of hydraulic structures and installations for the pump station.
- Prepare and implement a water source protection plan for the catchment area of the water sources.

Therefore, the proposed Lwentulege RGC Water Supply System is environmentally and socially feasible for implementation provided the recommended mitigation and monitoring measures are implemented, and the proposed implementation arrangements are upheld.

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ANNEXES

Annex I: NEMA Approved Letter for Terms of Reference

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

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P.O.Box 22255, Kampala, UGANDA.

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NEMA/4.5

6th June, 2022

The Permanent Secretary
Ministry of Water and Environment
Directorate of Water Development
Rural Water Supply and Sanitation Department
Headquarters, Plot 3-7, Kabalega Crescent, Luzira
P.O Box 20026
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RE: REVIEW OF THE TERMS OF REFERENCE FOR UNDERTAKING AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED PIPED WATER SUPPLY AND SANITATION SYSTEM FOR LWENTULEGE RURAL GROWTH CENTRE, IN KAGAMBA SUB-COUNTY, RAKAI DISTRICT

This is in reference to the Terms of Reference (TOR) **(EIATOR-8461)** for carrying out the Environmental and Social Impact Assessment (ESIA) for the above-mentioned project, which was submitted to this Authority, on 19th April, 2022, for review and 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. This is not a Certificate of approval.

In addition, you are advised to consider the key aspects below during the conduct of the environmental impact study and the preparation of the ESIA report.

1. Carry out comprehensive consultations with all the relevant stakeholders including Rakai District Local Government Authorities, Directorate of Water Resources Management, and the local community in the neighborhood of the proposed project sites. The views of the stakeholders consulted should be well documented/ addressed and lists of persons consulted appended in the EIA report.

   In addition, ensure that the relevant local government departments including, the Environment, water, Physical Planning and the Engineering departments, are consulted and concerns that may arise taken into account and incorporated in the design, construction and operation of the project.

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ii. Ensure that the project description is comprehensive for each of the project components, including the designs of the different project components, including the proposed incinerator. In addition, clearly indicate the chemicals that will be used in the water supply system and how these will be stored, handled.

iii. Undertake geotechnical and hydrogeological investigations of the proposed project sites/water sources so as to inform the design and construction of the Water Supply and Sanitation System.

iv. Study the land tenure and identify potential project affected persons/properties at the proposed sites. Propose plans for land acquisition and/or compensation where required, including resettlement action plans, where applicable.

v. Provide current baseline information of the project sites, accurate GPS coordinates clearly indicating the boundaries of the project sites and the associated components and images/maps of the project sites.

vi. Provide site specific baseline information. In particular, assess site baseline noise, soils and air quality taking into account key parameters relevant to the nature of the project. Append to the ESIA report the results of the baseline analyses from an accredited laboratory.

vii. Carry out an evaluation of all the potential negative impacts associated with the proposed Piped Water Supply and Sanitation System

viii. Provide detailed mitigation and environmental management and monitoring plans that relate to the identified environmental impacts from the proposed project. In particular, the following issues should be comprehensively assessed and appropriate mitigation actions provided in the ESIA:

a. potential waste streams associated with the construction and operational phases of the Piped Water Supply and Sanitation System, and management of such waste, as well as measures for preventing pollution of the environment and degradation of any sensitive ecosystems that may be within the vicinity of the project sites;

b. potential emission sources of particulate matter including volatile organic matter and proposed mitigation measures;

c. potential noise emission sources, impacts and proposed mitigation measures;

d. occupational health and safety issues associated with the construction and operational phases of the Project.

ix. Provide a clear and legible copy of the project site layout plan (preferably on A-3 sized paper) showing the equipment, clear boundaries of the project area in relation to its environs.

x. Include in the ESIA report comprehensive analysis of alternative /options to selected project location, design and technology among others.

xi. Append to the ESIA report authentic copies of land ownership and acquisition documents.

xii. Indicate the project cost of the project and append a copy of the certificate of valuation issued by a qualified and registered valuer in accordance with the provisions of Schedule 5, 3(f) of the National Environment (Environmental and Social Assessment) Regulations, 2020.

xiii. Provide evidence of payments of the 30% ESIA fees as required under regulation 49 (2) of the National Environment (Environmental and Social Assessment) Regulations, 2020.

Note that only registered Environmental practitioners including the team leader should be contracted to carry out the ESIA for the proposed project.

This is therefore, to recommend that you carry out the ESIA study for the proposed Project. We look forward to your cooperation and receipt of a copy of the ESIA report, for our further action.

Margaret Aanyu
FOR: EXECUTIVE DIRECTOR

Annex II: Stakeholder Engagement Plan, Feedback and Participants Attendance Sheets

The stakeholder engagements and community consultations were guided by the following agenda

1. Opening prayer from a volunteer
2. Welcoming remarks and recognition of leaders present by the chairman LCI, who then invited the team from Bright Technical Services to share the package / news they carried for the gathering.
3. BTS Presentation provided information on the following aspects:
    a. The developers
    b. Project Background
    c. Project Location
    d. Project Description
    e. Ongoing Activities
    f. RAP Process
4. Question and answer session
5. Closure by the top-ranking political or technical leader present

Schedule of engagements conducted during the RAP study in Lwentulege

Phase	Stakeholder	Key Officials Present	Date of engagement	Location	Numbers	
					Male	Female
Inception Meeting	**District Consultations**					
	Rakai	District water Engineer, DCAO, VV LCV, D/RDC, Sub-County Leaders, Councilors, Chairpersons	01.07.2022	Rakai District Headquarters	03	02
Detailed Disclosure and Assessment Phase		Lwentulege RGC Community Consultations				
	Kakenke Mweruka Trading Center	Community, LC Chair Persons, Parish and Sub-county Leaders	08.07.2022	Kakenke Mweruka	35	16
	Leaders and Opinion Leaders	LC Chair Persons, Parish and Councilors	08.07.2022	Kirangira P/School	11	1
	Kasambya Community	LC Chair Persons, Parish and Councilors	08.07.2022	Kasambya Trading Centre	17	07
	Residents of Lwentulege T/ Council	Community, LC Chair Persons and Leaders	09.07.2022	Lwentulege T/Council	13	04
	Kagamba Community	Community, LC Chair Persons and Leaders	09.07.2022	Kagamba Sub-County	25	21

Phase	Stakeholder	Key Officials Present	Date of engagement	Location	Numbers	
					Male	Female
		LC Chair Persons, Parish and Councilors	09.07.2022	Rev, Enock's Residence	16	06
	Kyabakazi Community	Community, LC Chair Persons, Parish and Sub-county Leaders	10.07.2022	Kyabakazi Trading Center	54	18
	Kenjokyi and Kirangira	Community, LC Chair Persons, Parish and Sub-county Leaders	10.07.2022	Kenjokyi Trading Centre	23	06

Summary of Stakeholder Views and Concerns at District Level with RAP Team Responses

Stakeholder	Issue/comment	Response
DRDC	Emphasis should be put on your equipment's to ensure they are safe. Asked for the roadmap of the project to implementation level for ease of monitoring. For how long are you here?	The equipment's we have now are manageable and we shall ensure that we improvise for the safety of our survey equipment. But this is noted and will be shared with the implementing partner to take note of We are here for about two weeks for multiple data collection.
V/Chairman LCV	We welcome this project with all hope and pray that it will come through as soon as possible. Kiziba has never seen piped water. Our people are eager and receptive to this project because it's long overdue Employment opportunities for our people please	We appreciate your cooperation and support sir. We are at the RAP study stage and once its completed, the reports will be shared with MWE for further management. The contractor at the implementation stage will be guided to use local labour and, on many occasions, they are more cost friendly compared to External Labour
Deputy CAO	Kindly consider expanding on the coverage of the project because our people are badly off and children sometimes miss school due scarcity of water	This is noted Sir, Lets first handle this phase and most probably and extension is much easier once this phase is finalized
V/Chairman LCV	Please consider our schools especially those in the hills	The design team, catered for such institutions and they will be served.
District Councilor	Projects always leave behind cases and people have no one to run to for support.	A Grievance Redress management committee will be set up at the sub-county level which will be trained and guided I different ways of mitigating

