MINISTRY OF WATER AND ENVIRONMENT

INTERGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS

IN NAMASALE TOWN COUNCIL, AMOLATAR DISTRICT

DEVELOPER

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CERTIFICATION

We the undersigned certify that this Environmental Impact Assessment Report for the proposed Namasale Town Water Supply and Sanitation Systems in Namasale Town Council, Amolatar districts was conducted under our direction, supervision and based on the Terms of Reference provided to us by Ministry of Water and Environment. We hereby certify that the particulars given in this report are correct and true to the best of our knowledge.

NAME	KEY ROLE	SIGNATURE
Dr. Paul Musali	Environment Specialist (Team Leader)	
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Ms. Jalia Nakiyemba	Invertebrates specialist
Mr. Eric Kigai Bigala	Birds Specialist
Mr. Sadic Waswa	Zoologist (Mammals)

Developer's obligation

I certify that I have read and understood the contents of this Environmental Impact Assessment report for the proposed Namasale Town Water Supply and Sanitation Systems in Namasale Town Council, Amolatar district. I agree to undertake all the recommended mitigation measures and all aspects of monitoring in order to protect the environment from any form of pollution and degradation.

Signed

_____

Project Manager/Coordinator

Ministry of Water and Environment

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BGG	Burial Ground and Grave
CAO	Chief Administrative Officer
CBD	Convention on Biological Diversity
CBOs	Community Based Organizations
CFU	Colony Forming Unit
CGV	Chief Government Valuer
CITES	Convention on International Trade in Endangered Species
CLO	Community Liaisons Officer
CSR	Corporate Social Responsibility
dB	Decibel
DEO	District Environment Officer
DISO	District Security Officer
DMM	Department of Museums and Monuments (Ministry of Tourism)
DSOER	District State of Environment Report
DV	District Valuer
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
EA	Environmental Audit
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMO	Environmental Management Officer
EMP	Environmental Management Plan
EOHS	Environmental and Occupational Health and Safety
EOHS-MP	Environmental and Occupational Health and Safety Management Plan
EPA	Environmental Protection Agency
EPB	Environmental Project Brief
EPP	Emergency Preparedness Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
GAC	Granular Activated Carbon
GIS	Geographical Information System
GPS	Global Positioning System
GRC	Grievance Redress Committee
GRM	Grievance Redress Management

HDPE	High Density Polyethylene
HRM	Human Resource Management
HSE	Health Safety and Environment
IBCC	International Bird Census Committee
ICT	Information Communication Technology
IDA	International Development Association
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
IWMDP	Integrated Water Management and Development Project
km	Kilometre
LC	Local Council
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MoGLSD	Ministry of Gender Labour and Social Development
MWE	Ministry of Water and Environment
NDP	National Development Plan II
NEA	National Environment Act
NEAP	National Environment Action Plan
NEMA	National Environmental Management Authority (Uganda)
NFA	National Forestry Authority
NGO	Non-Governmental Organisation
NT	Near threatened
NWSC	National Water and Sewerage Corporation
O&M	Operation and Maintenance
OAU	Organisation of African Unity
OHS	Occupational Health and Safety
OHSD	Occupational Health and Safety Department
OP	Operational Policy
PAP	Person (People) Affected by Project/Project Affected Persons
PCR	Physical Cultural Resources
PFD	Personal Flotation Device
PIU	Project Implementation Unit
PPE	Personal Protective Equipment
QA	Quality Assurance
RAP	Resettlement Action Plan
RDC	Resident District Commissioner
RGC	Rural Growth Centre

SDC	Site Disciplinary Committees
SDG	Sustainable Development Goals
SEAP	Social and Environmental Action Plan
SIA	Social Impact Assessment
SPR	Environment Sector Performance Report
STDs	Sexually Transmitted Diseases
TDS	Total Dissolved Solids
ToR	Terms of Reference
TSC	Timed Species Counts
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shilling
UNBS	Uganda National Bureau of Standards
UNESCO	United Nation Education and Scientific Cultural Organisation
UNRA	Uganda National Roads Authority
UTM	Universal Trans Mercator
UWA	Uganda Wildlife Authority
VAT	Value Added Tax
VAWG	Violence Against Women and Girls
VES	Visual Encounter Surveys
VIP	Ventilated Improved Pit Latrine
WB	World Bank
WCS	Wild Life Conservation Society
WHO	Wold Health Organisation
WHO	World Health Organisation
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

Introduction

The Government of Uganda (GoU) through the Ministry of Water and Environment (MWE), with financial assistance from the World Bank, under the proposed Integrated Water Management and Development Project (IWMDP) is planning to undertake Water and Sanitation sub-projects in small towns and rural growth centres. The Project will focus on three strategic areas: (i) delivering necessary WSS infrastructure and catchment management measures in targeted areas; (ii) supporting water related institutions (MWE, local government, and service providers) establish and consolidate operational efficiency and service quality in small towns and rural areas; and (iii) strengthening national and regional capacity to improve Integrated Water Resource Management (IWRM). The Project comprises the four components: Component 1–WSS in Small Town & Rural Growth Centers which will cover Support to Small Town & Rural Growth Centers and Support to Refugee & Host Communities; Component 2–WSS in Urban Large Towns; Component 3–Water Resource Management and Component 4–Project Implementation & Sector Support. Sub-components 1.1-Support to Small Towns and Rural Growth Centers will be implemented by MWE team at central level through the Department of Urban WSS (UWSSD) and RWSSD, with close collaboration with staff in WSDFs as well as district local governments. Existing MOU signed with Namasale Municipal Council will be adopted to provide a framework for cooperation and the Municipality fulfilling their roles of community mobilization, land acquisition and fecal sludge management including management and regulation of public sanitation facilities.

Namasale, Busia and Mbale cluster (Butaleja, Busolwe, Budaka, Kadama, Tirinyi, and Kibuku), Namungalwe-Kaliro and Kyegegwa-Mpara-Ruyonza will be financed under sub-component 1.1. The feasibility study, design review, and detailed engineering design of the improvement to the Water Supply and Sanitation for Namasale was carried out under the closed 'Water Management and Development Project', and this assessment has been carried out with the intention that the proposed project will be funded under the IWMDP.

Project description

Several activities will be undertaken during the implementation of the Namasale Water and Sanitation project. In summary, the following activities are envisaged;

- Exploitation of surface water from Lake Kyoga at Biko Landing Site to meet the demand for the year 2028 and construction of an intake structure complete with screens and sump to facilitate the installation of pumps of the capacity 43.8 m^3/hr, 17 m head.

- Construction of a conventional treatment plant and support infrastructure on higher elevated ground and of capacity 1227 m^3/day to be able to follow the processes of aeration, flocculation, sedimentation, rapid filtration units and treated water storage for both backwashing and pumping for storage into the distribution system.
- Supply and installation of 3-Phase 200 kVA transformer with associated cabling to the overhead three-phase power line.
- Laying of a Transmission Line OD 160 uPVC to the proposed tank site at the Town Council Headquarters of total length 2,500 m.
- Construction of a steel plate tank at the Town Council Headquarters of nominal capacity 350m3.
- Laying of distribution mains from the tank to the core project areas of Aweipeko, Kayago, Wabinua, and Central, initially a total of 14,733 m.
- Making new connections initially approximated at 439No and ultimately 1143No for domestic and 49No initially for institutions.

Project location

The proposed project will be located in Namasale Town Council in Amolatar district. The Parishes that fall in the Project Area are Central, Kayago, Wabinua and Aweipeko with 20 villages. Amolatar District falls under the Lango Sub-region in Northern Uganda and is boarded by the following Districts: Apac to the North East, Kaberamaido to the East, Nakasongola to the West and Lake Kyoga to the South. According to project design, water will be abstracted from Lake Kyoga in Biko trading centres and will be extended to Namasale, Kayago and Lenko landing sites along the shores of Lake Kyoga. The proposed water treatment plant for the Namasale water and sanitation project will be located in a built-up area at Biko landing site on the shore of Lake Kyoga. The reservoir (steel plate tank) will be installed in Aweipeko village about 500 meters away from Namasale Town Council offices in an open grassland with scattered trees of *Grevelia rubasta* and *Pinus spp.and* modified by farming activities. The transmission and distribution network will mainly be implemented along the road reserves that comprise of patches of grasses and in some areas are totally striped of vegetation.

Requirement for Environmental and Social Assessment

Development of water and sanitation infrastructure is listed in the Third Schedule of the National Environment Act No.5 of 2019 under Sub sections 4 and 2; among projects for which environmental impact assessment is mandatory. The ESMF of this project developed by MWE and approved by the World Bank classified it as Category B and in compliance with the World Bank Operational Policy 4.01 on environmental assessment. This is in consideration of the nature of the expected impacts associated with the project.

Environmental assessment is a pre-requisite to the implementation of the proposed activities under IWMDP, and in line with national and lender requirements.

Objective of this Envionmental and Social Impact Assessment

The specific objectives of an ESIA according to the EIA Guidelines of Uganda of 1997are:

- Describe the likely environmental conditions if the proposed project were not implemented;
- Assess the impacts (positive and negative) of the proposed project that might be expected to occur;
- Specify and cost the environmental measures needed to improve the beneficial impacts and reduce or eliminate the adverse impacts;
- Allow the incorporation of appropriate mitigation measures into the project and ensure that these are included in an Environmental Management Plan (EMP) to guide all the project development stages;
- Enable the selection of optimal alternatives from the various relevant options available.

For purposes of comprehensiveness, the report will refer to both national guidelines and World Bank Safeguards requirements in an effort to identify and address all risks and impacts associated with the project.

ESIA methodology and approach

The study was preceded by internalization of the Terms of Reference and formulation of appropriate data collection tools. It assessed each of the activities of the project covering physical, biological, socio-economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for negative/adverse impacts. The methodology used included;

Literature review, Stakeholder consultations, Water resources assessment, Biodiversity studies on flora and fauna, Baseline noise assessment, Mapping and photography, Visual observations, Impact screening, Impact assessment, evaluation and analysis.

The EIA study was based on data collected along the proposed project route (project sites) as well as review of documents provided by the Developer and those from other sources such as, Feasibility study reports, Environmental and Social Management Framework (ESMF), World Bank Safeguards policies, IFC Environmental Health and Safety Guidelines for Water and Sanitation Projects, and other documents provided by district staff on project location such as District Development Plans, district state of environment and health reports, among others. Other documents reviewed include relevant National Household survey reports, policies, regulations, legal framework impacting on the water and

sanitation sector. Consultations with stakeholders constituted a major part of the ESIA methodology in information gathering. Stakeholder perceptions, views and concerns were collected through focus group discussions, meetings and personal interviews with the target audience including but not limited to all communities in Namasale Town Council, Amolatar District Local Government, National Water and Sewerage Corporation among others. Emphasis was laid on environmental concerns expected from construction of the abstraction structures, sanitation facilities, and storage facilities and laying of water transmission and distribution pipes within the rest of project area, obligations of the various parties in mitigating the anticipated impacts and the procedure for operating the water and sanitation project among others. Concerns were analyzed, documented, and addressed in the Environmental and Social Management Plan (ESMP).

Policy, Legislation and Regulations

Two frameworks in regard to policy, legislation and regulations have been reviewed i.e. World Bank Environmental and Social safeguard policies and Uganda national policy, legal and institutional framework. The following World Bank Environmental and Social safeguard policies are trigged by the project: Environmental Assessment OP/BP 4.01 because of the likely negative environmental and social impacts arising from the construction and operational activities of the proposed project; Natural Habitats OP/BP 4.04 because the intake is located in a wetland and along the shores of Lake Kyoga; Physical Cultural Resources OP/BP 4.11 because construction excavations may unearth chance finds; And Involuntary Resettlement OP/BP 4.12 as a result of land intake and likely impact on livelihoods and economic displacement. However, there will be no physical displacement of Project Affected Persons. The main Ugandan national policies, laws and regulations that the project will guide project development and implementation are those that deal with water, environment, land, labour, child-abuse and gender aspects. These include but not limited to: - the Water Act Cap 152; the National Environment Act No.5 of 2019; the Land Act Cap 227; the Land Acquisition Act Cap 226; the OccupationalSafety and Health Act No. 9, 2006; Employment Act, 2006; Workers' Compensation Act 2000 and Children Act Cap 59.

Description of the Project host site

The proposed project will be located in Namasale Town Council in Amolatar district. The Parishes that fall in the Project Area are Central, Kayago, Wabinua and Aweipeko with 20 villages. Amolatar District falls under the Lango Sub-region in Northern Uganda and is boarded by the following Districts: Apac to the North East, Kaberamaido to the East, Nakasongola to the West and Lake Kyoga to the South. According to project design, water will be abstracted from Lake Kyoga in Biko trading centres and will be extended to Namasale, Kayago and Lenko landing sites along the shores of Lake Kyoga. Table 1 below gives the details of the coordinates of the key project

components Figures 0-1 below present an overview of the project area and the proposed water pipe network in the 4 major landing sites.

Table 0-1: Coordinates of the key project sites and features

S/No	Feature	X-Cordinates	Y-Cordinates (Metres)
1	Taping Point	459793.4	165366.6
2	Treatment Plant	459707.7	165362.5
3	Biko H/C III	459665.8	166562.5
4	Biko Town council	458223.6	166532
5	Namasale T/C	457149.5	165506.8
6	Namasale Ferry	457037.1	165002.1

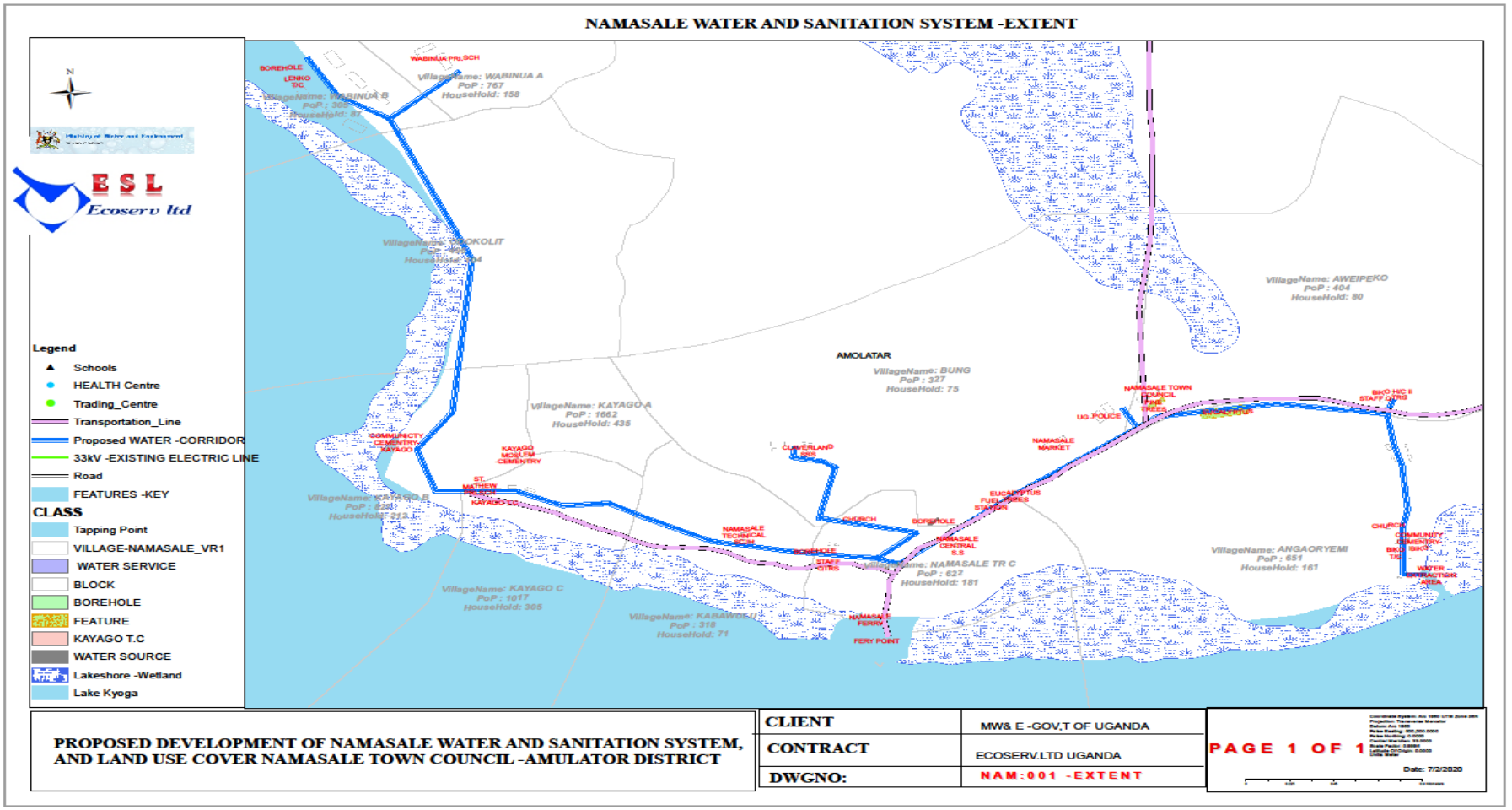


Figure 0-1: Map of the area presenting key features

The Namasale water and sanitation project will have one reservoir tank, which will distribute water to the entire project area. The location of the reservoir will be in Aweipeko village about 500 meters away from Namasale Town Council offices and about 1.5km from Biko Health Centre II (at E:458234, N:166064, H:1052). The elevation around this area is between 1051-1054meters above sea level (ASL). Namasale Town Council is located within a degraded Local Forest Reserve known as Namasale Local Forest Reserve. The vegetation around the town council is characterised by scattered trees of *Grevelia rubasta*.

The Namasale water project traverses an area that is considered modified. The intake and the water treatment plant are near a landing site at Biko where the shores are in a built-up area. Apart from the intake area at Biko, which is degraded, the entire stretch of the lake shoreline is a wetland. The water treatment plant will be constructed in a modified area. Fishing is the main economic activity in the project area. The pipeline traverses areas with several trading centers except in a few sections that are under cultivation and small patches of natural vegetation.

- *Intake:* The vegetation near the intake is dominated by lake shore marshes of *Cyperus papyrus*, *Phragmites mauritianum, and Echinochloa pyramidalis* with small expanses covered by invasive plant species of *Salvinia molesta* and *Eicchornea crassipes*. However, the intake abstraction point will be constructed on an area that has no vegetation except water hyacinth. i.e. the proposed area for the intake has two invasive species i.e. water hyacinth only and Kariba dam weed.
- *Treatment Plant:* The water treatment plant shall be constructed on the shores of Lake Kyoga that is characterisised by settlements and a modified farmland.
- *Transmission Line (TL):* The pipeline route is covered by roadside woodlots of Pinus pinus and Eucalyptus sp, bush lands dominated by Acacia brevispica, Sida ovata, Urena lobata and Achyranthes aspera.
- *Water storage facilities.* These will be constructed in a modified area covered by grass.

Generally, the species richness of the project area was low owing to lack of diversity of vegetation cover types. The lakeshores were characterized by more natural vegetation that was less diverse in terms of species richness; the existing gardens were intensively managed by weeding while the relatively diverse bush lands had a very low coverage.

The section of Lake Kyoga where the intake abstraction point is to be constructed is covered with two invasive species i.e. water hyancith and Kariba dam weed while the shores are already built up areas. Many sections of the pipeline route are cultivated and the few sections of natural vegetation are trampled by grazers. The main vegetation along the routes will be trampled upon with its other associated diversity and the open trenches may act as traps/pits for some of the slow-moving biodiversity to fall into them, unless the digging and laying of the pipes will be laid simultaneously. During the operational

phase, since the pipes will be laid underground, the areas along the routes will recover, except at positions of discharge of the water such as taps and pipeline checkpoints.

The survey locations were within the proposed project area route. Overall the site for the intake was characterized by invasive species i.e. water hyancinth and Kariba dam weed, and marshy swamps adjacent to the site while those away, along the proposed transmission lines, were a mosaic of fallows, settlements and gardens. One hundred twenty-six (126) species of plants belonging to 35 families were recorded and Herbs dominated the sample with 39.7% of species followed by shrubs with 24.6% in the project area. Four major groups of phytoplankton i.e. blue-green and green algae, flagellates and diatoms and two major groups of zooplankton i.e. rotifers and crustaceans were documented in the project area. The fish diversity of the project area was 23 species all of which are of least conservation concern. Nine amphibian species belonging to one order Anura, five families and six genera were recorded during the study while 11 reptilian species, belonging to four orders (Testudines, Crocodylia, Serpentes and Squamata), nine families and nine genera were also recorded. Wetland visitors were dominant representing 18 individuals of all recorded birds followed by grassland specialist (13) and water specialist (11). Lake Kyoga and the associated wetlands provide suitable habitat for water specialists such as the little egret (*Egretta garzetta*) and African reed warbler (*Acrocephalus baeticatus*). Fifty-one (51) mammalian individuals representing 12 species and seven families were recorded in the project area and were all of least conservation concern except Spotted neck otter) which is globally near threatened. Twenty (20) butterfly species in five families and nine dragonfly species were recorded in the different pipeline sections sampled and none of these were of conservation concern. Figure 0-2 below shows the map of surveyed locations. Geo-referenced way points surveyed along the Namasale water pipeline route refer to figure 0-2.

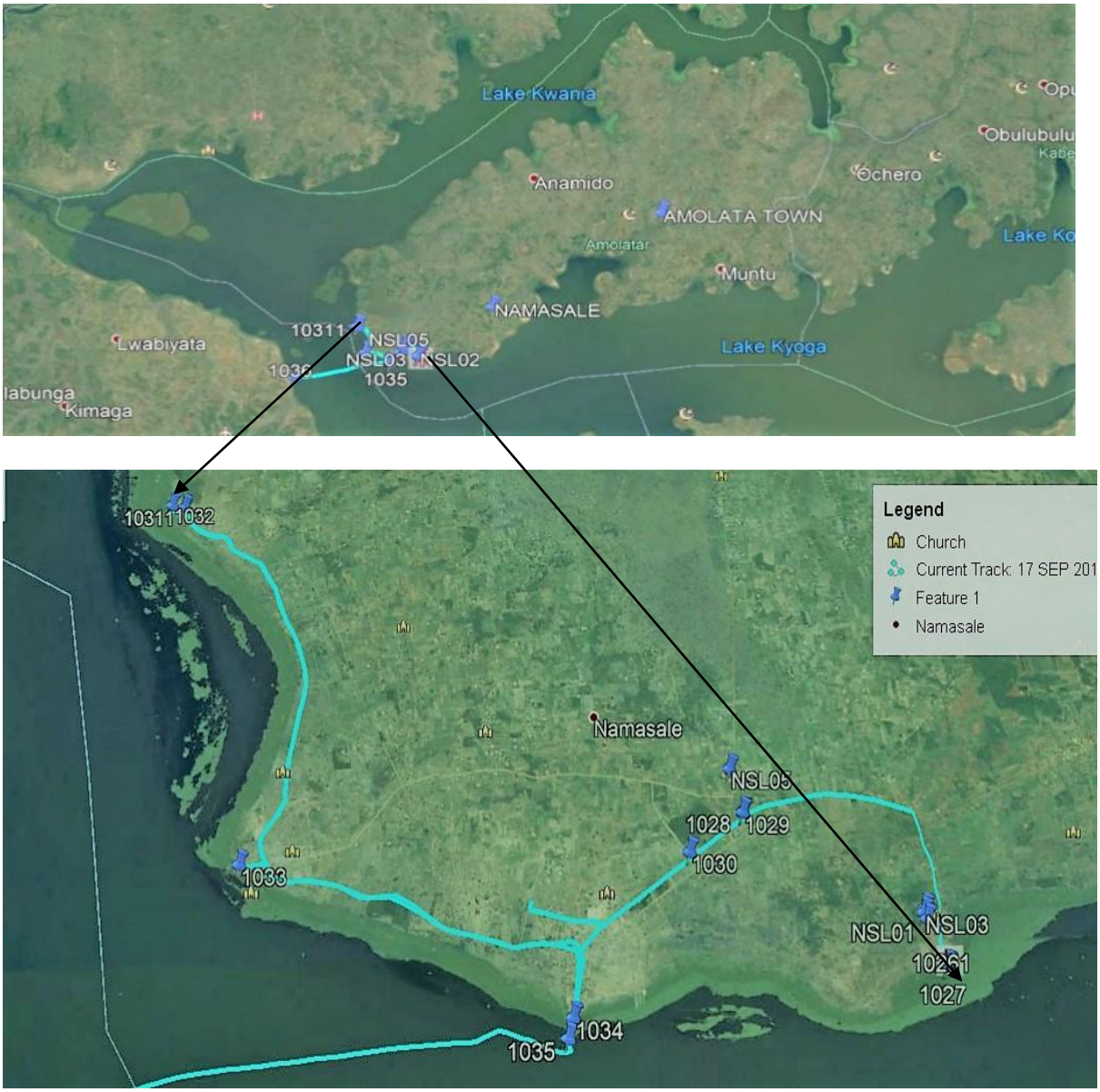


Figure 0-2 Google maps showing ground truthed sites along Namasale water pipeline route

Project impacts

The purpose of this project is to increase sustainable access to safe water and basic sanitation in Namasale town council.

Positive Impacts

The following positive benefits are expected to accrue from this project;

Reduction in diseases prevalence

The proposed Namasale Water Supply and Sanitation Project will contribute towards reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhea. This expected since

the communities will access clean water for drinking and domestic activities. The project would have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced. This positive impact will be enhanced if the following are done:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that operations and maintenance are properly done to avoid issues of water contamination
3. Ensuring that water is affordable and available all the time.

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

Easing of the water fetching burden

One of the major positive impacts of this project will be the easing of the burden of fetching water, which is one of the most arduous tasks for women and young girls in the rural areas. Therefore, the time which has always been wasted on water fetching can be invested into the development of income-generating activities especially for the women. This impact will be enhanced if the following are done:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

Improved livelihoods of the local people

The proposed project would result in increase of volume of water for production, which could result in improved livelihoods of the local people. The project would, therefore increase productive activities through reduced sick days and time saved in fetching water. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time
3. The project should put initiatives in place to promote productive use of water

Improved service delivery

The proposed project would result in bringing improved water and sanitation services closer to the people. This impact will be enhanced through:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.

2. Ensuring that operations and maintenance are properly done to avoid issues of water contamination
3. Ensuring that water is affordable and available all the time

Reduction of child mortality

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. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

Improved maternal health

The Project would result in reduced physical stress and improved health status of pregnant women, thereby reducing miscarriages, maternal deaths, and adverse impacts on foetuses and new-borns. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

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). This impact will be enhanced through:

1. ensuring that women and girls are given priority while recruiting personnel for the project
2. Ensuring the all the households within the project footprint are either are connected or have access to clean and safe water.

Increase in investment in the area

The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water. This impact will be enhanced through:

1. Ensuring that the project uses locally produced materials where possible.
2. The water distribution network connections should target SMEs

3. The project should have an initiative of promoting productive use of water

Human capacity building and creation of jobs

Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled labourers. During construction, about 100-150 people will be employed and about 10-20 people will get jobs during operation phase. More employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services. This will be enhanced through giving priority to local communities while recruiting workers for the project. This will not only enhance skills development in water construction but also environmental and social sustainability.

Increased Revenue to the government

This water supply and sanitation project will generate revenue to the districts and the country in general. This will be in form of VAT on water supply and other taxes associated with extension such as expanded and improved business opportunities in the project areas. This will be enhanced by putting in place an efficient mechanism for revenue collection.

Negative impacts

The major negative risks and impacts associated with the Namasale water and sanitation are summarised in the impact/risk-mitigation –responsibility matrix below:

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Loss of vegetation and terrestrial habitat alteration	▪ Prepare and implement a RAP before project implementation ▪ Pay adequate compensation for trees lost (In case of any) to the water transmission corridor. ▪ Adequate sensitization of PAPs about the project. The contructor should restore sites where activities were carried out at the project sites to allow natural regrowth of vegetation ▪ Movement of equipment (vehicles, contractors and the entire construction crew) shall follow designated path ways or agreed upon access roads. ▪ The disturbed areas should be restored by by backfilling and leaving the area to undergo natural recolonization of vegetation	-Contractor	Along the wayleave	▪ RAP report approved by CGV ▪ Number of people compensated ▪ Number of complaints on compensation ▪ No. of sensitization meetings conducted ▪ No. of sites restored ▪ No of tree seedlings given to the local afforestation programs	-MWE -Supervising consultant -District environment officer

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ MWE shall set aside funds to contribute towards local environmental programs (afforestation projects to compensate for biomass lost during corridor clearing and habitat fragmentation). ▪ MWE should also identify and support afforestation initiatives to enhance tree cover areas as a way of reducing its project footprint. ▪ Avoid clearing natural trees, forests and vegetation at all costs, as these species are under pressure in the Project Area. ▪ When laying water pipes, ensure trenches are carefully placed and well away from trees and/or remnant forest. ▪ Locate material storage areas and construction yards in existing cleared				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	areas in main towns for instance, and away from any wetland areas.				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Impact on fauna (wildlife, invertebrates, birds, e**tc.)**	▪ Guard agaist fire due to negligence ▪ Access roads should be kept to a minimum ▪ Awareness programs on biodiversity to employees ▪ Restoration plan developed and implemented. At minimum, a restoration plan should have materials to be used, action plan as well as a monitoring program	Contractor	Along the pipeline route, at the water treatment plant and intake point	▪ Awareness materials on fire outbreak ▪ Fire fighting equipment ▪ No. of access roads constructed ▪ Restoration plans developed and implemented	Supervising Consultnat and MWE

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Impacts on Surface Water flow streams	▪ The Contractor shall construct a drainage system with silt traps to reduce impacts of storm water from the construction site. ▪ No spoil soil or any other materials shall be dumped or temporary stored in a known drainage system	Contractor	Along the transmission route, at the water treatment plant and intake point	-Drainage system with silt traps at construction sites	

Degradation of source water quality	▪ **Management of alum & lime sludge** ▪ Do not discharge any untreated sludge into Lake Kyogaor any nearby water body; ▪ Adopt mechanisms that lead to: Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by residuals treatment; and safe disposal of wastes as a last option. ▪ **Management of backwash water** ▪ Do not discharge backwash water into Lake Kyoga or any water body prior to dechlorination; ▪ adopt mechanisms that lead to: Chlorine use reduction & waste reduction (resource recovery) atthe WTP as a first ▪ Mitigation from potential commuty impacts on water source ▪ Enforce Wetland policy and environmental regulations on lake shore and wetlands to protect or	Operator	At the water treatment plant	▪ Availability of NEMA approved waste disposal site(s); or Availability of a NEMA approved WTP waste handler; ▪ Complaints from communities; Waste management records; capacity building records; intact adjacent wetland	MWE, NEMA and the district local government

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	regulate the use of the adjacent lakeshore wetland. ▪ The project should have a component of capacity building to enable for safe handling and disposal of agro-pesticides by the communities as well as promote soil erosion control measures that reduce surface runoff and hence silt loading into the lake ▪ Restrict human and livestock access to water abstraction area ▪ Promote safe disposal of human waste among the neighbouring communities (e.g. use of pit latrines) to reduce pollution of the water source from unsafe disposal of human wastes.				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Exhaust emission from vehicle	Timely automobile maintenance to limit carbon emissions; Workers working near stationary emission emitting equipment be availed nose/mouth muffs);	Contractor	Project sites	▪ Records of automobile maintenance; ▪ visible gaseous emission from vehicles, equipment & machinery; ▪ Records of complaints from onsite workers & neighboring communities. ▪ Records of PPE issuance	Supervising Consultnat and MWE and the district local governments
Dust Emissions	▪ Construction sites shall be hoarded off to restrict dust to within site boundaries; ▪ Sprinkle water on vehicle pathways in places near schools, hospitals and rural growth centres. This should be done twice a day during the dry season; ▪	Contractor	Along the transportation routes within the project area	▪ Hoarded off sites ▪ Evidence of PPE issuance ▪ Taupaline covered trucks ▪ Sign posts in the project area limiting speed	MWE NEMA Amolatar district Local Government Supervising Consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ PPE like dust masks shall be availed to workers whenever needed; ▪ Loose materials like sand that are susceptible to dust generation during haulage be covered with tarpaulin; ▪ Limit vehicle speed to 30Km/hr on murram roads especially in places near schools, hospitals and rural growth centres				

Exposure to high noise levels	▪ The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the Contractor, Supervising Consultant and the management of the Water Treament Plant. ▪ The Contractor and the water treatment plant management should continuously monitor the noise levels during construction and operation resctively and in case, the levels go above the national standards, then the cause of the increase should be investigated and addressed. ▪ Periodic medical hearing checks should be performed on workers exposed to high noise levels. ▪ Sites near sensitive places like hospitals and schools must be hoarded	Contractor and Operator	At all project sites	▪ Record of PPE issuance ▪ Monitoring records	MWE Supervising Consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	to curb noise impacts to neighboring communities				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Increased susceptibility to soil erosion	▪ The construction sites (water treatment plant and storage tanks) will be hoarded off to intercept any eroded soil material ▪ Trenches shall be backfilled immediately after laying the pipes ▪ The disturbed areas shall be restorated by proper landscaping and vegeation ▪ The clearance should only be to the extent of the project ▪ The top soil should be heaped differently and used last during backfilling to enable fast gowth of planted vegetation or natural vegetation colonization of the exposed surface	Contractor	At all sites of the project area	▪ Hoarding of of the project sites which are susceptible to erosion ▪ Restoration plans and reports ▪ Work procedures indicating how the disturbed soil shall be handled	MWE
Loss of fauna	▪ secure site boundaries with fences & lights be maintained throughout the	Contractor	Along the pipeline, at the	▪ Extent of clearance	Supervising Consultnat and MWE, the district

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	night at the WTP site to keep away any amphibious that might encroach; ▪ Clearance of fauna habitat be limited only to localities required for development; ▪ Compensatory vegetation be planted once construction work is complete.		WTP and the intake point	▪ Records of compliance with the construction schedule ▪ Restored sites after construction	local governments and NEMA
Impact on Structures and land uses	▪ MWE shall work with local council committees, sub-county committees, Councillors, district land boards, CAOs, RDCs, Politicians and other local leaders to sensitize all people to be affected on the intentions of land acquisition. ▪ MWE shall conduct a Resettlement Action Plan (RAP) in accordance with the Land Act and World Bank environmental and social Safeguard	MWE	At all project sites	▪ Joint sensitisation plans and reports ▪ RAP approved by CGV ▪ Compesation reports ▪ Signed consent forms	-Ministry of Lands, Housing and Urban Development -Ministry of Labour, Gender and Social Development

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	Policies especially Involuntary Resettlement (OP 4.12). ▪ All sorts of compensation and settlements must be done at least 6 months before structures are demolished. ▪ MWE shall engage all affected land owners and obtain consent before their land is used, where the landlords' object using their land without any compensation, MWE shall obtain an alternative route for the proposed water pipes. ▪ All land acquired for establishment of the water treatment plant, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	Environmental and Social Safeguard Policies.				
Generation of solid waste	▪ Recycle all metallic waste; ▪ Inert and all hazardous waste shall be handled by a NEMA registered waste management company ▪ All organic waste shall be disposed at the town council recognised landfills. ▪ All plastic waste shall be sent back to factories for recycling; ▪ Human excreta shall be managed by a mobile toilet and later disposed in local pit latrines or lagoons or nearby gazetted waste disposal sites ▪ **A waste management Plan shall developed and implemented**	-Contractor -Supervising Consultant	In the project area	▪ Presence of waste bins at all workstations ▪ Presence of mobile toilets at at workstations ▪ Presence of delivery notes for all forms of waste generated and disposed during construction.	-MWE -Supervising consultant -District environment officer -LC Committee -Amolatar Local government

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Degradation of the catchment	▪ Spill control measures should be implemented to prevent spills from reaching water bodies. Measures should include appropriate materials handling and storage procedures, and development of contingency plans in the event of a spill. ▪ Provision of suitable workers' amenities facilities. If possible, effluent should be disposed of off-site at a nearby STP ▪ Locating stockpiles on flat areas, away from storm water. Ensure that sediment or erosion cannot reach a waterway; Diversion of overland flow around work areas / construction sites	Contractor/MWE	Along the proposed project sites	▪ Spill control protocols in place and under implementation ▪ Adequate and appropriate workers amenities ▪ Soil stockpiles management work procedures and reports ▪ Acres of trees planted or number or tree seedlings given out	MWE, NEMA, Amolatar district local government, NFA

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ The height and slope of stockpiles especially at the water treatment plant construction site should be limited to minimize erosion of unconsolidated materials during rainfall events ▪ Promote soils erosion control measures to reduce surface runoff ▪ Increase tree cover through appropriate afforestation or agroforestry practices with appropriate tree species.				
Spillage of hazardous chemicals	▪ All major vehicle repairs shall be conducted by qualified and experienced personnel at gazetted service centers (garages) away from the consturction sites.	-Contractor	Project area	▪ Number of vehicle servicing receipts for contractors vehicles. ▪ Records of hazardous waste management	-MWE -Supervising consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ All other forms of hazardous waste regardless of their hazardous properties such as plastics, polythene and others shall be collected out of the project site and disposed in gazetted NEMA waste disposal sites. ▪ Prudent handling and storage of hazardous chemicals, as described in Section 6.2.3.3 above, will help to minimize potential risks to workers. ▪ Implement a training program for operators who work with chlorine and ammonia regarding safe handling practices and emergency response procedures. ▪ Provide appropriate personal protective equipment (including, for example, self-contained breathing			▪ Concerns from the local leaders. ▪ Chemicals handling procedures in place ▪ Records of PPE issuance ▪ Hazardous chemicals managent plan and reports in place ▪ Safety signage prohibibiting activities like eating, smoking etc installed at the facility ▪ Safety evacuation routes and assesmbly points well designated	-District environment officer -LC Committee

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	apparatus) and training on its proper use and maintenance. ▪ Prepare escape plans from areas where there might be a chlorine or ammonia emission. ▪ Install safety showers and eye wash stations near the chlorine and ammonia equipment and other areas where hazardous chemicals are stored or used. ▪ Ventilate enclosed processing areas and ventilate equipment, such as pump stations, prior to maintenance. ▪ Periodically sample air quality in work areas for hazardous chemicals. If needed to meet applicable occupational health national requirements or internationally accepted standards, install				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	engineering controls to limit worker exposure. ▪ Prohibit eating, smoking, and drinking except in designated areas. ▪ Rotate personnel among the various treatment plant operations to reduce inhalation of air-stripped chemicals, aerosols, and other potentially hazardous materials.				
Wetland degradation	▪ No materials or wastes shall be disposed of in the adjacent wetlands ▪ MWE shall apply for and acquired a lakeshore user permit ▪ Design support structures for longer spans, to avoid/reduce the number of anchoring structures that need to be located in sensitive wetland areas. ▪ Design to place the water distribution line well above existing wetland	MWE	Along the project site	▪ Lakeshore user permit in place ▪ Records of waste disposal tracking ▪ Designs that are environmentally responsive	NEMA and the Amolatar district local Governent