Stakeholder	Issue/comment	Response
Kagamba Sub county		grievances and to escalate cases up to district level to ensure PAPs' grievances are adequately resolved.
Hon. Councilor	Hope compensation will be a reality. Most times project promise to compensate people but that does not happen and this demotivates the people.	This is one among the many reasons why we are conducting this exercise.
Hon. Councilor	Engage the LC chairpersons when conducting your exercise for ease of identifying land owners.	The team is supposed to get in touch with the local leaders before beginning the survey works. (Data collection)

Record of Stakeholder Consultations and Engagement at Community Level

Date & Venue	Target Community / Villages	Views/Concerns/Questions	Response
Kakenke Mweruka 08.07.2022	Kakenke Mweruka Lwentulege	Will water be free of charge or there will be some charges incurred	No, however the utility tariff charged will be affordable and somewhat similar to that charged in other areas. The charges usually ensure the sustainability of the project
		We request for Jobs for the local communities during construction phase.	The request is noted. And as already witnessed, our project coordinator is from the project area.
		Where is the source of the water?	This water source will be a borehole within our community, the source has been tested and found to be safe and reliable to sustain the project and address the scarcity of water.
		That water source has salty water which we cannot even use for washing clothes!	This is noted, however MWE has plans to install an iron remover to ensure that the water provided is safe for domestic use.
		We have a council resolution against any water project that is ground based! We request you halt this process and first conduct a further analysis of the water quality	This is noted and appreciated, this information will be shared with MWE for further engagement and deliberations about the water source.
		We request that the water source be lake Kijanebarola for a sustainable project.	This will be forwarded for further analysis and consideration
Kirangira	Kirangira	How much are you paying for the crops and structures if	District compensation rates will be used for

Date & Venue	Target Community / Villages	Views/Concerns/Questions	Response
P/School 08.07.2022	Trading Centre	am affected?	computation of compensation for trees and perennial crops.
		Will the charge be much fair for those who are sacrificing their land for the project?	A uniform unit charge will be applied. However, connection fees may vary since for you the pipe will be much closer to your home
		Are there opportunities for people living with disabilities?	Opportunities will be available for each person without any form of discrimination.
		PAPs should also be connected to the piped water scheme as an incentive	There are some items that are given for free when you apply for water but upon connection, you will have to pay for usage I order to have a sustainable project.
08.07.2022 Kasambya Trading Centre	Kasambya Kyalimuka	No construction should commence without compensation	This is the right procedure but at times the services is more needed than the compensation. So MWE will be advised to ensure that construction begins upon completion of compensation.
		What qualifications do we need to work on this project?	The Project will require unskilled labour for the locals but that will be communicated before the commencement of the construction phase.
09.07.2022 Lwentulege T/Council	Lwentulege Town	We request for a public toilet at our market. The one we have is so longer functional yet the market brings a lot of people	This has been noted ad will be shared with the local leaders to ensure one of the public toilets that have been designed with this project, is constructed to serve the market community.
		Are we allowed to build or plant our crops after your pipeline has been laid down?	No Structure of any kind, will be permitted on the pipeline. One is allowed to grow seasonal crops after the construction of the water transmission lines.
		Where is the water source?	A bore hole will be used as a water source
		Boreholes in our community don't last, very soon that water will be red in colour due to high levels of iron in this area	This is noted and will be shared with MWE for further management and possibly more tests and analysis will be conducted to ensure a sustainable project is implemented.

Date & Venue	Target Community / Villages	Views/Concerns/Questions	Response
		How soon should we expect have piped water in our town council?	The process is ongoing and once we finish this phase
09.07.2022 Kagamba Sub-County	Kagamba, Kabusa Kyakabugema	Will service line connections to private individuals be free of charge or there will be some charges incurred	No, however the charge will be affordable and somewhat similar to that charged in other areas. This is for the benefit of both the project implementors and the end users to ensure sustainability
		Contacts of the consultants should be left behind so as those having questions or inquiries regarding the project can have access to contact them. Is there any office left behind after the project has ended?	The RAP team including the project coordinator, will leave their contacts for whoever needs them. However, a grievance management Committee will be set up that will handle any issues that may arise in relation to this project.
09.07.2022 Rev, Enock's Residence	Kizira,	Wii the be Jobs for us?	Jobs will be available at construction stage
		Why do we have to pay utility charge for water usage	We pay for utilities to enable operation and maintenance activities and for continuity and sustainability of the project.
10.07.2022 Kyabakazi Trading Center	Kyabakazi	Will all our village get water?	Not really as some will be considered in the second phase of the project.
		We request for Jobs for the local communities during construction phase of the project	The request is noted. And as already witnessed, our project coordinator is from the project area.
10.07.2022 Kenjokyi Trading Centre	Kenjokyi Trading Centre	Will public stand taps be established in addition to service line extensions to private individuals	These will be established and ministry technical team will assess the need and provide the service accordingly.
		Will water be free of charge or there will be some charges incurred	No, however the utility tariff charged will be affordable and somewhat similar to that charged in other areas. The charges usually ensure the sustainability of the project
		There was an inquiry from the community if compensation will be done before the project commences	Yes, all PAPs will be compensated before the project commences.
		Will my house be compensated for in case the pipe line is	Compensation will be paid by the Government of

Date & Venue	Target Community / Villages	Views/Concerns/Questions	Response
		passing through it?	Uganda through Ministry of Water and Environment based on the Valuation Report upon being approved by the Chief Government Valuer

Attendance Sheets

MINISTRY OF WATER AND ENVIRONMENT-RWSSD 4/3/22

REGISTRATION SHEET

ACTIVITY Inception Report Presentation GRGCs Western & Bitiya and Nyamugasani [illegible]

S/N	Name	Title	Contact/Email Address	Signature
1	Eng David Bateganya	PE	bateganyad@gmail.com	[signature]
2	TUMWSIIME JOHN BOSCO	Engineer Civil	[illegible]12@gmail.com	[signature]
3	Eng. Carolyn Kasura	SE	[illegible]@gmail.com	[signature]
4	Mugeiga Kato	Senior SOC	mugeigakato@gmail.com	[signature]
5	Cath Namyalo	SEHO	cnamyalo@gmail.com	[signature]
6	Catherine Mutumuza	Senior Sociologist	Cattymoza@yahoo.co.uk	[signature]
7	Nakaggwa Jonah	Social Scientist	[illegible]@gmail.com	[signature]
8	Nakalagga Jackline	Sociologist	[illegible]@gmail.com	[signature]
9	Samuel Senfuma	Hydrogeologist	[illegible]@gmail.com	[signature]
10	Jonan Kayima	Social Safeguards Specialist	[illegible]@yahoo.com	[signature]
11	Eng collins Yebazamukama	Senior Engineer	yebazac@gmail.com	[signature]

4/3/22

MINISTRY OF WATER AND ENVIRONMENT-RWSSD

REGISTRATION SHEET

ACTIVITY Inception Report Presentation - GRGC - WESTERN & BITSYA AND NYAMWASENI, WSS

S/N	Name	Title	Contact/Email Address	Signature
1.	NAKASUBI BRIDGET	SOCIOLOGIST	0786023754	[illegible]
2.	Eng Kenneth Musabe	Engineer - Bright Technical services	kmusabe@gmail.com 0772543346	[illegible]
3.	Brayan W MATOVU	SS + RS - GS	0701 68262 brayan@gmail.com	[illegible]
4.	Alozius Ganza	Valuer RTC	0701 478636 alozius@gmail.com	[illegible]
5.	Dr. Eng. Alex Kahuliro	Engineer Bright Tech. Service	0772435572 akahuliro@gmail.com	[illegible]
6.	Joseph Babiuddemba	Sociologist	0771559686 babiuddemba.jb@gmail.com	[illegible]
7.	Edrida Muwangizi	Principal SS		[illegible]
8.	Eng. OLWENY HAMU	AC - R&D	0772-453395 | holweny@yahoo.co.uk	[illegible]
9.	PIUS KAHANGIRWE	TL ESIA & WSPPs	0774636856 kpius@gmail.com	Pius
10.	Eng. Ronald Kabale	Principal Engineer	0704345185 / ronaldkabale@yahoo.com	[illegible]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR LWENTULEGE PIPED WATER SUPPLY SYSTEM IN KAGAMBA SUB COUNTY; RAKAI DISTRICT.