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	vegetation, as far as is possible, to avoid vegetation clearing in wetland and riparian areas.				
Management of solid waste (sludge) during water treatment	.Dispose hazardous sludge in a gazetted waste disposal site for hazardous waste.	-MWE -Water operator	Project area	▪ Concerns from the community and local leaders. ▪ Evdence that sludge is well managed	-District environment officer -MWE
Management of waste water at the treatment plant	.Recycle filter backwash and reject water streams into the process if possible.	-MWE -Water operator	At the water treatment plant	▪ Concerns from the community and local leaders. ▪ Evidence that waste water is well managed treated before being discharged into the environment	-District environment officer -MWE -Water operator

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
				▪ Waste water quality monitoring reports	
Management of water treatment chemicals	▪ Manage chlorine as stipulated in the MSDS ▪ Store and manage other chemicals such as calcium hypochlorite, ammonia as stipulated in the Material Safety Data Sheet (MSDS) ▪ Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures.	-Contractor -Operator -MWE -Water operator	At the water treatment plant	▪ Evidence that all controls have been put in place to manage chemicals in an environmentally acceptable manner and as stipulated in the mitigation measures. ▪ Presence of a written and well implemented chemical management plan	-MWE -Water operator
Accidents and injuries due to	▪ All construction workers shall be provided with adequate Personal Protective Equipment (PPE)	-MWE	Project area	▪ Proof of PPE issuance ▪ Concerns from the community and leaders	-Contractor

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Physical hazards	▪ Only trained and certified workers shall be allowed to install, maintain, or repair the water and sanitation equipment. ▪ All drivers to be employed by the contractor and the Developer shall be qualified, skilled with valid driving permits. ▪ Traffic guides/flag men shall guide traffic and ensure road safety especially where road users are risk of being injured by construction equipment ▪ The Contractor shall develop and implement a safety management Plan ▪ The Contractor shall ensure that appropriate signage are placed in key areas ▪ The Contractor shall acquire workmans compensation insurance to ensure that	-Contractor		▪ Evidence of appropriate training of workers ▪ Presence of adequate PPE ▪ Presence of flag men and road signs at road crossing points ▪ **Workman's compensation insurance in place** ▪ **Safety Management Plan developed and implemented** ▪ **Appropriate signage installed in key areas**	-Supervising Consultant --LC Committee -Traffic police

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	in case of an accident compensation is done in accordance to the national laws				
Water quality and supply	▪ . ▪ Evaluate the vulnerability of the treatment system and implement appropriate security measures ▪ The Operator should establish an effective emergency response plan to respond to breakdown during supply	-MWE -Contractor -Supervising Consultant -Water operator	Water treatment plant and the entire project area	▪ Evidence that the quantity of and quality of water supplied is acceptable. ▪ Maintainance logs for the WTP ▪ Concerns from the community and local leaders on the quality and quantity of water being supplied to them. ▪ Emergency Response Plan developed and implemented	-Water operator -MWE

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Waste water and septage collection	Put in place a system among the communities, their leaders and the health workers to monitor, detect and alert the responsible authorities to call for emptying of any septic tank that pauses a danger to the community	-MWE -Water operator	Project area	▪ Evidence that filled up septic tanks and emptied and sewage disposed in gazetted waste disposal sites. ▪ Concerns from the community and local leaders.	-Water operator -MWE
Psychological impacts	▪ Address all people's fears of losing property in the water transmission corridor using appropriate media and avenues. ▪ Compensate all PAPs in accordance with the Land Act and WB OP 4.12 prior to project implementation.	-MWE -Contractor	Project site and any other site to be used by the contractor	▪ Evidence that all PAPs were compensated ▪ Concerns from the PAPs and their leaders ▪ Grievance Redress mechanisms developed and implemented ▪ Awareness/engagement reports	-MWE -Supervising consultant -Contractor

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Exploitation of Workers	▪ For unskilled jobs, give the local first priority ▪ Procure all staff under a well-recognised contract ▪ Workers shall be given appointment letters indicating their obligations as employees. ▪ All workers to be employed in accordance with the provisions of the Employment and Occupational Safety and Health Acts of 2006.	-MWE -Contractor	At all work stations	▪ Number of local people working with the contractor ▪ Presence of written contracts for all employees. ▪ Evidence that all workers are paid in accordance with their respective contracts and on time. ▪ Number Concerns of complaints from workers	-MWE -Supervising Consultant -LC Committee
Impact on Physical Cultural Property	▪ Relocate shrines and graves in accordance with the existing rituals and norms of the affected society.	-Contractor	Project area	▪ Number of graves and or shrines affected and relocated	-MWE -Supervising

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Chance finds shall be handled in accordance with the chance find procedure in this report. ▪ All imported staff shall be reported to the Local Leaders. They will be briefed, guided and shall be expected to abide by the bylaws of the villages where works on the distribution line will be on-going.			▪ Concerns from the local community ▪ **-Chance Finds Procedure being implemented**	Consultant -LC Committee -Community Development Officer
Interference with traffic and diminished road safety	▪ Trenching across roads and high ways shall be conducted in hours with less traffic. ▪ Conspicuous notices shall be well placed on roads and guides on ground shall direct traffic in case of diversions or lose/sagging conductors and cables.	-Contractor -Supervising Consultant	Project area especially where interference with traffic is likely.	▪ Number of accidents or near misses in records. ▪ Concerns from the local leaders community ▪ Maintenance logs for the project vehicles ▪ Restored portions of the road affected by	-Contractor -Supervising Consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Ensure all company vehicles are in sound mechanical conditions. ▪ Employ only drivers with valid driving permits and experience. ▪ The trench excavated across the roads, after laying the pipes should be backfilled with murrum, compacted and levelled to the level of the existing road. This is to ensure that the integrity of the road is not affected by the water line construction activities. ▪ The contractor will have to notify traffic police in advance and work with it during trenching across high ways and other major roads. ▪ Increase work site visibility ▪ Implement proper training in workplace safety. ▪ Ensure that all workers put on PPEs that have reflectors			trenching and water pipe laying ▪ Notices to traffic police on the program of trenching across the roads ▪ **PPE issuance records** ▪ **Workplace safety training plans developed and implemented** ▪ **Training records in place**	-Traffic police

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Public Health concerns	▪ Workers will be sensitized on protective behaviour and practices during work. ▪ Monitor communities during high-risk seasons to detect and treat cases. ▪ Excessive alcohol abuse shall be discouraged as a company policy. ▪ The Contractor will establish a first aid facility at the construction sites to treat injury cases whenever they occur. ▪ Provide surveillance and active screening and treatment of workers and the community where a communicable disease is discovered. ▪ Develop and implement adequate SOPs- for Covid 19	- -Contractor -Supervising -Consultant	Project area	▪ Number of health awareness trainings undertaken among staff and the local community. ▪ Records of training and sensitization of the workers. ▪ Presence of company policy prohibiting abuse of alcohol & drugs ▪ SOPs for Covid-19 in place ▪ Surevelence and Screening Procedures for communicable diseases in place.	-MWE -Supervising Consultant -District local governments

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
Gender concerns	▪ Main stream gender in project activities ▪ Workers will be sensitized on their sexual rights. -The Contractor shall develop and implement zero tolerance policies and codes of conduct related to violence against women and girls (VAWG). All employees must be made aware of the zero-tolerance policy and codes of conduct for employees. ▪ All workers shall receive adequate briefing and education on the laws against defilement and other sexual offences. ▪ To the extent possible, there should be gender sensitivity in task allocation;	-Contractor -Supervising Consultant	Project area	▪ Presence of facilities and activities at the work place that put gender into consideration including task allocation ▪ Gender policies and code of conducts developed and implemented ▪ Awareness plans and reports on gender issues	-MWE -Supervising Consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ The contractor shall conduct gender sensitization to the work force on matters such as gender sensitive communication and on the gender sensitive conduct of workers towards women including putting in place toilets segregated by gender amongst others and;				
Disruption of social order	▪ The construction activities shall as much as possible be restricted to daytime only when noise pollution is least felt. ▪ The contractor shall be prohibited from using vulgar language at work place and in the community. ▪ A code of conduct shall be put in place and shall be followed by the	-Contractor	Project area	▪ Number of Complaints from the community. ▪ Work code of conducted in place and signed by all employees ▪ Contract with a clause on penalties for misbehavior of the contractor and its employees	-MWE -Supervising Consultant -LC

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	workforce to avoid causing unnecessary inconvenience to the community through use of vulgar language or any other activity that may bring about social disorder. ▪ A clause shall be included in the contract stating clear course of action where the contractor breeches this code.				Committee -Community Development Officer
Increased crime, drug abuse and prostitution	▪ Recruit local people and where possible all casual jobs. ▪ Sensitize workers and community on dangers of risky behavior ▪ Main stream HIV/AIDS in the project ▪ The contractor shall involve local (LC) leaders in labour recruitment to	-Contractor	Project area	▪ Number of sensitization meetings held ▪ Number of complaints/ ▪ concerns from the community ▪ MOUs with the district authorities and police managing criminalities	-MWE -Supervising Consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	ensure that people hired have no criminal record. ▪ Local governments and the contractor shall collaborate with police to contain criminal activities. ▪ The Developer together with the Contractor and the Amoltar district local government shall undertake comprehensive awareness to avoid/minimize risks related to drug us and prostitution. ▪ Develop and implement a substance/drug abuse policy			▪ Substance/drug abuse policy in place	-LC Committee
Loss of livelihoods	▪ Sensitise existing water vendors in the area about adapting to the new developments in the area	MWE	Project areas	▪ No. of sensitization meetings targeting existing water vendors	-Community Development Officer

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Mobilise the local people and sensitise them about the opportunities presented by proposed project ▪ Encouraged Vendors to to tender for public water points. ▪ Develop and implement a livilohood restoration program for the affected communties			▪ No. of Vendors operating public water points ▪ Livelihood restoration program developed and implemented	
Pressure on Social Infrastructure and Services	work closely with NamasaleTown Council and other authorities to ensure resource utilisation without conflict	MWE	Project area	MOUs, engagement minutes and number of conflicts recorded	MWE
Pollution from waste water	▪ Well-designed water born toilet will be built to handle human excreta at the water treatment plant	MWE Operator	Project area	▪ Public toilets installed	MWE

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
from human occupancy	▪ A Periodic eco-san toilet maintenance regime will be put in place and implemented.			▪ Toilet maintenance developed and implemented.	
Pollution of water and cutting of Pipes	▪ Mark transmission line with visible land marks. ▪ People should respect road reserves and avoid building on water transmission lines ▪ Develop a GRM that effectively manages conflicts resulting from the dissagrements from current water service providers and the project	Contractor Namasale Town Council	Along the water transmission lines	▪ Visible land marks ▪ Water transmission corridor un tampered with ▪ A functional GRM in place	MWE Namasale Town Council
Disruption of schools and	▪ Schools shall be sensitized on the need to keep off construction sites.	Contractor	At all the project sites	▪ Engagement reports specific to schools	MWE, Ministry of Labour Gender

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
learning process	▪ When working near schools, work shall be scheduled to ensure minimal disruption for the learning. The schools should be notified of the work schedule ahead of time ▪ The contractor shall not employ any person below 18 years and any pupil or student above 18 shall not be employed during school time. Students above 18 years can be employed only during holidays.			▪ Schedules for working near schools ▪ Engagement/appointment letters with National IDs attached	and Social Development
Occupational health and safety of workers	▪ Contractor should have in place a Health and Safety Policy and Action Plan, addressing workers' occupational health and safety issues, workers' welfare and working		Staging areas; along the water distribution routes	▪ OHS plan ▪ OHS incidents ▪ Record of PPE issuance ▪ OHS report	District Environment Officers Health Officers

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	conditions in line with the Occupational Health and Safety Act of 2006, and World Bank Group EHS general Guidelines, and the EHS guidelines for Water projects; ▪ Contractor should have HSE induction for all workers, and undertake daily tool box meetings prior to works, including work at heights; ▪ Ensure adequate provision of PPEs (gloves, safety shoes, safety belts, overalls and goggles), as well as continuous awareness on the need for use of PPEs and enforcement of usage; ▪ Ensure good housekeeping practices on site (have all equipment,			▪ Induction and training records	MWE Supervisng Consultant

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	materials, containers well stacked or stored) to avoid trips and falls on site; ▪ Workers should regularly be taken through safety drills and emergency preparedness training allowing for quick and efficient responses to accidents that could result in human injury or damage to the environment; ▪ First aid facilities should be provided on site and accessible to all personnel. It should among others contain rubber gloves, bandages, pain killers and cotton wool to cater for minor accident victim; ▪ Fence off materials storage areas and camp sites to discourage idlers to the sites;				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Keep all equipment and machinery in good working order to limit excessive fumes and noise; ▪ The contractor to have in place a traffic management plan, and guidelines for drivers to avoid accidents; ▪ Provide adequate sanitary facilities for workers at the construction camps/staging areas and work sites.				
Labour issues – employment and working conditions	▪ Contractor to have in place a Labour force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents,	MWE/Contractor/Operator		▪ Labour Force Management Plan. ▪ Workers code of conduct. ▪ Contracts for workers.	MWE/Supervising Consultant/District Local Govts

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	payments and contracts, and a grievance management mechanism; ▪ All workers to have contracts and identification tags; ▪ Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement. ▪ To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly. ▪ Both men and women will be given equal employment opportunities and				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	that there will be fair treatment and non-discrimination among staff.				
Workers behaviour – affecting women, girls	▪ A code of conduct to be developed by Contractor for employees, to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation ▪ The code of conduct to address inappropriate and risky behaviour ▪ Envourage women and other affected persons to report cases of abuse	Contractor	Work sites, workers accormodation, urban centres along water distribution route	Cases reported; Cases concluded	MWE District Community Development Officer
Community and workers' health including HIV/AIDS	▪ Contractor to have in place an HIV/AIDS Prevention and Management Policy, and to ensure all workers are sensitized;	Contractor	Staging areas for workers and all Urban centres or rural growth centres where	HIV/AIDS prevention and management policy Community outreach reports	MWE District Health Officers Sub County Health Inspectors and Community

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Contractor to liaise with District Authorities (Directorate of Medical Services) and other HIV/AIDS institutions for related services, including provision of condoms, sensitization, counselling; ▪ Sensitize community and schools about construction hazards as well as HIV/AIDS; ▪ Provide workers with condoms ▪ Communities will be encouraged to report cases of illicit sexual behaviour by contractor workers to REA and local authorities; ▪ All workers to have access to medical care.		the water line traverses.		Development Officers.

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Work hand in hand with other Implementing Partners in regard to mitigation of HIV/AIDS. ▪ Ensure that HIV/AIDS awareness and mitigation measures target both men and women. ▪ The contractor to have in place a code of conduct for employees spelling out innappropriate and risky behaviour to be avoided				
Aquatic habitat alteration	▪ Minimize clearing and disruption to riparian vegetation to avoid exposing bare soils to erosion that may affect the water resources; ▪ Backfill the excavated soils immediately after erecting poles;	Contractor	In wet areas and streams	Extent of restoration works in wet areas.	MWE, District Environment Officers

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Avoid disturbance to wetlands as much as possible.				.
Grievance management	▪ Set up grievance management committees at Village, sub county and District Levels ▪ Inform affected communities on the functioning of the Grievance management committee ▪ Develop and implement a Public Consultation and Disclosure Plan.		In all villages affected by the water distribution lines	Functional GMC and reports; Public Consultation and disclosure plan	MWE, District Local Governments
Gender based violence	▪ The contractor is to ensure that women form part of the project workforce for technical and non-technical duties.	Contractor Supervising Consultant	Project areas	▪ Percentage of women employed on project	MWE MGLSD Local leadership

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	▪ Put in place punitive measures to be taken against project workers involved in spouse battery/child abuse. Empower the family/community to use grievance redress committees at village level to report cases of abuse. ▪ MWE will liase with local authorities and Community Based Organizations in the PACs to increase access to justice for women. ▪ Sensitizing and mobilizing communities in defense of women's right to a life free of violence, and increasing knowledge of women's rights. ▪ Awareness raising among women and men on the negativity/effects			▪ Records of reports to LC1 or police of violent workers	Women representative at local levels

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	associated with violence in the home/community.				
Child Abuse	▪ No workers below the age of 18 will be employed in any aspect of the project. National identification/voter registration details will be required before workers are engaged on the project ▪ No individual involved in a sexual relationship with a minor will be engaged on the project ▪ Trainings to raise awareness on child sexual abuse will be provided to workers to reduce incidences of disturbance of school children especially girls	Contractor	Project areas	▪ National identification records of workers indicating age ▪ Records of requirements for employment indicating forms of child sexual abuse ▪ Records of trainings on child abuse	MWE MGLSD Local leadership Community welfare officer
Sexual violence	▪ MWE should give take/train newly employed workers through the forms	Contractor	Project areas	▪ Training records on sexual abuse for	MWE

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	of sexual abuse and penalties associated with cases as such. ▪ Community members should be educated on the different forms of sexual abuse and channels through which cases can be reported (LC1, Police, Community Welfare Officer) and emergency contacts shared ▪ Any worker reported to have sexually abused a community member should be suspended from work and handed over to the police as the case goes to court. Victims should be enabled to pursue the case to a reasonable conclusion. ▪ Put in place punitive measures to be taken against project workers involved in spouse sexual abuse. Empower the family/community to			workers and communities ▪ Records of suspension from work of workers found to be sexually abusive ▪ Records of procedures for worker conduct including punitive measures in case of sexual abuse	MGLSD Local leadership Community welfare officer

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	use grievance redress committees at village level to report cases of abuse ▪ Ensure that all project workers can be easily identified through proper safety wear at site and identity cards when off site. In case of incidence, the community can easily identify perpetrators to the project personnel through the Grievance management mechanism ▪ The contractor will monitor workers at the construction site closely that anyone caught engaging in groping or insulting acts will be suspended from their work ▪ Trainings (to detect and mitigate) on all forms of aggression toward women and school going children will be undertaken prior to				

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Monitoring indicators	Party responsible for monitoring
	employment of workers on the project ▪ Awareness raising among women and men on the negativity/effects associated with sexual violence in the home/community.				
Impacts due to lack of guiding tools	The Contractor shall develop a Construction Specific ESMP(CESMP) and the associated work procedures(Waste Management plans, Health and safety management plant, incident investigations procedures, labour management plans, HIV prevention plans, Traffic Management Plan, Waste Management Plan, Equipment Yard Management Plan, Code of Conduct for Workers, Construction Materials Acquisition Due Diligence Procedure, etc. etc)	Contractor	On the entire project	CESMP and associated work procedures	MWE and the Supervising Consultant

Conclusions

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

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

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

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

1 INTRODUCTION

1.1 The Integrated Water Management and Development Project

The Government of Uganda (GoU) through the Ministry of Water and Environment (MWE), with financial support from the World Bank to the proposed Integrated Water Management and Development Project (IWMDP), is planning to undertake Water and Sanitation sub-projects in small towns and rural growth centres. The Project will focus on three strategic areas: (i) delivering necessary WSS infrastructure and catchment management measures in targeted areas; (ii) supporting water related institutions (MWE, local government, and service providers) establish and consolidate operational efficiency and service quality in small towns and rural areas; and (iii) strengthening national and regional capacity to improve IWRM.

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

The proposed project that this ESIA focuses on falls under component 1, sub-component 1.1 - **Support to Small Towns and Rural Growth Centers** and will be implemented by a MWE team at central level through the Department of Urban Water Supply and Sewerage (UWSSD) and RWSSD, with close collaboration with staff in Water and Sanitation Development Facilities (WSDFs) as well as district local governments. Existing Memorandum of Understanding (MOU) signed with Amolatar district provides a framework for cooperation and the Town Council fulfilling their role of community mobilization, land acquisition and fecal sludge management including management and regulation of public sanitation facilities. The design review, feasibility study and detailed engineering design of Water Supply and Sanitation component for Namasale water project was carried out under the closed Water Management and Development Project. The proposed project for which this ESIA is being done will be located in Namasale Town Council, Amolatar district.

The proposed interventions in the IWMDP will contribute to Uganda's achievement of the Sustainable Development Goals, SDG#3 - ensuring healthy lives and promote well-being for all at all ages, SDG#4 - ensuring availability and sustainable management of water and sanitation for all and SDG#10 - reducing inequalities within and among countries.

1.2 Current water supply and sanitation in Namasale

1.2.1 Status of urban water supply

According to the feasibility study, there exists 2 piped water supply schemes in Namasale TC. Both Schemes are located at the shores of Lake Kyoga in the Central Parish and are not functioning. One is a pilot mini scheme to which 10% of the households and 2 public kiosks are connected while the other belongs to the Beach Management Unit to cater for the commercial activities of the fishermen.

The mini water supply scheme

The scheme was built as a pilot mini piped water supply system to serve the community by the Norwegian hardware supplier – SCAN WATER and the Ministry of Water and Environment (MWE) with support from the Norwegian Agency for Development Cooperation (NORAD), in 2007. This system was managed by 2 Technicians that report to the Community Water Committee. Its intake is located just upstream of the Uganda National Roads Authority (UNRA) Ferry Station. The source of the water is Lake Kyoga. The suction pipe is a retractable flexible hosepipe while the raw water pump is a portable unit (Lombardini 3.68kWh). There is a sedimentation tank of canvas, supported by corrugated galvanized iron sheet of capacity 20 m3. There is also a pressure filter charged with sand and charcoal. A treated water pump delivers supply through a transmission line of ND 50 to storage in 20m3 HDPE tanks elevated 0.8m on dwarf walls from the ground. The system is currently non-functional as it broke down due to lack of regular maintenance.

Water Supply Scheme under the Beach Management Unit

This Scheme is under the management of the Beach Management Unit (BMU) and is located at the landing site adjacent to the UNRA Ferry Station (Figure 1-1 shows the location of Namasale water system). The Scheme was built under the African Development Bank (ADB) program to serve the fishermen commercial activities in a hygienic manner. This system infrastructure is still new (constructed in 2017) and had not been commissioned at the time of assesment as there are still contractual issues between the Client (Ministry of Agriculture, Animal Industry and Fisheries) and the Contractor (Armpass Technical Services Ltd). The intake is reportedly a line into Lake Kyoga adjascent to the landing site. There is a single stage pumping with the pump taking water from the lake, delivering through a pressure filter to the storage tank. An in-line doser has been installed after the pressure filter and is to inject chlorine. There was an air compressor/ blower on site, but it was not clear how the filter would be back washed and cleaned. The power supply is designed as a connection from the main power grid, and there is a stand- by generator set. The main storage reservoir has a capacity of 36 m^3 and is elevated at 8 m.

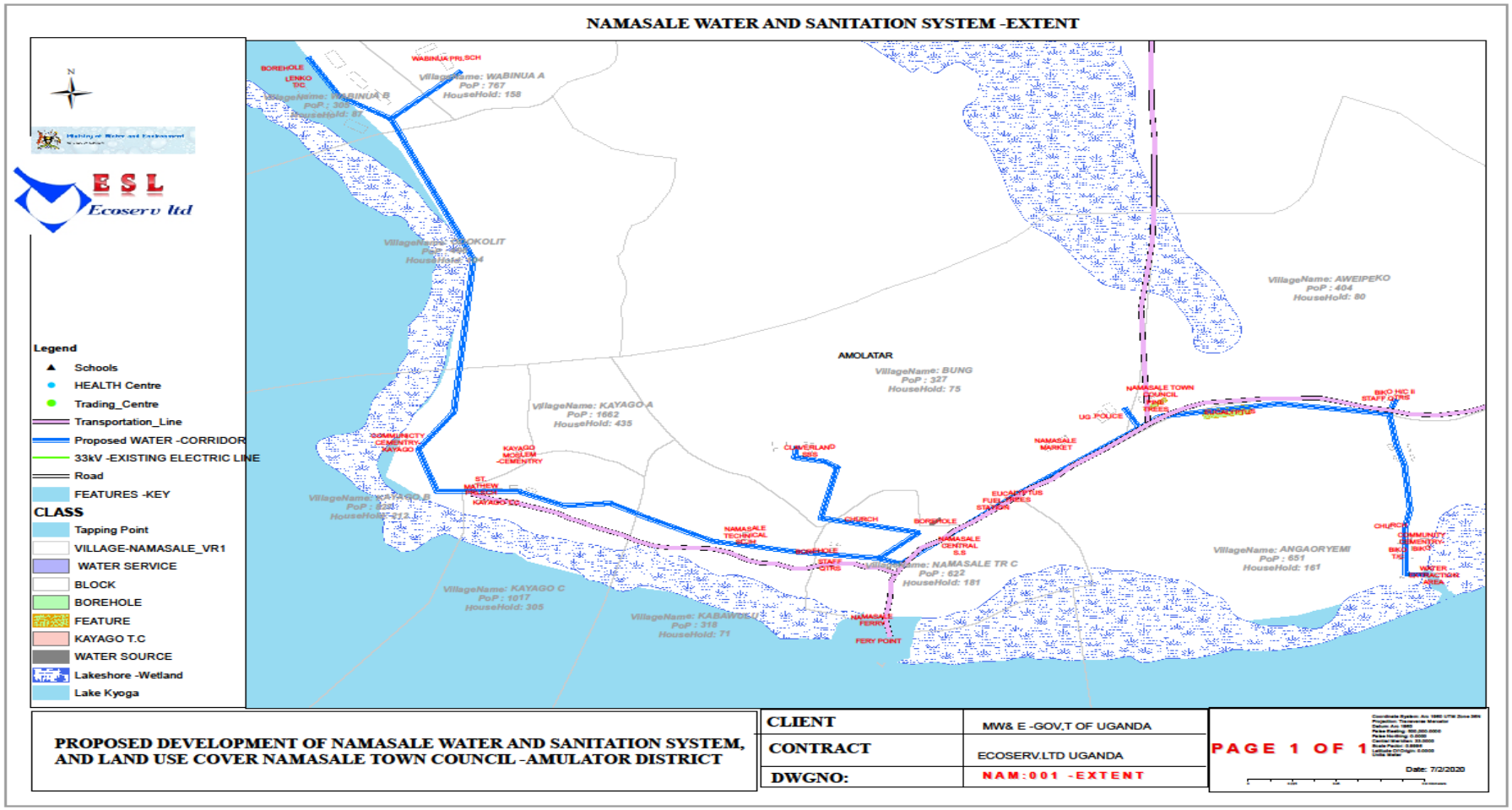


Figure 1-1: Namasale water supply scheme

1.2.2 Status of urban sanitation facilities

According to Namasale Town Council Development Plan (2013-2018), only seventy-five percent (75%) of the population has access to sanitation facilities while twenty-five percent (25%) use the bush/open ground and polythene bags as a way of disposing off their fecal matter. Public toilets are generally lacking in the town. They are only visible in schools, government offices and facilities such as health centres. Lenko was reported to have one public toilet, which was in bad condition.

As regards hand washing practices, all the households have some form of hand washing container, however only 32.6% wash hands after visiting the toilet and 36% wash their hands after doing dirty work. All of them indicated that they wash their hands before and after eating food.

Solid waste disposal is in a dire state as 40.5% of the community throws their rubbish in the open and only 9.1% using the central collection points. The other 30.3% and 20.1% do use a pit behind their compound and burn respectively. The Town Council collects rubbish on a bi weekly basis, but the community has expressed that the dumping/ collection points provided by the Town Council are far away from them.

1.3 Feasibility study

To meet the current water and sanitation needs of Namasale town, the feasibility study recommended pumped transmission of treated water from the Water Treatment Plant at Biko landing site to the Storage Reservoir proposed site at the Town Council headquarters from where water will be distributed by gravity to the project area Parishes of Central, Kayago, Wabinua and Aweipeko.

1.4 Project location

1.4.1 Overview

The proposed project will be located in Namasale Town Council in Amolatar district. The Parishes that fall in the Project Area are Central, Kayago, Wabinua and Aweipeko with 20 villages. Amolatar District falls under the Lango Sub-region in Northern Uganda and is bordered by the following Districts: Apac to the North East, Kaberamaido to the East, Nakasongola to the West and Lake Kyoga to the South. According to project design, waterwill be abstracted from Lake Kyoga in Biko trading centre and will be extended to Namasale, Kayago and Lenko landing sites along the shores of Lake Kyoga. Figure 1-2 and 1-3 below shows the location of the project area.

Figure 1-2 Map of Uganda showing Amolatar District

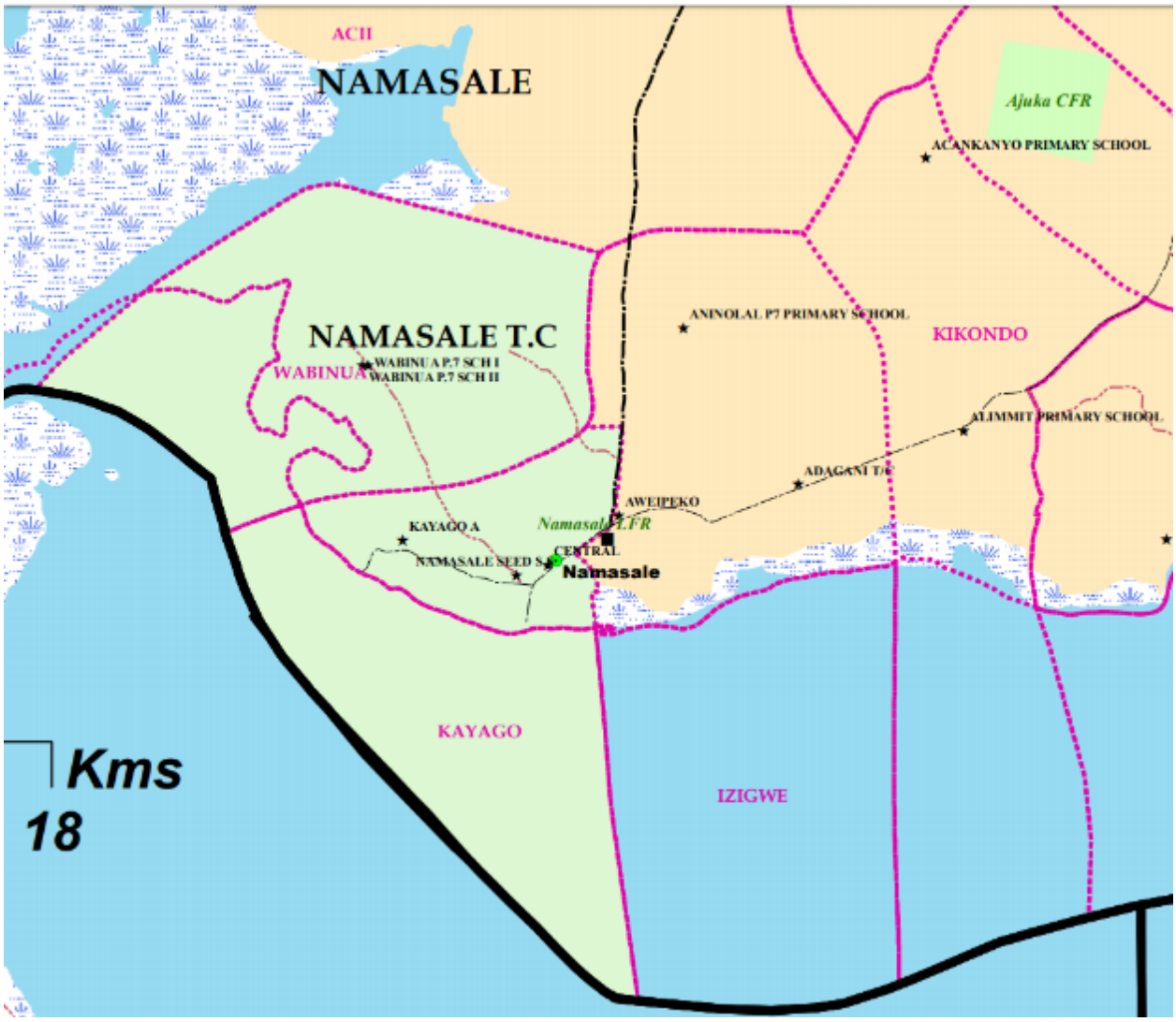


Figure 1-3 Map of Namasale Town Council and its parishes

The proposed project infrastructure will comprise an intake with a water treatment plant at Biko landing site, water transmission system (pipes) from Biko landing site to Lenko trading centre (landing site) via Namasale trading centre and Kayago landing site (Figure 1-4). Water distribution points will be established at each of the landing site/centre mentioned above to serve the host communities in these areas. The water tank/reservoir will be constructed in an open space located between Namasale Town Council Offices and Biko Health Centre II. According to the feasibility study, a water borne toilet type (6 stance, i.e. 2 stances for female inclusive of one for disabled use, and 2 stance for gents inclusive of one for handicapped and 2 urinal sets) with 2 shower rooms and Hand Washing facilities is proposed at one of the market areas at a location to be agreed by the Town Authorities.

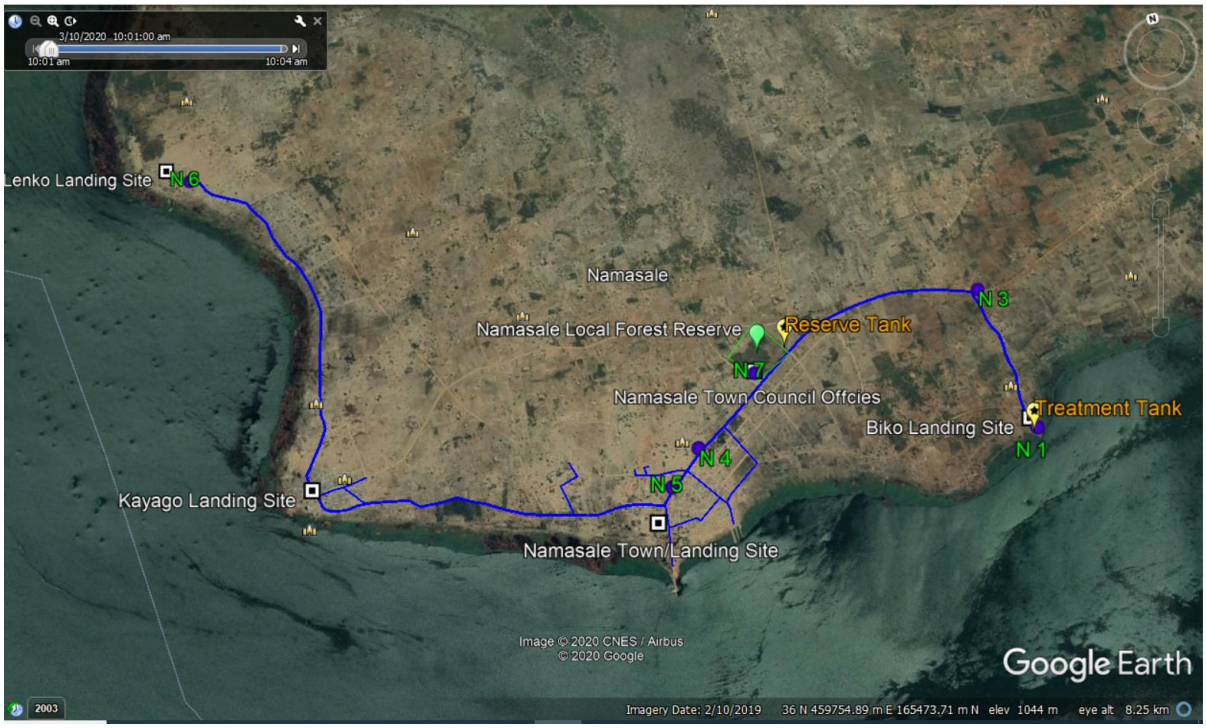
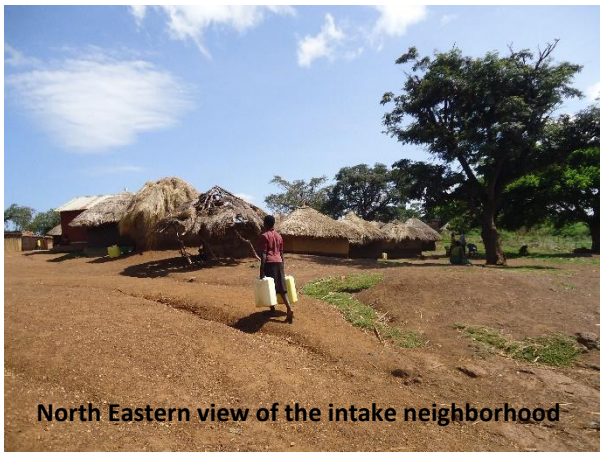


Figure 1-4 General overview showing the location of project infrastructure in Namasale Town Council

1.4.2 Location of the water treatment plant and intake

The intake and water treatment plant for the Namasale water and sanitation project (Details of the design of the intake and water treatment plant are presented in section 2.1.2 will be located at Biko landing site at E:459777, N: 165044 (WGS 84-UTM) on the shore of Lake Kyoga. The actual site is a homestead comprising of an open space, one (1) complete permanent structure (residential), One (I) permanent structure under construction, two (2) grass thatched houses and one (1) open shed. While it is expected that these structures will be displaced, the detailed design of the entire intake facility and treatment plant will inform the extent to which displacement will occur. A grave yard is located about 105 meters north east of the proposed water treatment site and will not be affected by the project.