Date: 19th/05/2022

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	KABISWA R. SENDAWULA	SAS/T.C.	0702391248	[signature]
2.	ODOI JOHN.	H/A	078302389c	[signature]
3.	KAMOLI WILSON	MAJOR	0772928315	WILSON
4.	LUWUMBA CHRIS	COUNCILLOR LCV	0774991244	[signature]
5.	Mugisha Nasan	Muslim.	0782872583	
6.	Jerengere William	C/P	0775505591	Erugere
7.	Ssenkima Wilberforce	BodaBoda	0772790825	Wssenkima
8.	Saluvina Tashemere	For women	0776671624	Saluvina
9.	Nanyunja mary	Treasure	0785907741	nanyunja
10.	Kalema R.	macumuzi	0779187652	[signature]

Manzonsi Benadi C/MAN 0775167933 [signature]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR LWENTULEGE PIPED WATER SUPPLY SYSTEM IN KAGAMBA SUB COUNTY; RAKAI DISTRICT.

Date: 19th/05/2022

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	D. Mukyusenda	SEC. LC I	0773377467	[signature]
2.	Biryomumisho Pauson		0784907225	Pauson.
3.	Musinguzi Benon		0780711861	Benon.
4.	Kizza Yakobo	Speaker Lwentulege A/C	0781001657	[signature]
5.	Ssaazi Edward		0781012580	[signature]
6.	[illegible]			
7.	Ssempijja Ronald		0774579722	Ssempijja.
8.	Kwengye Julius		0709516788	Julius
9.	Nsinikweri Brian		0771890817	[signature]
10.	Sseguya Charles		0761102268	[signature]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR LWENTULEGE PIPED WATER SUPPLY SYSTEM IN KAGAMBA SUB COUNTY; RAKAI DISTRICT.

Date: 19th/05/2022

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Resty Kamulari	mulimi	0789734045	Resty
2.	Cissy Kavuma	Sec Lc I	0751011970	cissy
3.	Sifivia Manyonyi	mulimi		sifivia
4.	NANYONGO	F		
5.	AINEMY GILBERT			
6.	TUMWEBAZE TADEO		0785336646	
7.	boy WILIBA			
8.	Muwanje Peter	Mulimi	0774966731	Muwanje
9.	Nakakeeto mariya	musawo	0773737876	
10.	Kagwapita	muvubi	0789232252	

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR LWENTULEGE PIPED WATER SUPPLY SYSTEM IN KAGAMBA SUB COUNTY; RAKAI DISTRICT.

Date: 19TH |05|2022

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Mugerwa Aggrey	Farmer	0703868961	mugerwa
2.	MUTEBI PAUL	BODA BODA	078216580	[signature]
3.	Kamukurwa Benard.	farmer	078295139 5	Kambuki
4.	Tubihinguneho patrick	Kampisi	0777096935	Tubihinguneho
5.	BASASIA JAMES	Builder.	0706878721	[signature]
6.	Tugume jackson	Farmer	0776425460	[signature]
7.	Sebirala Batasta	Trader	0703653952	[signature]
8.	Mwebembezi Robert	Farmer	0772066526	mwebembezi
9.	TUMUSIME	ROBERT		[signature]
10.	BWEBEMBE	WYCLIFF	0772864131	[signature]

STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR LWENTULEGE PIPED WATER SUPPLY SYSTEM IN KAGAMBA SUB COUNTY; RAKAI DISTRICT.

Date: 19th/05/2022.

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	NABAGEREKA MADINA		KAMPISI	0784979934
2.	Nabayinda JUDITH		MWELWKA	
3.	NAILATO FLOCE		MWELWKA	
4.	Kanoyili rola		KAMPISI	077284397
5.	BABUEYAKA Shaban			
6.	NANTONGO MIRIAMY		KAMPISI	0706691400
7.	Nakatongo Mary		KAMPISI	0708276442
8.	NASamba pasinazy		kampici	0773810756
9.	ARINAITWE RACHEAL		KAMPISI	0789905947
10.	KASOKSNS A EMC		KASMKSNEC	

REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT

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

STAKEHOLDER CONSULTATIONS - ATTENDANCE LIST PLACE RAKAI Date 9TH FEBRUARY 2022

REF	NAME	DESIGNATION	TELEPHONE NO / E-MAIL	SIGNATURE
01	MUWANGA FRANCIS	DWO	0701995757	
02	KAMYA EDWARD	DCAO	0775336422	
03	KALUNGI RICHARD B	Law office	0759719475	
04	MATUMBWE BARNABAS	ADWO/M	0772057613	
05	SIMON SSERUNJO	DLSO	0772966674	
06	Sekamwa Ki Samuel	C/P L C V	0772414223	
07	Catherine Mukomoza	Senior sociologist	0772660024	
08	Cate Namyalo	SEPA/RLWSSP	0775171504	

BRIGHT TECHNICAL SERVICES LTD
Civil Engineers and Project Managers

12.

REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT

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

STAKEHOLDER CONSULTATIONS - ATTENDANCE LIST PLACE RAKAI Date 9TH FEBRUARY 2022.

REF	NAME	DESIGNATION	TELEPHONE NO / E-MAIL	SIGNATURE
09	NAKAGGWA JAMIRAH.	SOCIOLOGIST. RWSSSD/MWE	0772062814	
10	TUMUSIIME JOHN BOSCO.	ENGINEER, CIVIL RWSSSD/MWE.	0784-130-953.	
11	DAVID SSUPAKA	VALUER/BTS	0702 KE 0993	
12.	JONATHAN KAYUMA.	SOCIALOGIST/BTS.	0753 603235	

BRIGHT TECHNICAL SERVICES LTD
Civil Engineers and Project Managers

M - 24 (51)
F - 16

RECORD OF ATTENDANCE

MEETING REFERENCE: Consultative meeting RAP for Lwentulige Rural Growth Centre

VENUE: Kakenke - Mweruka DATE: 08/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	David Mukwedo	M.			0713377467		
2	Byamukama James	M	—		0771082725		
3	Tumugeize William	M	—	C/man	0773503591	—	
4	Mamonyi Benadi	M		C/MAN	0774167937		
5	MUGABIRWE JACKSON	M		PISO	0779550718		
6	KYAKALI MAUDA	F			0778135061		Kya
7	BESHIKE YORAMU	M		Chkakenke	0772320656		
8	AMUBWINE BRIAN	M		Citizen	0770743600		
9	Kamunyu James	M			0774383831		
10	Kyakuhaire Evas	F		Citizen	0781456802		Evas
11	Tulemura Joulet	F		" "	0775731539		Tulemura
12	Nakukunda mable	F	—		0779859474		mable

RECORD OF ATTENDANCE

MEETING REFERENCE: Consultative Meeting for RAP for Lwentulige Rural Growth Center

VENUE: KAKENKE - MWERUKA DATE: 08/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	NABASAGI ANNET	F		Woman Councillor Lwentulige/Kakenke	0759955037		
2	LUJUMBA CHRIS	M	Asst. Councillor	Councillor LCII	0774991244		
3	KIZZA YAKOBO	M	Speaker Lwentulige	Speaker Lwentulige	0781201637		
4	NDYABAHO HELIKA	M	RAKAI	farmer			NDYABAHO
5	mugiugazi	M	RAKAI	farmer	0780711861		benoni
6	mwebesa dataiwusi	M	RAKAI	Samat	0785142134		
7	Revd mulindwa stephen	M	RAKAI	Farmer	0775771554		
8	Bangahan Joseph	M	Rakai		0775536086		Joseph
9	Twikirize Scovia	F	Rakai	farmer			Scovia
10	Ayinembabazi Scovia	F	Rakai	Farmer	0789405439		Scovia
11	Namiyonjo Hope	F	Rakai	Farmer	0784501523		Hope
12	Ayinesiwi Jekeleti	F	Rakai	Farmer	0770871183		Ayinesiwi

M - 7
F - 5

RECORD OF ATTENDANCE

MEETING REFERENCE: CONSULTATIVE MEETING RE RESETTLEMENT ACTION PLAN RE LWENTULWE RURAL GROWTH CENTRE

VENUE: KAKONKE - MWERUKA DATE: 08/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Sseeyanzi [illegible]	M	—	V/Cman	0775512092	-	Ki'22A
2	Kabaterine Frank	M	—	Cman PWDs	0779598933	—	Kabaterine
3	Kabiondhawa Joseph	M	BIS	Senior Sociologist	0701859666	—	[illegible]
4							
5							
6							
7							
8							
9							
10							
11							
12							

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RECORD OF ATTENDANCE

MEETING REFERENCE: CONSULTATIVE MEETING RE RESETTLEMENT ACTION PLAN

VENUE: KAKONKE - MWERUKA DATE: 08/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	BYARUHANGA J.	M	RAKAI	Farmer	0788781671		[illegible]
2	KAMUGISHA DAN	M	RAKAI	Same	0704390906		Kamugisha
3	Kaganda Damyano	M	Rakai	Farmer	0788563039		Kaganda
4	Barigye Justus	M	Rakai	Farmer	0774220364		[illegible]
5	BYARUHANGA G.	M			0776911140		
6	MUSASIZI REMEGIO	M	RAKAI	Farmer	0785336330		[illegible]
7	NABUKENYA STELLA	F	RAKAI	H/WORKER	0775896235		[illegible]
8	Busingye Ronas	F	RAKAI	Teacher	0776747950		Ronas
9	AYINESAASI JOKALA	F	RAKAI	Farmer	0770871183		Ayinesaasi
10	BALINAKE PAULINA	F	Rakai	Farmer			Paulina
11	Semakula	M	Rakai	Farmer	0773492216		Semakula
12	Nakayiwa Nazirah	F	Rakai	Farmer	0759484419		Nazirah

RECORD OF ATTENDANCE

MEETING REFERENCE: CONSULTATIVE MEETING FOR RAP [illegible] RGC

VENUE: KAKENKE - MINERUKA DATE: 08/07/22

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Kasana prota Paul	M	Rakai District	Town Agent	0779584751	[illegible]	[illegible]
2	[illegible] Patrick	M	-do-	Town Agent	0705 992492		[illegible]
3	Kyoheirwe Harriet	F	Rakai	Deputy Mayor	0781411998		Kyoheirwe
4	Kasiisira R. Senami	M	"	Town Clerk	0702351245	[illegible]	[illegible]
5	Ntwire John	M	Rakai		0773850071		Ntwire
6	Ndyabahika Godfrey	M	Rakai		0783690521		[illegible]
7	Ssemayengo expedito	M	Rakai		0771041914		[illegible]
8	Tukwasibwe Wilberforce	M	Rakai		0760517065	[illegible]@gmail.com	[illegible]
9	MUGIZI BENON	M	RAKAI	Farmer	0773946113		Mugizi
10	Nabuzono Olive	F	Rakai	Farmer	0774301465		[illegible]
11	Byamunisho Ruson	M	Rakai	Farmer	0784907225		Ruson.
12	Katongole Emmanuel	M	RAKAI	Farmer	0775847519		[illegible]

M - 10

RECORD OF ATTENDANCE

MEETING REFERENCE: Consultative Meeting (Leaders)

VENUE: Kirangira Primary School DATE: 8/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Rev Kusaasira J.	M	Rakai	Councillor	0774 626707		[illegible]
2	WASSWA CHARLES	M	RAKAI	TEACHER	0773064050		[illegible]
3	LUYOMBYA GUSTER	M	RAKAI	TEACHER	0773228635		[illegible]
4	Ssenyonjo James	M	Rakai	C/man LCI	0774758947		[illegible]
5	DANGIRA HENRY	M.	Rakai	peasant	0783172735		[illegible]
6	SSEJJOBA TOMAS	M	Rakai	C/person LCI	0773223572		[illegible]
7	Lubega Deo	M.	Rakai	V/C/P	0773056857		Deo
8	TURINAWE METHODIUS	M	Rakai	Teacher	0781595142		[illegible]
9	SSERWANGA FREDRICK	M	Rakai	Teacher	0751755716		[illegible]
10	KALEMA RONALD	M	RAKAI	TEACHER	0788355903		[illegible]
11	KYOMPAIRE PATIENCE	F	RAKAI	TEACHER	0773601791		[illegible]
12	SSEMWOGERERE [illegible]	M	RAKAI	TEACHER	0700226071		[illegible]

M - 7

RECORD OF ATTENDANCE

MEETING REFERENCE: Consultation meeting

VENUE: Kasambya Tc DATE: 8/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Buye Dalaus	M	RAKAI	Mutuza	0772956477		Buye
2	Ssewalle	M	RAKAI		0777015205		Tomths
3	Mugirimba Mike	M	RAKAI	Cl man	0787434915		mike
4	Kyeyune Edward	M	RAKAI	Mutuuze	0773240327		Kyeyune
5	Dhumbuwa Alexander	M	Kyalimwe RAKAI	Resident	0789179993	[illegible]	[illegible]
6	Kiwanuka Ibrahim	M	Rakai	Resident	0708165410		[illegible]
7	Ssonko Vincent	M	RAKAI	Mmrac	0779370 742		Ssonko
8	Muhoozi moses	M	RAKAI	Mutuze	0774963819		[illegible]
9	Settaba Situmi	M	Rakai	mutuza			Settaba
10	Bongole Samuel	M	RAKAI	mutuze	0785511289		Bongole
11	Ssengabitta [illegible]	M	Rakai	Resident	0774963509		[illegible]
12	Namanya Robert	M	Rakai Kyalimwe				

RECORD OF ATTENDANCE

MEETING REFERENCE: Consultation meeting

VENUE: Kasambya Trading Centre DATE: 08/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Nabusi Jennifer	F	Rakai		0773393559		
2	Namusoke Cerema	F	Kyalimwe RAKAI		0773393559		Namusoke
3	Mutahi Godfrey	M	Kasambya RAKAI	omutuze	0789528180		mutahi
4	Namulo Penina	F	RAKAI	omutuze	0706324989		Namulo
5	Mwine Alice	F	RAKAI	omutuze	0		
6	Kabarisa Abia	M	Rakai	Omutuuze	0787630663		[illegible]
7	Nakanintu [illegible]	F	Rakai	Omutuuze			Nakanintu
8	Nakumi Sanyu	F	Rakai	Mutuuze	-		Nakumi
9	Ndiiraza Nolan	F	Rakai	Mutuuze	0789675848		Ndiiraza
10	Lusunin Payas	M	Rakai	Mutuuze			Lusunin
11	Bahimwa Siraje	M	RAKAI	OMUTUUZE	0754235787		[illegible]
12	Lule Mukomaz	M	RAKAI	Omutuuze	[illegible]		[illegible]

M-13 (17)
F-4

RECORD OF ATTENDANCE

MEETING REFERENCE: Rakai District Stakeholder Engagement

VENUE: Lwentulege Town Council DATE: 09/07/22

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	David Ssempala	M	Bright T.S	Valuer	0700575903	—	[signature]
2	Akatuhurira Sion	M	Bright T.S	Valuer	0703315905		[signature]
3	Mbaine Isreal	M	Rakai	Sec. Finance	0772868094	[illegible]@gmail.com	[signature]
4	Kemirembe Scovia	F	"	Mutuze	0778283232		Kemirembe
5	Nakato	F		C/P	0775538628		Faith K.M
6	Nsamba Kuteesa	M	Bo	Counciller	0777323392		[signature]
7	Nakubiri Annet	F		Mutuze	0775973092		N.A.
8	Kenceme Sotelolo	F			0775119766		[signature]
9	Samanya Zabolo	M	Leader	C/P	0773499994		[signature]
10	Byamatooro Yamu	M		Mutuze	0778783279		[signature]
11	Nakyuma Deus	M		Mutuze	0773593960		[signature]
12	Ssempangi Christopher	M	ISO	GISO Lwentulege T/C	0778248984	ssempangichristopher2@gmail.com	[signature]

RECORD OF ATTENDANCE

MEETING REFERENCE: Rakai District Community Stakeholder Engagement.