Western view of the intake area


North Eastern view of the intake neighborhood

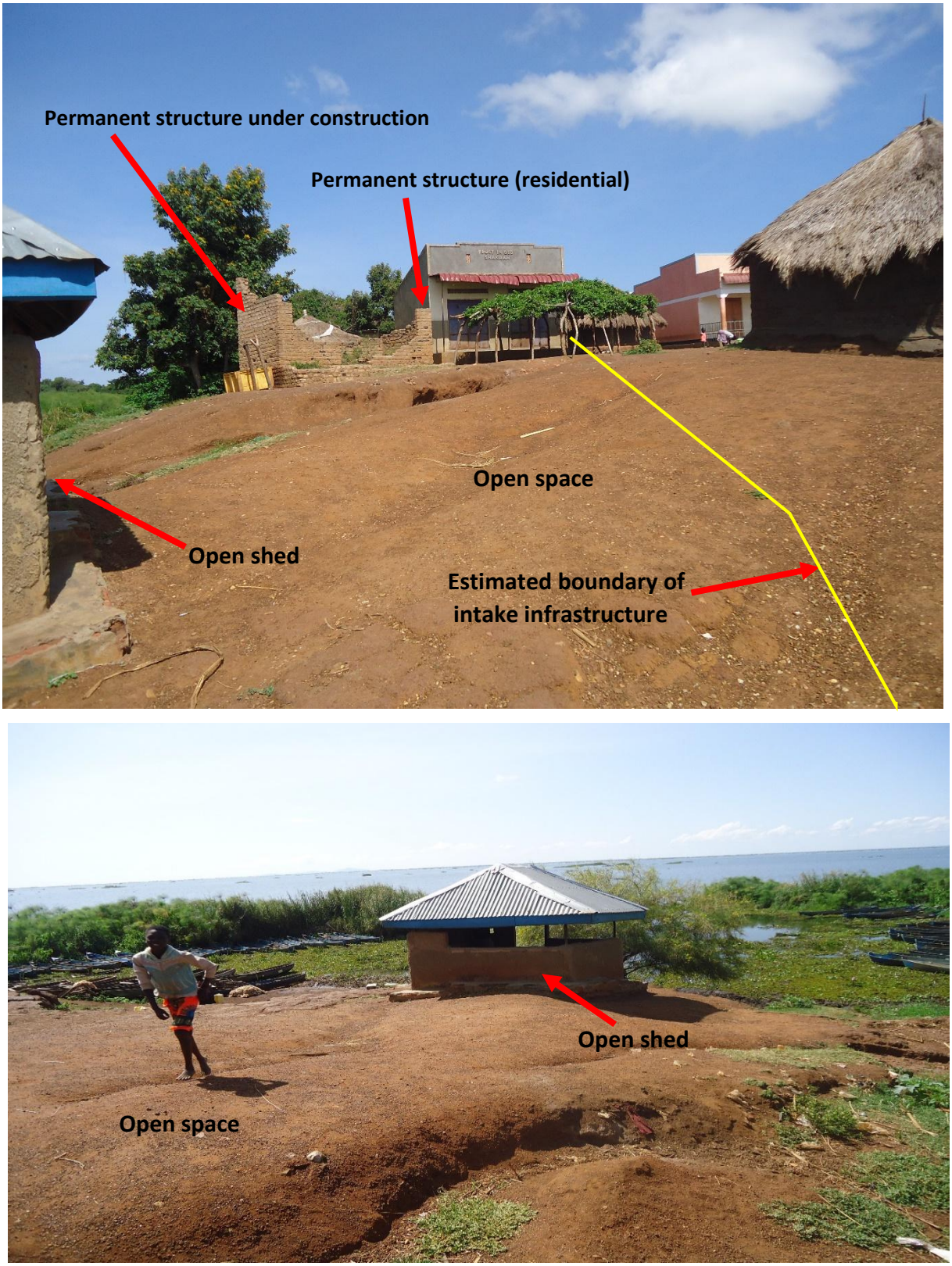


Figure 1-5 The area where the threatment plant and intake will be located

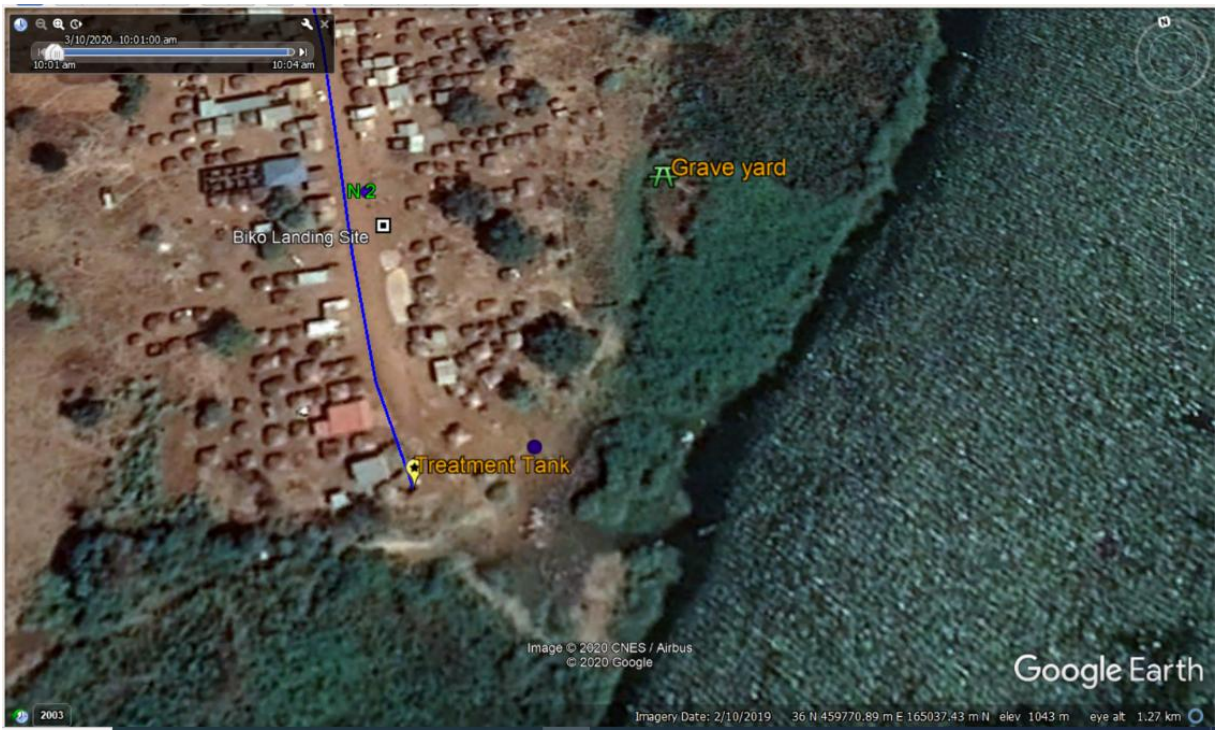


Figure 1-6 Aerial view showing the location of water treatment Plant at Biko Landing site

1.4.3 Location of the water reservoir

The Namasale water and sanitation project will have one reservoir tank (Details of the design are presented in section 2.1.6) which will distribute water to the entire project area. The location of the reservoir will be in Aweipeko village about 500 meters away from Namasale Town Council offices and about 1.5km from Biko Health Centre II at E:458234, N:166064, H:1054). This site is open grassland which has been modified by occasional farming activities about 25 meters from the Namasale-Namabere road. The wider aspect of the project area surrounding this site comprises scattered trees of *Grevelia rubasta* and *Pinus spp.* The establishment of the reservoir tank is not expected to displace any flora of high conservation value. Figure 1-7 below shows an aerial overview of the location of the reservoir tank.

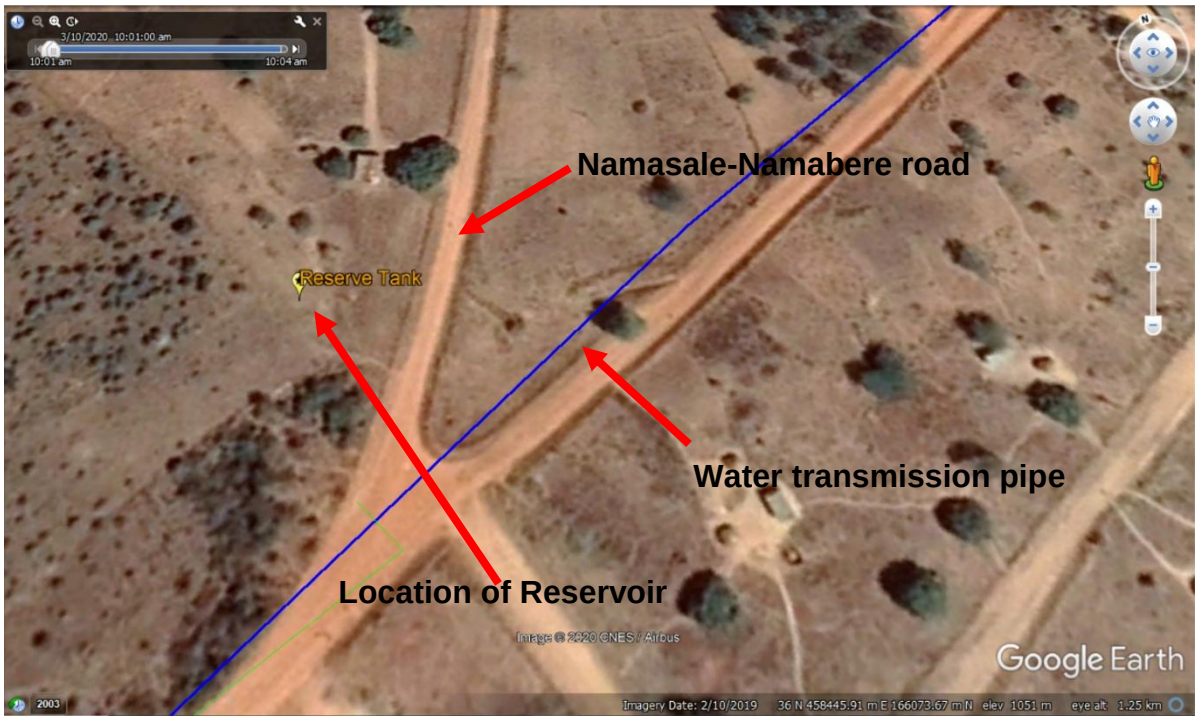


Figure 1-7 Aerial view showing the proposed location of the water reservoir

1.4.4 Location of Water transmission & distribution route(s)

The water transmission and distribution routes (Design details presented in section 2.1.3) will follow the road reserves of the existing access roads within the project area especially the main road connecting Biko, Namasale, Kayago and Lenko landing sites/trading enters. Several T-offs will be established along the transmission pipe to distribute water to various households and institutions in the benefiting centres. The feasibility study suggested some possible routes for distribution routes (marked light blue on the maps) to serve the various customers in the project area. In terms of vegetation cover, the road reserves comprise patches of grasses and in some areas are totally striped of vegetation. The trenching of the road reserve for purposes of laying the transmission and distribution pipes will have negligible impact on vegetation and will not impact any wetlands. Figures 1-8 to 1-11 below present the aerial view of the proposed transmission & distributing routes and other associated systems in the project area.

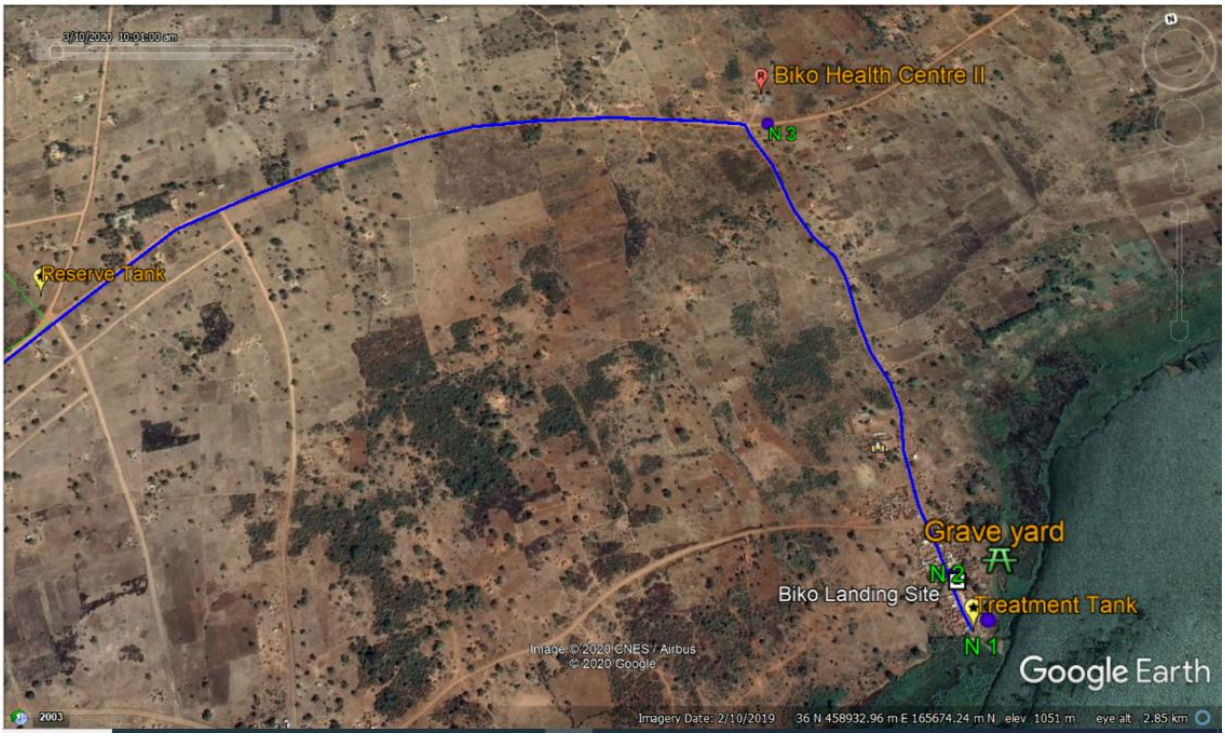


Figure 1-8 Water transmission route dark blue line) from the treatment tank to the Reserve tank via Biko Health Centre

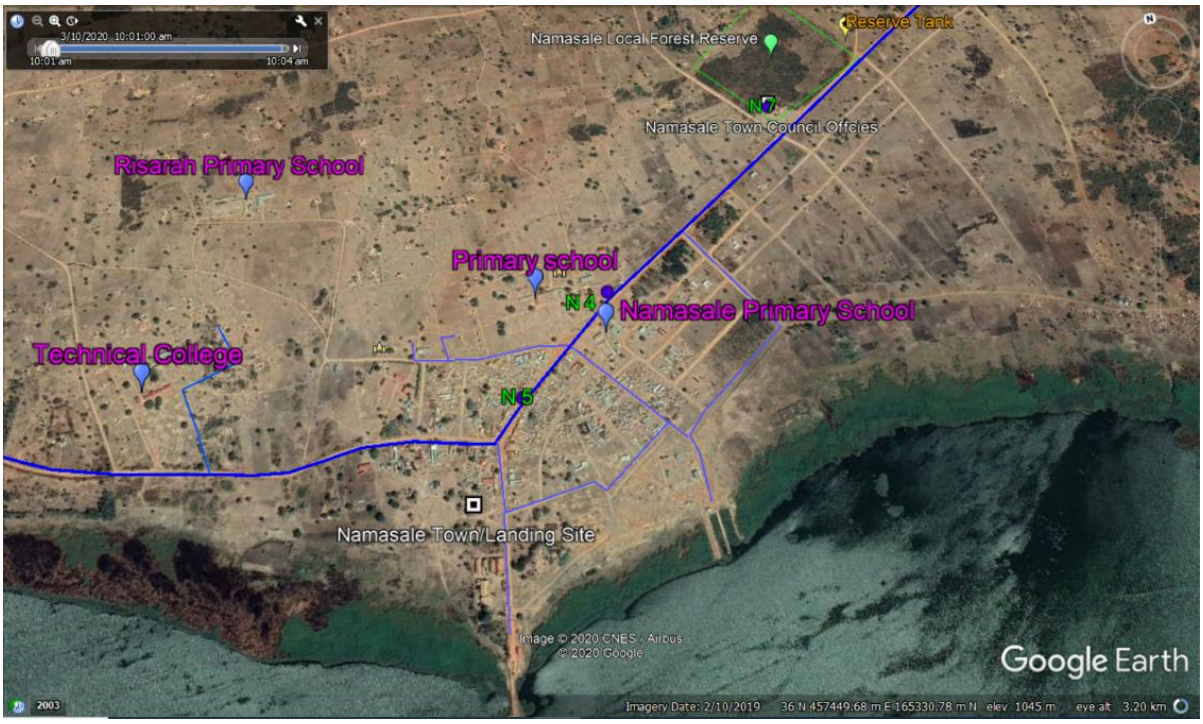


Figure 1-9 Water transmission (dark blue line) and distribution pipes (light blue) between the reserve tank and Namasale trading centre.

Figure 1-10 Water transmission and distribution route between Namasale & Kayago landing site

Figure 1-11 Water transmission route between Kayago & Lenko landing site

1.5 Project justification

The purpose of this project is to increase sustainable access to safe water and basic sanitation in Namasale town council. The following benefits are expected to accrue from this project;

a) Reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhea;
b) A significant reduction in health costs and time for collecting water which translate into substantial savings for rural households;
c) The easing of the burden of fetching water which is one of the most arduous tasks for women and young girls in the rural areas;
d) The development of income-generating activities for women given the free time accruing from the reduced burden of fetching water;
e) An increase in the enrolment ratio, especially for girls, and in the female literacy rate;
f) The reduction in social conflicts related to water use;
g) The promotion of local governance and decentralization;
h) The efficient management and maintenance of water supply and sanitation facilities;
i) Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities.

1.6 The need for Environmental and Social Impact Assessment

1.6.1 Project overview

Several activities will be undertaken during the implementation of the Namasale Water and Sanitation project. In summary, the following activities are envisaged;

- Abstraction of surface water from Lake Kyoga at Biko Landing Site and construction of an intake structure complete with screens and sump to facilitate the installation of pumps of the capacity 43.8 m^3/hr, 17 m head.
- Construction of a conventional treatment plant and auxiliary buildings not more than 1km away on higher elevated ground and of capacity 1227 m^3/day to be able to follow the processes of aeration, flocculation, sedimentation, rapid filtration units and treated water storage for both backwashing and pumping for storage into the distribution system.
- Supply and Installation of 3-Phase 200 kV Transformer with associated cabling to the Overhead three-phase power line.
- Laying of a Transmission Line OD 160 uPVC to the proposed tank site at the Town Council Headquarters of total length 2,500 m.

- Construction of a steel plate tank at the Town Council Headquarters of nominal capacity 350 m^3.
- Laying of distribution mains from the tank to the core project areas of Aweipeko, Kayago, Wabinua, and Central, initially a total of 14,733 m.
- Making new connections initially approximated at 439No and ultimately 1143No for domestic and 49No initially for institutions.
- Construction of a new Office Building next to the proposed reservoir tank at the Town Council Offices.
- Construction of sanitation facilities (Public toilets) in selected areas.

The project falls under the fifth Schedule of the National Environment Act No. 5 of 2019 as amended, which lists projects to be considered for ESIA.

Water and Sanitation projects are listed by the Act under the category of mandatory ESIAs
Furthermore, the World Bank's OP 4.01 Environmental Assessment requires ESIA/ESMPto be undertaken for projects that are considered to pose negative environmental and social impacts. Since the proposed project activities are likely to pose site specific environmental and social risks and impacts, ESIA is required as per OP 4.01 policy requirements.

Therefore, this ESIA study seeks to ensure compliance of the project with applicable National and World Bank environmental and social safeguard policies, while also providing the overall framework for addressing social and environmental risks.

1.6.2 Purpose of the ESIA

- To investigate the likely impacts of the proposed project on the biophysical and social-economic environment and propose appropriate mitigation measures to avert or reduce such impacts.
- To promote environmental sustainability through identifying appropriate mitigation measures.
- To facilitate informed decision making by the Ministry of Water and Environment (Project Proponent), National Environment Management Authority (NEMA) and other Lead agencies and to set terms and conditions for the implementation (construction and operation) of the water and sanitation project.
- To involve and engage stakeholders including communities in the project area in the decision-making process

1.7 THE ESIA PROCESS

1.7.1 Overview

The study assessed each of the activities of the project covering physical, biological, socio-economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for adverse negative/adverse effects.

1.7.2 Literature Review

During the ESIA process, the team reviewed documents provided by the Developer and those from other sources such as, Feasibility study reports, Environmental and Social Management Framework (ESMF) for the Integrated Water Management and Development Project-P163782, IFC Environmental Health and Safety Guidelines for Water and Sanitation Projects, World Bank Safeguards policies and other documents provided by district staffs on project location such as District Development Plans, district state of environment and health reports among others. Other documents reviewed include relevant National Household survey reports, policies, regulations, legal framework relevant to water and sanitation sector.

1.7.3 Stakeholders' consultations

Consultations with stakeholders constituted a major part of the ESIA methodology in information gathering. Data on stakeholder perceptions, views and concerns was collected through focus group discussions (Plate 1.1-1.2), meetings and personal interviews with the target audience/communities that likely to be affected by the water and sanitation project in all the villages of the proposed project areas of Biko, Namasale, Kayago and Lenko landing sites, Amolatar district administration and Namasale Town Council Administration. Emphasis was laid on environmental concerns expected from the water abstraction and treatment activities at Biko landing site, laying of water transmission and distribution pipes within the rest of project area, obligations of the various parties in mitigating the various impacts anticipated and the procedure for operating the water and sanitation project among others. This was aimed at ensuring that the communities give their views from an informed point. Concerns raised were documented (Annex 1), analysed, and addressed in the environment management plan.

Plate 1.1: ESIA team consults PAPs at Biko Landing Site

Plate 1.2: ESIA team consults PAPs at Kayago Landing Site.

Plate 1.3: EIA team consulting Namasale Town Council Officials

1.7.4 Physical measurement and assessment of environmental parameters

The ESIA team gathered relevant baseline data on biophysical and socio-economic parameters in the project area. The objective was to record empirical evidence on the status quo to facilitate determination of potential risks/impacts and their corresponding mitigation measures as well as future monitoring of project activities on the environment. Below are some of the parameters that were investigated;

- **Baseline noise condition**

Baseline noise conditions were investigated at various sections of the project site (see figure 4.1 and Table 4-1) using an Extech 407730 Sound Level Meter. The current noise conditions are necessary for monitoring future impacts of the project activities on the neighbouring communities, the safety and health of the workers and the surrounding environment.

- **Biodiversity inventories**

The ESIA team conducted biodiversity inventories and documented the conservation status of flora and fauna within the project site and project area (farmlands, forest reserves and homesteads) and details are presented in chapter 4.

- **Mapping and Photography**

Data in respect of the project site was captured using Global Positioning Systems (GPS), and maps were processed and generated using Geographic Information Systems (GIS). Photographs of vital importance and concern on the site's status quo, stakeholders' meetings and the surrounding environment were

taken using digital cameras to record empirical evidence as presented in the various sections of the report.

1.7.5 Impact screening

Checklists as detailed out in the ESMF structured on environmental components in the case of the biophysical environment, and of socio-economic concerns in the case of activities, man-made structures, institutions or likely demographic-economic changes by the proposed project were used for the preliminary screening of the impacts. Impacts were defined for the selected aspects of the biophysical and socio-economic environment.

1.7.6 Assessment, evaluation and analysis of potential adverse impacts

Assessment of direct and indirect; immediate and long term; permanent and temporary impacts of the project was done according to their nature and severity. The assesment was done based on the baseline data that enabled predictive analysis. The assessment sought to:

- Distinguish between impacts that are severe (and therefore need to be avoided, mitigated or compensated) and those that are considered minor;
- Organize measures of significance in a way that allows a comparison of alternative project sitting/locations.

1.7.7 Report writing

Findings of the study, discussion and recommendations were compiled and presented in this report.

2 PROJECT DESCRIPTION

2.1 Introduction

The Ministry of Water & Environment through the Urban Water & Sewerage Department intends to undertake construction/rehabilitation of the Namasale small towns' water supply and sanitation systems. Below is a description of the project components.

2.1.1 Design Overview – Water Supply

According to the feasibility study report prepared by M&E Associates Ltd Consulting Engineers in June 2015, the design considered the technical, social, water resources, environmental and financial considerations. The water supply system designed was conceptualized as follows;

- Exploitation of surface water from Lake Kyoga at Biko Landing Site to meet the demand for the year 2028 and construction of an intake structure complete with screens and sump to facilitate the installation of pumps of the capacity 43.8 m^3/hr, 17 m head.
- Construction of a conventional treatment plant and auxiliary buildings not more than 1km away on higher elevated ground and of capacity 1227 m^3/day to be able to follow the processes of aeration, flocculation, sedimentation, rapid filtration units and treated water storage for both backwashing and pumping for storage into the distribution system.
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- Laying of distribution mains from the tank to the core project areas of Aweipeko, Kayago, Wabinua, and Central, initially a total of 14,733 m.
- Making new connections initially approximated at 439No and ultimately 1143No for domestic and 49No initially for institutions.

2.1.2 Detailed Design of the Intake and Treatment Plant

The proposed water treatment plant will have a conventional design. It will consist of several treatment processes. These include: (1) Collection; (2) Screening; (3) Chemical Addition; (4) Coagulation and Flocculation; (5) Sedimentation and Clarification; (6) Filtration; (7) Disinfection; (8) Storage; (9) and Distribution.

Collection – The source water for the water treatment plant is Lake Kyoga. A Pump and water pipeline will transport the water to the treatment plant.

Screening and Straining – Water from an open source like Kyoga contains varying amounts of suspended and dissolved materials. This material may include turbidity, color, fish, plants, trash, etc. The material may be organic or inorganic, suspended or dissolved, inert or biologically active, and vary in size from colloidal to a tree trunk. Some of these larger items can impede equipment in the treatment process, such as a tree limb getting stuck in a water pump impeller. Therefore, the first process in conventional water treatment is to screen or strain out the larger items. This is accomplished using a large metal screen called a bar-screen, which is placed in front of the water source intake. Large items are trapped on the screen as the water passes through it. These screens must routinely be raked or cleaned off.

Chemical Addition– Once the pre-screened source water is received into the treatment plant, chemicals are added to help make the suspended particles that are floating in the water clump together to form a heavier and larger gelatinous particle called floc. In this process, a chemical is added that reacts with the natural alkalinity in solution to form an insoluble precipitate. These chemicals are called coagulants. The most common coagulants used in Uganda are alum and polymers.

Coagulation and Flocculation- A rapid mix unit is usually used where the coagulant is added to the water to provide a very quick and thorough mixing. The water mixing is then slowed to allow the water to come in contact with the forming floc and allow it to increase in size. The continued mixing must be gentle to allow the floc to grow and gain weight, but fast enough to keep it in suspension until you are ready for it to settle in the clarifiers. The process of adding a chemical to cause the suspended material to "clump" into larger particles is called flocculation or coagulation. The treatment unit where coagulation and flocculation is performed is called the "flocculator".

Sedimentation and Clarification– Once the flocculation process is complete, the water then passes over the weir in the flocculator and travels to the center of the clarifier, or sedimentation basin. Here, the water makes its way from the center of the clarifier to the saw tooth weir at the perimeter of the unit. As the water makes its way towards the weir, the large floc particles are allowed to settle out to the bottom of the clarifier. The reason clarification occurs before filtration is so the majority of suspended material can be removed prior to filtration, which avoids overloading the filters and thus allowing much more water to be filtered before the filters must be backwashed.

Filtration – Clarified water enters the filters from the top. Gravity pulls the water down through the filters where it is collected in a drain system at the bottom of the unit. There are many different types of materials (media) used in filters. The most common being sand and gravel. **Disinfection –** Once the water has gone through the filtration process, it is about as clear and clean as it can get. However, there may still be bacteria and viruses remaining. To ensure these are destroyed, there must be a disinfection

process employed. The most common disinfection process used is chlorination. Chlorine is added to the water in an amount to ensure all microorganisms are destroyed.

Storage – Once the disinfection process is complete, the water is stored. Elevated storage tanks that provide adequate water availability in the event of emergencies shall be used.

Figure 2-1 below shows a schematic diagram of a conventional surface convention water treatment plant

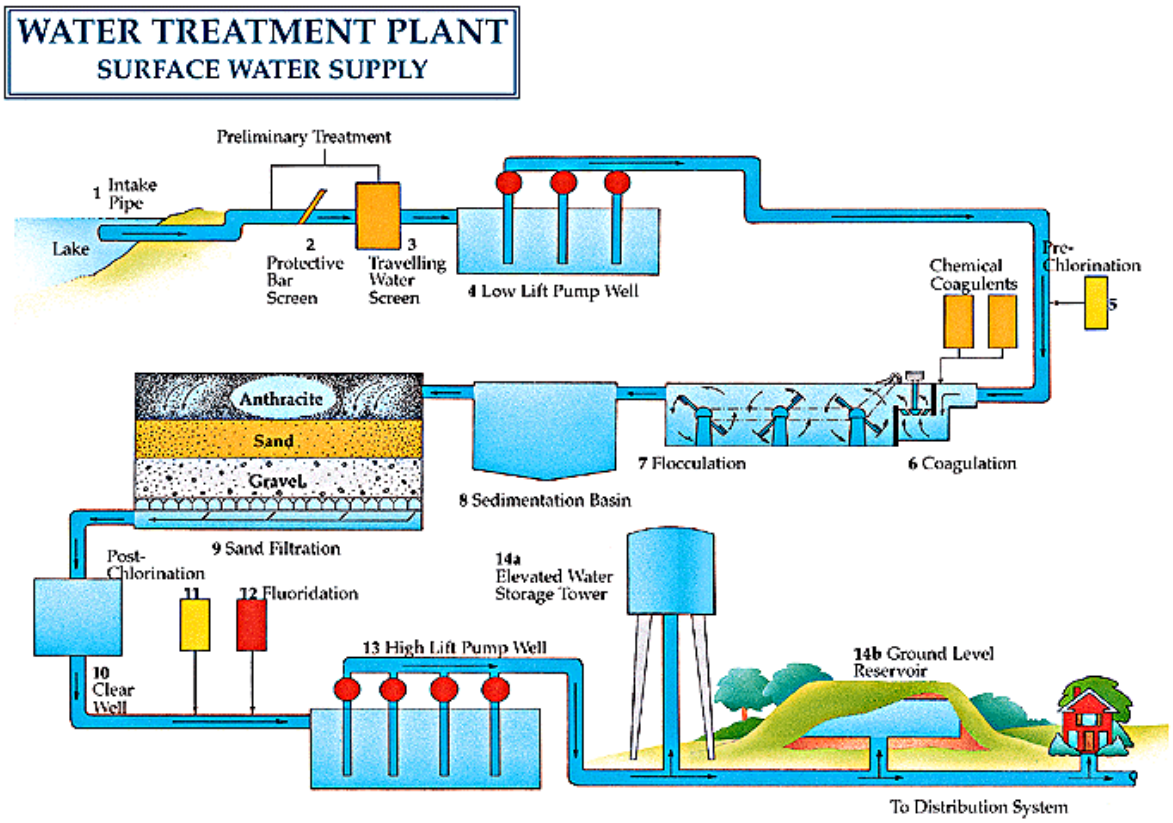

Figure 2-1: Schematic flow of a typical convetional surface water treatment plant

The proposed type of intake is an Intake Well. The intake structure shall be formed from DN 2000 precast reinforced concrete rings to accommodate the raw water pumps. A walkway will be provided to the intake point from the shores and will be made of steel columns and an open grid decking. A DN 150 DI raw water-pumping main shall be fixed to the walkway.

The proposed raw water pumps will be the submersible type installed in the raw water well. It is proposed to have a single duty pump and one stand by pump. The pumps have been sized for the year 2028 at which time it will be due for replacement. The replacement pumps will be sized for the year 2040 duty. There will be a local control point and power supply will be from the water treatment plant. The proposed pumps and pumping head are shown in the Table 2-1. The Raw Water Pumping main will be OD160 DI PN10 from the Intake structure to the Water Treatment Plant. The delivery level in

the Water Treatment Plant is the inlet pipe into the coagulation. Summary of the design details for the sizing of the raw water transmission main are given in the Table 2-1 below.

Table 2-1: Raw water pumping main design

Parameter	**Value for Lake Kyoga to WTP – 2028 (initially)**	**Value for Lake Kyoga to WTP – 2040 (later)**	
Demand- (m^3/day)		746.40	1,168.20
Treatment Plant Use (5%) (m^3/day)		37.32	58.41
Total Amount of Water Abstracted (m^3/day)		783.72	1,226.61
Hours of Pumping (h)		16	16
Efficiency Pump (%)		60.0%	60.0%
Efficiency Motor (%)		80.0%	80.0%
Required Delivery (m^3/h)		48.98	76.66
Required Delivery (m^3/s)		0.0136	0.0213
Low Lake level (m amsl)		911.15	911.150
Inlet Level at Flocculator (m amsl)		920.96	920.963
Static Lift (m)		9.8	9.8
Hazen Williams Coefficient, Cwh (C)		140	140
Pipe Details		**OD 160 DI PN10**	**OD 160 DI PN10**
Pipe Diameter ND (mm)		150.00	150.00
Pipe Diameter ND (m)		0.150	0.150
Velocity (m/s)		0.770	1.205
Flow in Pipe (m^3/s)		0.0136	0.0213
Length of Pipe (m)		**375**	**375**
Friction Loss (m)		1.5	3.5
Fittings losses - 10% (m)		0.15	0.35
Total Friction Loss (m)		1.5	3.5
Total Head in Raw Water Main (m)		**11.5**	**13.7**

The capacity of the treatment works is 1227 m^3/day inclusive of 5% plant use and is sized for the maximum day. The plant will operate for 16 hours per day in the ultimate year of 2040. The sizing of the treatment units is given in Table 2-2.

Table 2-2: Treatment component sizes

	Treatment Component			
Sizing Details	**Flocculation Tank**	**Sedimentation Tank**	**Rapid filter**	**Cl2 contact Tank**
L*W*H (m)	3.0*1.5*5.2	3.1*3.1*1.5	2.0*4.0*1.1	81 & 112 m^3
Specs:	2 No., vertical	2 No., vertical	2 No.	2 No.
	Flow	Flow		chambers
	Detention time:	Surface loading	Filtration	Detention
	0.3 hours	rate: 20 m/d	rate: 7 m/hr	time:
				0.5 hours

Source: Feasibility Study Report

2.1.3 Detailed Design of the Treated Water Transmission

Water from the WTP to the Storage Reservoir proposed site at the Town Council headquarters will be transmitted through pumping. The water will then be distributed by gravity to the project area Parishes of Central, Kayago, Wabinua and Aweipeko. There will be one duty pump and one standby pump. The backwash tank will be served by a tee off at the treated water main. The sizing of the transmission main and the pumps is shown in Table 2-3 below. Water will be transmitted to the users/beneficiaries using the road reserves of the exiting public and community roads.

Table 2-3: Transmission characterisctics from WTP to the proposed tank options

Parameter	**Value for T1 from Biko WTP to tank in 2028 (initially)**	**Value for T2 from Biko WTP to tank in 2040 (later)**
Namasale Demand (m^3/day)	746	1,168
Total Amount of Water Pumped (m^3/day)	746	1168
Hours of Pumping (hr)	16	16
Required Delivery (m^3/hr)	52.2	73.0
Required Delivery (m^3/s)	0.0145	0.0203
water Level in Sump (m amsl)	920.96	920.96
Inlet Level at Reservoir (m amsl)	936.64	936.64
Static Lift (m)	18.7	18.7
Hazen Williams Coefficient, Cwh (C)	150	150
Pipe Details	OD 160 uPVC PN10	DN 160 uPVC PN10

Parameter	Value for T1 from Biko WTP to tank in 2028 (initially)	Value for T2 from Biko WTP to tank in 2040 (later)
Pipe Diameter ND (mm)	144.6	144.6
Pipe Diameter ND (m)	0.145	0.145
Velocity (m/s)	0.789	1.235
Flow in Pipe,Q (m^3/s)	0.0130	0.0203
Length of Pipe (m)	2500	2500
Friction Loss (m)	9.8	22.5
Fittings losses - 10% (m)	0.98	2.25
Total Friction Loss (m)	10.8	24.7
Total Head in Raw Water Main (m)	30.4	43.4
Total Head in Raw Water Main (m/km)	4.3	9.9
Power (kVA) for pumps	10.3	22.8

Source: Feasibility Study Report

2.1.4 Determination of the Pumping Hours

The pumping Hours were determined over the horizon as presented in Table 2-4 below. These pumps will be changed in 2028.

Table 2-4 : Pumping hours

		First set of pumps			Second set of pumps		
Year	**2016**	**2021**	**2026**	**2028**	**2028**	**2036**	**2040**
Clear water pumps							
MDD (m^3/d)	477	575	693	746	746	1006	1168
MDD (m^3/hr)	20	24	29	35	35	42	49
Total Amount of Water Pumped (m^3/day)	746	746	746	746	1,168	1,168	1,168
No. of pumping hours	9	11	13	16	11	14	16
Raw Water Pumps							
Flow rate (m^3/day)	877	877	877	877	1,227	1,227	1,227
No. of pumping hours	9	10	13	15	11	13	15

Source: Feasibility Study Report

2.1.5 Energy Provision

The pump power requirement and associated power supply options is summarized in Table 2-5 below.

Table 2-5 : Pumps and Power requirements and associated power supply options

Location	Head (m)	Flow m^3/hr	Power (kW)	Required Motor size KW	Available Motor (KVA)	Total power (KVA)	Amperage (A)	Starting KVA	HEP POWER SUPPLY OTIONS	
									UETCL Power Extension (Km), Transformer	Generator (KVA)
Raw Water Pumps	21	76.67	9.14	10.5	11	13.75	19.13	34.38	0.12,20.0kVA	20
Clear Water Pumps	45	73.02	36	41.1	42	52.5	73.04	131	1.5, 75kVA	150

Source: Feasibility Study Report

This power requirement includes the supply and installation of 1No. 100 KVA, 11,000 Volts / 433 Volts, 50Hz, 3 phase pole mounted transformer and the extension of the 33 KV overhead power line with 3-line conductors, of estimated total length 1.5 Km, to the Treatment plant. Standby power will be provided by one Diesel driven generator (200 KVA), installed at treatment plant.

2.1.6 Storage

On the basis of a 24-hour demand and considering 30% of this as storage capacity, the size of the storage tanks is estimated at 350 m^3. The tank material that is recommended is steel panels. It will be raised on a 10 m tower to increase the pressure head for the distribution network. It is recommended to erect a pressed steel tank with square 1.22 m panels measuring 8.54 m long, 8.54 m wide, and 4.88 m, giving storage capacity of 356 m^3. The reservoir storage capacity at various stages of the design period is reflected in Table 2-6 below.

Table 2-6 : Namasale Town Reservoir Storage Capacity

Item	2017	2023	2028	2033	2038	2043
MD Demand- m^3/day	458.2	572.0	688.2	828.1	996.7	1203.5
Storage Capacity (m^3)	361	361	361	361	361	361
Hours of Storage	18.9	15.1	12.6	10.5	8.7	7.2
Storage Capacity (%)	79%	63%	52%	44%	36%	30%

Source: *Project Estimates from the feasibility studies*

2.1.7 Distribution System

The distribution network is designed for the peak hour demand using the following peak factors:

- Peak day factor: 1.2
- Peak hour factor: 2.0
- Max/min pressure: 60 m/5 m

The distribution system has been sized using the EPANET software. The network was designed for those areas with defined access roads but the possibility of extending it was catered for since the town is expected to expand from the core into the fringe areas. Consequently, the smallest pipe size is DN 50 PN 6. The ultimate sizes are shown in the Table 2-7 below.

Table 2-7 : Distribution pipe sizes

Pipe Description	Length	Quantity
uPVC 225, PN 6	m	1026
uPVC 160, PN 6	m	466
uPVC 110, PN 6	m	1009
HDPE 90 PN 6	m	1393
HDPE 75 PN 6	m	1419
HDPE 63 PN 6	m	3603
HDPE 50 PN 6	m	5656
Total		**14,572**

2.1.8 Service Connections

The number of connections for the project is estimated at 1143 by 2040. Tables 2-8 shows the estimated number of service connections per parish.

Table 2-8 : Required service connections for Namasale by 2040

Parishes	Yard Tap		Stand Pipe	No Supply	Total
Central	119	215	24	4	**362**
Kayago	124	225	23	4	**376**
Wabinua	73	132	20	3	**228**
Aweipeko	58	106	11	2	**177**
Total	374	**678**	**78**	**13**	**1,143**

The criteria used to determine the number of service connections for each served population category is as follows.

Table 2-9: Population per category criteria

Category	Population Served	Source of Criteria
House Connection	4 persons per household	Socio-Economic Study Data
Yard Taps	2 Households per yard tap	Project Estimates
Standpipes	125 persons Per Standpipe	Standpipe coverage from project estimates
Occasional user	125 persons per Standpipe	Standpipe coverage from project estimates

2.1.9 The transmission corridor

The water transmission line will comprise a corridor of 4 meters and the pipe will be buried 1.5 meters below the ground. Therefore, the way leaves will be 2 meters on either side from the centerline of the pipe.

2.1.10 O&M Tools and Equipment

Equipment and tools that will be supplied for the running of the Water Treatment Plant (WTP) as well as equipping the water office are summarised below. Details under each category of tools & equipment is presented in the feasibility study report which is a separate document prepared by another consultant. The tools will include;

- WTP office equipment
- Town water office equipment
- Workshop Equipment
- Laboratory Equipment
- M&E tools
- Chemical equipment and Chemicals

2.2 Sanitation

2.2.1 Design overview-Sanitation

The design has considered the physical, institutional, environmental, socio-economic, cultural and financial factors to come up with the technology options. As a general rule:

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

2.2.2 Public Toilets

The feasibility study proposed construction of one (1 No.) water borne toilet type (6 stance, i.e. 2 stance for female inclusive of one for disabled use, and 2 stance for gents inclusive of one for handicapped

and 2 urinal sets) with 2 shower rooms and Hand Washing facilities is proposed at one of the market areas at a location to be agreed by the Town Authorities. This is because there is virtually no public toilet in Namasale to serve the market area and the community. The feasibility study analysed different options and the waterborne toilet was found to be most appropriate as they are better used when water is available on or close to the plot while pit latrines are the best conventional sanitation option when there is no source of water but it has issues of polluting soil and ground water. An EcoSan toilet is not suited for public use because of the need to sustain communication on use and monitoring. People are less likely to adopt the approach when they already have a latrine or a pour / flush toilet. This probably explains why the EcoSan latrine that was constructed at the market facility was abandoned because the communication system to inform users on usage and monitoring was not efficient.

2.2.3 Institutional Sanitation Facility/Set

The institutional sanitation set shall be installed at one of the public institutions and shall consist of a toilet facility with hand washing. In this regard, the Institution to benefit from the intervention has been decided upon by the Town Authorities together with an assessment from the Social economic Department from WSDF-N as Namasale P.S. The proposed options are;

- Toilet type – lined VIP latrine type
- Hand washing facilities at the toilets

The recommended toilet facility is a lined VIP latrine type. The toilet block shall have 6 - stance each for the females and the males, inclusive of 2 stance for the physically handicapped, a shower room and urinal drain.

2.3 Labour Force

For the proposed Namasale water and sanitation project, the number of staff required during construction could include; project managers, supervisors, and other technical categories and unskilled workers who shall be recruited locally. Semi-skilled and unskilled workers will be trained by supervisors prior to the commencement of construction. Local people will be recruited mainly as unskilled labourers from the villages traversed by the water transmission and distribution-line, where possible. On average, an estimated 50-100 people are anticipated to constitute the workforce on the project. While in many cases the workers will arrive at the site on foot, some pool transport can be provided as necessary to bring workers to the project sites. Expatriate staff will be housed in existing accommodation preferably, modest private houses which can be rented by the expatriates within the nearby towns or trading centres in the project areas of Amolatar town, Namasale Town Council and any other nearby place. The entire recruitment process for the workers will be managed by the contractors in accordance with Uganda labour laws.

2.4 Other Auxiliary Facilities

2.4.1 Workers accomodation

Since the majority of the workers will be casual labourers and who will be recruited from Namasale Town and hence commuting from home, the project will not require construction of of workers camps. However, few technical workers (5-10 people) will be housed in rented houses in Namasale town. However, should the contractor prefer to construct a workers's camps, s/he shall acquire land in accordance with the national laws and secure all the permits including ESIA certificate. a No-Objection from the client before establishment of the camp shall also be secured by the Contractor. A Bank No-Objection for the site location and management plan shall also be secured by the client.

In addition, the contractor shall consider the following factors while selecting a site for the camp

(i) The land use of the area: The Contractor should select a site that is not in a built-up area, off the fragile eco-systems, off the protected areas, off the social gathering points like churches, schools, market etc; and the site must not be on land that is under cultivation

(ii) Access: The site should be easily accessed so that it negates the need to construct access roads.

(iii) The safety and security of the personnel and materials

(iv) Topography: The site should be on a gentle hilly or relatively flat area. The site should never be in a valley which might interfere with run-off flow.

(v) The site must be in proximity of the project area.

2.4.2 Equipment and Materials storage yard

The project will require a storage yard for both materials and the equipment. The yard shall be put in a place that is secure with burren land and preferably near the houses where the workers will be staying. The selection of the area for the site will be done in close collaboration with the local leadership.

2.4.3 Office and storage building

A building to house offices, general stores, chemical (Coagulants/floculants -Aluminium Sulphate and disinfectants -Chlorine) stores, chemical mixing and dosing tanks as well as a water quality analysis laboratory will be constructed.

2.5 Other works and project details

Other works and project details such as water treatment technologies, reservoir structures, details of the water distribution system and others are presented in the feasibility study report which is a separate document prepared by another consultant.

3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Introduction

This Chapter provides analysis of the policy, legal and institutional framework within which the proposed Namasale water and sanitation project is expected to operate. This Chapter covers relevant Ugandan and Development Partner policies, legislations and guidelines. Key Ugandan legislations governing the conduct of Environmental Impact Assessment (EIA) are the National Environmental Act No.5 of 2019 and the Environmental Impact Assessment Regulations (2020). The National Environmental Act established the National Environment Management Authority (NEMA), and entrusts it with responsibility to ensure compliance with the EIA process in planning and execution of development projects.

3.1 Overview of the national policies and laws on environmental and social impact assessment

Several environmental and social policies and laws will apply to the proposed Namasale WSSP. A list below provides applicable policies, laws and guidelines include: -

3.1.1 Policies

a) The National Environment Management Policy, 1994
b) The Uganda's Vision 2040
c) The Land Policy
d) National Gender Policy, 1997
e) HIV/AIDS Policy, 1992
f) Wetlands Policy
g) National Development Plan II
h) National Water Policy, 1999
i) The National Children Policy
j) The National Climate Change Policy
k) National Health Policy, 1999
l) The National Policy for the Conservation and Management of Wetlands Resources, 1995
m) Occupational Health and Safety (OHS) Policy

3.1.2 Guidelines

EIA Guidelines, 1997

a) Environmental Impact Assessment Guidelines for water resources related projects, 2011
b) The Environmental Audit Guidelines for Uganda, 1999
c) The Guidelines for Occupational Safety and Health, Including HIV in the Health Services Sector 2008

3.1.3 Laws

a) The 1995 Constitution of Uganda (as amended)
b) The National Environment Act No. 5 of 2019 as amended
c) The Water Act, Cap 152
d) The Land Act, Cap 227
e) The Land Acquisition Act, Cap 226
f) The National Forestry and Tree Planting Act, 2003
g) The Uganda Wildlife Act Cap 200
h) The Public Health Act Cap 281
i) The Occupational Safety and Health Act No. 9, 2006
j) The Physical Planning Act, 2010
k) The Local Governments Act, Cap 243
l) The Employment Act, 2006
m) The Workers' Compensation Act 2000
n) The Children Act Cap 59
o) The Prevention of Trafficking in Persons Act, 2009
p) The Penal Code Act Cap 120
q) Historical Monuments Act, 1967
r) The Mining Act, Cap. 148 2003

3.1.4 Regulations

a) The Water Resources Regulations, 1998
b) Water (Waste Discharge) Regulations, 1998
c) The Water Supply Regulations, 1999
d) The Sewerage Regulations, 1999
e) The Environment Impact Assessment Regulations, 2020
f) The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000
g) Environment (Waste Management) Regulations, 2020
h) The National Environment (Delegation of Waste Water Discharge Functions) Instrument, 1999
i) The National Environment (Standards for Discharge of Effluents into Water or on Land) Regulations, 1999
j) The National Environment (Noise Standards and Control) Control of Noise Regulations, 2003
k) The Employment (Employment of Children) Regulations of 2012
l) Draft National Air Quality Standards, 2006
m) National Environment (Audit) Regulations, 2020
n) Uganda National Roads Authority (General) Regulations, 2017

3.2 Key provisions of the environmental policies and laws

The water source of the Namasale WSS project is Lake Kyoga. The Water intake and Water Treatment Plant will be located in Kayago landing site Village, Namasale Town Council. As a result of the project the water quality of the lake at the intake point may deteriorate. Since the implementation of the project may affect the Lake and the surrounding environment, the following laws will apply and guide project construction and operation phases.

3.2.1 Policies

Uganda policies	Key provisions and Relevancy
The National Environmental Management Policy, 1994	The framework points out cross-sectoral guiding principles and strategies to achieve sustainable socio-economic development. The policy sets a guiding principle that Environmental Impact Assessment should be required for any activities, which cause significant impact on the environment. The National Environment Management Policy 1994 supports and promotes the proposed water and sanitation project under key principle 1 which provides for a clean, safe and productive environment.
Wetlands Management Policy, 1995	The national policy on conservation and management of wetlands aims at curtailing loss of these resources and ensuring that their benefits are equitably distributed to all people of Uganda. The wetlands policy calls for: Sustainable use to ensure that benefits of wetlands are maintained for the foreseeable future; Environmentally sound management of wetlands to ensure that other aspects of the environment are not adversely affected; Equitable distribution of wetland benefits; Application of environmental impact assessment procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed.
Land Policy 2012	The Policy has two major objectives: (1) to re-orient the land sector in national development by articulating management co-ordination between the land sector and other productive sectors in the

Uganda policies	Key provisions and Relevancy
	economy; and (2) enhancing the contribution of the land sector to the social and economic development of the country.
National Climate Change Policy, 2012	The goal of the policy is to ensure a harmonized and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda. The overarching objective of the policy is to ensure that all stakeholders address climate change impacts and their causes through appropriate measures, while promoting sustainable development and a green economy
National water policy 1999	The goal of this policy is to provide guidance on development and management of the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs, with full participation of all stakeholders and mindful of the needs of future generations
National Development Plan II	NDP II is the second in a series of five-year plans tailored to achieving Uganda Vision 2040, whose goal is to transform Uganda into an upper middle-income country. NDP II was launched by the President of Uganda in June 2015. NDP II is anchored on five priority areas - agriculture, tourism, infrastructure, mineral, oil and gas and human capital development. Under section 11.3 (water for production), NDPII provides for increasing the provision of waterfor production facilities; and increasing the functionality and utilization of water for production facilities. Therefore, the proposed project is line with the five major priority areas of the NDPII.
National Health Policy, 2010	The policy aims at promoting people's health to enhance socio-economic Development. The national policy on health is guided by; primary health care, decentralization, evidence-based and forward-looking strategy, Gender-sensitive and responsive health care, Pro-poor and sustainability and Partnerships.
Uganda Forestry Policy, 2001	The policy aims at maintaining a sufficiently forested, ecologically stable and economically prosperous Uganda. Maintaining forest cover will help to conserve biodiversity and provide vital ecological services, such as soil and water protection. The

	government is fostering a common interest in all its developments and a sense of inclusion across all groups and localities by addressing the ways that forestry can benefit people throughout Uganda,
HIV/AIDS Policy, 1992	The goal of the national HIV policy is to provide a framework for prevention of further spread of HIV and mitigation of the socio-economic impact of HIV/AIDS within the world of work in Uganda. It sets out 6 guiding principles that are aimed at achieving this goal and these are; non-discrimination, confidentiality, HIV testing, involvement of people living with the disease, Promotion of Prevention, Treatment, Care and Support and the gender concerns in the world of work

3.2.2 Laws and guidelines

Law/Regulation/Guideline	**Key provisions and Relevancy**
The Constitution of the Republic of Uganda, 1995.	The implementation of the project will take into consideration of the Constitution that provides for, *interalia*, matters pertaining to land, natural resources (such as swamps, rivers and lakes) and clean environment. Principle XXVII of the Constitution declares that: a) Utilization of natural resources shall be managed in such a way as to meet the development and environmental needs of the present and future generations of Uganda, particularly taking all measures to prevent or minimize damage and destruction to land, air, and water resources resulting from pollution or any other kind of natural resource degradation. b) The state shall promote sustainable development and public awareness of the need to manage natural resources and to ensure that the utilization of the natural resources of Uganda shall be managed in such a way as to meet the needs of Present and future generations.
The Land Act Cap 227	The Act requires a person who owns or occupies land to manage and utilize the land in accordance with the environmental laws and

Law/Regulation/Guideline	Key provisions and Relevancy
	other laws listed in Section 43 including the Water Act and National Environment Act.
The National Environment Act No. 5 of 2019 as amended	This act provides for the management of the environment for sustainable development, provides for emerging environmental issues including climate change, management of hazardous chemicals and biodiversity, and provides for strategic environmental assessment to address environmental concerns for any developments of such magnitude. Schedule 5, part 4 of the National Environment Act lists projects for Utilization of water resources and water supply under those for which environmental and social impact assessments are mandatory
The Environment Impact Assessment Regulations, 1998	Regulation 2 (2) provides that no developer shall implement a project for which environmental impact assessment is required under the Act and under these Regulations unless the environmental impact assessment has been concluded in accordance with these Regulations. The project Developer will apply for the license from NEMA so as to comply with standards provided under the Regulations.
The EIA guidelines of 1997	The guidelines establish three major phases through which the EIA should be conducted namely; the Screening phase, the environmental impact study phase and thirdly, the decision-making phase.
The Environmental Impact Assessment Guidelines for water resources related projects, 2011	The guidelines under Section 3.4.1 requires that in order to avoid excessive abstraction or pollution of the available ground water resources, an assessment be carried out for All those water use projects that are likely to impact on such groundwater resources in rural and small towns'water supply projects. ESIA for this project has been conducted based on the above provisions of the Act, the EIA regulations and the guidelines

Law/Regulation/Guideline	Key provisions and Relevancy
	followed. NEMA will issue an amended EIA certificate for the Namasale WSSP after reviewing and approving the updated ESIA.
The Physical Planning Act, 2010	The Act regulates the approval of physical development plans and applications for development permission. Section 37 requires an applicant of a development permit to acquire environmental impact assessment certificate in accordance with the National Environment Act before he or she can be granted full approval to develop. Therefore, the development of the Namasale WSSP is subject to the control of Physical Planning Authority of the respective Municipal Councils as mandated under S.12 of the Act.
The Water (Waste Discharge) Regulations (1998)	Regulation 4 (1) require a person who wishes to discharge effluent or waste on land or into aquatic environment to apply for a waste discharge permit.
The Waste Management Regulations of 1999	The Regulations require waste disposal in a way that would not contaminate water, soil, and air or impact public health. Regulation 5 requires a person who owns or controls a facility or premises, which generate waste to minimize the waste generated by adopting the cleaner production methods. These provisions apply to the proposed Namasale Towns Water Supply and Sanitation Project in respect of the construction process, domestic waste and construction waste. The contractor and other institutions responsible for the generation of this waste shall comply with provisions of this regulatory standard.
The Local Government Act Cap 243	Under Part 4 of the second schedule of the Act, the local government is mandated to ensure the protection of Wetlands, the protection and maintenance of local water resources inter alia. The Amolatar Natural Resources/Environmental Officers shall in this respect monitor the project implementation to ensure that the project meets the environmental standards.
The Wildlife Act Cap 2000	The Act provides for sustainable management of wildlife.

Law/Regulation/Guideline	Key provisions and Relevancy
	S.15 of the Act states that any Developer desiring to undertake any project, which may have a significant effect on any wildlife species, or community, shall undertake an environmental impact assessment in accordance with the National Environmental Act. This ESIA is carried out in line with this provision. Uganda Wildlife Authority (UWA) is the institutional body whose principal function is to ensure sustainable management of wildlife resources in Uganda. It shall monitor the implementation of conservational measures of the wildlife by the water project in Amolatar. Considering that much of the water pipe will go through remote section of the countryside involving clearing of vegetation, and excavation of land to create holes etc, this Act is quite relevant, and relevant provisions should be complied with.
The Public Health Act Cap 281	Regulation 6 established permissible noise levels for a facility. Regulation 12 requires that any owner or occupier of premises whose works or activities are likely to emit noise in excess of the permissible noise levels shall apply to the Executive Director of NEMA for a license to emit noise in excess of the permissible levels.
Historical Monuments Act, cap 46 1968	This act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical and traditional interest and for other matters connected therewith.
National Environment (Audit) Regulations, 2006	These regulations apply to: • A developer of a project listed in Schedule 5 and 10 of the NEA 5 of 2019 • The enforcement of the schedhule 126 of part XII of the National Environment Act 5 of 2019 making a requirement for Environmental Audits to any project that has or may have adverse impacts on human health or the environment;

Law/Regulation/Guideline	Key provisions and Relevancy
	• Environmental Audit requirements by the National Environment (Environmental Impact Assessment) Regulations in section 31 where annual environmental audits of projects are mandatory; • Voluntary Environmental Audits; and An environmental Audit shall be carried out by persons certified and registered in accordance with the National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003.

3.3 Key provisions of Social Policies Laws and Guidelines

The construction will require both unskilled and skilled labour. The project will be implemented within settlements. This requires good social, Health and Safety safeguards systems to be put in place. Such Health and Safety issues of workers and the general public will trigger the following policies, laws and guidelines.

3.3.1 Policies

No.	Name	Purpose
1.	Vision 2040	Uganda's Vision is to have "A transformed Ugandan society from a peasant to a modern and prosperous Country within 30 years", from 2010. This involves changing from a predominantly low income to a competitive upper middle-income country within 30 years. It is envisaged that the country will graduate to the middle-income segment by 2017 and reach a per capita of USD 9,500 by 2040. For the country to achieve its Vision 2040, it is necessary to increase access to appropriate and adequate sanitation as well clean and safe water.
2.	National Cultural Policy, 2006	The policy is put in place to protect Ugandan heritage and culture, as well as recognise specific heritage sites of national and global importance. This policy protects and conserves cultural heritage in Uganda, both tangible and intangible heritage.
3.	National Land Use Policy, 2006	This policy aims to achieve coordination, sustainability and optimal land utilisation for socio-economic development.

No.	Name	Purpose
4.	National Employment Policy 2011,	The policy will stimulate Government objectives and processes for generating jobs and ensuring a better employment environment for all workers. The Employment Policy also makes mention of vulnerable groups and recognises the importance of and need for special considerations towards enhancing their employability. These groups include persons with disability and this aspect is important because of the number of young people who are disabled and continue to face numerous challenges when it comes to accessing employment opportunities.
5.	National Gender Policy, 1997	This primary policy is in the current debates at a national level, and aims to guide and direct the planning, resource allocation and implementation of development programmes with a gender perspective in all sectors of the economy.
6.	National HIV/AIDS Policy, 2004	This essential health policy aims to provide a framework for a multi-sectoral response to HIV/AIDS in Ugandan's world of work and applies to all current and prospective employees and workers in the public and private sectors.
7.	Occupational Health and Safety (OHS) Policy	This policy seeks to: • Provide and maintain a healthy working environment; • Institutionalize OHS in the power-sector policies, programs and plans; • Contribute towards safeguarding the physical environment; and • The OHS Policy Statement is guided by the Constitution of the Republic of Uganda and other global, national and sectoral regulations and policies. The OHS Policy also takes into recognition the Water Policy and the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.
8.	Uganda Resettlement/Land Acquisition Policy Framework (2002)	Regarding compensation and resettlement issues, the leading legislation is the Constitution of Republic of Uganda and the Land Act, both of which require that:

No.	Name	Purpose
		• Compensation should be aimed at minimising social disruption and assist those who have lost assets as a result of the project, in order to maintain their livelihoods; and • Community infrastructure must be replaced and ideally be improved in situations where it was deficient.

3.3.2 Laws

Law/Regulation	Key provisions and Relevancy
The Employment Act No 6, 2006	The Act makes provisions for governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, Management and compensation of workers. It mandates Labour Officers to regularly inspect the working conditions of workers to ascertain that the rights of workers and Basic provisions are provided and workers' welfare is attended to. Further, it has provisions prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV), Providing for labour inspection by the relevant Ministry (Part III) and stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI). The Developer shall be required to treat workers with fairness and Without discrimination and in addition, Amolatar District Labour officers shall regularly monitor the Contractor's compliance.
The Occupational Safety and Health Act, 2006	The Occupational Safety and Health Act, 2006 provides for, general duties, obligations and responsibilities of employers, rights and responsibilities of workers and general safety requirements. Section 13 (1) a stipulates that it's the responsibility of the employer to take, as far as is reasonably practical all measures for the protection of his or her workers and the general public from the dangerous aspects of the employer's undertaking at his or her own cost. The employer should ensure, as far as is reasonably practical, that the working environment is kept free from any hazard due to pollution. Section 19 requires an employer to provide adequate and suitable protective clothing and protective equipment to the workers of his or her undertaking. The Namasale WSSP should adhere to occupational safety and health rules

Law/Regulation	Key provisions and Relevancy
	according to the mitigation measures suggested in this report such as workers be trained in health safety, given the PPEs and given access to a first aid kit.

The project area has a number of both out of school and school going children. The project may have risk of using child labour at construction sites and therefore the underlying provisions have to be complied with. The following laws relating to protection from child labour will be applicable.

Law/Regulation	Key provisions and Relevancy
The 1995 Constitution of Uganda (as amended)	Article 257 defines a child as any person below the age of 18 years. (*Also, Section 2 of the Children Act Cap 59 and the Prevention of Trafficking in Persons Act 2009*) Article 34 (4) of the Constitution provides that Children are entitled to be protected from social and economic exploitation and shall not be employed in or required to perform work that is likely to be hazardous or to interfere with their education, to be harmful to their health or physical, mental, spiritual, moral and or social development.
The Employment Act 2006	Section 32 prohibits employment of a child under the age of twelve years to be employed in any business, undertaking or work place. The Act permits a child of under the age of fourteen years to be employed on condition that work is light work and carried out under supervision of an adult aged over eighteen years and does not affect the child's education. It also requires that the child is not employed in any employment or work which is injurious to his or her health, dangerous or hazardous or otherwise unsuitable and that a child does not work between the hours of 7 p.m. and 7 a.m. The person who employs such a child has to notify a labour officer in writing that the employment or work complies with the above conditions.
The Employment of Children Regulations of 2012	The Regulations also emphasize that a child employed under the age of fourteen years shall not be employed in any business undertaking or workplace, except for light work carried out under the supervision of an adult and where the work does not exceed fourteen hours per week. They prohibit employment of a child to do work which is

Law/Regulation	Key provisions and Relevancy
	injurious, dangerous, and hazardous or in the worst forms of child labour. Overtime work is prohibited for a child aged between fifteen to seventeen years and a child shall not be employed at night between the hours of 7.00 p.m. and 7.00 a.m.The Ministry of Water and Environment will work with the Ministry of Gender, Labour and Social Development to ensure prohibition of child labour by the contractors of the project.

Women and child sexual abuse by contractors' workers is a risk that needs to be managed especially at construction sites. Protection ought to be given to Children and women against sexual abuse and therefore the laws below will be applicable.

Law/Regulation	Key provisions and Relevancy
The Penal Code Act Cap 120	Section 129 stipulates that any person who has sexual intercourse with a girl under the age of 18 is guilty of an offence and is liable to suffer death and also stipulates that any person who unlawfully and indecently assaults a boy under the age of 18 is guilty of felony. Section 131 prohibits procurement or attempting to procure a girl for the purpose of commercial sexual exploitation. *(Also, Regulation 5 of the Employment of Children Regulations 2012)* Section 123 makes it an offence to have sexual intercourse with a woman without her consent and Section 132 prohibits procuring defilement of women and girls by threats or intimidation or false pretences or false representations or administration of drug, matter or thing with intent to stupefy or overpower.
The Prevention of Trafficking in Persons Act 2009	Section 8 prohibits recruiting a person below 16 years in any form of employment for the purposes of exploitation or introducing or matching any person to another for purposes of sexual exploitation. In Implementation of the project, the Ministry of Water and Environment will work with the Ministry of Gender, Labour, and Social Development to make sure that the women and children are not sexually exploited by the contractors. Amolatar District Labour officers have a key role in monitoring compliance of the contractors.

3.4 Legal, Policy and Regulatory Framework for Resettlement in Uganda

The project involves construction of sanitation facilities and transmission lines that required acquisition of land. This implied that the Central Government and Local Government had the responsibility to acquire land for the construction of the different project facilities which means compensation of Project Affected Persons (PAPs) in line with OP 4.12 and GoU compensation requirements. The different types of land tenure and the acquisition processes, under Uganda laws are given below.

3.4.1 Customary Land

Most of the proposed land for the project in Namasale is held under customary tenure. Land ownership is vested in the lineage and is allocated by a father to his sons, who in turn assign it to their wives and children for cultivation. The situation indicates that the youth and the women only have a user-right to the land and not ownership, which disadvantages a vulnerable group. Therefore, there is need to involve the owners of land where the project is going to be implemented during the entre cycle of the project.

Law/Regulation	Key provisions and Relevancy
The 1995 Constitution	The Constitution restored recognition of the rights of those who held customary land (Article. 237 (3) (a) and (4)).
The Land Act Cap 227	Section 3 (1) of the Act explicitly recognized that customary law should regulate this form of land tenure. It states that customary land tenure shall be governed by rules generally accepted as binding by the particular community. Anyone who acquires land in that community shall also be bound by the same rules except where such rules are repugnant to natural justice, equity and good conscience. The required land therefore shall be acquired as per the customary rules in the respective areas with the involvement of Local Council 1 chairpersons to verify ownership and women and the youths' due their vulnerability.

3.4.2 Freehold Land

Law/Regulation	Key provisions and Relevancy
The 1995 Constitution of Uganda	Article 237 (3) (b) provides that land in Uganda belongs to the citizens of Uganda and shall vest in them in accordance with the land tenure systems provided for in there under including freehold tenure
The Land Act Cap 227	Section 2 provides for the different tenures of land including freehold.According to S.3 (2), the freehold tenure may involve either a grant of land in perpetuity, or for a lesser specified time period.The

	Act specifies that the holder freehold land has full power of ownership of it and as such, he may use it for any lawful purpose,dispose of it by will or transact it in any other way as he or she sees fit upon negotiation with the project developer.A search has to be done with the District Land Board to certify title to the required land for the Water intake and the WTP as under the Registration of Titles Act Cap 230 S.101.

3.4.3 Public land

The water transmission pipes will be laid mainly along the road reserve. Similarly, the water treatment plant will be located at Kayago landing site (lake shore). This is public land, which shall require public use by the water project. It requires the involvement into discussions by the MWE and the Ministry of Justice and constitutional affairs and Amolatar District Local Government. Where a government institution wants land that belongs to another government institution an application should be made to the Uganda Land Commission for change of use or shared use. For utilization of the lakeshore, a Wetland, Riverbank and Lakeshore User Permit shall be obtained from NEMA.

3.5 Key international environmental and social laws

3.5.1 International Protocols and Conventions

The relevant international protocol and conventions which Uganda is a signatory to are presented below;

No.	Name	Purpose
1.	African Convention on the Conservation of Nature, 1968	Encourages individual and joint action for the conservation, utilisation and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.
2.	United Nations Framework Convention on Climate Change (UNFCCC), 1992	The Convention requires parties to avoid adverse effects on the environment and adopt measures and policies to control carbon dioxide emissions in technologies, taking into account their common, yet differentiated responsibilities, as well as their specific national and regional development priorities, objectives and circumstances. They are required to take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for

No.	Name	Purpose
		example impact assessments, formulated and determined nationally, with a view to minimising adverse effects on the economy, on public health and on the quality of the environment of projects or measures undertaken by them to mitigate or adapt to climate change.
3.	United Nations Convention to Combat Desertification (UNCCD), 1994	Binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007 with a view to *forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability*.
4.	Montreal Protocol for the Protection of the Ozone Layer, 1987	The protocol was designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. All of the ozone depleting substances controlled by the Montreal Protocol contain either chlorine or bromine (substances containing only fluorine do not harm the ozone layer). The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities.
5.	Stockholm Convention on Persistent Organic Pollutants, 2001	Protects human health and environment from Persistent Organic Pollutants that remain intact in the environment for long periods and can become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife, which can lead to serious health effects.
6.	Strategic Approach to International Chemicals Management, 2006	Fosters sound management of chemicals and to ensure that by the year 2020, chemicals are produced and used in ways that minimise significant adverse impacts on the environment and human health.

No.	Name	Purpose
7.	International Labour Organisation Convention, 1998	Sets out basic principles and labour rights at work, based on international best practise.

3.5.2 World Bank Operational Policies

The Operational Policies provide basis on which the World Bank screens proposed projects to determine the appropriate extent and type of Environmental Assessment to be undertaken. The Bank classifies proposed projects as Class A, B, C or F1 depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. The categorization of projects is based on an assessment of their likely environmental and social impacts. Below is a brief description of different categories:

a. **Category A Project:** which may have potentially significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented;
b. **Category B Project:** may have potentially limited adverse social or environmental impacts that are few in number, generally site specific, largely reversible, and readily addressed through mitigation measures;
c. **Category C Project**: likely to have minimal or no adverse social or environmental impacts, including certain financial intermediary projects with minimal or no adverse risks; and
d. **Category FI Project**: Assigned to business activities undertaken by Financial Intermediaries or through delivery mechanisms involving financial intermediation.

OP No.	World Bank Safeguards Operational Policies	Key provisions and Relevance
OP 4.01	**Environmental Assessment**	This is the umbrella policy for the World Bank's safeguard policies and requires an environmental impact assessment carried out before implementation of category A and B projects. In this respect, MWE's Namasale water and sanitation project falls under category B since its impact on the human populations and other important areas including wetlands, forests and other natural habitats is less adverse. The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they

OP No.	World Bank Safeguards Operational Policies	Key provisions and Relevance
		are environmentally sound and sustainable, and thus to improve decision-making. This ESIA has been prepared in accordance with the O.P. 4.01 operation manual of the World Bank to establish a detailed Environmental and Social Management Plan that will provide guidelines for the environmental and social stewardship of the construction and operational phases of the project.
OP 4.04	Natural Habitat	The Bank supports the protection, maintenance, and rehabilitation of natural habitats and their functions. The conservation of natural habitats is essential for long term sustainable development. Sections of the project infrastructure will traverse natural habitats such as wetlands, and grasslands. Impacts of the project on such habitats will be mitigated through measures outlined in this ESIA and in its ESMP.
OP 4.12	Involuntary Resettlement	This is the guiding policy when a project results in involuntary resettlement. OP 4.12 describes the detail and elements that a resettlement plan should include. These include objectives, potential impacts, socio economic studies, legal and institutional framework, eligibility, valuation and compensation of losses, resettlement measures, relocation planning, community participation, and grievance redress procedures, implementation schedule, costs and budgets, and monitoring and evaluation. This report conforms to the WB policy requirement on contents and structure.
OP 4.11	Physical Cultural Resources	This policy gives guidelines for the preservation of cultural property and seeks to avoid their elimination, otherwise mitigation activities be undertaken to limit the adverse impacts as far as possible.

OP No.	World Bank Safeguards Operational Policies	Key provisions and Relevance
		Whereas there are no serious cultural properties along the proposed water transmission and distribution corridors, chance finds could be encountered during construction especially while trenching channels for the water transmission pipes. Detailed in the EMP are measures to mitigate impacts on cultural properties. When RAP studies are carried out, any physical cultural resources in the water transmission corridor will be enumerated as structures and all affected PAPs will be compensated for such structures to ensure that they are relocated in accordance with cultural norms of the affected people and society
OP 4.36	**Forests**	The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services. Although no forest will be affected, the project will put in place measures that enhance the tree cover in the project area inline with the National forestry and tree planting guidelines.
	World Bank Policy on Access to Information (July 1, 2010)	There is need for disclosure of information to all the stakeholders. Compliance shall be ensured by disclosing the information to all the stakeholders such as district technocrats, Municipal and Local council leaders, and communities among others during the consultation process and the information is accessible.

3.5.3 The World Bank Group Environmental, Health and Safety Guidelines for water and sanitation project

The EHS Guidelines for water and sanitation project include information relevant information relevant to the operation and maintenance of (i) potable water treatment and distribution systems, and (ii) collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage

at centralized facilities. The document lists environmental issues, occupational health and safety concerns and community health and safety impacts which are associated with water and sanitation projects. All the issues presented in these guidelines were either taken care of at design stage or are discussed and mitigated as part of this report.

3.6 Permits and Licenses

The following Consents and Permits will be required for the Contractor to achieve legal compliance with Environment and Social requirements

Consent/Permit required	Issuing Agency	Applicable law
ESIA certificate	NEMA	National Environment Act 2019
RAP approval conditions for this project	CGV	The Land Act Cap 227
Wetland Permit to carry out a regulated activity in a wetland/River Bank /Lakeshore	NEMA	The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, No. 3/2000
Road Permit(s)	UNRA	Roads Act 2019, The Uganda National Roads Authority Act, 2006
Work Place Registration Certificate	MoGLSD	The Occupational Safety and Health Act, 2006
Traffic Diversions consent	Uganda Police	Traffic and Road Safety Act 1998
Water Abstraction Permit(s)	DWRM	The Water Act, Cap 152

3.7 Insttitutional framework

3.7.1 Ministry of Water and Environment

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

3.7.2 National Environment Management Authority

National Environment Management Authority (NEMA) was established under the National Environment Act No.5 of 2019 as the principal agency in Uganda charged with the responsibility of

coordinating, monitoring, regulating and supervising environmental management in Uganda. In this context, NEMA will be responsible for review and approval of this environmental impact assessment, ensuring proposed mitigation measures are implemented, monitoring compliance with approval conditions, and ensuring any other impacts that may arise are mitigated.

3.7.3 National Forestry Authority

The National Forestry Authority (NFA) is a Government statutory entity responsible for the management of Central Forest Reserves (CFRs) on a sustainable basis, as well as, to supply high quality forestry-related products and services in Uganda. NFA will be interested in ensuring tree clearance is minimised in case the project traverses a forest reserve. NFA has a number of regional NFA offices that have Forest Rangers to inspect and report any impacts on the forests.

3.7.4 Uganda Wildlife Authority

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

3.7.5 Wetlands Management Department

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

3.7.6 Directorate of Water Resources Management

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

3.7.7 Ministry of Lands, Housing and Urban Development

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

3.7.8 Uganda National Roads Authority

The mandate of UNRA is to develop and maintain the national roads network, advise Government on general roads policy and contribute to addressing of transport concerns, among others. Some of UNRA responsibilities include: management of the National Roads Network; maintenance and development of the national roads network; and establishing and maintaining road reserves among others. UNRA is a

key stakeholder under the project because the distribution lines components largely run along the road reserves.

3.7.9 Ministry of Local Government

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

3.7.10 The Ministry of Finance, Planning and Economic Development

The mandate of the Ministry is to:

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

3.7.11 Ministry of Gender, Labour and Social Development

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

3.7.12 The Equal Opportunities Commission (EOC)

The Equal Opportunities Commission (EOC), was established by the Equal Opportunities Act 2007. The Commission is mandated to provide a framework for redressing imbalances, which exist among the marginalized groups while promoting equality and fairness to all. The Commission was established pursuant to article 32 (3 – 4) of the Constitution and is a body corporate with perpetual succession and a common seal and may sue or be sued in its corporate name and, may do, enjoy or suffer anything that

bodies corporate lawfully do, enjoy or suffer. The Commission gives effect to the State's constitutional mandate to eliminate discrimination and inequalities against any individual or group of persons on the ground of sex, age, race, colour, ethnic origin, tribe, birth, creed or religion, health status, social or economic standing, political opinion or disability, and take affirmative action in favour of groups marginalized on the basis of gender, age, disability or any other reason created by history, tradition or custom for the purpose of redressing imbalances which exist against them; and to provide for other related matters.

3.7.13 The Amolatar District Local Governements/Namasale Town Council

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

3.7.14 Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

Ministry of Agriculture, Animal Industry and Fisheries is mandated to formulate, and review national policies, plans, legislation, standards and programmes relating to fisheries and agricultural sector as well as control and manage crop and animal epidemic diseases affecting production. The project may have an impact on fisheries activities and therefore Ministry of Agricultire, Animal Industry and Fisheries is a key stakeholder of the project.

4 ENVIRONMENTAL AND SOCIAL BASELINE

4.1 Social economic Baseline

4.1.1 Demographic Information

4.1.1.1 Population

According to the 2014 housing and population census Amolator district had a total population of 147,166 people with 73,741 males and 73,425 females. There was a total of 27,983 households with 1,957 being non-household population. The Population Density of the district was reported to be 147 persons/km^2. Namasale T.C. had a population of 55,359 people comprised of 26,168 males and 27,179 females. This is expected to increase to 69,351 people by 2022.

4.1.1.2 Average Household size

The District has a high household size of 5.2 which is higher than the national mean household size of 4.9. This implies a relatively large household size in the project area, which is associated with less wealth and high poverty levels according to the 2015 National Household survey reports (UBOS, 2015).

4.1.1.3 Age structure

Amolatar District generally has a young population with 55.7% of its population below 18 years. The school going age is 33% of the district population while the elderly constitutes 4.1%. The young population of the district has an implication on development because more resources are spent on delivering services to the largely non-productive population.