VENUE: Lwentulege Town Council DATE: 09/07/22

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Ssenkumba Sharif	M		V/C	0774034940		[signature]
2	Bukenya-J Kalema	M	Bright T.S	Mutuuze	0780665958		[signature]
3	Kamooli Wilson	M	Mayor		0771925315		Wilson
4	Kizza Yakobo	M	Speaker Lwentulege	Speaker Lwentulege T/C	0781801637		[signature]
5	Balikuddembe Joseph	M	BTS	Survey Geologist	0701859666		[signature]
6							
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RECORD OF ATTENDANCE

M - 25 (46)

MEETING REFERENCE: RAKAI STAKEHOLDER ENGAGEMENT

VENUE: KAGAMBA SUB-COUNTY HEADQUARTERS DATE: 09/07/22

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	DAVID SSEMPALA	M	BRIGHT.T.S	VALUER	0701573903	—	[illegible]
2	Ssendege Jimmy	M	Bright T.S	Sociologist	0703999194		[illegible]
3	AKANKWASA TOM	M	BRIGHT T.S	VALUER	07720154?23	—	[illegible]
4	Nakabugo Kelemi	F	Kabusa A	mulimi	0709588705	—	Kelemi
5	Nabigaaga Judah	F	Kabusa B	Kulima	0706375013		Nabigaaga
6	Katushabe Zipporah	F	Rakai	Mulimi	0701868890	—	Zipporah
7	Namwesezi Sharifah	F	Rakai	mulimi	0783051515	—	Sharifah
8	Nampiija Mariam	F	Rakai	musubuzi	0708860502		Mariam
9	SSENDAWULA WILLY	M		Chairperson LC	0759761183		[illegible]
10	Guuga Abudu	M		mulimi	0782916???	—	Guuga
11	Matovu Sabul	M	Rakai	Mulimi	0754902682		[illegible]
12	Nalukwaga Resty	F	Rakai	Mulimi	—	—	Nalukwaga

M - 6
F - 6

RECORD OF ATTENDANCE

MEETING REFERENCE: RAKAI DISTRICT STAKEHOLDER ENGAGEMENT

VENUE: KAGAMBA SUB-COUNTY HEADQUARTERS DATE: 09/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Matovu Nasa Mulumba	M	RAKAI	MuLimi	0755445078	—	[illegible]
2	KATO PEREZI	M	RAKAI	MULIMI	0785158572	—	Kato P.
3	KIREMBEKA HAMIDY	M	RAKAI	MULIMI	0703214240	—	Kirembeka
4	Mamata Rose	F	Rakai	muLimi	0758040548	—	Rose.
5	Muwembida Ronald	M	Rakai	muLimi			Ronald
6	Nalubega Sifah	F	Raki	Musubuzi	0753497007	—	Sifah
7	Kamukama Topista	F	Rakai	mulimi	0700132062		Kamukama
8	Nakasiita Silivia	F	Rakai	mulimi	0700985709		Nakasiita
9	Babirye Haliyiti	F	Rakai	mulimi	0773149542		Babirye
10	Namayanja Halima	F	Rakai	mulimi	0757028409	—	Namayanja
11	Nakalyango Maria	F	Kabusa "B"	Mulimi	0783150699		Nakalyango
12							

RECORD OF ATTENDANCE

MEETING REFERENCE: Rakai District Stake Holder Engagement Community

VENUE: Kagamba Sub-County DATE: 9/7/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	David Ssemala	M	Bright T.S	Valuer	0701575503	-	[signature]
2	Abudu Muwazi	m	Kizzira	Muwazi	-		Muwazi
3	Muyambi Francis	m	Kizzira	Muyambi			Muyambi
4	Namtowu Zaina	F	Kyakabugem	Namtowu	0705923573		Namtowu
5	Nabulya Resty	F	Kyakabugem	Resty	0753161204		Nabulya
6	Mansamba Hadijja	F	Kizira	Mansamba	0756813415		Mansamba
7	Kyohirwe Naliyeli	F	Kizira	Kyohirwe	0771459629		
8	Nakato Winnie	F	Kizira	Nakato	0773704668		Winnie
9	Byamukama Midiasi	F	Kizira	Byamukama	0704706521		Midiasi
10	Kembabazi Janifa	F	Kizira	Kembabazi			Janifa
11	Nyakuba Ridia	F	Kizira	Nyakuba			Ridia
12	Ssemujju Akileo	M	Kyakabugem		0781515379		Akileo

RECORD OF ATTENDANCE

MEETING REFERENCE: Lwentulege RGC Community Consultation

VENUE: Kagamba Sub-County DATE: 9-July-2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Tuhamwe	F.M	Kizira	Omulimi			[signature]
2	Kayongo	F/M	Kagamba	Mulimi			John
3	Mucunguzi E.	F/M	Kizira	Mulimi			Muganzi
4	Ssembatuuza Mathias	M	Kizira	Mulimi	07		[signature]
5	Tukamushabe Noah	F/M	Kagamba	Mulimi			Noah
6	Kayura John	F/M	Kagamba	Mulimi			John
7	Lule Akilewo Moh	F/M	Kagamba	Mulimi			Lule
8	Tukagumisiriza G	F/M	Kizira	Mulimi	078224457		
9	Kakyamugyenyi Jonas	F/M	Kizira	teacher	0775399053		[signature]
10	Mutebasiira Emmanuel	M	Kagamba	Mulimi	078170292		Mutesasira
11	Rwakishdembe Jimmy	M	BTS	Sociologist	0701557666		[signature]
12							

RECORD OF ATTENDANCE

m-6

MEETING REFERENCE: LWENTULEGE RGC Community Consultations

VENUE: Rev. Enocici Residence DATE: 09/July/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	KATUREEBE HUSSEIN	M	RAKAI	C/MAN LCI	0773775841		Katureebe
2	SSENGOOBA FREDRICK	M	RAKAI	C/P LCI	0789190143		[illegible]
3	Ssetubeek Kizito	-do-	-do-	Villager	0706700310		[illegible]
4	Nuwagaba	M	Rakai	〃	0785046186		
5	Byamugisha Saimon	M	Rakai	〃	0785046186		Saimon
6	Nyesigoha Joseph	M	Rakai	village	0786235795		Joseph
7	Kiwalagye Emmanuel	M	Rakai	village	0782 378289		Kiwalagye
8	Kingi Edward	M	Lakayi		0701213335		King'E.
9	NAYEBARE BABRA	F	Rakai	KIZIRA	0776034611		Babra
10	Goroti Kyagabire	F	Rakai	KIZIRA	0773899103		Goroti
11	Bakiyaga mawuriti	F	Rakai	KIZIRA	0778757543		maguriti
12	Curisitina Kyagabire	F	Rakai	KIZIRA	0789021830		Curisitina

RECORD OF ATTENDANCE

MEETING REFERENCE: RAKAI DISTRICT STAKEHOLDER ENGAGEMENT

VENUE: Rev Enocici Residence DATE: 09/07/22

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Kwoimba Godfrey	M			0781920249		G.K.
2	Kawesi musa	M			0700975138		musa
3	Kalyango	M			0751873838		Kalyango
4	Twinamugagu	M					Twinamugagu
5	TURYAMUBONA YEROKAMU	M	KIZIRA	Vice chairman	0771 658340		Yerokamu
6	TUMUHIMBISE ENOCK	M	KIZIRA	Parish Priest	0772163470		[illegible]
7	Twiine Abudu	M	KIZIRA	vileji	0787116192		Abudu
8	MYOMUSIIMA JOVIA	F	Kizira	vileji	0780711891		Jovia
9	Bakiauddemb Joseph	M	BTS	Sociologist	0701857166		[illegible]
10							
11							
12							

M-5

RECORD OF ATTENDANCE

MEETING REFERENCE: LWENTULEGE RGC. Community Engagement

VENUE: Rev. Enock's Residence DATE: 09.07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Bamukubawa meri	F	Rakai	Kiziri	0754934650		meri
2							
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RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for LWENTULEGE RGC. CONSULTATIVE MEETING

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Fokubaho Dickson	M	Micro finance	Manager	0778259547	kgdsi.sacco@gmail.com	[illegible]
2	Bukenya J	M	Rakai		0775773731		
3	SSEGGAWA Tomas	m	Rakai	Kyperconder	0772239577		Bukenya
4	Mushubuzi. F.	M	Rakai				Segawa
5	Agaba julius	M	Rakai		0774016869		[illegible]
6	Bamugwana John	m	Rakai				Agaba
7	Balija Sam	M	Rakai		0779399960		
8	Dangira Henry	M	Rakai		0783145736		B S
9	Tukamulona Gaston	M	Rakai		0778399800		[illegible]
10	Nyamba George william	m	Rakai		0787462564		K
11	Byarahanga jon	m	Rakai		0785062655		[illegible]
12	B. Sa So	M	Raki		0773581768		Barigye Sepina