4.1.1.4 Migration

The project area is cosmopolitan in terms of its ethnicity due to the fishing activities in the two lakes of Kioga and Kwania. In addition, the migration patterns in the district were influenced by the insurgency in the Acholi and Lango sub regions that led to the area receiving a large number of internally displaced persons some of whom have since settled and integrated into the community.

4.1.2 Settlement patterns

The proposed project area is characterized by clustered settlements around major landing sites such as Namasale, Kayago, Lenko and Biko. Some settlements were also observed to be linear to the access/feeder roads that connect these main centers. Ease of accessibility to socio-economic infrastructure and economic activities have been the two main drivers behind the observed settlement.

Figure 4-1: Settlement patterns in the project area

4.1.3 Ethnicity and religion

According to the 2015-2020 Amolatar District Development Plan, people in the project area are mainly Langi representing 89%, Kumam at 6%, Itesots at 2%, while the remaining 3 percent represent other tribes. Religiously the people in the project area are predominantly Protestants (39.1%), Catholics (41%), Moslems (8.1%), Seventh Day Adventists (2.3%) and others (9.5%).

4.1.4 Economic Activities

According to the Namasale Town Council Development Plan (2015-2020), seventy percent of the population rely on subsistence farming and fishing, twenty five percent are engaged in businesses (wholesale and retail) dealing in general merchandise and household materials, three percent were civil servants while two percent included other activities such as brick making, sand quarrying, transportation using boda- boda (motor cycles and bicycles) taxis and buses, animal rearing (cattle, goats, piggery, poultry).

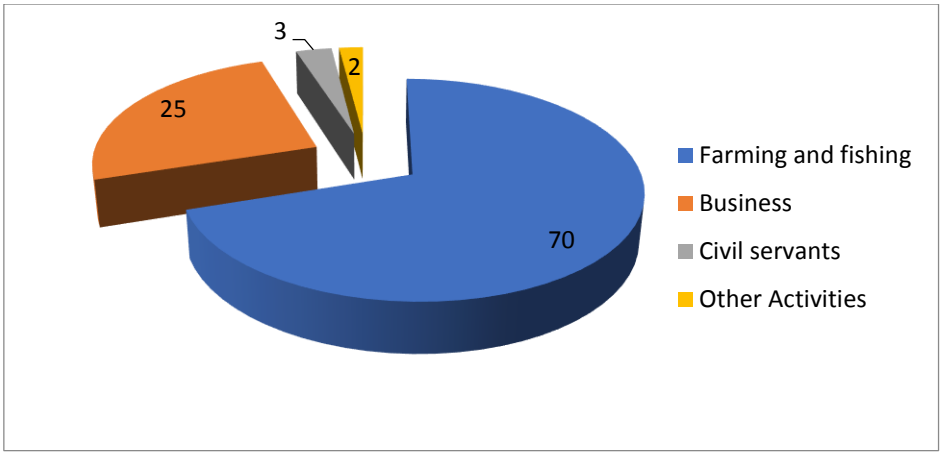

Figure 4-2: Main economic activities in Namasale

The people of Namasale are generally poor with over 70% of the population living below the poverty line, and earning an average household income of about UGX170,000=per annum (Namasale T.C Five Year Development Plan Report 2015 – 2020).

Figure 4-3: Sun drying fish at Kayago

Figure 4-4 : Biko Landing site

Figure 4-5 : Namasale weekly market

Figure 4-6: Don fuel station along the Namasale main road

The main types of crops produced as food crops include, Millet, Maize, Sorghum, and Cassava, pigeon peas, Beans, and vegetables. Cash crops mainly include; Cotton, legumes and non-traditional cash crops such as simsim, rice, sunflower, and soya beans.

Livestock ranks high on the list of assets and economic activities in the District and is the main financer of school fees, security of the family, welfare and source of protein. Ox ploughing is vital in crop production but with the cattle rustling this was considerably affected although the ongoing restocking has improved the situation. The cattle rustling which was done by the Karimajongs on the negighbouring communities made the people of Lango loose their cattle. Government stopped it and later put in place a cattle-restocking project that is intended to ensure that those who lost their cattled are componseted with similar cattle.

4.1.5 Water Sources for Namasale Town

The various sources of water in Namasale town include Boreholes which are used by eighty percent of the population; Ponds, swamps and Lake Kyoga which serve daily water needs of the population and a gravity flow scheme that currently serves Namasale Central.

Figure 4-7:Open water source at Biko

Figure 4-8: A water source in Namasale TC

Open water sources that are commonly used by Namasale residents are prone to contamination from open waste dumping, lack of pit latrines, sharing of the same sources of water with their animals and the use of such sources for washing and bathing areas.

4.1.6 Sanitation

The sanitary conditions of the town are in a deplorable state. According to Namasale Town Council Development Plant (2013-18), only seventy-five percent of the population has access to sanitation facilities while twenty-five percent use the bush/open ground and polythene bags as a way of disposing off their fecal matter. Public toilets are generally lacking in the town. They are visible in schools, government offices and facilities such as health centres. In households where the private sanitary facilities exist, their state leaves a lot to be desired and a good number of latrines are a health hazard. This kind of excreta management presents a high risk of contaminating both the underground water table/aquifers and surface water thus making some water sources unsafe for human consumption.

4.1.7 Transport

The town has a total of road network coverage of 25Kms, 5Km of which are under the control of National/Central Government roads and the remaining 20Kms are under the management of the town council. All roads within Namasale town are earth surfaced. The modes of transport that exist within Namasale town comprise of road and water transport. Road transport mode consists of bicycles, motorcycles, pedestrians and motor vehicles while water transport comprises of boats, canoes and the Ferry. Water transport in Namasale town is reliant on the ferry schedule which at times limits activities for lack of flexibility.

Figure 4-9 : State of the road network in Namasale

4.1.8 Health Institutions

There is only one public Health centre in Namasale town namely Biko Health Centre II along Namasale–Amolatar road. This Health Centre needs to be upgraded to Health Centre III status to match the required standards set by Ministry of Health for town council health facilities. The existing public health facility is supplemented by private clinics and drug shops.

Figure 4-10: Biko Health Centre II

According to Namasale Town Council physical development plan forty-five percent of the households obtain medical services from the government health facility, twenty percent access medical services from nearby drug shops while thirty-five percent access medical services from private clinics within town.

4.1.9 Educational Institutions

The educational institutions in the town include Nursery and Kindergarten schools, primary schools, secondary school and vocational training colleges. Primary schools found include Namasale Primary School, Namasale central primary school, Felisted Junior school, Risarah Integrated Primary school, Future care primary school and St. Matthew nursery and primary school. The secondary schools include Namasale Seed School, Clever land High School and one vocational school known as Namasale Technical College. The above schools include both government aided and privately founded schools. Most people are within 5km from a primary school which implies that primary schools are well distributed with in different wards and can be easily accessed by the general community. Access to secondary and tertiary institutions was lower indicating a gap in availability of such services in the area.

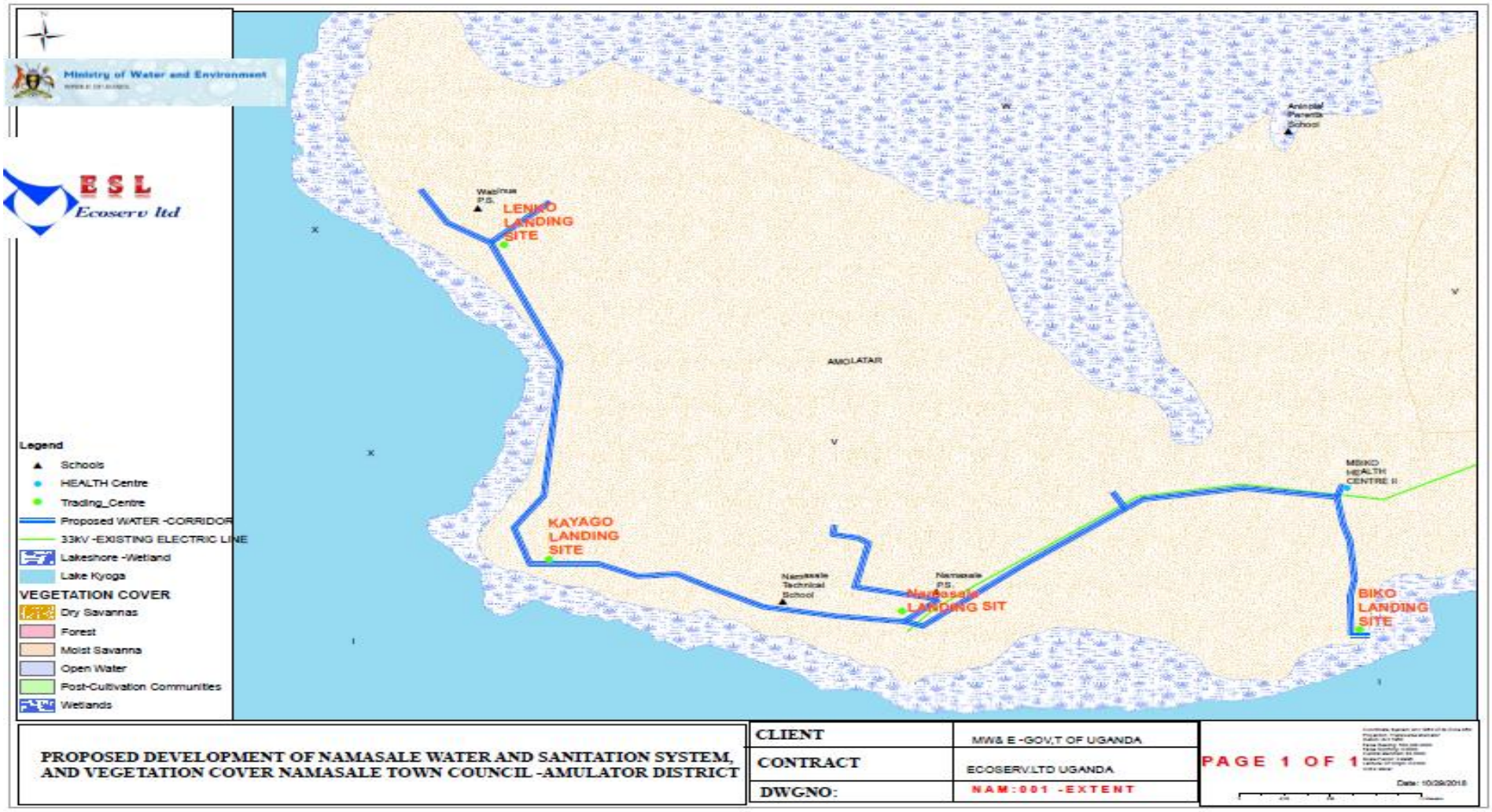

Figure 4-11: The Map showing educational institutions that will benefit from the project

Figure 4-12: Educational institutions along the transmission route that will benefit from the project

4.1.10 Power/ Electricity

The National grid (UEDCL) supplies power to Amolatar Town Council, Namasale Town Council, Agwingiri SC, Muntu SC and Aputi Sub-counties. In the project area only Namasale central ward in the T.C is connected to the National grid. All other centres such as Biko, Kayago and Lenko are not yet

connected although plans to extend power are in advanced stages as indicated during community consultations. About 92% of the households still use firewood for cooking and kerosene is the main source of energy for lighting in the project area.

Figure 4-13 : Power distribution lines in Namasale town

4.1.11 Physical Cultural Resources (PCR)

Worship centers, graves and communal burial grounds were the PCR recorded in the project area. Burial grounds are areas where family members remember their departed ones and it is one of the safeguarded identities in the cultural setting of a given ethnicity. These included both recognizable (cemented or non-cemented) and the non-recognizable for example those washed away. The project area being a fishing community attracts people from all walks of life some of whom without known relatives. In the event that such people depart there are designated places at most landing sites namely Biko and Kayago where they are laid to rest. All burial grounds along the proposed route for the proposed water transmission and distribution project will not be affected by the proposed project.


Figure 4-14: A Muslim burial ground in Kayago

4.1.12 Communication

In Namasale T.C all the mobile telecommunication networks in Uganda are available and can be accessed while in Namasale town. This has enhanced business development in the area since communication was made easy and affordable. Telecommunication network has also facilitated money transfer to finance business transactions through the various mobile money platforms they offer. There are eight local FM radio stations in the Lango sub region namely; Dokolo FM, Voice of Lango, Radio Rhino, Radio Lira, Radio North, Radio Unity and Radio Waa. They have greatly improved listening culture, mass mobilisation and entertainment as well as dissemination of policy and development programs that come at the cost. Television is accessed through subscription to Zuku, Go TV and DSTV. However, information flow by use of TV is minimal given that only a small proportion of the population owns a television. Majority of the Amolatar population read Rupiny, a Luo weekly. This is supplemented by the New Vision and Monitor newspapers, in addition to Red Pepper, whose readership circulations have of late tremendously increased even if it is accessed late in the evening or the following day. Communication is enhanced by high literacy levels and according to the The National Population and Housing Census 2014; the Literacy rate of Namasale is 72.2% (of the population aged 10 years and above).

4.1.13 Poverty

Based on the current district development plan, the poverty situation in the district is high as indicated by the following; only 0.9 percent of the households use electricity, 0.4% use gas, illiteracy is still high, 87 percent use wood fuel as source of energy, infant mortality rate of 199/1000 (high), high disease burden, especially malaria at 33 percent. Poverty is also evidenced by the magnitude of permanent shelters since only 1.2% of the dwelling units are constructed with permanent roof, wall and floor materials. Similar to the general district statistics the project area was observed to have mainly temporary structures which are one of the indicators for measuring poverty.

4.1.14 Housing

As per National Household survey of 2012/2013 Northern region had the highest % of owner-occupied dwellings (over 90%). According to Namasale Town Council Development Plan (2013-18) 1.2% of the dwelling units are constructed with permanent roof, wall and floor materials. Similar to the general district statistics the project area was observed to have mainly temporary structures which are one of the indicators for measuring poverty. Although it was observed that most of the dwelling units are made of temporary/grass roofs materials, a large percentage of homesteads are constructing permanent structures besides the grass thatched ones. Local government officials consulted also said that the number of houses built with burnt bricks and roofed with iron sheets has increased in the last years. Generally, around the project area, the local community buildings are characterized by iron sheet/grass roofs, burnt bricks for the walls and earthed floors.

4.1.15 Land tenure

Like in many rural Districts of Uganda, land in Northern and North eastern Uganda is mainly communally owned and governed by the customary system of land tenure. Under this tenure arrangement, land ownership is vested in the lineage and is allocated by a father to his sons, who in turn, assign it to their wives and children for cultivation. Women therefore tend to be excluded from owning land, although they are allowed the right of use.

While in theory, it sounds as if no single individual or household owns land under such tenure ship arrangement, in practice; the ownership is actually vested in the users. In every community, it is clear which portion of land belongs to which household, and usually the head of the household is recognized as the defacto owner. It is also the head of the household (land owner) who has the responsibility to rent or sell out potion of such land in case of need; though this is usually done after consultation with and the consent of the larger members of the lineage is obtained.

4.1.16 Gender

Women lack control over land, the crops their labour produces, livestock and other productive resources, yet they are responsible for meeting family needs. They only have access to the land. However, decisions on what to produce and in what quantity remain the domain of men. Women complain bitterly of men wasting time and family resources on drinking. Women are alleged to have more family responsibility now than in the past, for example, being responsible for paying for costs of schooling, when this used to be unheard of. From the water and sanitation perspective women in Amolator district are responsible for domestic chores which include fetching water.

4.1.17 HIV/AIDS

The HIV prevalence rate in the project area stands at 7% which is high. During the implementation stage, the contractor should develop a comprehensive HIV management plan that will help contain the disease bearing in mind the knowledge attitude and practices of the PAPs.

4.2 Physical Environment of the Project Area

4.2.1 Topography

The project area (Namasale Town Council) is relatively flat and is at the lowest point of Amolatar district. On average elevation above sea level between Biko landing site and Lenko is 1044meters. The lowest point is at the shores of Lake Kyoga at 1037meters above sea level.

4.2.2 Geology and soils

The geology around the intake and within the service area comprises of Mafic metavolcanic rock, amphibolite. In rare outcrops, amphibolite is a greenish grey, fine- to medium-grained, weakly deformed rock. The overall appearance of the rock suggests derivation from a massive (though foliated) basaltic lava protolith with obscure pillow-like textures. The association with thick, skarn altered carbonate bearing bands composed of large, randomly oriented amphibole (actinolite) prisms in a nearby aggregate quarry (463670E /166431N) also suggests a supracrustal origin of the amphibolite. Ferralsols and Leptosols with a sandy loam texture are the dominant soil types in the project area.

4.2.3 Climate and hydrology

4.2.3.1 Rainfall

Considering rainfall probability, in nine out of ten years annual rainfall amounts received range from 1250mm - 1500mm towards the north and north-eastern part of the District. In the drier areas, however, annual rainfall is from 1000mm - 1250mm. On the other hand, in four out of five years, the drier areas receive 750mm - 1000mm, and for the rest 1000mm - 1250mm. Peak rainfall is usually during April-May and September-November. The Lake Kyoga/Kwania complex appears to produce significant variations within their immediate environs.

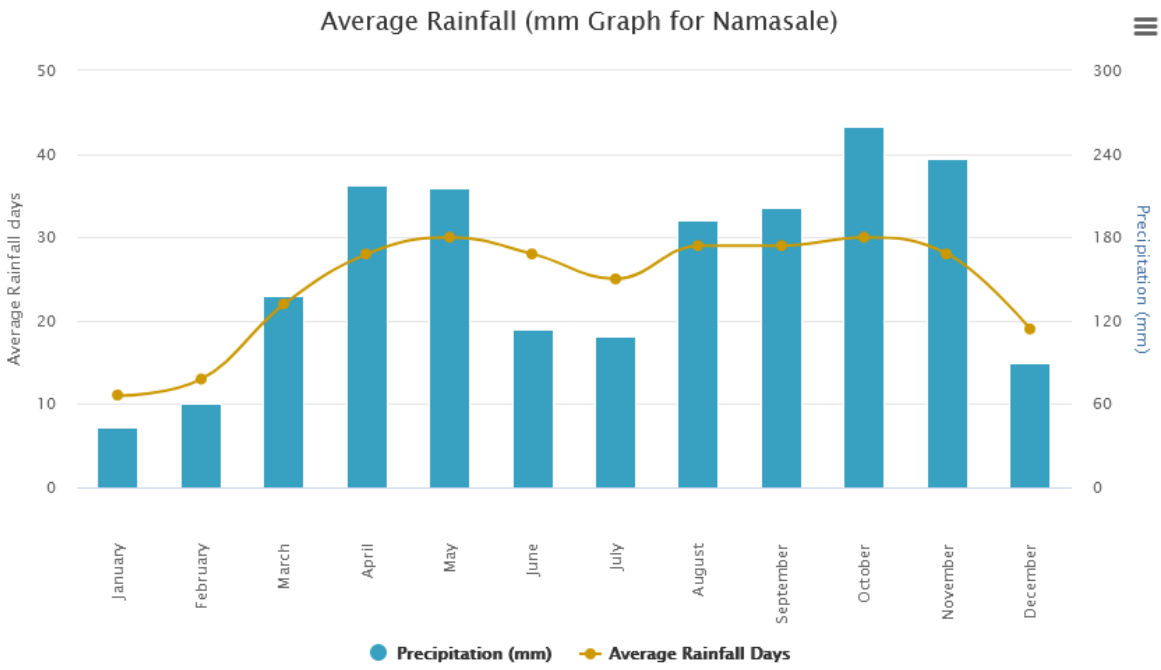

Figure 4-15: Average Monthly rainfall for the project area

4.2.3.2 Hydrology of the project area

Namasale is located on the shore of Lake Kyoga which is located in the Kyoga basin. Lake Kyoga is a large shallow lake of about 1,720 km^2 (660 square miles) in area and at an elevation of 1,033 metres. The Victoria Nile flows through the lake on its way from Lake Victoria to Lake Albert. The lake reaches a depth of about 5.7 metres, and most of it is less than 4 metres deep. Lake Kyoga receives flows from the Victoria Nile and the tributaries emanating from the Mount Elgon region. The basin consists of eleven sub-catchments including Awoja, Okok, Okere, Mpologoma, Victoria Nile, Sezibwa, Akweng, Abalang, Lwere, Lumbuye, and Kyoga lake side zones.

Figure 4-16 : A map showing Lake Kyoga Basin

The principal inflow to Lake Kyoga is from the Nile which drains Lake Victoria and contributes an average of 25.6 billion m3 of water each year. The other affluents are much smaller, the most important being the Mpologoma, which brings some 610 million m3 of water from southeast Uganda each year, and the Okere which contributes an average of 373 million m3water/yr, Awoja which brings 1,232 million m3water/yr, Sezibwa discharges some 217 million m3 of water to Lake Kyoga each year, while the Omunyal contributes a further 40 million m3/yr.

The flows from catchments other than Victoria Nile have little impact in the overall inflow into Lake Kyoga. When looking at the scale of the whole L. Kyoga catchment, water resources is plentiful and much higher than water demand (Kyoga Catchment Water Management Plans.

Lake Kyoga hydrology is governed by the discharge from the Victoria Nile. In rough order of magnitude, the variations between high and low lake water levels can be seen to vary 0.5-1.0 m from year to year between extreme events. The data on the changes in Lake Kyoga water levels is hard to come by but the assessment of the long-term changes of L. Kyoga from 1945 to 2010 as summarized in figure 4-16 below was extrapolated to to current situation since the lake level variation over those years is small the lake water level changes of Lake Victoria and Lake Kyoga and its levels is highly influenced by L. Victoria water level variations (MWE 2011)[1].

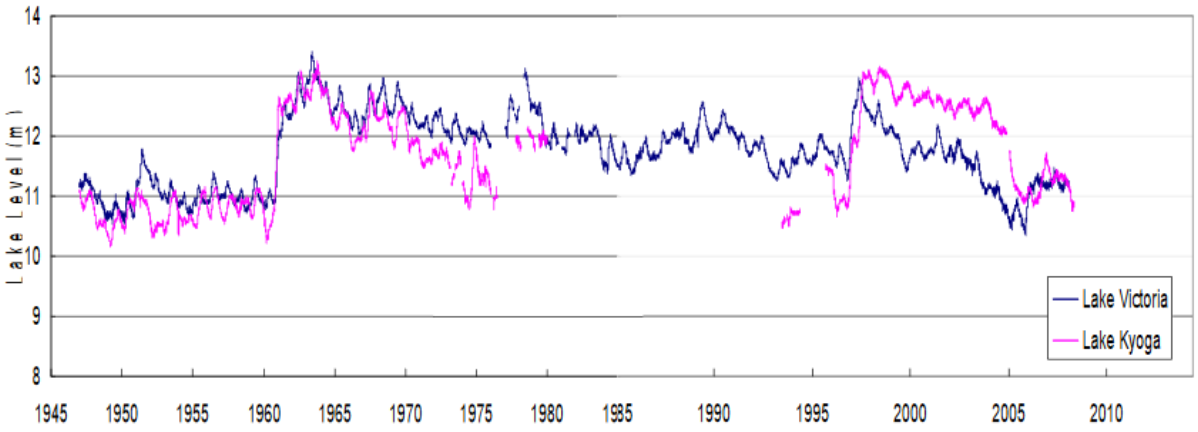

Figure 4-17 : Water level variations of Lake Kyoga (Source, MWE, 2011)

As regards ground Water Sources, Namasale Town Council, has a low potential for groundwater development, with boreholes having an average yield of 1.90m^3/hr (Feasibility Study report for this project). Anaysis by DWRM show that most of the wells yield around Namasale town council yielded not more than 5m^3/hr as indicated in the geological map indicating well yields from hydro census data.

[1] The report for development of water resources in lake Kyoga basin prepared by Oyo international Corporation in association with Tokyo Engineering and Oriental International Consults

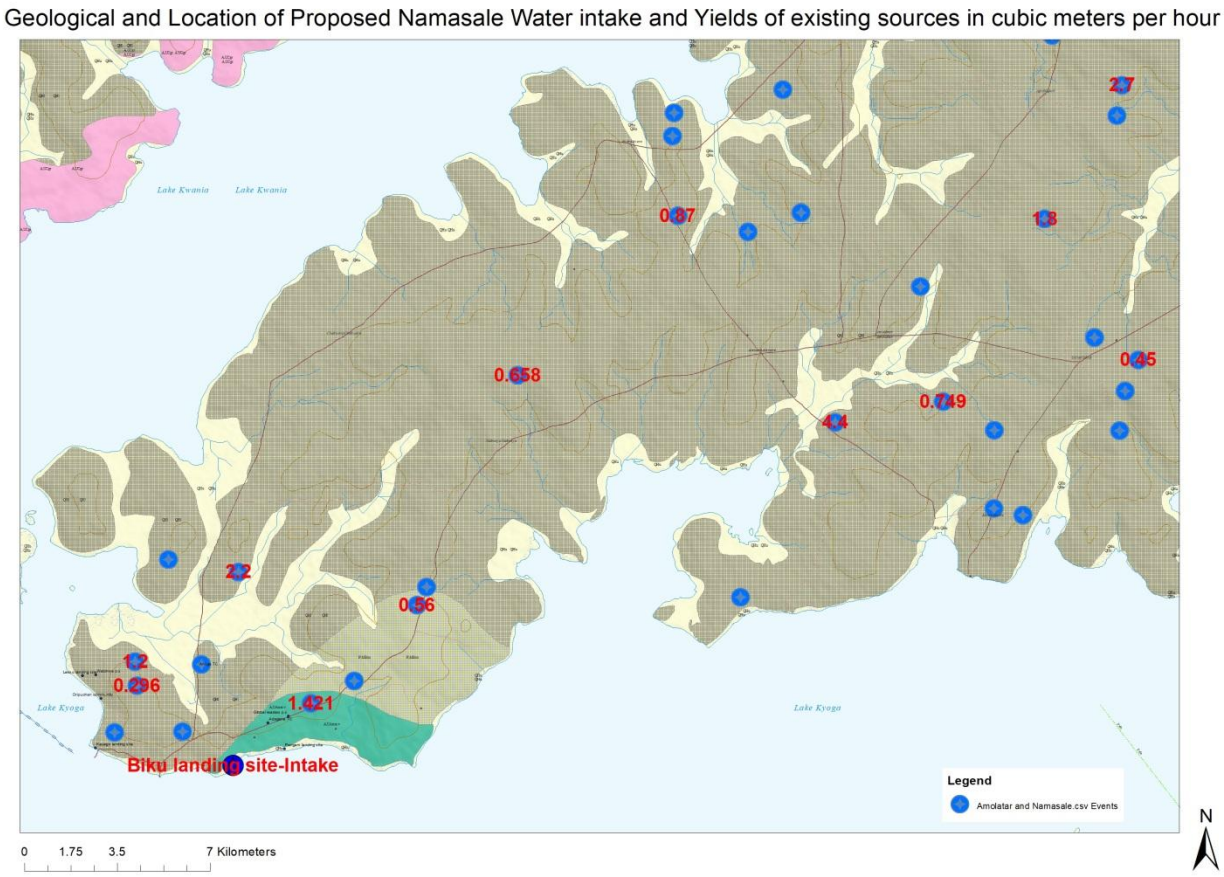

Figure 4-18 : Ground water map for Namasale

According to the MWE Annual monitoring report 2014/15, the ground water in Namasale has excess iron levels and salinity in most areas which leads to corrosion and aesthetic characteristics that has led to abandonment of most of the existing boreholes by the community.

4.2.3.3 Water balance of Lake Kyoga

The water balance of L. Kyoga is made up of inputs, which consist of direct rainfall and inflow from rivers and groundwater, and losses from evapotranspiration, surface outflow, and outflow to groundwater, as well as storage. The lack of data on the interaction between groundwater and lakes often presents a challenge in the quantification of groundwater flows into and out of the system. In the absence of data on groundwater, the inflow and outflow of water from this source was assumed to be negligible; this is in line with earlier water balance studies carried out in the Ugandan lakes. Direct abstractions from the lakes were also considered to be small and therefore negligible in relation to the other components of the water balances and have been ignored.

The water balances of the L.Kyoga therefore included only the following components:

1. Inflows from surrounding catchments and from major rivers;
2. Direct rainfall on the lake;
3. Losses through evaporation from the lake surface;

4. The outflow from the lake; and
5. Changes in storage.

The available data for water balance of Lake Kyoga was for year's upto 1978 (National Water Resources Assessment, 2013). Therefore, the water balance presented below was adopted from the National Water Resources Assesment done by Ministry of Water and Environment in 2013.

The Victoria Nile, which is essentially the Lake Victoria outflow, is the main input into Lake Kyoga, a shallow lake with a surface area and volume equivalent to 10% and 0.6% of Lake Victoria, respectively. Lake Kyoga mainly acts as a temporary storage of Victoria Nile flows which make up around 84% of the inputs to the lake. All water balance components are small in comparison to the Nile inflow and lake outflow. This is equally apparent from the monthly variation of the various elements of the water balance. It clearly shows the dominance of the Nile in the hydrology of the system with inflows and losses being relatively constant, varying between 1,000 and 1,200 m3/sec. Although the catchment inflow and direct rainfall exhibit significant monthly variations, the level of Lake Kyoga is kept relatively stable throughout the year because of the regular inflow from the Nile.

Table 4-1: Monthly variations of water balance components of lake Kyoga based on mean monthly flow(m3/s) for 1953-1978 NE, SE, S denote inflows from North Eastern, South Eastern and South catchments respectively while' local' indicates catchments around the lake

	Gains							Losses			Balance (Storage)
	NE	SE	S	Local	Lake Victoria	Rainfall	Total	Outflow (Nile)	Evaporation	Total	
January	11.8	33.7	10.8	11.3	1038.7	19.8	1126.0	1053.8	184.3	1238.1	-112
February	7.5	16.7	5.0	4.4	1031.4	55.0	1120.0	1017.9	187.0	1205.0	-85
March	5.4	11.5	3.6	4.4	1035.9	97.7	1158.4	999.3	179.6	1178.9	-21
April	4.5	26.5	4.0	6.2	1065.1	188.5	1294.8	1015.6	159.2	1174.8	120
May	6.5	126.5	10.3	19.1	1141.8	220.7	1524.9	1093.7	151.6	1245.3	280
June	8.0	89.7	10.2	13.1	1181.5	138.2	1440.7	1167.9	151.9	1319.9	121
July	7.5	36.8	6.3	6.9	1141.6	151.0	1350.2	1190.0	148.0	1338.0	12
August	9.6	22.1	5.1	7.0	1087.6	198.4	1329.8	1188.6	156.4	1345.0	-15
September	17.8	31.2	6.7	10.5	1055.7	187.1	1309.0	1178.8	169.5	1348.3	-39
October	20.5	33.4	8.7	13.8	1024.8	170.4	1271.5	1158.9	171.4	1330.3	-59
November	16.8	77.9	15.5	26.3	1011.0	122.3	1269.9	1140.8	166.4	1307.2	-37
December	15.9	83.6	18.8	27.6	1039.1	45.7	1230.6	1124.5	176.2	1300.6	-70
Mean	11.0	49.3	8.7	12.4	1071.4	132.9	1285.5	1110.8	166.8	1277.6	8
Proportion (%)	0.9	3.8	0.7	1.0	83.3	10.3		86.9	13.1		

Lake Kyoga accounts for an average net loss of 33.9 m3/s. This is because surface evaporation exceeds direct rainfall onto the lake surface. The contribution from all catchment draining into Lake Kyoga is small and estimated at 81 m3/s, representing only 6.4% of the total lake input. This low value is ascribed

to the very large wetland areas in the lower parts of the contributing catchments. Much of the tributary flows evaporate when passing through these wetlands and small internal lakes before reaching Lake Kyoga. While catchment inflow and direct rainfall exhibit significant monthly variations, total lake input is dominated by Victoria Nile flows and therefore relatively stable throughout the year. Outflow follows the inflow function with a time lag of some 2 months and therefore peaks around August. The increase in storage (and water level) therefore takes place during the rainy season. Most of this water is subsequently released in the next few months. The principal inflow to Lake Kyoga is from the Nile which drains Lake Victoria and contributes an average of 25.6 billion m3 of water each year. The otheraffluents are much smaller, the most important being the Mpologoma, which brings some 610 million m3 of water from southeast Uganda each year, and the Okere which contributes an average of 373 million m3water/yr, and drains much of the north and central eastern parts of the country. The Sezibwa discharges some 217 million m3 of water to Lake Kyoga each year, while the Omunyal contributes a further 40 million m3/yr. Direct precipitation over the major lakes amounts to about 6 billionm3/yr, while the mean annual outflow from the system is 27 billion m3

4.2.3.4 Temperature

The hot season lasts for 2.3 months, from January 14 to March 22, with an average daily high temperature above 89°F. The hottest day of the year is February 22, with an average high of 91°F and low of 69°F. The cool season lasts for 4.8 months, from April 30 to September 22, with an average daily high temperature below 83°F. The coldest day of the year is July 13, with an average low of 66°F and high of 82°F.

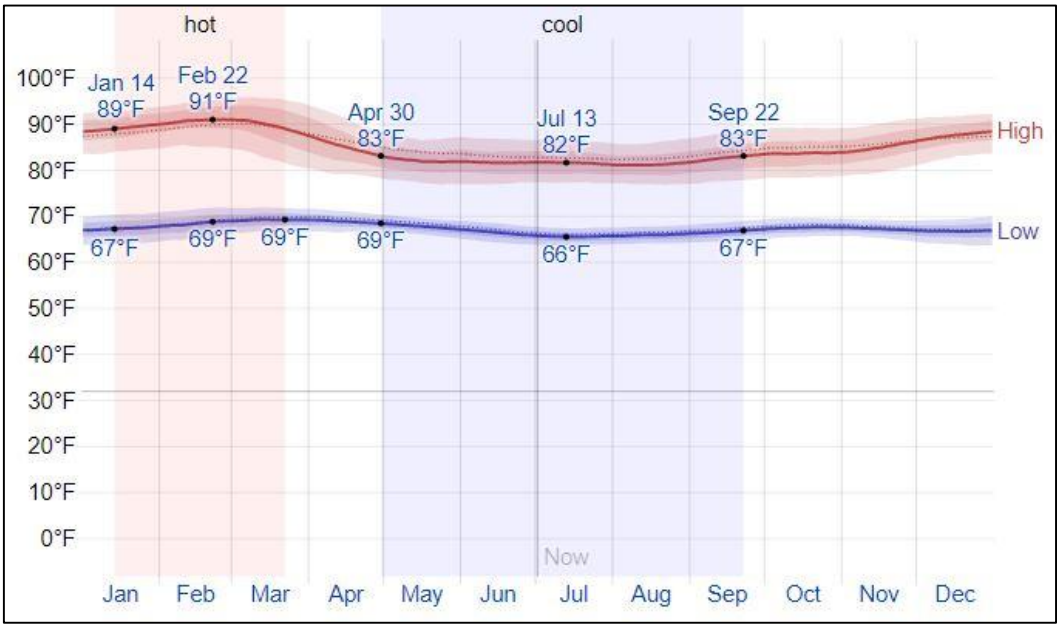

Figure 4-19 Average High and low temperature for the project area

4.2.3.5 Evaporation

In the northern half of Uganda, factors which influence the rate of evaporation are differences in altitude, humidity, temperature, and prevailing winds. Rate of evaporation for the project area (Namasale) is usually high during December to March, at the level of 175mm to 200mm (average of 187mm). For the rest of the year during the rains evaporation levels are 125mm - 175mm (average of 150mm) (National Water resources assessment 2013).

4.2.4 Noise

Baseline noise conditions were investigated along selected segments of the proposed Namasale water and sanitation project areas using an Extech 407730 Sound Level Meter. Figure 4-2 below presents a map of areas that were sampled for noise measurement and table 4-2 below presents the baseline noise levels taken at some selected points.

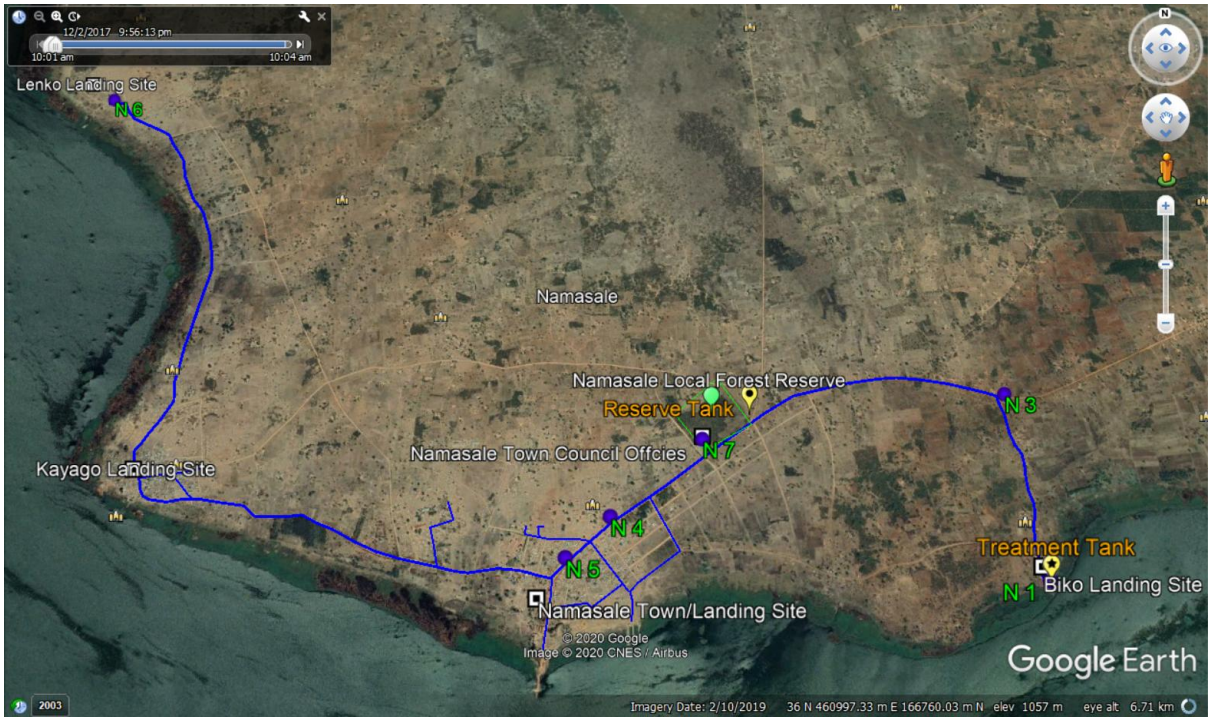

Figure 4-20 Site Map showing noise sampling points (N1-N7)4.1 below presents a map of areas that were sampled for noise measurement.

Table 4-2 : Summary of noise study findings at various points within and around the sampled project sites

Area Sampled	Minimum (dBA)	Maximum (dBA)	Average (dBA)	Source of baseline noise conditions	Coordinates & name	National Standards (dBA)	Comments	Overall rating
Biko landing site (at the proposed water intake)	41.3	49.8	45.55	Natural processes (wind and birds) and people fetching water	E:459808 N:165046 H:1042m (N1)	60	Normal	Low
Biko landing site (in the centre of the town)	Lo	56.2		Music and interactions from retail shops.	E:459779 N:165131 H:1043m (N 2)	60	Normal	Low
In an open area with savanna grassland (road reserve) opposite Namasale Health Centre II	Lo	58.4		Natural processes (birds and wind) and domestic activities and occasional traffic	E:459758 N:166137 H:1051 (N3)	60	Normal	Low
At the begigining of Namasale town near Namasale P/s	51.7	62.4	57.05	Mainly from pupils playing in the background and moving traffic.	E:457423 N:165461 H:1046 (N4)	60	Normal	Low

Area Sampled	Minimum (dBA)	Maximum (dBA)	Average (dBA)	Source of baseline noise conditions	Coordinates & name	National Standards (dBA)	Comments	Overall rating
Namasale Trading Centre	58	64	61	Commercial activities from shops, traffic from vehicles and motorcycles.	E:457170 N:165236 H:1049 (N5)	60	Normal	Low
Lenko Trading Centre	Lo	50.3	-	Mainly from traffic, retail traders and natural processes (wind).	E:454150 N:168427 H:1042 (N 6)	60	Normal	Low
At Namasale Town Council Offices	Lo	44.2	-	Natural processes and some traffic from motorcycles.	E:457966 N:165903 H:1050 (N 7)	60	Normal	Low

Source: Field data

Noise levels along the proposed project area fluctuates greatly and this is due to the changing land uses in the project area environment, and therefore during project implementation the time and location of project activity shall be important. However, all the noise levels along the sampled project sites are within the permitted normal ranges for Residential + Industry or small scale production + Commerce as indicated in the Standards for Maximum Permissible Noise Levels for various environments (The National Environment (Noise Standards and Control) Regulations, 2003). The proposed project may not result in general increase in noise of the project sites except the water intake at Biko where water pumps and generators will be installed. Construction works will result into sporadic modification of baseline noise levels at certain segments of the project area but such an impact will be temporary and of short term. Table 4.3 below presents standard for maximum permissible noise levels for various environments.

Table 4-3 : National stnadards for maximum permissible noise levels for various environments

For General Environment		
	Noise Limits dB(A)	
Facility	**Day**	**Night**
A. Any building used as hospital, convalescence home, home for the aged, sanatorium and institutes for higher learning, conference rooms, public library, environment or recreational site.	45	35
B. Residential building.	50	35
C. Mixed residential (with some commercial and entertainment).	55	45
D. Residential + Industry or small scale production + Commerce.	60	55
E. Industrial.	70	60
Construction site		
(i) Hospitals, schools, institutions for higher learning, homes for the disabled, etc.	60	50
(ii)Buildings other than those prescribed in (i).		

From a factory or workshop		
Acceptable noise limit dB(A)	**Duration (Daily)**	**Duration (weekly)**
85	8 Hours	40 Hours
88	4 Hours	20 Hours
91	2 Hours	10 Hours
94	1 Hours	5 Hours
97	30 Hours	2.5 Hours
100	15 Hours	1.25 Hours
103	7.5 Minutes	37.5 Minutes
106	3.75 Minutes	18.75 Minutes
109	1.875 Minutes	9.375 Minutes

Accelerating vehicles		
Vehicle Category in dB(A)		
	Vehicle Category	**Maximum sound level**
1	Vehicles intended for carriage of passengers and equipped with not more than nine seats, including the driver's seat	78

2	Vehicles intended for carriage of passengers and equipped with not more than nine seat including the drivers' seat and having maximum permissible mass of more than 3.5 tonnes-	
	(a) With an engine power of more than 150KW	80
	(b) With an engine power of less than 150KW	83
3	Vehicles intended for carriage of passengers and equipped with more than nine seats including driver's seat: Vehicles intended for carriage of goods-	
	(a) With maximum permissible mass not exceeding 2 tonnes.	79
	(b) With maximum permissible mass exceeding 2 tonnes but not exceeding 3.5 tonnes.	80
4	Vehicles intended for the carriage of goods and having a maximum permissible mass exceeding 3.5 tonnes-	
	(a) With an engine power of less than 75KW.	81
	(b) With an engine power of not less than 75KW but less than 150KW.	83
	(c) With an engine power of less than 150KW.	84

Time frame:

Day	6.00am	-	10.00pm
Night	10.00pm	-	6.00am

Source: The National Environment (Noise Standards and Control) Regulations, 2003

4.3 Biological environment

4.3.1 Introduction

Biological diversity along water pipeline routes as well areas where the facilities like abstraction point and storage tanks for the Namasale water and sanitation project were surveyed for one month between 31st August and 30th September 2018 as part of this Social and Environmental Impact Assessment study.

4.3.2 Study area

Six sites with the dedicated taxa habitats were surveyed along the Biko-Namasale water pipeline route (Fig. 4-20, Table. 4-4). For terrestrial fauna, a radius of about 50 metres were surveyed for every site. Most of the sites are along the shorelines of Lake Kyoga, dominated by Water Hyacinth and Kariba dam weed at the edges of water, and Cyperus papyrus further inland.

Figure 4-21: Google maps showing ground - thruthed sites along Biko -Namasale water pipeline route

Table 4-4 : Geo-referenced way points surveyed along the Namasale water pipeline route

Way Point	Code Name	UTM	Altitude	Key Feature	Description
1027	NA01	36N 459799 165030	1033 m	Biko Landing Site	Proposed Water Abstraction Point dominated by Water hyacinth and Kariba dam week towards the lake and *C.papyrus* towards lad
NSL01	NA02	36N 459700 165349	1046 m	Outskirts of Biko	Bushland adjacent to swamp. Heavily disturbed
1028-1030/NSL05		36N 458405 166108	1045 m	Built up area	Water pump and Bushland along the route
1029		36N 458406 166109	1045 m	Stock Market	Modified due frequent human use
1030		36N 457976 165820	1041 m	Along pipeline route	Fallow land
NSL05	NSL05	36N 458336 166436	1042 m	Along pipeline route	Subsistence agriculture gardens
10311 - 1032	NA03	36 N 453864 168646	1038 m	Outstkirts of Lenko RGC	*Cyperus papyrus* dominated wetland up to shoreline
1032		36N 453755 168668	1034 m	Outstkirts of Lenko RGC	Overgrazed wetland with other Cyperus spp, herps and shrubs
1033	NA04	36N 454563 165730	1035 m	Kayago Landing	*C.papyrus* dominated wetland along shoreline with road (upt to lake) and setllements in a seasonal wetland inland
1034-1035	NA05	36N 457050 164688	1038 m	Namasale Ferry Point	*C.papyrus* dominated wetland along shoreline with road (up to lake)

Way Point	Code Name	UTM	Altitude	Key Feature	Description
					and setllements in a seasonal wetland inland
Amolatar Town	Amolatar Town	36N 483084 181101	1043 m	Urban area	Settlements
Namasale	Namasale	36N 466854 170803	1053 m	Urban area	Settlements

4.3.3 Sampling methods for higher plants

4.3.3.1 Overview

Due to intense human activity in the project areas, systematic-random sampling was found a better option with more points selected from areas that are less modified (with some natural vegetation cover) than in modified ones. Five quadrats each measuring 100 x 100 meters were established randomly according to nature and size of the habitat from which vegetation type, plant species, presence of disturbances signs and species of conservation interest including invasive species were made. Within these points records of features of landscape and environment including vegetation assemblages were made at specific points. The vegetative assemblages in the study sites were classified basing on Langdale-Brown *et al*. (1964) system in preference to that of National Biomass of 2003 for several reasons as indicated by Van Breugel *et al*. (2011). The Langdale system recognizes 22 ecosystem types identified by letters between A to Z as opposed to 13 adopted by the National Biomass System (USAID 2014). The A-Z system is based on plant community composition rather than just plant biomass, which was more relevant in characterizing vegetation, identifying plant species and sensitive habitats. Secondly, although much of Uganda's vegetation has been extensively altered over the past two-three decades, the A-Z system can still be considered to epitomize the potential of an area in supporting an ecosystem type and this is relevant to environmental impacts study (Kalema, *et al*., 2010; Pomeroy, *et al*., 2002). Species of plants recorded were assessed as percentage of total sampling point. The records generated from each day of field work were used to provide a detailed characterization of vegetation assemblages, generation of species list, identification of plant species of conservation concern and illustration of existing forms of disturbances. Presence of any form of legal protection by Uganda's acts and policies on conservation of biodiversity by organs such as NFA, Wetlands Department and UWA was also quoted.

4.3.3.2 Data analysis

Landscape cover types and vegetation to precisely delineate the land cover in the project area, the landscape was put to phytosociological descriptions. Field observation and use of Langdale-brown *et al*. (1964) system made the basis for analysis of landscape cover types.

Compilation of species lists

Compilation of species list from each study point in a site as well as intermediate encounters enabled generation of a general species list for the entire project area. This species list was confirmed after identification of all the plants encountered during the surveys as well as identification of specimens collected. Identification of specimens was done from Makerere University herbarium. This list was crucial in a way that it facilitated further analyses conservation status and invasiveness.

Existing forms of disturbances

Different forms of disturbances at each study point as well as occasional encounters in the project area were recorded and pictures taken for illustrations.

Species threat levels and invasiveness

The conservation status for each species was obtained from the published most recent IUCN (2018) red list data and the National red list of Uganda's threatened species (WCS 2016). Invasive species considered here included those that are exotic and have threats to native species at both individual and ecosystem levels.

4.3.4 Sampling methods for water quality and aquatic species

4.3.4.1 Scope of the study

The study covered aspects of water quality, macro-invertebrate and plankton diversity, potential project impacts, and mitigation, management and monitoring measures. The geographical scope of the study was limited toshores of L. Kyoga. The study sites of aquatic resources are NA01, NA02, NA03, NA04, NA05 and NSL05 in Figure 4-20 and Table 4-4. Investigation points were located in or within 300 metres of the shoulders of the proposed project area. Water quality and aquatic species were surveyed using various methods.

4.3.4.2 Sampling locations and water quality parameters

The appropriate macrohabitats were initially identified (Arend, 1999) for further monitoring of the aquatic species. (See Table 4-4).The coordinates of sampling locations were determined using a GPS unit. Data was collected from Mbiko landing (NA01 - UTM Co-ordinates 36 N 459799 165030, 1033 masl); Outskirts of Mbiko (NA02 - UTM Co-ordinates 36 N 459700 165349, 1046 masl); Outstkirts of Lenku RGC (NA03 - UTM Co-ordinates 36 N 453864 168646, 1038 masl); Kayango Landing (NA04 UTM Co-ordinates 36 N 454563 165730,1035 masl) and Namasale Ferry Point (NA05 - UTM Co-ordinates 36 N 457050 164688, 1038 masl).(see figure 4-4 above) Environmental (water quality) parameters that were determined include: dissolved oxygen concentration (DO), water temperature, pH, conductivity (CND), and water transparency, Nitrogen, Phosphorous Biochemical demand and chlorophyll-a. Water temperature and dissolved oxygen concentration were determined in situ with an

YSI oxygen/temperature meter. Conductivity and pH were measured using an YSI conductivity meter and an OAKTON pH Testr 1, respectively. Nitrogen and Phosphorous and chlorophyll-a were determined as described methods for the examined water. Water transparency were estimated with a 20-cm Secchi disk. Water depths, substrates, and vegetation communities were also be described in general terms. Algal species in the area were also documented and monitored. Sampling of macro-invertebrates and fish were done on site. Water samples were also taken for off site analysis. The sampled water was analyzed at National Water and Sewerage Corporation (NWSC) – Kampala to determine the physio-chemical and bacteriological characteristics of the sources. Specifically, the samples were analysed for BOD, Total Coliforms, COD, Calcium, Chloride, pH, sulphate, Total Phosphorous and turbidity.

4.3.5 Aquatic macro-invertebrates and plankton sampling

Benthic macro-invertebrates or `bottom-living' organisms are a highly diverse group which makes them excellent for assessing changes in biodiversity. In addition, different groups of macro-invertebrates have different tolerances to pollution, making them useful indicators of water quality. Biological monitoring using macro-invertebrates can therefore provide an effective method for determining if an environment has been impacted by pollution from various, cumulative or multiple sources. Phytoplanktons are also good indicators of water quality. Blue-green algae are usually associated with eutrophic (rich nutrient) waters. Quantitative and semi-quantitative sampling for aquatic invertebrates was done at specific sites along each water pipeline route, on lakes, rivers, and wetland sites using an Ekman mud grabber (lakes), dip nets, and drift/kick nets (rivers). All sites were referenced as either disturbed or undisturbed, and the bottom types (e.g., stones in riffles, sticks in pools, leaf packs, and fine sediments) were recorded. Samples collected were sorted either before or after preservation in 30% ethanol for further analysis in the laboratory. Live sorting was done either on shore, or in the laboratory, and the different groups of invertebrates identified to the lowest practicable taxon (family or genus level), and enumerated using Merritt and Cummins (1996). Habitat features were also scored to qualitatively evaluate important habitat components. Water samples were collected using a 5 litre plastic container, filtered through a plankton net (45µm) mesh into a 25ml sample bottle and preserved with 70% ethanol for zooplankton analysis in the laboratory. For phytoplankton, the samples were preserved with Lugol's iodine solution for further analysis in the laboratory.

4.3.6 Fish (Pisces) survey methods

Fisheries data was collected using the following methods:

- Habitat characteristics at each sampling point, including depth, substrate, water transparency, conductivity, temperature, dissolved oxygen, shoreline vegetation and, in some instances, aquatic macrophytes and activities along the river were recorded. The sampling points were marked using a GARMIN Global Positioning System (GPS).

- Fish sampling was carried out using monofilament gillnets of stretched mesh sizes 1 to 6 inches in increments of 0.5 inches. In habitats where gillnets could not be used, especially rocky areas, hooks of sizes number 18 and 20 were used. Experimental fishing: this was done with the help of the fishermen in the area. It involved using of the normal fishing methods on the waters with gillnets (monofilament and multifilament). These methods are Gill-net method using fishing nets of stretched meshdifferent sizes 1 to 6 inches in increments of 0.5 inches; Beach seine method where applicable. Experimental fishing was used withfishermen throw net into water using hands and using hooks in areas where gillnets could not be used, such as rocks and fast-moving water.
- Observations: Observations were done especially in the wetland areas (See figure 4-21) along the shores of L.Kyoga in the project area. The data obtained using this method included: water type, fish species if any, nature of the wetland, and status of the wetland.
- Interviewing: interviews were used to identify the species and size of the fish caught from the wetland during the wet season. The interviewees included the district fisheries officers, and the people that live along the wetlands in the project area.

4.3.7 Herpetiles (amphibians and reptiles) survey methods

Visual Encounter Surveys, opportunistic records and consultations were the key methods used in monitoring herpetofauna. Visual Encounter Surveys (VES) are a time-honoured technique. VES is similar to the Timed Constrained Count (TCC) method described by Heyer et al., (1994). Visual encounter surveys are used to document presence of amphibians and are effective in most habitats and for most species that tend to breed in lentic habitats. They generate encounter rates of species in their habitats in a unit hour. The method involves moving through a habitat, turning logs or stones, inspecting retreats and watching out for surface-active species. The data gathered using this procedure provides information on species richness of the habitat.

Opportunistic records are those made outside the sampling points but occur in the surrounding area to be impacted by the project. It helps complete the checklist of the animals as much as possible. Amphibians and reptiles are mobile and can therefore be encountered outside their preferred habitats both spatially and temporally. Several individual specimens were recorded outside the sampling time along transects.

Local people were also interviewed to establish the reptilian species known to be present in the sites surveyed. This was treated as secondary data. Identification of herpetofauna followed (Schiøtz, (1999), Spawls et al., (2002) and Channing & Howell (2006). The AmphibiaWeb (2015) and The Reptile Database (Uetz, P. & Jirí Hošek (eds.) 2015) were also used. The conservation status of the herpetofauna is reported using the IUCN Red Listing (IUCN 2018) and the Ugandan Red List (WCS 2016).

4.3.8 Birds (Aves) survey methods

Birds were surveyed using Point counts or Timed Species Counts (TSC) method as were deemed necessary. Timed Species Counts are a method of rapid surveys which have been widely used in East Africa (Freeman et al., 2004). During each one-hour count, bird species are listed in the order in which they are seen, or heard. The time is also noted at 10-minute intervals so that scores can be allocated, thus: 6 for species recorded in the first ten minutes, 5 for those recorded in minutes 11-20, and so on to 1 for those only recorded in the final ten minutes. A commoner species will more often be recorded in the first ten minutes than a rare one, which will also be recorded in fewer counts. Where ten or more counts are made at the same site, these scores can be transformed into values that more closely reflect abundance. Identification were based on Stevenson and Fanshawe (2002).

A point count, or circular-plot survey, involves a series of points or stations at which birds are counted. Observers spend a prescribed time (usually 3 to 20 minutes, with longer times occasionally suggested for areas with more complex vegetation structure or where travel times between stations is a serious limitation) at each station, looking and listening for birds. Stations are to be separated by sufficient distance to preclude sighting the same bird at more than one station. Observers may restrict attention to birds within a prescribed distance of the station (fixed-distance circular plots) or record birds regardless of the distance (unlimited-distance circular plots). Although sighting distance might be recorded and used to develop estimates of density, typical point counts do not use information on sighting distance (Reynolds et al. (1980), International Bird Census Committee (IBCC) (1977), Blondel et al. (1981) and (Droege, 1990).

Both land birds and waterbirds were monitored. The exercise was done one day every week of each month for the whole year on islands upstream of the dam. Monitoring bird species will involve both land birds and waterbirds. Birds will also be classified birds according to their migratory and conservation status (if threatened, they are said to be Red-Listed (IUCN 2000) and habitat requirement (see, for example, Bolwig et al., 2004, Caswell et al., 2005).

4.3.9 Mammals survey methods

Mammals were monitored using various methods. The exercise was done in every suitable habitat along each pipeline route. Each mammal observed would be geo-referenced, counted and recorded. The identification of the mammals follows nomenclature by Wilson and Reeder (1993), and Davies & Vanden Berghe (1994). The conservation status of the species is reported using the IUCN Red Listing (IUCN, 2018). For the time allowed, to complete these monitoring studies, the mammalian fauna were surveyed on transect counts along the each pipeline route through signs of occurrence (run ways, feeding signs, etc) or counts of actual individuals sighted along the transects.

For large mammals, line transect sampling is the most efficient way to record their sign (browse, dung, tracks) and make direct observations of individuals. A transect was the sampling unit and its length were dictated by the size of the islands. Transects were walked at a constant, average speed. Such ground transects are most frequently used at the site level, and often follow secondary roads or trails of predetermined direction. Notes on the habitats at locations where species are encountered were made to document the characteristics of the preferred habitats or the ranging habitats.

For small mammals, population size is easily determined by using traps to capture rodents and insectivores. Trap lines could be established, along which trap stations are located with two live traps placed at each trap station, with stations spaced more than 15m apart. Traps may be placed on the ground along natural features such as fallen logs, but avoid any site with flooding potential. A limited use of traps was used to record the species of small mammals present on the islands. Small mammals will represent the larger diversity of mammals on the islands as compared to large mammals. Changes in the community composition and relative abundance can be used fairly safely as indices of change induced by habitat changes.

4.3.10 Butterfly sampling

Sweep netting

The adult butterfly fauna of the target areas were sampled systematically using sweep net. An established transect line was walked at constant pace, recording all the butterfly species seen on wings. Individuals that were difficult to identify on wings were taken and stored for further processing identified using available field guides (e.g. Larsen, 1991; Kielland, 1990). Opportunistic observations were included to help build the species list. Each of the butterfly species was assigned to one of the ecological categories as described by Davenport (1996). The major categories considered included forest dependent species (F), forest edge/woodland species (f), open habitat species (O), widespread species (W), migratory species (M), and wetland species (S).

4.3.11 Dragonflies survey methods

Adult dragonflies were sampled using sweep nets. Some species were more easily caught when they flying about, perched or while basking.

4.3.12 Results and discussions (Plants)

4.3.12.1 Vegetation types and critical Habitats

Biko-Namasale water transmission and distribution network traverses an area that has modified habitats. The intake and the water treatment plant will also be constructed in modified habitats. However, adjacent habitats to the intake are natural dominated by papyrus. The intake is area is covered

by invasive species i.e. water hyancith and Kariba dam. The intake is near a landing site at Biko where the shores are in a built-up area. The pipeline traverses areas with several trading centers except in a few sections that are under cultivation and small patches of natural vegetation. The vegetation at the intake is dominated by lake shore marshes of *Cyperus papyrus*, *Phragmites mauritianum, and Echinochloa pyramidalis* with small expanses covered by invasive plant species of *Salvinia molesta* and *Eicchornea crassipes*. The pipeline route is covered by road side woodlots of *Pinus pinus* and *Eucalyptus* sp, bush lands dominated by *Acacia brevispica*, *Sida ovata*, *Urena lobata* and *Achyranthes aspera*. Plates below is pictorial illustration of some of the major landcover types in Biko-Namasale water project area.

Plate 4.1: Cynodon-Sida open grassland in settlement near Biko intake at 36N 0459624E 0165231N

Plate 4.2: Acacia-Achyranthes-Urena bush land with scattered trees at 36N 0459570E 0165274N

Plate 4.3: Soda-Solanum-Cynodon bush land with scattered trees at 36N 0459604E 0165265N

Plate 4.4: Acacia-Soda-Solanum dense bush land with scattered trees at 36N 0459541E 0165283N

Plate 4.5: Senna-Solanum-Sida bush land at 36N 0459570E 0165274N

Plate 4.6: Marsh of Phragmites mauritianum on water at 36N 0459787E 0165030N

Plate 4.7: Cyperus papyrus Lake shore marsh at 36N 0459810E 0165037N

Plate 4.8: Road side Pine woodlot along pipeline route at 36N 0459236E 0166277N

Plate 4.9: Cynodon-Echinochloa-Cyperus lake shore grassland at 36N 0453861E 0168645N

Plate 4.10: Sporobolus-Cynodon-Cyperus Seasonally flooded lake shore grassland at 36N 0453813E 0168655N

According to IUCN, a site may be recognized as sensitive if it contains the following categories i) threatened taxa in accordance with IUCN assessment protocol, ii) rare species, iii) endemic species, presence of iv) fragile watersheds, v) steep slopes, and vi) riparian areas (Lucie *et al.* 2016). With regard to this assessment Lake Kyoga its self and its shore line form critical habitats worth protecting since they fall under categories IV and VI above. These habitats are within the project area, however the project components will be implemented outside and hence not expected to have impacts on them.

4.3.12.2 Plant species list and richness of sites

From a total of 5 survey points (See figure 4-20 above), 126 species of plants belonging to 35 families were recorded (Annex 5). Herbs dominated the sample with 39.7% of species followed by shrubs with 24.6%. Generally, the species richness of the project area was low owing to lack of diversity of vegetation cover types (chart 4.2). The lake shores were characterized by more natural vegetation that

was less diverse in terms of species richness, the existing gardens were intensively managed by weeding while the relatively diverse bush lands had a very low coverage.

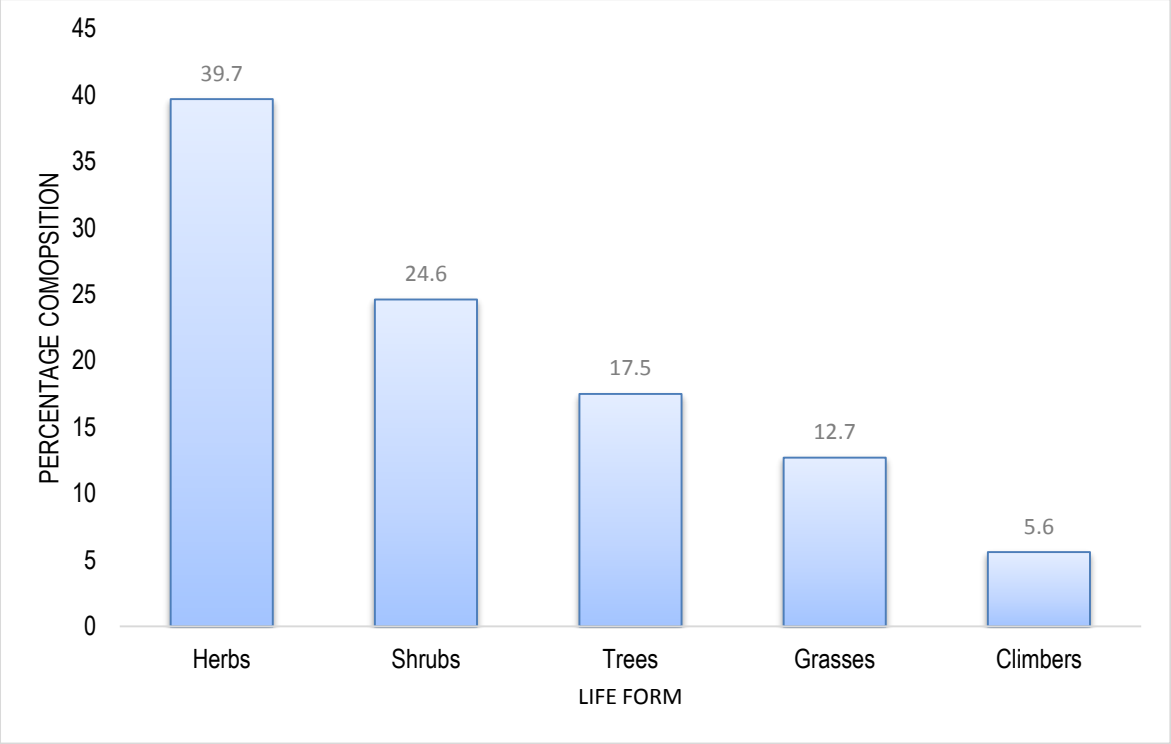

Chart 4.1: Percentage cover of plant species by life form in the project areas for Biko-Namasale water project

From the chart 4.1 above it can be deduced that the project area has few tree species. Dominants were herbs, shrubs that are easier to recover compared with trees, and thus few species with higher biomass are likely to be impacted (see annex 5 for the table of plants in the surveyed locations of the project area). This at least contributes to conservation of habitats, ecosystem functions and services from trees of the area.

4.3.12.3 Invasive (noxious) plant species

Several invasive species of plants (Plates 4.23-4.26) were encountered within the project area including *Eicchornia crassipes, Salvinia molesta, Senna siamea, Lantana camara, Mimosa pigra, Ricinus commuis* and *Senna spectabilis*. Invasive species flourish due to disturbances that alter the environment to their favorable levels (Klinger & Brooks 2009). Due to their great dispersal characteristics, high tolerance to unsuitable conditions, large reproductive capacities and high growth rates invasive species easily overtake the natives. Changes in landscape due to soil excavation and earth works alter the growth of natives, disturbance regimes and geomorphology and hence open up areas to invasion by invasive plant species.

Plate 4.11: Senna spectabilis encountered at 36N 0459624E 0165231N

Plate 4.12: Ricinus communis encountered at 36N 0459604E 0165265N

Plate 4.13: Cluster of Salvinia mollesta (blue arrow) on water at 36N 0459787E 0165030N

Plate 4.14: Eicchornea crassipes (Red arrow) on water at 36N 0459810E 0165037N

Plate 4.23-4.26 some of the common Invasive species in Biko-Namasale water project area

4.3.12.4 Existing forms of disturbances on vegetation

Major disturbance to natural vegetation in the project areas were mainly settlement infrastructures, plantation and subsistence agriculture, grazing, invasive species. The section of Lake Kyoga where the intake is to be constructed is covered with invasive species while the shores are already built up areas. Many sections of the pipe line route are cultivated and the few sections of natural vegetation are trampled by grazers. Figure below gives a pictorial illustration of the major forms of disturbances to the vegetation in Biko-Namasale water project area.

Plate 4.15: Garden planted with coffee and yams with stamps of recently harvested maize along pipe line at 36N 0459467E 0166232N

Plate 4.16: Cattle grazing in one of the Lakeshore grasslands at 36N 0456952E 0165401N

Plates 4.27-4.28: Some of the major forms of disturbances to vegetation in Biko-Namasale water project area

4.3.12.5 Plant threat levels and species of conservation concern

A total of 126 plant species were recorded in the Biko-Namasale water project area (Annex 5), and very few have already been evaluated globally or nationally. Only three plant species of the project area have been globally and nationally evaluated and they include: Tamarindus indica, listed globally as Not Evaluated (NE) (IUCN 2018) but listed nationally as Vulnerable (VU) by Wildlife Conservation Society (WCS 2016), Albizia coriaria listed globally as Not Evaluated (NE) but nationally as Near Threatened (NT) and Vitellaria paradoxa (the Shea butter tree) listed both globally and nationally as Vulnerable (VU). These plants should be accorded its due protection (example of the plant species Plate 4.29). The area also has invasive species and these have the potential to cover large sections of the project area if they are not well managed.

Plate 4.17: One of the individuals of Tamarindus indica (arrow) recorded from Biko-Namasale water project area and coordinates of location of other individuals

- 0459601E 0166190N
- 0458867E 0166256N
- 0457415E 0165438N
- 0456952E 0165401N
- 0456448E 0165242N

4.3.13 Results and discussions (Water quality & aquatic life)

4.3.13.1 General findings on water quality

Water samples for offsite analysis were picked from 2 different water sources around the project site. One Sample was collected from the borehole at Namasale town centre (E: 456799, N: 165236) and Lake Kyoga (E: 459802, N: 165045) at the current water source for the Biko community whichis also a proposed point of abstraction for the project. The water quality analysis results done by National Water and Sewerage Corporation were compared with National Standards for potable water (Table 4-5). Detailed results of the laboratory tests for each sample and parameters tested is presented in table 4-5 below against permissible standards.

Table 4-5 : Results of water analysis

Parameter	Units	National Standards for Potable water (Maximum permissible)	Biko landing site(Community water fetching point)	Namasale Town Centre(Borehole)
PH	-	6.5-8.5	7.4	7.03
Bacterial Total Coliforms	CFU/100ml	0	50	201
Calcium: as Ca^{2+}	mg/L	150	4.8	60.8
Chloride	mg/L	250	28	90
Biochemical Oxygen Demand (BOD) - 5 days at 20^0C	mg/L	Not specified	3.63	1.2
Turbidity	NTU	25	2.42	1.27
Chemical Oxygen Demand	mg/L	Not pecified	12	3
Nitrate - N	mg/L	45	0.09	0
Total-Phosphate:	mg/L	22	0.09	0.14
Sulphate: SO_4^{2-}	mg/L	400	1	21

Note: Two samples were analyzed and their properties were compared against these standards (Annex 3)

Table 4-6 : Water quality assesment for the sources within and around the project site

Name of sample	Coordinates at which sample was taken	Hydrological and or key particulars of the water source	Water quality results
Namasale Town Centre Borehole	E: 456799 N: 165236	Source is a community bore hole that was established to meet water needs for community in Namasale Town	The sample showed complying physical-chemical characteristics of the source for natural portable water except for bacteriological characteristics which did not. For details of the water quality results, refer to Annex 3.
Community water source at Lake Kyoga	E: 459802 N: 165045	The point is a community water source for the people of Biko landing site. It is also the proposed	The sample showed complying physical-chemical characteristics of the source for natural portable water

Name of sample	Coordinates at which sample was taken	Hydrological and or key particulars of the water source	Water quality results
(Biko Landing site)		point for water abstraction in respect of this project	except for bacteriological characteristics which did not. For details of the water quality results, refer to Annex 3.

4.3.13.2 Macro-invertebrates

The macro invertebrates recorded within the project area belonged to two major groups; Mollusca and annelidae (Table 4.7). Both groups were represented by two families. The Mollusca were more abundant compared to annelids, though both were poorly well distributed.

Table 4-7: Macroinvertebrates distribution in water resouces along Biko-Namasale

Taxon	NA01	NA04	NA05
No of organisms per sample			
Mollusca			
Lymnaeidae	24	-	5
Planorbidae	10	6	-
Annelidae			
Herudenea	4	6	
Tubificidae	-	-	3

4.3.13.3 Phytoplankton

The phytoplankton community of the water resources studied was composed of four major groups; blue-green and green algae, flagellates and diatoms (**Table 4-8**Table 4.8). Overall, green algae were the most diverse with five genera followed by blue-green algae (four), followed by flagellates (two) and the least diatoms with one genus. In terms of numbers, blue green algae were the most abundant, followed by green algae, followed by flagellates while diatom had the lowest numbers.

Table 4-8: Phytoplankto distribution in water resources along Biko-Namasale

Taxon	**NA01**	**NA04**	**NA05**
Number of Cells per Litre			
BLUE-GREENS			
Microcystis sp	236	184	92
Anabeana sp	88	67	50
Oscillation sp	54	36	22
Tolypothrix sp	-	52	-
GREENS			
Nitella sp	142	98	-
Chlorella sp	64	-	26
Peridinium sp	72	-	-
Cladophora sp	-	32	20
Desmidium sp	47	-	18
FLAGELLATES			
Phacus sp	23	-	-
Uroglena sp	-	36	10
DIATOMS			
Synedra sp	4	-	-

4.3.13.4 Zooplankton

The zooplankton community of the water resources studied along the proposed Namasale water supply route was composed of two major groups; rotifers and crustaceans. Overall, rotifers were more diverse (five genera) compared to crustaceans (three). Rotifers were also more abundant and widely spread compared to crustaceans (Table 4-9).

Table 4-9: Zooplankto distribution in water resources along Biko-Namasale

TAXON	**NA01**	**NA04**	**NA05**
ROTIFERS			
Euclanis sp	74	60	38
Ascomapha sp	-	42	-
Proales sp	56	-	-
Keratella sp	32	24	-
Filinia sp	-	30	-
CRUSTACEANS			
Bosmina sp	22	-	08

Ostracod sp	-	15	-
Cyclops sp	40	13	-

4.3.13.5 Discussion

For the surveys done, water quality was assessed in the interest of domestic and fish use. According to EPA (2001), extremes of pH affect palatability of water. Furthermore, pH values deviating from the normal affect fish leading to mortality. Fish thrives well in water pH range of 5.0-9.0, though 6.5-8.5 is preferable. Water palatability is also affected by TDS; drinking water becomes significantly and increasingly unpalatable at TDS levels greater than about 1000mg/litre. TDS levels of less than 600mg/litre is generally considered to be good. However, no health-based guideline value is proposed WHO (2006).

According to EPA (1998) there are generally three pollution tolerance groups are as follows:

- Group I (sensitive organisms) includes pollution- sensitive organisms such as Ephemeroptera, Plecoptera, and Trichoptera (non net-spinning), which are typically found in good-quality water;
- Group II (somewhat sensitive organisms) includes somewhat pollution-tolerant organisms such as Trichoptera (net-spinning), Mollusca (clams) and crayfish, found in fair-quality water; and
- Group III (tolerant organisms) includes pollution-tolerant organisms such as Diptera, aquatic worms, and leeches, found in poor-quality water.

The macro invertebrates' community recorded during the current survey included Mollusca and leeches (Herudenea) among others. These groups occurred in low numbers at all stations. Presence of Hemiptera which are relative sensitive to pollution in relatively high numbers indicated that the investigated water resources within the project area are of fair quality of water. Blue green flourish and dominate in aquatic systems whose quality of water is compromised with organic pollutants (Rissik and Suthers, 2009). The dominance of blue green algae in studied water resources could be attributed to anthropogenic nutrient enrichment from human activities in the wetlands and their catchment.

4.3.14 Results and discussions (Fish)

4.3.14.1Lake Kyoga wetlands (water type, nature of the wetland and status of the wetland)

Due to its swampy nature, the wetlands along Lake Kyoga are characterized by dense cover of papyrus further inland, and Kariba dam weed and water hyacinth in waters adjacent to the shoreline. The wetland is is natural and permanent along the shoreline, merging into seasonal further inland and most of it has not been encroached by other human activities such as farming.

4.3.14.2 Fishing

Commercial fishing takes place along the shorelines and further into Lake Kyoga in the project area. Over fishing was observed as there were many boats on the lake at all the times througout the time of the survey. The fishermen also reported very poor catches. Biko landing site had the highest fish diversity with seven species recorded, followed by Kayago landing and Ferry point each with six species, while Lenko had four species. Note though that the waters covered are in the same area and any of the fish recorded can easily move up and down the shoreline. The fish diversity of the project area can be described as fair although there is over fishing. The fish species caught included *Oreochromis niloticus, Clarias carsonii, Clarias gariepinus, Labeo victorianus, Momyrus kannume, Rastrineobola argentea, and Lates niloticus.* Fishing is done using mainly longlines, basket traps and gillnets. Table 4.10 below represents the fish species that were reported mainly from interviews, observations and experimental fishing from the fishermen.

Table 4-10 : Table showing the fish species recorded in sites along the shorelines of L. Kyoga adjacent to the pipeline route

Study site	**Coordinates**	**Fish Family**	**Species**	**Conservation status (IUCN-red list)**
Biko landing site - NA01	36N 459799 165030	*Cichlidea*	*Oreochromis niloticus*	Least Concern
		Claridea	*Clarias carsonii*	Least Concern
		Claridea	*Clarias gariepinus*	Least Concern
		Cyprinidea	*Labeo victorianus*	Least Concern
		Momyridea	*Momyrus kannume*	Least Concern
		Cyprinidea	*Rastrineobola argentea*	Least Concern
		Latidea	*Lates niloticus*	Least Concern
Lenko - NA03	36N 453864 168646	*Claridea*	*Clarias carsonii*	Least Concern
		Claridea	*Clarias gariepinus*	Least Concern
		Cyprinidea	*Rastrineobola argentea*	Least Concern
		Latidea	*Lates niloticus*	Least Concern
Kayago landing site - NA04	36N 454563 165730	*Cichlidea*	*Oreochromis niloticus*	Least Concern
		Claridea	*Clarias gariepinus*	Least Concern

Study site	Coordinates	Fish Family	Species	Conservation status (IUCN-red list)
		Cyprinidea	*Labeo victorianus*	Least Concern
		Momyridea	*Momyrus kannume*	Least Concern
		Cyprinidea	*Rastrineobola argentea*	Least Concern
		Latidea	*Lates niloticus*	Least Concern
Namasale Ferry point - NA05	36N 457050 164688	*Cichlidea*	*Oreochromis niloticus*	Least Concern
		Claridea	*Clarias carsonii*	Least Concern
		Claridea	*Clarias gariepinus*	Least Concern
		Cyprinidea	*Labeo victorianus*	Least Concern
		Cyprinidea	*Rastrineobola argentea*	Least Concern
		Latidea	*Lates niloticus*	Least Concern

Plate 4.18: Labeo and clarias gariepinus

Plate 4.19: Lates niloticus

Plate 4.20: *Oreochromis niloticus*

Plate 4.21: *Rastrineobola argentea* being dried at Kayago landing site

4.3.15 Results and discussions (Herptiles)

4.3.15.1 Introduction

Up to 90 amphibian species have been documented for Uganda (Channing, 2006), Goodman, 1996, WCS, 2016, Amphibiaweb, 2018), while up to 190 reptilian species have been recorded (WCS, 2016, Spawl et al, 2002, Reptitile Database of the World, 2018). Amphibians are entirely dependent on the existence of the right habitat. As such the biggest threat to amphibians is habitat destruction and alteration. Some amphibian fauna such as *Bufo vitattus* are known to be common inhabitants of the littoral and ecotone zones of lacustrine ecosystems and can even indicate how far inland the flood zones of a lake extends (Behangana, 2004). Reptiles on the other hand are also top carnivores in their environment for the food chain. The presence or absence of reptiles in an ecosystem can have considerable inferences on the habitat health and integrity of a certain area. Any activities in an area such as water pipeline construction will have impacts on the amphibians and reptiles.