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for LWENTULEGE RGC CONSULTATIVE MEETING

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	SSENTONGO JAMES	M	Rakai	C/Person LCI	0774785947		[illegible]
2	Bindeba Bashiru	M	Rakai	Citizen	0779354050		Bindeba
3	Ssekuwaju Joseph	M	Rakai	Citizen	07769912556		[illegible]
4	Hon Kusasira Jackson	M	Rakai	Councillor LCII	0774626908		[illegible]
5	Beguarisa Edison	M	Rakai	Citizen	0776263476		Bigumi
6	Ssempiga Leonall	M	Rakai	Citizen	0779305260		Leonall.
7	Nakamya Dinoverce	F	Rakai	Citizen	0770405371		[illegible]
8	Ssenuwafu Benon	M	Rakai	Citizen	0779975251		Benon
9	Nsereko Denis	M	Rakai	Citizen	0774026399		[illegible]
10	Zaabingira Yelocouse	M	Rakai	Citizen	—		[illegible]
11	Ssenyondde Vincent	M	Rakai	Citizen			Ssenyondde
12	Nyankunda Mackline	F	Rakai	Citizen	0787645612		Nyankunda

F= 3
M 9

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for LWENTULEGE RGC CONSULTATIVE MEETING

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Nalugo Molly	F		Rakai	0785522617		[illegible]
2	Kabigumira Amos	M		Rakai	0780906158		Amos
3	Buhikyire Maulisia	F		Rakai	—		Maulisia
4	Muhumuza Gerald	M		Rakai	0777857936		[illegible]
5	Karemire Charles	M		Rakai	—		[illegible]
6	Nakanjuwa Leokadia	F		Rakai	0750928195		Kalonini
7	Katte Gordon	M		Rakai	0780809922		[illegible]
8	MUSIIGE	M		Rakai	0786443269		[illegible]
9	Mukamgozi Joseph	M.		Rakai	0772039470		
10	Tibemanya Denis	M		Rakai	0757533361		[illegible]
11	Kyeyune Eric.	M		Rakai	0783348884		[illegible]
12	Fabiyano K.Sasa F	M		Rakai	0755502704		K.Sasa

RECORD OF ATTENDANCE

M = 8
F = 1

MEETING REFERENCE: RAP for LWENTULEGE RGC Consultative meeting

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Tibingeba Ch	M		RAKAI	0780588177		[signature]
2	Kafumuma christopher	M		Rakai	0774974626		[signature]
3	Mulumuta Erias	M		Rakai	0750427499		[signature]
4	Ssentongo Edward	M		Rakai	0759699974		[signature]
5	Twinomugyisha moses	M		Rakai	0782419227		[signature]
6	Twijarisha Robert	M		Rakai	0786[illegible]131		[signature]
7	Kushaba David	M		RAKAI	0772036686		[signature]
8	Amugire Janet	F		Rakai	0776108856		[signature]
9	TWIJUKYE KURAN	M		RAKAI	0773913744		[signature]
10							
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RECORD OF ATTENDANCE

M = 4
F = 8

MEETING REFERENCE: RAP for LWENTULEGE RGC Consultative meeting

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	SSENYONJO IBRAHIM	M	RAKAI		0788461479		[signature]
2	TUHAIHEBWA AMOSI	M	RAKAI		0774280190		Amosi
3	KABALERE Godfrey	M	RAKAI		0771329990		Godfrey
4	NAMAKOMBE DEBRA	F	RAKAI				debura
5	NAKATO Robina	F	RAKAI				
6	Muhwezi Alex	M	RAKAI		0786453573		[signature]
7	KYOHIRWE	F	RAKAI				ALLENI
8	BISOBOKA HARRIET	F	RAKAI		0778520805		Bisoboka
9	NAKIGE GETURDA	F	Rakai				
10	Nasasira mariam	F	Rakai				
11	Namugumya paulina	F	Rakai				
12	Nanyonjo Frazia	F	Rakai		0772051776		

M = 1

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for Lwentulege RGC Consultative meeting

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Juriyeti Tulyatoka	F	Rakai				[signature]
2	Nuwagaba Maniya	F	Rakai				[signature]
3	Baliraddewa Joseph	M	Envir Sociologist	BT Services	070859466		[signature]
4							
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M = 10
F = 02

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for LWENTULEGE RGC CONSULTATIVE MEETING

VENUE: Kyabakazi Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Amanya Dickson	M	Rakai		0783 761751		[signature]
2	Kyohirwe Molly	F	Rakai		0788252354		Molly
3	Ssemmanda Tiens	M	Rakai		0789525299		[signature]
4	Byamukama Rapto	M	Rakai		0775731674		[signature]
5	Binta Elk	M	Rakai		0770380990		Binta
6	Byamukama	M	Rakai				Tanasi
7	Nabasumba Lehema	F	Rakai		0778678416		[signature]
8	Kalibobasenitin	M	Rakai				[signature]
9	MBAZIIRA	M	RAKAI		0780628515		[signature]
10	Tusabe Neo	M	RAKAI		0750745965		[signature]
11	Tumwesigye George W	M	RAKAI		0760122631		[signature]
12	JOHN						[signature]

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for Lwentulege RGC (Rural Growth Centre) Consultative Community Engagement

VENUE: Kenjoki Kiviengira DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	NATURINDA SYLIVIA	F	RAKAI	KENJOKI	0788603651		Sylivia
2	Semkunga Wasswa	M	Rakai	Kenjoki	0774567042		[signature]
3	KISABYA CHALIS	M	Rakia	Kenjoki	—		[signature]
4	Nakacha Mary	F	Rakia	KENJOKI	—		[signature]
5	KATUSIIME GRACE	F	Rakai	KENJOKI	—		[signature]
6	Y. Semanda	M	Rakai	Kenjoki			Katusiime
7	ATEBARE ROVINA	F	RAKAI	KENJOKI	0756465019		Semanda
8	KAFURUKI BENARD	M	Rakai	Kiviengira	0751737491		Rovina
9	Semwanga Ahmed	M	Rakai	Kiviengira	0705977957		[signature]
10	Lutembe Gusta	M	Kibanyuka	Teacher	0773226635		[signature]
11	Bujuma Damian	M	Kiviengira	[illegible]	0775222351		[signature]
12	Muhangi Godfrey	M	Kiviengira	Kiviengira Trad.	0783103895		Muhangi

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for Lwentulege RGC (Rural Growth Centre) Community Engagement

VENUE: Kenjoki Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Rwamereza Paul	M	M	Omulimi	0780861662		[signature]
2	Mugyenda	Kaweri	tawun	Joseph	~~[illegible]~~	0752122354	
3	Ssekirunda Tonny	M	M	KENJOKI	0781257134		[signature]
4	Namatovu Mary	F		Mulimi	0773006935		Namatovu
5	Tumusiime Aligeta	F		Mulimi			
6	Ntumwa [illegible]	M		Farmer	0771571125		[signature]
7	Babumbdeme Joseph	M	B.I.S	Senior Secretary	0701859666		[signature]
8	S. Katoola	M	Kenjoki	Mulimi	0771827992		SK
9	Rweranga J	M	Kenjoki	Farmer			RJ
10	Tumusiime Shungura	M	Kenjoki	Farmer	0781205514		TA
11							
12							

RECORD OF ATTENDANCE

MEETING REFERENCE: RAP for Lwantulege RGC (Rural Growth Centre) Community Engagement

VENUE: Kenjoki Trading Centre DATE: 10/07/2022

#	NAME	SEX (F/M)	ORGANIZATION	DESIGNATION	TEL CONTACT	EMAIL	SIGNATURE
1	Kalyabugoleme Bonnie	M	KENJOKI	C P	0773009586		[illegible]
2	Kwoyoreeka Hassan	M	Kenjoki	Treasurer	0775463297		[illegible]
3	Sekalalo C	M	KiRangira	C F M	0773018618		[illegible]
4	Lubega Deo	M	Kenjoki	V/CP	0772056859		Deo
5	Byaruhanga God	M	Kenjoki	Rakai	0757269970		Good
6	Ssemwanga Harrison	M	Kenjoki	Mecanic	0757797337		[illegible]
7	MUWEBE EREMIGIUS	M	Kirangira	BUSSINES man	0788855662		[illegible]
8							
9							
10							
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Annex III: Land Ownership Documents