4.3.15.2 Importance and conservation of herpetofauna

Ecologically, amphibians and reptiles (herpetofauna) are important; they are mostly predators, acting as primary and secondary carnivores. Their prey consists mostly of insects, some of which are pests to crops or disease vectors. They are also inter-linked in food chains, often acting as food for other vertebrates, such as pigs, birds, snakes and sometimes man. Because of their ectothermic physiology, the life history and ecology of amphibians often differ markedly from that of birds or mammals. Herpetofauna are known to be easily recognizable taxa in given habitats; and populations are sometimes specialized within a narrow habitat. This makes it easy and practical to monitor changes in composition over time, given different conditions (Heyer et al., 1994). Impacts on their habitat are reflected in changes in numbers and species diversity in a short time. These are some of the factors that have made amphibians to be recognized, nowadays, as good indicators of habitat change.

Amphibians are excellent, although largely overlooked indicators in assessing biodiversity of an area because:

- Most species are strictly habitat-dependent;
- Their taxonomy is reasonably clear
- It is easy and quick to obtain reasonably complete fauna lists by direct observation and listening to the voices at the right season
- The number of species is large enough to give meaningful figures for comparisons, and not so large that one is bogged down with identification problems
- The aquatic tadpoles of some species may serve as indicators of water quality.

Reptiles are important in nature. Most of the factors as for amphibians above apply making them excellent indicators in assessing biodiversity of an area. There is no amphibian species currently protected by national law in Uganda. The conservation of amphibians is claimed to be indirectly assured by other policies and legislations that target ecosystems, habitats and some species (Behangana and Luca, 2011). The same case applies to the reptilian species, only that the Nile crocodile (*Crocodylus niloticus* Laurenti, 1768) has some degree of protection from commercial harvesting in the range states (Ross, 1998). Subject to annual quota criterion, it is for example considered under CITES Appendix II (Ross, 1998). According to the Crocodile Specialist Group (2018) IUCN Red List, its conservation status is considered as Lower Risk, least concern (LR) although it can be threatened because of interactions with human beings in its range such along rivers and lake shorelines.

4.3.15.3 Amphibian diversity, distribution and status

A total of nine amphibian species, belonging to one order Anura, five families and six genera were recorded during the study (Tab. 4.11, chart. 4.3). The most species rich sites were Biko Landing site – NA01or 1 with nine species, followed by NA03 or 7 and NA04 or 9 (08spp each), then NA02 (5spp) while NA05 had the least diversity (5 spp). The difference in diversity across the sites was generally within a small margin because they are mostly along the shorelines of Lake Kyoga, with the similar habitat conditions. The commonest species were *Hyperolius kivuensis, Hyperolius v.viridiflavus, Phrynobatrachus natalensis* and *Ptychadena nilotica* recorded in all the all five sites. The least common species was *Hoplobatrachus occipitalis* recorded at only one site –NA01. The abundance of species across the sites also generally followed how common a species was. All the amphibian species recorded according to the red listing (IUCN, 2018; WCS, 2016) are of Least Concern (LC) both globally and nationally.

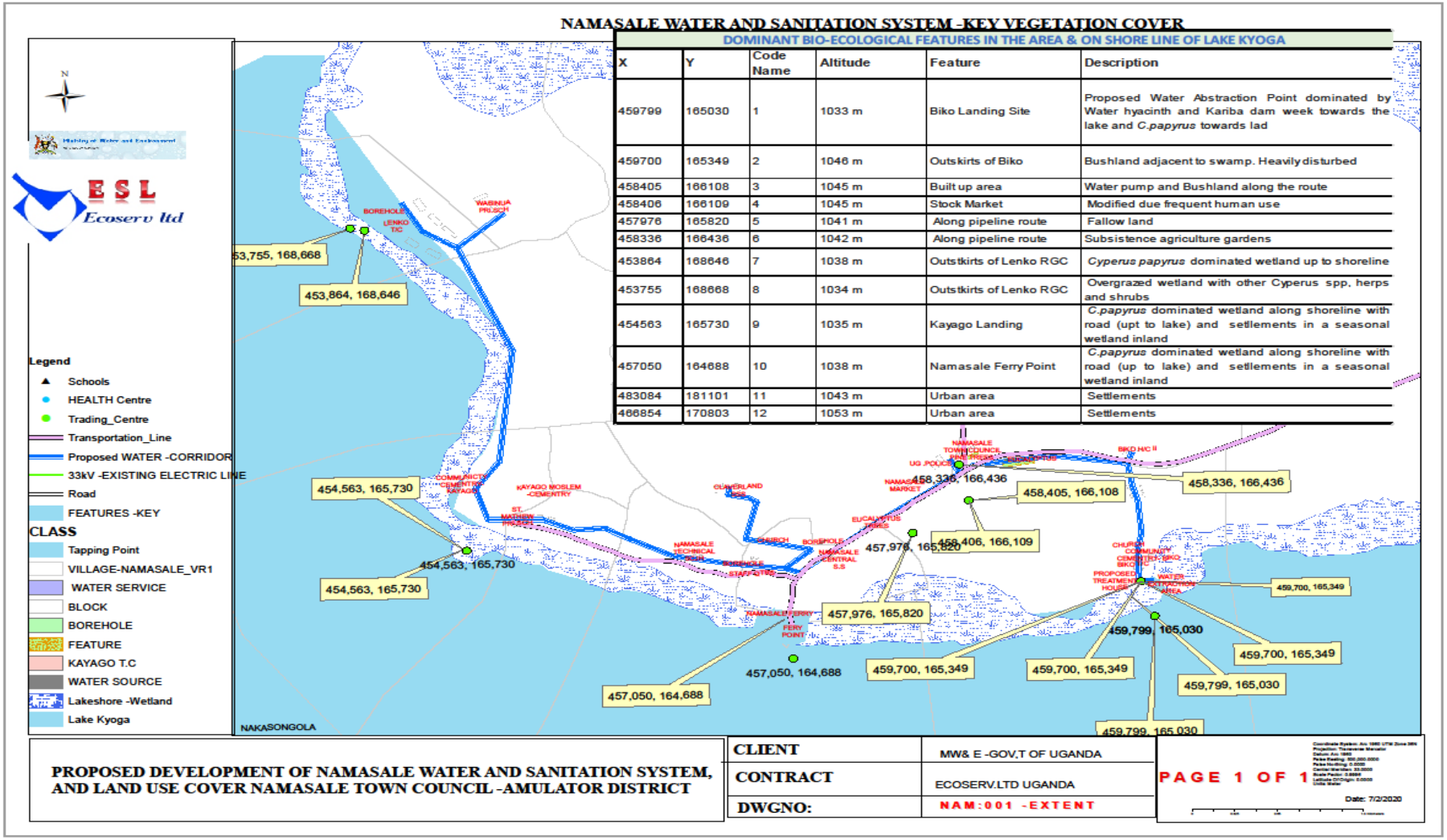

Figure 4-22 Map showing surveyed points and the shoreline wetland

Table 4-11: Amphibian species of sites along Biko -Namasale and their status

Order	Family	Species	Common name	IUCN Global	IUCN Country
Anura	Hyperoliidae	*Afrixalus quadrivittatus*	Four-lined Spiny Reed Frog	Least Concern	Least Concern
Anura	Dicroglossidae	*Hoplobatrachus occipitalis*	African Groove-crowned Frog	Least Concern	Least Concern
Anura	Hyperoliidae	*Hyperolius kivuensis*	Kivu Reed Frog	Least Concern	Least Concern
Anura	Hyperoliidae	*Hyperolius v. viridiflavus*	Common Reed Frog	Least Concern	Least Concern
Anura	Phrynobatrachidae	*Phrynobatrachus natalensis*	Natal Dwarf Puddle Frog	Least Concern	Least Concern
Anura	Ptychadenidae	*Ptychadena nilotica*	Nile Grassland Frog	Least Concern	Least Concern
Anura	Ptychadenidae	*Ptychadena porosissima*	Grassland Ridged Frog	Least Concern	Least Concern
Anura	Bufonidae	*Sclerophrys regularis*	African Common Toad	Least Concern	Least Concern
Anura	Bufonidae	*Sclerophrys vittata*	Lake Victoria Toad	Data Deficient	Least Concern

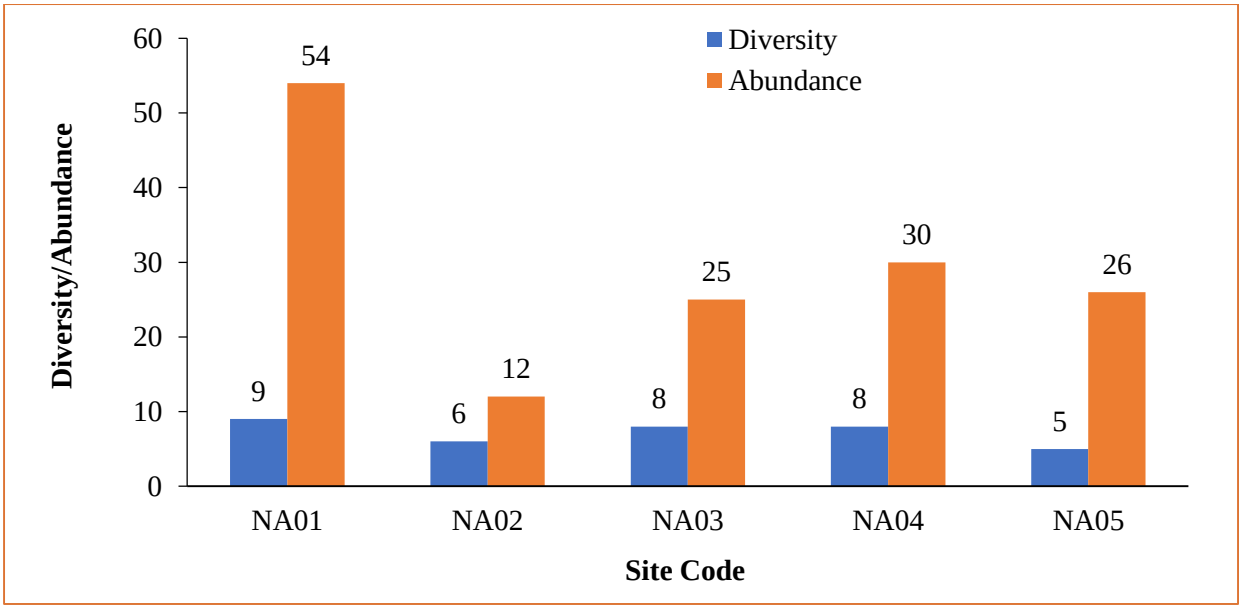

Chart 4.2: Amphibian diversity and abundance of sites along Biko-Namasale pipeline route

4.3.15.4 Reptilian diversity, distribution and status

A total of 11 reptilian species, belonging to four orders (Testudines, Crocodylia, Serpentes and Squamata), nine families and nine genera were recorded during the study in only three sites (Tab. 4.12, chart 4.4). NA01-Biko landing site was the most species rich with all the 11 species, followed by NA02, NA03 and NA04 (05spp each), while NA05 and NSL05 had the least diversity with four species each. Species abundance generally followed diversity. Like for amphibians, the diversity of reptiles was generally within the same range because they are mostly along the shorelines of Lake Kyoga, with the similar habitat conditions. The commonest species was *Agama agama mwanzae*, *Trachylepis maculilabris* and *Trachylepis striata*, each recorded in all the six sites, followed by *Naja melanoleuca* and Varanus niloticus (4 sites each) while *Hemidactylus mabouia* was reported in only three sites. Rest of the species were each recorded once each. The abundance of species across the sites also generally followed how common a species was. All the reptilian species recorded are of Least Concern (LC) nationally according to the red listing (WCS, 2016) but globally Not Evaluated (IUCN, 2018) except the *Agama agama mwanzae* which is both nationally and globally considered as of Least Concern.

Table 4-12: Reptilian species of sites along Biko-Namasale pipeline route and their status

Order	Family	Species/Site	Common name	IUCN Global	IUCN Country
Testudines	Pelomedusidae	*Pelomedusa subrufa*	Marsh terrapin	Not Evaluated	Data Deficient
Squamata	Agamidae	*Agama agama mwanzae*	Mwanza Flat-headed Rock Agama	Least Concern	Least Concern
Squamata	Chamelionidae	*Chamaeleo laevigatus*	Smooth Chameleon	Least Concern	Least Concern
Squamata	Scincidae	*Trachylepis maculilabris*	Speckle-lipped Skink	Not Evaluated	Least Concern
Squamata	Scincidae	*Trachylepis quinquetaeniata*	Rainbow Skink	Not Evaluated	Least Concern
Squamata	Scincidae	*Trachylepis striata*	Common-striped Skink	Not Evaluated	Least Concern
Squamata	Gekkonidae	*Hemidactylus mabouia*	Common House Gecko	Not Evaluated	Least Concern
Squamata	Varanidae	*Varanus niloticus*	Nile Monitor	Not Evaluated	Least Concern
Crocodylia	Crocodylidae	*Crocodylus niloticus*	Nile Crocodile	Least Concern	Near Threatened
Serpentes	Pythonidae	*Python sebae*	African Python	Not Evaluated	Least Concern
Serpentes	Elapidae	*Naja melanoleuca*	Forest Cobra	Not Evaluated	Least Concern

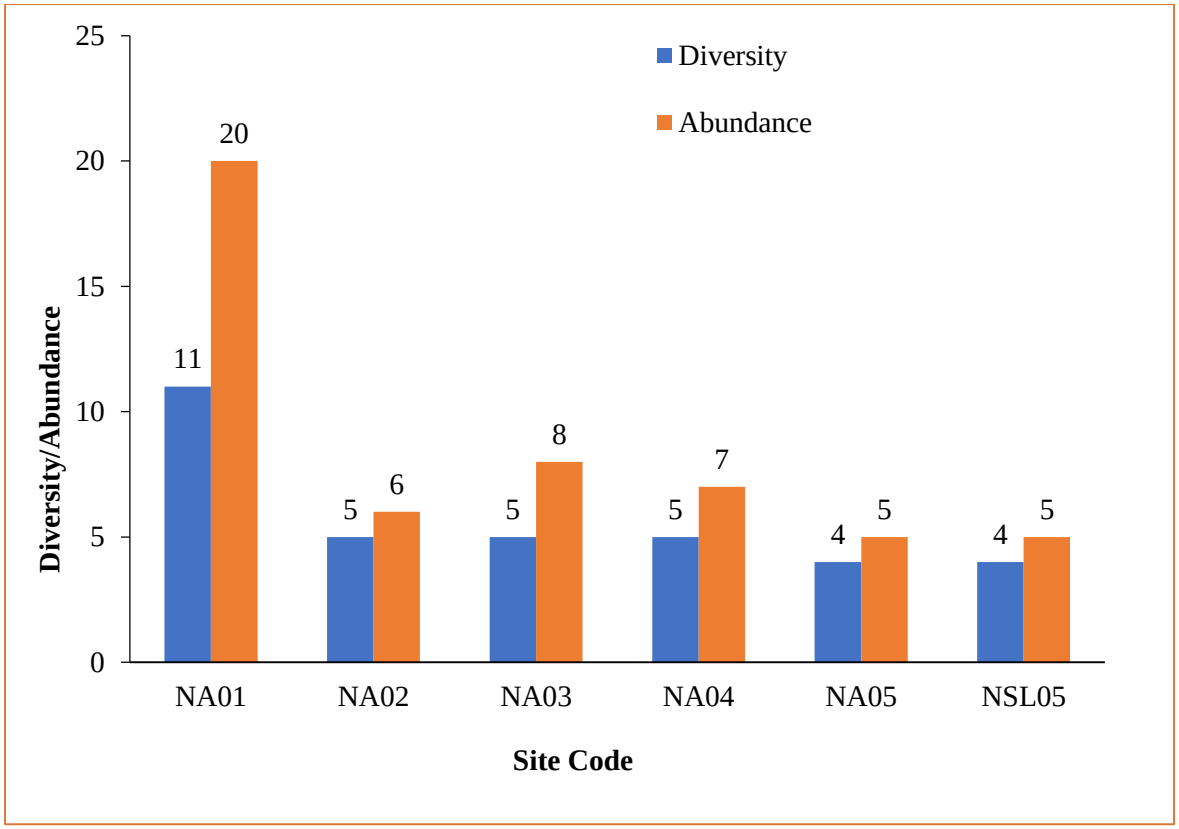

Chart 4.3: Reptilina diversity and abundance of sites along Biko-Namasale pipeline Route

4.3.15.5 Critical sites

Critical sites were assessed using World Bank (2017) and IUCN (2016) definitions to support the country's method based on species richness and the most critical habitat rank were the ones with the highest species richness. The combined ranks for amphibians and reptiles select out the most critical sites for the herpetofauna, with the least sum representing the most critical habitat. Any development should take great care at such critical sites, such as applying the necessary mitigation measures.

Thus, for the project, the most critical sites for herpetofauna were the water abstraction point at Biko (NA01) ranked first, followed by the outskirts of Lenko (NA03) ranked second and then Kayago landing (NA04) ranked third.

Table 4-13: Number of species in the sample sites

Taxon	NA01	NA02	NA03	NA04	NA05	NSL05
Amphibia	9	6	8	8	5	
Reptilia	11	5	5	5	4	4
Total	20	11	13	13	9	4
Rank	1	4	2	2	5	6

4.3.16 Results and discussions (Birds)

4.3.16.1 Introduction

Uganda has 1007 bird species, of which 7 are Endangered, 11 Vulnerable and 26 Near-threatened. 190 species are listed in the East Africa Regional Red List (Bennun and Njoroge 1996). The categories of birds according to their habitat include forest specialists (FF), forest generalists or forest edge species (F), forest visitors (f), species restricted to wetlands/open waters (W), water bird non-specialist, often found near water (w) and grassland species (G) (Caswell, *et al.*, 2005, Bennunand Njoroge, 1996). Uganda has 134 are Palaearctic migrants (species that breed in Europe and Asia during summer and migrate to Africa during winter season). It is also a range state for 56 species that are Afro-tropical migrants (birds that migrate within the African continent) (Caswel, *et al.*, 2005).

4.3.16.2 Conservation value of birds

Given the significance of birds for conservation planning and environmental assessments, there is a need for a better ecological understanding of the role of avian community structure in conservation decision-making. Thus, they are widely used in conservation and population trends in farmland are one of the 15 'Quality of Life' indicators. In addition, small land birds in particular have often been proposed as potential indicators for the presence of other unrelated taxa or as environmental change indicators to be integrated into broader monitoring schemes. Furthermore, they are frequently included in evaluation studies for overall biodiversity conservation (Gregory *et al*., 2004; Kati and Sekercioğlu 2006).

4.3.16.3 Birds as biodiversity indicators

Birds are good indicators of general biodiversity i.e. areas very rich in bird species have been found to also be rich in other biodiversity. Birds have been found useful as bio-indicators because they are:

- Wide spread, they occur in all habitats (forest, grassland, water, cultivation)
- Relatively large, conspicuous- easily surveyed with simple methods like observations, use of calls to record presence or absence
- Mostly active during the day (compared to many mammals and amphibians)

- Specialized in their habitats in some cases e.g. forest or water bird specialist. The disappearance of such specialist species in an ecosystem can be used to assess the health of that particular ecosystem or the extent of degradation.

4.3.16.4 Habitat classification

Birds recorded were classified into categories, where possible, basing on the standard habitat classification by Bennun and Njoroge (1996) and Carswell*et al*., (2005). This classification is widely used in evaluation of avifauna in Uganda. The categories are;

- FF - Forest specialists (species of typical forests interior)
- F - Forest generalists (species less specialized also occur in small patches of forests)
- G – Grassland species
- f - Forest visitors
- W - Water bird specialists (normally restricted to wetlands or open waters)
- w - Water bird non specialists (often found near water)
- Ae – Aerial feeders

A species can fit into two ecological categories; for instance, it can be both a water non specialist at the same time forest visitor. In this categorization, it is important to note that species of the open areas are not categorized to finer details of vegetation descriptions and are based on generalizations of natural habitat types. Bush land, thickets and human modified habitats such as gardens and built areas are not directly included. Because they are not tied to any restrictions, species in the non-specialist categories i.e. G, f, F and w can inhabit a wide range of open habitats in the landscape including bush land, thicket, woodland, and cultivated areas. The 'FF', 'F' and 'f' species also comprise the tree species and stress the importance of trees in areas where they are recorded.

4.3.16.5 Birds species in the project area

Overall 229 individuals of birds were recorded along the Namasale water supply pipeline, representing 57 species in 32 families (Annex 6); the diversity was overall high in all sites, but Biko landing site had the highest diversity with 31 species, followed by Namasale landing site (19 species) and Angauryem village (18 species). Kayago landing site had the least diversity with 11 species (Annex 6). Species abundance was generally low amongst most species, little egret was the most abundant species (14) followed by Winding cisticola (13) and Black headed weaver with (12) (Annex 6).

Relative species abundance also conformed to the abundance hollow curve implying a few species are common (abundant) while many are considered rare (Chart 4.5). Rarefaction curves were used to estimate species richness. However, it should be noted that rarefaction curves only work well when no taxon is extremely rare or common, it does not account for specific taxa, it does not recognize species abundance, only species richness and does not provide an estimate of asymptotic richness meaning that it cannot be used to extrapolate species richness trends in larger samples. A comparison of species

accumulation in relation to sample size using rarefaction curves shows that; non of the curves for the surveyed locations attained the asymptote, only Site Bukaye is starting to attained the symptote while curves from other sampling sites are yet to attain the asymptote. For the sites that did not attain the symptote it means that further surveys might yield more species. The smoothed averages of the individual curves (chart 4.5) represent the statistical expectation of species accumulation curve per sampling site.

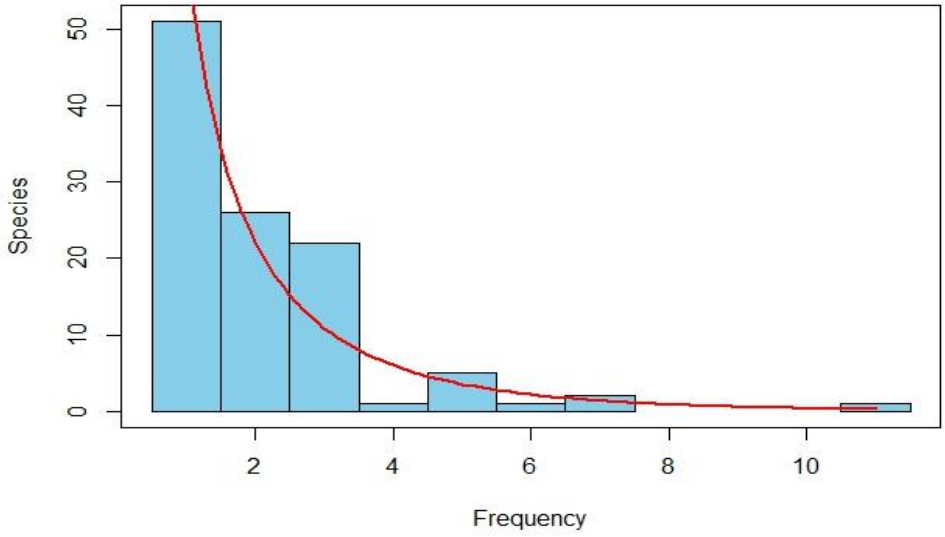

Chart 4.4: Universal hollow curve for the relative species abundance of the bird community along the proposed Namasale water supply route.

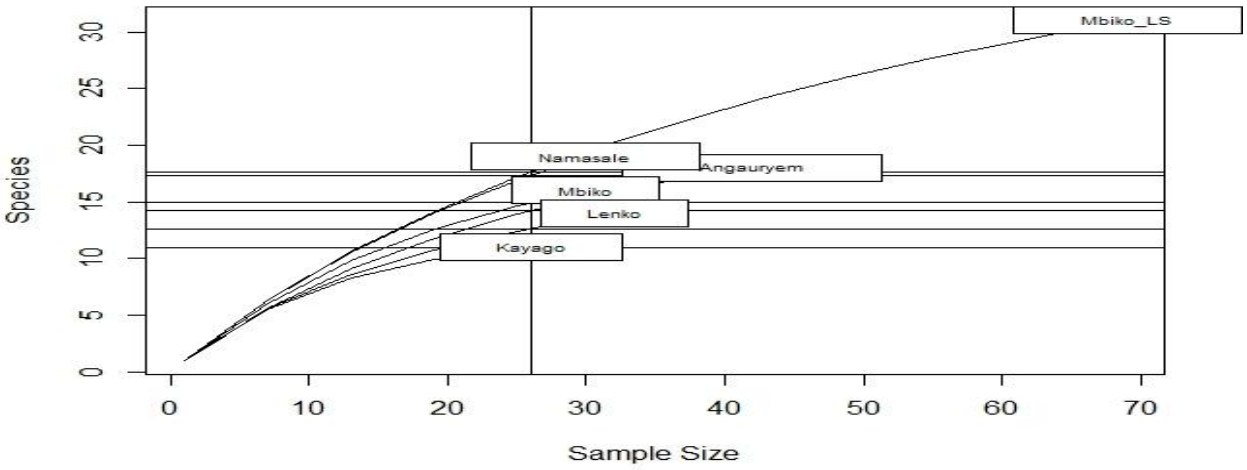

Chart 4.5: Rarefaction curves comparing birds sample size and species accumulation for the different sampling sites along the proposed Namasale water supply pipeline route

4.3.16.6 Ecological status of birds recorded along the project area

The survey locations were within the proposed project area route where the intake was at Biko landing site on Lake Kyoga (See figure 4-20 above for the map of the surveyed sites). Overall the sites along

the lake where characterized by marshy swamps while those away where a mosaic of fallows, settlements and gardens. Wetland visitors were dominant representing 18 individuals of all recorded birds followed by grassland specialist (13) and water specialist (11) (Table 4-13). Lake Kyoga and the associated wetlands provide suitable habitat for water specialists such as the little egret (*Egretta garzetta*) and African reed warbler (*Acrocephalus baeticatus*).

Table 4-14: Number of species in various categories of ecological classification within Namasale project area

Target species				No.Spp
Ecological feature	Forest specialist		FF	0
	Forest generalist		F	0
	Forest visitors		F	4
	Wetland specialists		W	11
	Wetland visitor		W	18
	Grassland specialists		G	13
	Woodland		Af	7
	Generalists		Gen	11
	Aerial feeder		Ae	0
Migrants	Palearctic		P	
	Afrotropical		A	
Red-list Species	Globally	Critically	G-CR	
		Endangered	G-EN	
		Near- threatened	G-NT	
		Vulnerable	G-VU	
	Regionally	Endangered	R-EN	
		Vulnerable	R-Vu	
		Near- threatened	R-NT	6
		Regional responsibility	RR	
		Regional restricted range	R-RR	1
	Uganda	Endangered	U-EN	
		Vulnerable	U-VU	
		Near- threatened	U-NT	
Non-Red-list Species		Least- Concern	LC	51

4.3.16.7 Species of conservation concern

According to IUCN (2018), all species recorded are considered as Least Concern (Annex 6), basing on their wide distribution, stable populations and not facing any alarming threats. Seven species of regional importance were recorded i.e. six regionally Near Threatened (R-NT) and one Red-chested sunbird which is a regionally restricted range (R-RR) (Table 4-15). 14 below shows the bird species of regional importance encountered in Namasale.

Table 4-15 Bird species of regional importance in Namasale

Family	Common Name	Scientific name	Habitat	Conservation status	Biko landing site	Angauryem village	Biko	Kayago landing site	Namasale landing site	Lenko wetland	Abundance
Monarchidae	African Blue flycatcher	*Elminia longicauda*	f,G	LC	0	0	1	0	0	0	1
Accipitridae	AFRICAN FISH EAGLE	*Haliaeetus vocifer*	W	LC	1	0	0	0	0	0	1
Columbidae	African green pegion	*treron calva*	Af	LC	1	0	0	0	0	0	1
Jacanidae	African jacana	*Actophilornis africana*	W	LC	1	0	0	2	1	1	5
Accipitridae	African Marsh-Harrier	*Circus ranivorus*	W	R-NT	1	0	0	0	1	0	2
Apodidae	African palm swift	*Cypsiurus parvus*	Gen	LC	0	0	0	2	1	0	3
Motacillidae	African pied wagtail	*Motacilla anguip*	Gen	LC	0	1	2	0	0	0	3
Sylviidae	African reed warbler	*Acrocephalus baeticatus*	W	R-NT	0	10	10	1	2	3	6
Charadriidae	AFRICAN WATTLED LAPWING (Plover)	*Vanellus senegallus*	W	LC	2	0	0	0	0	0	2
Gruidae	Balearica regulorum	*Grey crowned crane*	wG	LC	0	0	0	4	0	0	4
Rallidae	Black Crake	*Amaurornis flavirostris*	W	LC	1	0	0	0	1	1	3
Malaconotidae	Black headed gonolek	*Laniarius erythrogaster*	Gen	LC	3	0	0	0	0	0	3
Ploceidae	*Black-headed Weaver*	*Ploceus melanocephalus*	Gen	LC	0	1	3	5	0	3	12
Coliidae	Blue naped mousebird	*Urocolius macrourus*	G, Af	LC	0	2	0	0	0	0	2
Columbidae	Blue spotted wood dove	*Turtur afer*	Af	LC	1	3	2	0	0	0	6
Estrildidae	*Bronze Mannikin*	*Lonchura cucullata*	G	LC	0	0	5	0	3	0	8

Leiothrichidae	Brown barbler	*Turdoides plebejus*	Af, G	LC	0	3	0	0	0	0	3
Psittacini	Brown parrot	*Poicephalus cryptoxanthus*	f	LC R-NT	12	0	0	0	0	0	2
Ardeidae	Little egret	*Egretta garzetta*	W	LC	5	0	0	3	0	6	14
Ardeidae	Cattle egret	*Bubulcus ibis*	G,w	LC	7	2	0	0	0	0	9
Pycnonotidae	Common bulbul	*Pycnonotus barbatus*	Gen	LC	3	2	1	0	0	0	6
Estrildidae	COMMON WAXBILL	*Estrilda astrild*	wG	LC	5	0	3	0	1	0	9
Cisticolidae	Croaking cisticola	*Cisticola natalensis*	G	LC	0	0	0	0	0	0	0
Ardeidae	Goliath Heron	*Ardea goliath*	W	R-NT	1	0	10	0	1	0	2
Sylviidae	Greater Swamp Wabler	*Acrocephalus rufescens*	W	LC	0	0	0	0	2	1	3
Cisticolidae	Grey backed camaroptera	*Camaroptera brevicaudata*	f	LC	0	2	0	0	0	0	2
Passeridae	Grey headed sparrow	*Passer griseus*	G	LC	0	0	2	0	0	0	2
Ardeidae	Grey heron	*Ardea cinerea*	w	R-NT	1	0	10	0	1	0	2
Threskiornithidae	Hadada Ibis	*Bostrychia hagedash*	w	LC	2	1	0	0	3	0	6
	Hammerkop		w	LC	0	0	0	0	0	3	3
Columbidae	Laughing dove	*Spilopelia senegalensis*	f,G	LC	0	0	1	0	1	0	2
Apodidae	Little Swift	*Apus affinis*	w	LC	3	1	0	0	0	0	4
Accipitridae	Lizard buzzard	*Kaupifalco monogrammicus*	f,G	LC	0	0	1	0	0	0	1
Ploceidae	Northern brown throated weaver	*Ploceus castanops*	W	R-RR	1	0	0	0	0	0	1
Ciconiidae	Open billed storke	*Anastomus lamelligerus*	W	LC	2	0	0	0	0	0	2
Corvidae	Piapiac	*Ptilostomus afer*	Gen	LC	0	3	0	0	0	0	3
Alcedinidae	Pied Kingfisher	*Ceryle rudis*	W	LC	1	0	0	0	1	0	2
Ardeidae	Purple Heron	*Ardea purpurea*	W	R-NT	0	10	10	1	2	1	4
Alcedinidae	Pygmy King fisher	*Ispidina picta*	Af	LC	0	1	0	0	0	0	1
Ploceidae	Red billed quelea	*Quelea quelea*	Gen	LC	0	11	0	0	0	0	11
Columbidae	Red eyed dove	*Streptopelia semitorquata*	Gen	LC	0	2	2	0	0	0	4
Macrosphenidae	Red faced Crombec	*Sylvietta whytii*	Gen	LC	1	1	0	0	0	0	2
Cisticolidae	Red-faced Cisticola	*Cisticola erythrops*	G.w	LC	2	2	1	0	0	1	6
Sturnidae	Ruppell's long tailed starling	*Lamprotornis Purpuropterus*	Gen	LC	3	3	2	0	0	0	8

Charadriidae	SPUR-WINGED LAPWING (Plover)	*Vanellus spinosus*	WG	LC	2	0	0	0	0	2	4
Muscicapidae	Swamp fly catcher	*Muscapa aquatica*	W	LC	1	0	0	2	1	1	5
Cisticolidae	*Tawny flanked prinia*	*Prinia subflava*	G	LC	0	0	2	0	0	0	2
Muscicapidae	White browed robin-chat	*Cossypha heuglini*	Gen	LC	0	0	1	0	0	0	1
Anatidae	White faced whistling duck	*Dendrocygna viduata*	W	LC	3	0	0	0	0	0	3
Cuculidae	White-browed Coucal	*Coucal superciliosus*	Af	LC	1	0	0	0	1	0	2
Phaenicophilidae	White-winged Warbler	*Bradypterus carpalis*	W	LC	1	0	0	1	0	3	5
Cisticolidae	Winding Cisticola	*Cisticola galactotes*	G,w	LC	3	0	0	2	3	5	13
Hirundinidae	Wire tailed Swallow	*Hirundo simthii*	w	LC	7	0	0	3	0	0	10
Ciconiidae	Yellow billed storke	*Mycteria ibis*	w	LC	1	0	0	0	1	1	3
Lybidae	Yellow fronted tinker bird	*Pogoniulus chrysoconus*	G,Af	LC	0	1	0	0	0	0	1
Ploceidae	YELLOW-BACKED WEAVER	*Ploceus melanocephalus*	W	LC	0	0	0	0	3	0	3
Cisticolidae	Zitting cisticola	*Cisticola juncidis*	G	LC	0	0	1	0	0	0	1
	DIVERSITY				**3.2**	**2.6**	**2.63**	**2.27**	**2.82**	**2.42**	

4.3.17 Results and discussions (Mammals)

4.3.17.1 Introduction

Mammals exploit a broad range of niches and play crucial ecological roles that influence community structure and ecosystem functioning (Ripple *et. al*., 2014). The presence and distribution of flora and fauna within an ecosystem be it aquatic or otherwise is a component of various factors; anthropogenic activities, altitudinal, flood regimes, habitat suitability, the amount of dissolved oxygen, nutrients and suspended solids. The distribution and occurrence of mammalian species in the study area is mainly because of anthropogenic activities. It was observed that areas with high levels of human disturbance recorded few species compared to those with limited disturbance.

4.3.17.2 Small mammals

These include rodents, shrews and bats and are a very significant component of any terrestrial ecosystem (See section 4.3.17.4). Impacts on the dynamics of their populations, species composition and preferred habitats may have gross and irreversible impacts on the ecosystem for the larger species of mammals.

4.3.17.3 Large and medium sized mammals

Medium- sized and large mammals are conspicuous and mainly have a diurnal habit. Medium and large sized mammals are considered good bio indicators and have therefore been used in large-scale monitoring programs worldwide (Luzar *et. al*., 2011 and Nobre *et. al*., 2013). Data obtained from these rapid surveys will provide information on the current quality of the study areas and the mammal populations. Because anthropogenic disturbances are likely to affect occurrence and abundance of mammal species, these surveys will contribute to the understanding of human impacts on mammal assemblages and help identify local patterns of change. The results are intended to inform the development of the water pipeline focused on protection and management of mammals expecially threatened species

4.3.17.4 Mammals in the project area

A total of 51 mammalian individuals representing 12 species and seven families were recorded in the project area (Tabs 4.16 & 4.17). Mammal diversity was overall low from all the sampled sites; Angauryem having recorded the highest diversity followed by Kayago and Namasale and Lenko, these areas were characterised by more natural vegetation cover such as swamps compared to the other sites along the water pipeline route. Species abundance was generally low among most species, *Chlorocebus pygerythrus* being the most abundant abundant species (15) followed by *Colobus guereza* (10). Bat species were reported in the area but none seen for identification because the survey was diurnal.