Annex IV: General Layout, Layouts of the Transmission and Distribution System and Structural Drawings

Annex V: Water Quality Analysis Certificate

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

In any Correspondence on this subject quote No. GE098/2022

April 14, 2022

THE REPUBLIC OF UGANDA

MINISTRY OF INTERNAL AFFAIRS
DIRECTORATE OF GOVERNMENT
ANALYTICAL LABORATORY
Plot No. 2 Lourdel Road
Wandegeya,
P.O.BOX 2174
Kampala - Uganda

REPORT OF ANALYSIS

Description of Sample

One borehole water sample labeled 'A' from Lwentulege RGC, Rakai District was received on April 7, 2022 for conformity to US EAS 12:2014 Specification of Natural Potable Water

Methods of Analysis

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

Results of Analysis

The mean analysis values are as below;

Parameter	Result	Limits/Authority
pH	6.5	5.5 – 9.5
Conductivity(µS/cm)	242	2500 Max
Total Dissolved Solids (mg/L)	1258	1500 Max
Total Suspended Solids (mg/L)	**8**	Not Detectable
Total Hardness, CaCO3 (mg/L)	86	600 Max
Turbidity (NTU)	22	25 Max
Arsenic (mg/L)	≤0.01*	0.01 Max
Cadmium (mg/L)	0.01	0.003 Max
Calcium (mg/kg)	38.8	150 Max
Chromium (mg/L)	≤0.01*	0.05 Max
Copper (mg/L)	0.8	1.0 Max
Iron, Total (mg/L)	**4.8**	0.3 Max
Lead (mg/L)	≤0.001*	0.01 Max
Magnesium (mg/L)	32.6	100 Max
Manganese (mg/L)	**1.8**	0.1 Max
Mercury (mg/L)	≤0.001*	0.001 Max
Sodium (mg/L)	88.8	200 Max
Ammonia (mg/L)	0.2	0.5 Max
Chlorides (mg/L)	128	250 Max
Fluorides (mg/L)	1.2	1.5 Max
Nitrates (mg/L)	6.4	45 Max
Phosphates (mg/L)	6.5	2.2 Max
Sulphates (mg/L)	114	400 Max
Total Coliforms cfu/100ml)	**18**	Absent
E. coli (cfu/100ml)	**3**	Absent

Remarks

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

Justus Mike Ochom
Senior Government Analyst

"Go Scientific for a Safe and Just Society"

NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY-BUGOLOBI.

P.O. Box 7053, Kampala.
Tel. 041257548/341144 Fax: 041 255441
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: Royal Techno Industries Ltd
ADDRESS :P.O.BOX 23009,Kampala
TEL:256-414-220573

Serial No:ES /2018/4789
Sampled by: Client
Type of container: plastic
Sample source: Borehole water.

Date Sample received: 24- 08-2018 Date of Report:27-08-2018

Table of analytical results

Parameters	Units	Location;: Rwetulege S/c: Kagamba District : Rakai DWD; 60878	National Standards for Natural portable water
WS Sample Nr	-	K2220/2018/C	
pH	-	6.74	5.5– 9.5
Conductivity	μs/cm	186	2500
Turbidity	Ntu	7.0	25
Total dissolved solids	mg/l	150	1500
Total Alkalinity: (as $CaCO_3$)	mg/l	82.0	500
Magnesium : $Mg2^+$	mg/l	4.20	100
Calcium ;Ca2+	mg/l	8.60	150
Hardness: total as $CaCO_3$)	mg/	42.0	600
Iron:total	mg/l	0.039	0.3
Total suspended solids	mg/l	0	0.0
Chlorides-Cl^-	mg/l	14.0	250
Nitrate-N	mg/l	0.0	45
Bi-Carbonates:as $CaCO_3$	Mg/l	82.0	500
Colour	Ptco	27	50
Sulphates:SO_4^{2-}	mg/l	12	400
Fluoride :F	Mg/l	0.09	1.5

Remarks;
The sample showed satisfactory physio-chemical characteristics of the source ,which was commensurate with the National Standards for natural portable water .

ANALYSED BY: Robinah Muheirwe
AUTHORISED BY:MANAGER, Central Laboratory Services.....M.....

APPROVED BY:SENIOR MANAGER, Water Quality Management Department.....

NB: The NWSC certificate of analysis by no means constitutes a permit to any person or undertaking to conduct business

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DATE: 27/8/18
EXTERNAL SERVICES

Annex VI: Chance Finds Procedure on Physical Cultural Resources Management

The Physical Cultural Resources Policy (PCRs) i.e. OP 4.11 should be triggered because of the excavation works that may encounter PCRs. To meet the requirements of this policy, a Chance Finds Procedure has been developed to indicate a real risk of causing undesirable adverse environmental and social effects on the physical and intangible cultural resources, and that more substantial planning may be required to adequately avoid, mitigate or manage potential effects. Chance find procedures will be used as follows:

i. Stop the construction activities in the area of the chance find;
ii. Delineate the discovered site or area;
iii. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the Directorate of Museums and Monuments (DMM) take over;
iv. Notify the site / supervisory Engineer who in turn will notify the responsible local authorities and the Directorate of Museums and Monuments under the Ministry of Tourism, Wildlife and Antiquities (within 24 hours or less);
v. The Directorate of Museums and Monuments would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the Directorate of Museums and Monuments (within 24 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
vi. Decisions on how to handle the finding shall be taken by the Directorate of Museums and Monuments. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
vii. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the DMM;
viii. Construction work could resume only after permission is given from the responsible local authorities and the Directorate of Museums and Monuments concerning safeguard of the heritage;
ix. These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed;
x. Construction work will resume only after authorization is given by the responsible local authorities and the National Museum concerning the safeguard of the heritage.
xi. Relevant findings will be recorded in World Bank Implementation Supervision Reports (ISRs), and Implementation Completion Reports (ICRs) will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

Annex VI: Grievance Redress Mechanism

There will be a necessity to resolve conflicts swiftly in order to expedite the project's planning and construction phase and for the smooth eventual operational activities. Therefore, a grievance redressing mechanism is essential for Recycling Facility. This procedure will address this need in detail. The objectives of the grievance process as explained in the subsequent chapter of these guidelines will be as follows:

- Provide affected people with avenues for making a complaint or resolving any dispute that may arise;
- Ensure that appropriate and mutually acceptable corrective actions are identified and implemented to address complaints;
- Verify that complaints are satisfied with outcomes of corrective actions;
- Avoid the need to resort to judicial proceedings.

Grievance management is an important step in community engagement. There had been and will be community grievances throughout the project's various development stages. It is expected that all such grievances be amicably resolved if the developer is to abide by the global and country specific Social Safeguard guidelines. In practice, in similar compensation and resettlement activities, many grievances arise from misunderstandings of the Project policy, or result from conflicts between neighbours, which can usually be solved through adequate mediation using customary rules or local administration at the lowest level. Most grievances can be settled with additional explanation efforts and some mediation using customary dispute settlement mechanisms.

The purpose of Grievance management shall be to provide opportunity for the aggrieved parties to resolve issues through arbitration and negotiation based on transparent and fair hearing. It will allow the parties in the dispute to arrive at a win -win solution. Final outcome thus be that the extra judicial systems will work smoothly and that number of disputes seeking interventions at the country judiciary will be made minimal. The functioning a proper grievance management mechanism is a requirement in view of the above. The overall management of grievances is the responsibility of the developer or/and the contractor. The Project, thus, will put in place an amicable, extra-judicial mechanism for managing grievances and disputes based on explanation and mediation by third parties. Procedures relevant to this amicable mechanism are detailed below. It will include three different levels:

- Registration by project of the complaint, grievance or dispute;
- Processing by project of the grievance or dispute until closure is established based on evidence that acceptable action was taken; and
- In the event where the complainant is not satisfied with action taken by project as a result of the complaint, an amicable mediation can be triggered involving a mediation committee independent from the Project.

Managing grievances needs a clear and transparent procedure well instituted within the management structure of the project. At minimum, such a procedure should consist of the following steps:

a) to receive the grievances,
b) to acknowledgement the receipt,
c) investigation and resolution,
d) Closeout and follow-up.

I. The need for maintain a Grievance Register

There should be Grievance Register which would record all the grievances, complaints and issues the stakeholders would wish to bring to the attention of the Developer or the Contractor. It should be kept at a place where all will have easy access; preferably this should be placed at the office (allocated for the Grievance Committee (GC)). It should contain the date of the entry, name and contact details of the complainant; nature of grievance, Signature (on one side of the Register) and actions taken to address or reasons the grievance was not acted on, the signature of the GC and Complainant as to how the grievance was closed and date (on the other side of the Register.

II. Recording of the complaints into the Grievance Register

The following steps are to be followed when the complaints will be received: Receipt of complaint (a verbal or in written) will be received by the Community Liaison Officer or any other officer (a member of the Grievance committee).

- The complainant can obtain the assistance from a member of the grievance committee or the Site welfare officer to lodge such an entry in to the Grievance Register.
- The Officer Responsible or the GC member, who is at present, will communicate with the complaint in a language acceptable to the complainant.
- Since the site working is carried out in English Language, the Site welfare officer or the member of the Grievance committee may lodge the entry in English language
- After lodging the complaint in the register, the officer recorded such complain shall read to the complaint what is recorded and sign the entry made into the Grievance Register

III. Formation of a Grievance Committee

In Uganda at the local level, the village leaders and the LC (1) play a key role in managing disputes. The Parish level committees formed for the management of disputes is the lowest level of accepted forms of reconciliation board at which the complainants can have access to for justice if issues will not be resolved at the village level. However, in order to strengthen the village level reconciliation of disputes specially over the issues arising from the project related matters, appointing of a Grievance Committee has been considered a viable option according to the accepted practices. It is expected that grievances depending on the complexity and nature can be resolved either at the site level, at the grievance committee level or at the project developer's top management level or at the judiciary level. It means that if a complainant is not satisfied with the site level solution offered by the site manager or the project's administration manager, the matter can be taken up by the Grievance Committee (GC).

The constituency of the grievance committee and its role is explained in the following section. This GC is to be considered the vital body which prevents any grievances to be heard at higher levels. In parallel and where necessary, the GC holds meetings or other appropriate communication with the complainant, with the aim of reducing any tensions and preventing them from escalating. During closeout, the GC seeks to confirm that its actions have satisfied the complainant. During follow-up, the GC, with the assistance of the Site Construction Manager investigates the causes of grievances, where necessary, to ensure that the grievance does not recur.

The composition of Grievance Committee is depicted below:

a) Representative from area – 02 Members (preferably from Sub County/Town Council)
b) Representative of Women – 02 Members
c) Representative of the Local Government – 02 Community Development Officers
d) Representative from the developer – 01 Member
e) Representative from the contractor – 01 Member

Members of the Grievance will be provided training on conflict resolution and given more exposure on procedures of managing grievances.

IV. Performance Indicators in respect of the functioning of the Grievance Committee

Key interventions include:

- Setting up of a Functional Grievance Committee;
- Addressing employee's and affected persons (PAPs) grievances in all project phases.

V. Grievance Redress Procedure

The Grievance Redress Committee will receive a written grievance or complaint. Preferably these should be those, which the Reconciliatory Committee has failed to handle. This Committee will dispense grievances/complaints as described below;

Legal Redress

If the complainant feels dissatisfied with the administrative arbitration decision by the Grievance Redress Committee (GRC), the complainant will then seek legal redress in courts of law. If the complainant is not satisfied with the decision made above, he or she may lodge an appeal to the civil court.

VI. Proposed Process of Grievance Management

The ESMP recommends the following process, which should be adopted by the project support team:

a) Lodging Complaint

The Grievance Management Coordinator/Officer will receive complaint from the PAP in the local language and complete a Grievance Form, which will be signed by the leader of the Local Grievance Management Committee and the PAP/complainant. This will then be lodged in the Grievance Log/Register provided by the Grievance Management Coordinator/Officer.

b) Determining Corrective Action

If in their judgment, the grievance can be solved at this stage and the Grievance Management Coordinator/Officer and a representative of an NGO/CBO will determine a corrective action in consultation with the aggrieved person. A description of the action; the time frame in which the action is to take place; and the party responsible for implementing the action will be recorded in the grievance database.
Grievances will be resolved and status reported back to complainants within 30 days. If more time is required, this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, detailed investigations will be undertaken and results discussed in the monthly meetings with affected persons. In some instances, it may be appropriate to appoint independent third parties to undertake the investigations.

c) Meeting the Complainant

The proposed corrective action and the time frame in which it is to be implemented will be discussed with the complainant within 30 days of receipt of the grievance. Written agreement to proceed with the corrective action will be sought from the complainant (e.g. by use of an appropriate consent form). If no

agreement is reached, the above step will be re-visited.

d) Implementation of corrective Action

The Project or its Contractors/Operators within the agreed timeframe will undertake agreed corrective actions. The date of the completed action will be recorded in the grievance database.

e) Verification of the Corrective Action

To verify satisfaction, the aggrieved person will be approached by the Grievance Officer to verify that the corrective action has been implemented. A signature of the complainant will be obtained and recorded in the log and/or on the consent form. If the complainant is not satisfied with the outcome of the corrective action additional steps may be undertaken to reach agreement between the parties. If additional corrective action is not possible alternative avenues maybe pursued.

f) Action by Local leaders and Contractor(s).

If the Grievance Co-ordinator and NGO/CBO representative cannot solve the grievance, it will be referred to relevant parties such as local leaders, District Officers, NEMA, Valuer and MWE, for consultation and relevant feedback provided.

g) Action by Grievance Redress Committee (GRC).

If the complainant remains dissatisfied and a satisfactory resolution cannot be reached, the complaint will be handled by the Grievance Redress Committee. A dedicated Grievance Committee will be established to assess grievances that arise from disputes. This will include the following members: -

a. MWE Chair,
b. IWMDP Project Coordinator,
c. Resettlement Officer/Social Scientist Secretary,
d. Project's Environmental Focal Point,
e. The Chair of the local community (LC I Chairman),
f. A member of a recognized non-government organization, A Community Leader.

This committee must have a quorum of at least two thirds persons. Decisions will be reached by simple majority. The Grievance Committee should be constituted for as long as no more grievances are lodged. Once the Grievance Committee has determined its approach to the lodged grievance, this will be communicated to the Grievance officer, who will communicate this to the complainant. If satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied however, the complainant notes the outstanding issues, which may be re-lodged with the Grievance Committee or the complainant may proceed with judicial proceedings. The effectiveness of the GRM will be evaluated during the periodical performance reporting and as part of the Environmental Audits.

The GRM should be assessed on the following parameters: -

a. Number of complaints:
b. Grievance issues by type and how they were resolved:
c. Total received, total justified,
d. Total resolved at various levels including the type of agreement reached,
e. Total referred to legal system/courts of law, including clarification on who initiated (local

leaders, PAP or MWE) the referral and subject matter.

VII. Proposed Terms of Reference for the Grievance Management Coordinator/Officer

In line with MWE's resettlement policy framework, projects need to adopt appropriate measures that minimize the risks relating to constructing the water supply and sanitation project. Based on consultations with stakeholders in both districts, effective management of grievances strongly enhances the performance of projects through elimination of construction delays, proper expectation management and increasing community support for the project the current situation suggests that community members incur high transaction costs to ensure that their grievances are handled.

Therefore, MWE will seek the services of a grievance management coordinator to support the existing framework in documenting, analysing and engaging stakeholders on how to manage project related grievances as a way of minimizing to delays in works related to unresolved grievances. The roles and responsibilities of the grievance management coordinator will include: -

a. to coordinate the work of the Grievance Committee, including calling and chairing scheduled meetings;
b. help train Community and Local Government staff engaged in grievance management for land and crops;
c. provide advice and assistance to such persons;
d. monitor progress of grievances;
e. inform Members of outcome of vote on whether or not to proceed to grievance;
f. act as primary Association contact with lawyers and liaise with legal counsel regarding on going grievance issues;
g. And report on informal disputes and grievances to MWE Project Implementation Unit on a regular basis.

Training and Qualifications: Minimum of a relevant university degree with 5 years' experience in grievance handling in rural communities with solid working knowledge of environment, resettlement and compensation issues in Uganda.

Annex VIII: RAP Executive Summary

Annex IX: Certificate of Valuation issued by a qualified and registered Valuer on Project Cost