Table 4-16: Occurrence of mammalian species recorded in the different sites along the Namasale town water supply pipeline

Order	Family	Scientific name	Common name	IUCN
Carnivora	Canidae	Canis mesomelas	Black backed jackal	LC
Primates	Cercopithecidae	Colobus guereza	Black and white colobus monkey	LC
Primates	Cercopithecidae	Chlorocebus pygerythrus	Vervet monkey	LC
Eulipotyphla	Soricidae	Crocidura olivieri	African giant shrew	LC
Carnivora	Herpestidae	Atilax paludinosus	Marsh mongoose	LC
Rodentia	Muridae	Aethomys sp	Rock rat	LC
Rodentia	Muridae	Arvicanthis niloticus	African grass rat	LC
Rodentia	Muridae	Mastomys natalensis	Natal multimammate mouse	LC
Rodentia	Muridae	Lemniscomys striatus	Striped grass rat	LC
Rodentia	Muridae	Lophromys aguilus	Gray brush furred rat	LC
Carnivora	Mustelidae	Hydrictis maculicollis	Spotted neck otter	NT
Rodentia	Sciuridae	Xerus erythropus	Striped ground squirrel	LC

Table 4-17: Occurance of mammalian species recorded in the different sites along the Namasale town water supply pipeline

Species	Biko	Angauryem	Biko	Kayago	Namasale	Lenko	Abundance
Canis mesomelas	0	0	1	0	0	0	1
Colobus guereza	0	10	0	0	0	0	10
Chlorocebus pygerythrus	0	12	1	1	1	0	15
Crocidura olivieri	0	0	0	1	0	0	1
Atilax paludinosus	1	0	0	0	0	2	3
Aethomys sp	0	1	0	0	0	0	1
Arvicanthis niloticus	0	1	0	0	2	0	3
Mastomys natalensis	0	2	0	0	0	0	2
Lemniscomys striatus	0	0	0	2	0	0	2
Lophromys aguilus	3	0	3	0	0	2	8
Hydrictis maculicollis	0	0	0	0	1	1	2
Xerus erythropus	0	3	0	0	0	0	3
DIVERSITY	0.56	1.38	0.95	1.04	1.04	1.05	

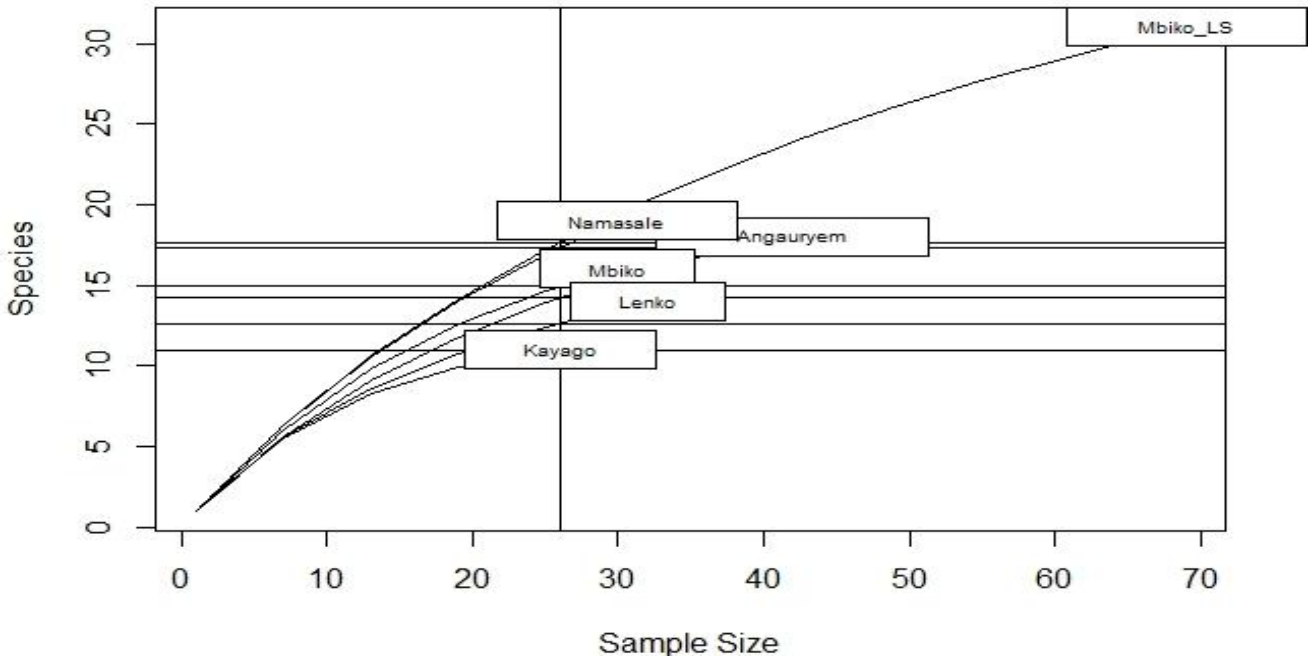

Chart 4.6: Rarefaction curves comparing sample size and species accumulation for the different sampling sites along the Namasale town water supply pipeline

A comparison of species accumulation in realtion to sample size using rarefaction curves shows that only one curve for Angauryem was starting to attain the asymptote while the rest of the curves for the other survey sites did not attain the asymptote (chart 4.7). For the sites that did not attain the symptote it means that further surveys might yield more species. The smoothed averages of the individual curves (4.7) represent the statistical expectation of species accumulation curve per sampling site.

4.3.17.5 Species of conservation concern

According to IUCN (2018), most species recorded are considered as Least Concern (4.15), basing on their wide distribution, stable populations and not facing any alarming threats. One Globally threatened species was recorded i.e. *Hydrictis maculicollis* (Spotted neck otter) which is globally near threatened (IUCN 2018). This was observed in the waters along the shorelines of Namasale and Lenko. Although this species has a large distribution they are restricted to areas of permanent fresh water, offering good shoreline cover and an abundant prey base. The Spotted-necked Otter is decreasing throughout its range, mainly as a result of the alteration or degradation of freshwater habitats and riparian vegetation (Reed-Smith *et. al*., 2015).

4.3.18 Results and discussions (Invertebrates)

4.3.18.1 Introduction

Insects are highly susceptible to the adverse effects of disturbances and land use changes have been found to alter abundance and species richness of many insect groups. Many tropical species are locally endemic or are rare and with patchy distribution which predisposes them to increased extinction risk

when habitats are modified (Terborgh, 1992). Butterflies are known sensitive indicators of environmental change associated with natural and human-induced disturbances. Their populations are influenced by changes in local climatic conditions and the availability of host plants for larval and adult stages (Thomas *et al*., 1998). The dragonflies that are predominantly diurnal, utilizing both aquatic and terrestrial habitats contribute greatly to the evaluation of environmental quality (Miller and Miller, 2003). They are known to be very sensitive to structural habitat quality and are used as indicator groups to evaluate landscape degradation. The adults are sensitive to habitat structure and are excellent indicators of river disturbances.

4.3.18.2 Invertebrates in the project area

A total of 20 butterfly species in five families were recorded in the different pipeline sections sampled (Table 4.18) and eight dragonfly species were recorded (Table 4.19). A number of habitat specific butterfly species were present for example eight migrant species, one open habitat species and 11 widespread species.

Table 4-18: Butterfly species recorded from the different sites along Namasale Town council water pipeline with their corresponding habitat preferences

Species	Ecotype	Biko	Lenko	Kayago
Nymphalidae				
Acraea eponina	W	1	1	
Amauris niavius	W		1	
Bicyclus safitza	W	1	1	1
Danaus chrysippus	M	1	1	
Junonia oenone	W	1	1	1
Junonia terea	W		1	
Neptis serena	W		1	
Pieridae				
Belenois creona	M	1		
Catopsilia florella	M	1	1	1
Colotis danae	W		1	
Colotis eucharis	W		1	
Eurema brigitta	M	1		1
Eurema hecabe	M		1	
Lycaenidae				
Azanus jesous	M		1	
Leptotes pirithous	M	1		

Species	Ecotype	Biko	Lenko	Kayago
Zizeeria knysna	W	1	1	
Zizula hylax	W	1		1
Zizina antanossa	W	1		
Hesperiidae				
Spialia spio	O	1		1
Papilionidae				
Papilio demodocus	M	1	1	1
Total = 20 Species				

4.3.18.3 Dragonfly species results

A total of nine dragonfly species were recorded and have been assessed for the IUCN Red List and are all categorized as being of least concern (LC). Table 4.18 shows dragonfly species recorded in the different transects surveyed in the areas of interest along the three pipeline routes.

Table 4-19: Dragonfly species recorded from the different sites along Namasale Town council water pipeline

Species	IK	KK	Namasale T/C
Brachythemis lacustris	1	1	1
Ceriagrion glabrum	1	1	1
Crocothemis erythraea	1		1
Elattoneura glauca		1	
Nesciothemis farinosa	1	1	1
Orthetrum chrysostigma	1	1	1
Palpopleura lucia	1	1	1
Pseudagrion kersteni			1
Trithemis arteriosa	1	1	1
Total = 9	7	7	8

4.3.18.4 Species of conservation concern

The study did not record within the direct impact areas any globally or nationally threatened species of butterflies. No species of conservation concern in the sense of endemism, threat in IUCN context or rarity were recorded. Of all the butterfly species recorded by the surveys, only three species (*Eurema brigitta, Junonia oenone* and *Zizina antanossa*) have been evaluated for the IUCN Red List, while the other species have not yet been evaluated. The three species are all categorized as being of least concern.

5 PUBLIC CONSULTATION AND DISCLOSURE

5.1 Introduction

NEMA guidelines as well as the World Bank safeguard policies require the people likely to be affected by a development project to be consulted so that their views and fears are incorporated in planning. Community perspectives are important for project planning and implementation. Knowledge of what the community perceives will go a long way to help during the compensation and resettlement action plan. Therefore, during the ESIA process, consultations were conducted with relevant stakeholders, including potential beneficiaries, affected groups and local authorities about the project's environment and social aspects and their views considered. To meet this requirement, the EIA team held public consultations with all the villages affected by the proposed Namasale water and sanitation project. National agencies and district local governments were also consulted.

The stakeholder engagement and consultation process was undertaken as per the requirements of the Environmental Impact Assessment Regulations. Under sub-regulation (1) of regulation (12) of the Environmental Impact Assessment regulations for Uganda (1998) and best international practice, the project developer is required to undertake public consultations during the ESIA process as detailed below.

1) The developer shall take all measures necessary to seek the views of the people in the communities which may be affected by the project during the process of conducting the study under these regulations.

(2) In seeking the views of the people under sub-regulation (1), the developer shall -

(a) Publicise the intended project, its anticipated effects and benefits through the mass media in a language understood by the affected communities for a period of not less than fourteen days;

(b) After the expiration of the period of fourteen days, hold meetings with the affected communities to explain the project and its effects; and

(c) Ensure that the venues and times of the meetings shall be convenient to the affected persons and shall be agreed with the leaders of local councils.

5.2 Public participation objectives

Stakeholders were engaged during the ESIA process to create awareness about the project and obtain their perceived positive and negative social and environmental impacts. Consultations were undertaken in order to;

- Explain the project and create awareness;
- Ensure Compliance with both national regulations and international best practice
- Obtain baseline environmental and social conditions in the proposed project area based on local knowledge;

- Obtain their perceived economic, social and environmental benefits so that they can be enhances during project implementation and operation;
- Obtain the perceived potential negative environmental and social impacts so that they can be mitigated;
- Provide equal opportunity to stakeholders to get involved in project planning;
- Manage expectations and concerns: by providing a mechanism for stakeholders to engage with the project about their concerns and expectations and provide a mechanism for receiving, documenting and addressing comments received
- Build trust with the stakeholders.

5.3 Stakeholder participation process

The ESIA team formulated a stakeholder matrix and identified key stakeholders to be engaged during the scoping phase. A stakeholder engagement plan was drafted clearly identifying stakeholders and their probable interest. These included; directly affected and indirectly affected community members, local leaders and Government Agencies. Stakeholders that have been consulted during this ESIA process include; Community within the project area, Amolatar district local government, Namasale Town Council leaders, Ministry of gender labour and social development Labour, OSH, community development departments) and Ministry of water and environment.

5.4 Methods of engagement

Stakeholder engagement during the ESIA study involved different methods. These included formal meetings, key informant interviews, focus group discussions and public meetings as illustrated in the table 5.1 below.

Table 5-1: Summary of stakeholders identified and consulted during the ESIA process

Activities	Stakeholder	Purpose of Information sharing/ disclosure
Awareness/sensitization meetings by the EIA team	PAPs and Land owners	General overview of project and implications
Focus groups	Women Youth Elderly Persons with disability Area leaders Other interest groups	General overview of project and implications Disclosure of mitigation measures and grievance mechanism Identification of views and expectations
Village meeting / public consultation	All PAPs Indirectly affected people	General project overview

Activities	Stakeholder	Purpose of Information sharing/ disclosure
		Identification of views and expectations Disclosure of mitigation measures Acquisition of information for input into ESIA
Formal meetings	Government bodies Local government	Overview of project and implications Disclosure of mitigation measures Acquisition of information for input into ESIA
Key informant interviews	Local government Government officers Local and political leaders Cultural Leaders	Overview of project and implications Baseline data Feedback on the project proposals

Before community meetings were convened, members of the EIA team visited a Local Council I leader to introduce the subject and request for assistance to mobilize the community, who own land next to the road reserve where the proposed water pipe line will run and those with interest for a meeting. Letters of introduction for this purpose were issued by Ministry of Water and Environment to all Local Councils and District authorities. Details of institutions, communities and interest groups consulted and detailed minutes of the consultations are contained in Annex 1.

5.5 Findings

5.5.1 Consultations at district level

Meetings were held at district and Town Council level where both technical staff and political leaders expressed their views and concerns about the proposed project. Below is a summary of findings at this level.

5.5.1.1 Namasale Town Council Agriculture officer

The Town Council Agricultural Officer expressed concern about the crops that were likely to be destroyed because some were due for harvest although he added that he did not expect objection from the community. He highlighted shortage of clean water and poor hygiene as the main challenges within the project area. For this reason he noted that extension of water would improve people's hygiene because the current sources i.e. open sources and boreholes were not safe. He added that sensitization should be done throughout the communities likely to be affected.

5.5.1.2 Namasale Town Council

A meeting which was held with several officials from Namasale Town Council (Details of those who attended are attached under Annex 2) expressed concern about the likely damage to trees and structures due to the project. They said that there was need to sensitize the local community as a way of ensuring acceptance. According to the Town Council Officials, improved access to water will ensure improved livelihood for the women specifically pointing out anticipated improvement in maternal and child health at Biko H.C II.

5.5.1.3 Chief Administrative Officer

The CAO was happy about the project and was optimistic that the initiative would reduce the incidence of people using contaminated water. He pointed out that water borne diseases such typhoid, intestinal worms and cholera have a high occurrence in the area because of limited access to safe potable water.

5.5.1.4 L.C V Chairperson

The chairperson stated that Namasale had a water problem despite being located near two big water bodies i.e. the Nile and L. Kyoga. However, he was optimistic that the proposed water project would improve the situation. He noted that Namasale is a multicultural Society and has been ear marked as a convocational center for the entire country.

5.5.1.5 Resident District Commissioner

The RDC noted that many places in the district needed water adding that it is a presidential directive to have a bore hole per village. He however noted that as a district this may be difficult because some areas have salty water while some don't have viable underground water sources. He indicated that currently the safe water coverage in the district was at 70% although there are variations among sub counties. The other concern he highlighted was likely land take wrangles arising from project implementation. He was informed that the water pipe would mainly follow the existing road reserve therefore this is unlikely to occur.

5.5.1.6 Senior Environment Officer (SEO)

The SEO mentioned that there is seasonal drop in the water levels therefore this should be considered when developing plans. He added that the lake which is the proposed main water source for this water scheme has an invasive weed which sometimes covers the lake's surface. Suds were also noted as a potential source of interruption at the intake point. In regard to land issues the Senior Environment Officer noted that the water intake and treatment plant would be located within the protection zone therefore all due diligence should be exercised to avoid contamination from project activities.

5.5.2 Community sensitization

The project was disclosed to communities through meetings with all communities that will be affected by the project. A total of 4 meetings were held with members from 15 villages in the project host area. The villages were Wabinua A, Wabinua B, Oribchan, Odokolit, Kayago A, Kayago B, Kayago C, Apitopat, Market area, Kasubi, Trading centre, Kamaul, Bung, Aweipeko and Biko.

5.5.2.1 Mobilisation of Project Affected Persons

Project Affected Persons were mobilised by their respective area Local Council leaders in which a central location was chosen as the meeting venue. The meetings comprised all affected persons from the affected villages. Attendance was good and in most instances, three to four villages converged at one central location. Several local leaders and community members attended these consultative meetings in each case as affected individuals or as public leaders (a full list of people consulted is appended to this report as Annex 2). All meetings commenced with disclosure of the project by ESIA Team Leader. During the meetings, community members were informed that this activity (ESIA process) was mandatory and a legal requirement by the laws of Uganda. They were informed that projects of this magnitude had great impact on their livelihood therefore their views were vital. The group discussion was then facilitated by the Team Leader who explored several social and economic aspects within the community. Specific information on livelihoods, culture and social networks was also collected from the meetings.

5.5.2.2 Villages consulted

A total of 156 people comprising of 39 females and 117 males were consulted. These were from 15 villages and their comments, complaints, questions and views as regards the water project were captured and have been considered during the preparation of this ESIA report. Detailed minutes of public consultations are presented in Annex 1 while a summary of these villages were mobilised and consulted is presented in 5.2 table below;

Table 5-2: List of villages from which project affected persons were consulted

Key contact person	Meeting date	Ward	Village
Emasu Moses 0775975598	4th/09/2018 10:00am	Wabinua	Wabinua A
			Wabinua B
			Oribchan
			Odokolit
Ssenyonga Richard 0777176518	4th/09/2018 2:00pm	Kayago	Kayago A
			Kayago B
			Kayago C
			Apitopat

Awel Nelson 0787448656	4th/09/2018 4:00pm	Central	Market area
			Kasubi
			Trading centre
			Kamaul
			Bung
Odong Bosco 0776117482	5th/09/2018 10:00am	Aweipeko	Aweipeko
			Biko

5.5.2.3 Summary of Key Public Issues about the project

During public consultations in the above areas, a number of concerns were raised most of which were common and repetitive in all areas. The issues raised included but were not limited to the following;

Destruction of property

In all meetings stakeholders wanted to know whether property destroyed during project implementation would be compensated for. They were informed that a RAP will be undertaken and all property destroyed would be compensated.

Delayed implementation of project

They were pessimistic as to whether the project would be implemented any time soon because promises had been made about the water project since 2002. They were advised to be patient and be hopeful as government finalizes all funder's requirements.

Water quality

Water quality issues were raised and they wanted to know whether the water would be treated before distribution. They were informed that a water treatment plant was to be established at Biko to ensure that the water distributed is safe.

Extension of water to households

Majority of community members in attendance wanted to know the requirements and processes involved in extending water to their individual households. The ESIA team informed them that this phase would follow the proposed layout and water would be provided at community stands.

Management of the water scheme

Concern was expressed about the management of the proposed scheme citing an example of the previous Namasale water (Project constructed under NORAD funding and others boreholes constructuted with government of Uganda funding) supply which they said failed because of miss management. The community was informed that this is a World Bank funded government project and

consideration of this had been made under the feasibility study to ascertain among others sustainability of the project.

Water extension to institutions

Communities mentioned that there are a number of institutions like schools, health and worship centre among others that should not be left out during this project. They were informed that most institutions especially schools had been considered during development of the planned water network hence they would be connected.

Water pressure

Area residents noted that the area proposed for water extension is big therefore a booster should be provide in the middle to reduce chance of reduced pressure. They were informed that the feasibility study had determined that the proposed scheme would sustainably supply water to all towns near Namasale as indicated on the proposed distribution network.

Employment of local people

They wanted to know if local people would be considered for employment during project implementation. The community was informed that priority is usually given to local people for opportunities for which they have the required skills.

Non - payment for services offered

A complaint was raised about contractors who engage local labour but leave without paying for services rendered. They cited a power project were this scenario occurred. In this regard they were advised to involve their local leaders during the recruitment exercise and also request for contracts and/or formal letters of appointment.

Disease outbreaks

The community noted that a number of diseases such as cholera and stomach upsets often break out at the landing site because of lack of clean water. A comment was given to the affected that this was expected to reduce when the project is implemented because it is expected that access to clean safe water and sanitation would improve.

The buffer zone

Communities of Biko expressed concern about the land earmarked for the treatment plant which they said belonged to NEMA. In this regard they were informed that the ESIA study is being conducted to ensure that project related activities do not cause harm to the environment by suggesting proper mitigation measures.

Change of proposed designs

Fear was expressed about the likelihood of some community members attempting to bribe the implementing team to alter the designs to suit their interests. The community was assured that under this phase, the proposed water extension network would be followed to the end unless changes are proposed by the ministry which would be communicated.

Public toilet

The communities noted that there is a challenge of not having public toilets which had led to littering of the area with faecal matter and increase water borne related health risks. This has been noted and provision of public toilets would be proposed for all major trading centres that don't have them because improving sanitation was component under the project.

Drowning

They said a number of children and women have drowned in the lake in attempt to draw water. The community was informed that extending piped water would reduce such risks to women and children among others.

Timing of compensation

Community members also wanted to know whether compensation for affected property would be before project activities commence. They were informed that compensation will be before construction begins because the RAP team would follow shortly to address all compensation and corridor acquisition issues before the project is implemented.

In all the meetings, a majority of the participants were aware of the project but had not received formal communication since the meeting held were the first about the project in all villages they were held. Participants emphasized that proper community consultation by professionals should be carried out continuously for this project to progress with minimum interruption to the community. The quotations below summarize the concerns of some stakeholders;

Table 5-3: Examples of issues and questions (vertatim) raised by stakeholders

- Will water be extended to the villages or just along the road to the landing site?
- Won't the proposed piped water affect property/house?
- Is it piped water or shallow wells?
- Different people have come on the issue of water eg, Northern Umbrella, are these not lies?
- The community sought clarification as to whether what the team was presenting about was not politics.
- Will local people be given opportunity to work or contractors will come with workers?

- Will the water be free of charge?
- They indicated that there is a nearby water source at Kayago why therefore should water be got form Biko?
- Can water be extended to my house?
- They wanted to know where the water would be got. From underground or the lake
- Will there be a treatment plant and laboratory for monitoring the quality?
- The proposed water line will come from Biko to Lenko through people's gardens and property will they be compensated?
- When will the work start?
- The project could take part of my land, how will government or World Bank compensate me?
- Who will be in charge of the system and facility?
- Will there be a requirement for financial contributions from the community?
- In case there is compensation, will it be before or after the project
- Will the plant be run by electricity or generator?
- Supposing people refuse the project, what happens?
- Will there be compensation and will it be equal to property lost?

As highlighted from the questions above, the affected communities were concerned most about when the project was to be implemented, what their contribution as a community would be and compensation. These concerns were highly brought out in all the meetings. The affected communities were informed that the proposed project will follow the existing road reserve to minimise displacement. Details of minutes for each meeting are attached Annex 1**.**

5.6 Conclusion

Community discussions and stakeholder interviews showed that communities will support the project if anticipated social issues are addressed in a comprehensive manner. The community and the key stakeholders expressed support for the project since they see it as a way of enhancing access to safe water in the area. The community also envisaged that the proposed project would promote development as well as employment creation for themselves or their children during construction. Despite the anticipated benefits, the project will lead to some negative social and economic impacts. To ensure that the project is managed perfectly to a logical conclusion, Ministry of Water and Environment should make the necessary budgetary provisions to ensure that mitigation commitments in the ESIA and monitoring programs are effectively implemented. In addition, public consultation and sensitization shall continue during the disclosure and implementation period in order to capture any other issues that could have been left out during the ESIA consultation exercise and address it accordingly.

6 ANALYSIS OF ALTERNATIVES

6.1 Introduction

In environmental impact assessment studies, it's important that alternatives be analyzed to maximize environmental safety. Alternatives can take on several forms including technological options, project site options, transportation options, labour sources and type and others. Several factors can influence the choice of alternatives to be considered by a Developer and in most cases, such factors are either technical, financial, socio or environmental. The best option is one which tries to strike a balance on the above factors with viable mitigations measures for residual impacts. In this project, the scenarios discussed under shall be as follows;

1. Technological options of treating and evacuating water to the consumers
2. Sanitation options
3. Project or no project options

6.2 Sources of water

Ground Water Sources

According to the feasibility study Namasale Town Council, has a low potential for groundwater development, with boreholes having an average yield of 1.90m^3/hr. Four borehole sites were identified as possible sources for ground water. They give a total yield of 8.08m^3 as shown in the table below.

Table 6-1: Identified ground water sources charactersitics

BH ID.	Location	Village	Northings	Eastings	BH depth (m)	BH yield (m3/h)	SWL (m)	BH dia (mm)
DWD 27204	Namasale P/S	Bung	457322.16	165392.21	46.5	0.80		127
DWD 27203	Namasale Tech Sch.	Bung	456497.00	165431.00	46.4	4.08		127
CD 681	Namasale T/ Council	Aweipeko	458490.00	166200.00	46.4	2.00		152
DWD 29116	Biko HC II	Aweipeko	459649.00	166481.00	42.0	1.20	40.5	127
Total						**8.08**		

The analysis showed that the existing ground water sources can neither meet the initial year's demand nor the demand for year 2040.

The population that can initially be served by the present sources is only 27%. To cover the demand deficit, initially 11 boreholes on average each yielding at 1.9 m^3/h have to be drilled and then progressively drill a total of 34 sources by the year 2040 or pump from the nearest high yielding well field 28km away from the town.

Full scale borehole siting was carried out in close proximity to these boreholes using resistivity profiling and Vertical Electrical Soundings with the hope that the new borehole sites may be even better than the old boreholes. Three main groundwater well fields were identified from the thematic analysis. The nearest well field to Namasale T/C is about 12km north of Namasale at Acii parish, Namasale sub county and the best groundwater well field is about 28km NE of Namasale T/C at Alemere parish, Muntu sub county. The fields identified above are in areas where the borehole yields are expected to be ≤ 2.48 m^3/hr which is still insufficient as source for the water supply system.

Potential well yields were further analyzed using hydro census data from DWRM. Most of the well yield around Namasale town council yielded not more than 5 m^3/hr.

According to the MWE Annual monitoring report 2014/15, the ground water in Namasale has excess iron levels and salinity in most areas which leads to corrosion and aesthetic characteristics that has led to their abandonment of the existing boreholes by the community.

Based on the findings of ground water characteristics coupled with limited yields from the existing boreholes, the option may not fulfill the long term plans of the project.

6.3 Surface Water Sources

As regards surface water, the major water body in the catchment is Lake Kyoga. Accordinng to the feasibility study of this project, the maximum demand for the project is 76.66 m^3/hr for the year 2040. The present small-scale water supplies (e.g. Namasale BMU fish handling plant rated at 6 m^3/h and Luweero Industries) and other planned water abstractions (e.g. for Nakasongola rated at 5000 m^3/d or 312.5 m3/h). This surface water source is able to meet the demand of the project area over to 2040 considering the quantity, quality, protection and feasibility. The total water demand for the current and the proposed project is less that 0.001% of the total volume of the water body and therefore the project will not have significant impact on the lake volume. Therefore, this is the preferred source of the proposed project.

Water Transmission and Distribution

The transmission and distribution pipes are either made of steel or plastic. The steel pipes may undergo rusting and this may comprise the quality of water as well. This may also lead increased maintenance costs as rusting of the pipes may require them to be replaced. The plastic pipes are therefore the best alternativetive. Treated water will be pumped through the clear water transmission plastic pipe main

from the WTP to the Storage Reservoir at the Town Council Headquarters from where the water will be distributed by gravity to the project area Parishes of Central, Kayago, Wabinua and Aweipeko. There will be 1No. duty pump and 1No. stand by pump. The clear water transmission main will comprise of an OD200 uPVC pipe of pressure rating PN10.

6.4 Sanitation options

6.4.1 Sewerage system

This ESIA is in agreement with the sanitation assessment of the feasibility study report that since the generated waste water from house connections and institutions cannot meet the minimum requirements for both the gravity conventional system and small-bore sewers, the individual connections dispose of their effluent in septic tanks, i.e. on-site storage. On being full, the septic tanks can be emptied using a cesspool emptier. The rest of the households shall be encouraged to use soak pits for waste water disposal.

6.4.2 Public toilets

Keeping the recommendations of the feasibility study on public toilets, this ESIA recommends at least 2 public toilets (water borne toilet type (6 stance, i.e. 2 stances for female inclusive of one for disabled use, and 2 stances for gents inclusive of one for handicapped and 2 urinal sets with 2 shower rooms and Hand Washing facilities) at Namsale and 1 public toilet in Biko, Kayago and Lenko landing site.

6.5 WTP Technology Selection Alternatives

The type of treatment operation performed at a drinking WTP and treatment chemicals used depend largely on the contaminants present in the source water (EPA, 2011a). An analysis of the source water quality indicates elevated levels of total suspended solids (TSS), faecal coliforms, turbidity, and apparent colour with respect to the Uganda Drinking Water Standard. To transform the source water to a potable form, the key processes of coagulation/flocculation, sedimentation, filtration, and disinfection will have to be employed. Below is an analysis of the key technologies that hat could be adopted in the key processes of coagulation/flocculation, filtration and disinfection.

6.5.1 Coagulation/Flocculation

Coagulants and flocculants that are added to raw water include metal salts (e.g. aluminium sulphate/chloride and ferrous sulphate/chloride) and polyelectrolytes. Below is an analysis of available options. Aluminium sulphate is the preferred option.

Table 6-2: Technology analysis of coagulants/flocculants.

	Aluminium/Ferrous sulphate/chloride	Polyelectrolytes
Pro	Offer the lowest price per unit weight and are widely available, thus most commonly used; insoluble at normal drinking water treatment operating conditions, thus very little metal is carried into finished product; generally, settles readily.	Effective over a wider pH range than inorganic coagulants; can be applied at lower doses; produce smaller volumes of more concentrated, rapidly settling floc; floc formed from use of a properly selected polymer will be more resistant to shear, resulting in less carryover and a cleaner effluent;
Cons	Require corrosion-resistant storage and feed equipment; may alter the pH of water since they consume alkalinity, thus need for liming; sludge exhibits poor compaction traits, ranging from 0.5 to 2 percent solids (ASCE/AWWA, 1997), thus difficult to dewater; sludge is biologically inert (inorganic) with little organic content and have little value as a fertilizer/soil conditioner; large volumes of settled floc must be disposed of in an environmentally acceptable manner.	Several times more expensive in price per unit weight than inorganic coagulants; selection of the proper polymer for the application requires considerable jar testing under simulated plant conditions, followed by pilot or plant-scale trials; All polymers must be approved for potable water use by regulatory agencies.

6.5.2 Filtration

After solids settling, the source water passes through filters to remove finer particles and metals. Various types of filter media may be used by WTPs, including permeable fabric and porous beds (EPA, 2011a; EPA, 1995). Table 6.2 below is an analysis of the types of filters used by WTPs. In general, the multimedia filter should be considered as a first option with the rapid sand filter as a second and last option given their suitability as summarized in Table 6-3 for the project, the selected option is rapid sand filtration.

Table 6-3: Technology analysis of filter types

Filter type	Characteristic	Pros/cons
Slow sand filter	Consists of a bed of fine sand above a gravel layer and underdrain system; used for low-flow rates.	Not suitable for high turbidity source waters; trap microorganisms that break down algae, bacteria, and other organic matter. The source water for the project contains up to 16.4 NTU of turbidity. This is above the Uganda Drinking Water Standard of 10 NTU. The use of slow sand filters in the project will imply increase in dosing levels of alum so as to alleviate turbidity, with cost implications.
Rapid sand filter	Consists of a bed of sand above several layers of gravel in varying sizes.	Gravity filtration is the most widely used form of water filtration in many countries. However, in rapid gravity filtration the particulate impurities are removed in or on the media, thus causing the filter to clog after a period. Clogged filters are cleaned by backwashing.
Pressure filter	Similar to rapid sand filters but the operation is housed within a cylindrical tank and the water passes through the filter while under pressure generated by a Pump rather than by gravity.	Pressure filters have been found to offer lower installation and operation costs in small filtration plants. However, they are generally somewhat less reliable than gravity filters. Their use is mainly confined to the treatment of water for industrial purposes.
Diatomaceous earth filter	Consists of a layer of diatomaceous earth above a septum or filter element.	Most suitable for low turbidity and low bacterial count source water; Coagulants and filter aids are required for effective virus removal. The source water for the project contains up to 16.4 NTU and 20 CFU of, respectively, turbidity and bacterial faecal coliforms. These are above the Uganda Drinking Water Standards of, respectively, 10 NTU and 0 CFU. The use of diatomaceous earth filter in the project will imply increase in dosing levels of alum and chlorine, with cost implications.

Filter type	Characteristic	Pros/cons
Multimedia filter	Consists of layers of various sizes of gravel, high-density garnet, sand, and anthracite coal.	Enhances the removal of tastes, odours, and organic substances. Thus, lowering the amount of alum to be employed. However, frequent backwashing may be required to remove clogs.
Membrane filters	Include ultrafilters and microfilters; use pressure as the driving force.	Designed to remove particulates smaller than 10 micrometers; WTPs using membrane separation are typically smaller plants (serving less than 50,000 people) (EPA, 2011a), thus cannot be employed in the project with an ultimate year population of 186,295.

6.5.3 Disinfection

Historically, chlorine was the disinfectant used, but more recently other chemicals such as chlorine dioxide, chloramines, and ozone have been used to purify water. Non-chemical methods of disinfection include heat and radiation (e.g. ultraviolet light (UV)). Table 6.4 below is an analysis of the key options that could be employed in the project. The application of UV disinfection for source water treatment is limited because turbidity and suspended solids that can render it ineffective (EPA, 1999c). Thus, UV has not been analyzed for the project. As can be seen from Table 6.4, ozone, the most efficient disinfectant, is not a persistent disinfectant, thus unsafe water consumption can occur in case of recontamination along transmission/distribution lines and reservoirs. It is also difficult to fulfil the legal limit for the formation of bromate during the process of ozonation, thus most WTPs tend not to employ ozonation. Chlorine and chloramines are more effective in secondary disinfection in comparison to chlorine dioxide (Less persistent chemical). Thus, chlorine dioxide may not be suitable for the project given the extent of piping systems. Lastly, though the combined residual from chloramines lasts longer than chlorine residuals, chloramines are not as effective as other germicidal agents. In general, chlorine is the key form of disinfectant employed in Uganda. This is similar to the US, a developed country, with up to 80% of WTPs employing free chlorine (EPA, 2011a).

Table 6-4: Technology analysis of didinfection types

Criteria	Disinfectant			
	Chlorine	**Chloramines**	**Chlorine dioxide**	**Ozone**
Persistency	Persistent chemical (used locally and for transport across long distances to the final consumers).	Persistent chemical (used locally and for transport across long distances).	Less persistent chemical (used locally and for transport across long distances).	Non-persistent chemical (used Locally at production plants).
Oxidant demand rate	Chloramine > Chlorine > Chlorine dioxide > Ozone			
Disinfection efficiency	Ozone > Chlorine dioxide> Chlorine > Chloramine NB: efficiency order can be changed by local conditions e.g. disinfectant consumption rate, biofilm protection, etc.			
Disinfection by-products	More than 500 by-products identified that are formed by reaction with organic matter; most products are halogenated (Cl, Br, I) organics; most relevant organic halogenated by-products are Trihalomethanes, Haloacetic acids, Haloacetonitriles, Haloketones, and	Nearly no halogenated organic by-products formed; negligible reaction with organic matter, except halogen transfer to nitrogen amines; some halogenated organic by products formed with trace of	Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated organic by products formed with excess of chlorine used or	Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated by-products formed with excess of chlorine used or chlorine formed in-situ;

	Haloaldehydes; Trihalomethanes are regulated in Europe; Both Trihalomethanes and Haloacetic Acids are regulated in the US.	chlorine or chlorine in excess; Ammonia is formed if used in excess, thus nitrite formed from Bacterial oxidation of ammonia.	Chlorine formed in-situ.	main halogen by-product is bromate; it's difficult to fulfil the legal limit for its formation, thus many WTPs have replaced the Ozonation step.

6.5.4 FSTP Technology Selection Alternatives

A number of domestic wastewater treatment technologies exist. These technologies tend to employ a combination of physical and biological techniques, in addition to being tailored to small or largescale Person Equivalent (PE). Given that the project is targeted to a municipality (i.e. medium to large PE) in a developing country, a number of low-cost treatment techniques could be employed, including activated sludge system, waste stabilization ponds, aerated lagoon system, and constructed wetlands.

Reliable energy supply is a challenge in developing countries, Uganda inclusive, thus energy intensive wastewater treatment systems such as activated sludge and aerated lagoons may not be sustainably operated. Waste stabilization ponds and constructed wetlands could be opted for given that they are low energy-based systems.

Both waste stabilization ponds and constructed wetlands are simple to operate and have low maintenance cost, thus tailored to developing countries. However, constructed wetlands are poor in removing phosphorus, unless special materials are incorporated in the substrate. On the other hand, waste stabilization ponds encourage leaching (groundwater contamination in zones with elevated water level) and are not all that good in removing suspended solids and phosphorous.

In general, waste stabilization ponds may not be the best option for the project given the elevated groundwater level at the various alternate sites. Constructed wetlands, vertical flow (VF) systems in particular, can be constructed with impervious materials, the challenge is that they are poor in removing phosphorous, thus they need to discharge into a natural wetland system prior to effluents accessing any receiving water body or include a phosphorus removal media to treat the effluent before discharging into a water body.

Table 6-5: Technology analysis of applicable FSTP types

Criteria		Activated sludge System	Waste stabilization ponds	Aerated lagoon system	Constructed wetlands (hybrid system)
Plant performance	BOD removal	Good (70 – 90%)	Good (up to 90%)	Good (80 to 905)	Good (up to 80%)
	FC removal	Fair	Good	Good	Good
	SS removal	Good (90%)	Fair	Fair	Good (Up to 90-95%)
	Helminth removal	Poor	Good	Fair	Good
	Virus removal	Poor	Good	Good	Good
	Total N removal	Good (70-80%)	Good (up to 80%)	Fair	Good (up to 80%)
	Total P removal	Good (80%)	Fair (up to 50%)	Poor	Poor
	Prevention of groundwater leaching	Good	Poor	Good	Good in VF systems; Poor HF systems
Economic factors	Simple and cheap construction	Poor	Good	Fair	Good
	Simple operation	Poor	Good	Poor	Poor
	Land requirement	Good	Poor	Fair	Good
	Maintenance costs	Poor	Good	Poor	Good

	Energy demand	Poor	Good	Poor	Fair
	Sludge removal costs	Fair	Good	Fair	

Adapted from Arthur 1983, EPA 2002, Korkusuz 2004, IUPWARE 2012, and Youbin undated.

6.6 Project Option vs No Project Option

6.6.1 No project option

Analysis of the 'no project option' as an alternative is an important component of this ESIA. It provides an environmental baseline against which impacts of the proposed action can be compared. The **'no project option'** alternative here means that the proposed Namasale water and sanitation project will not be developed, and hence the site and project area continue with the present course of actions or status quo. In this respect, government and the communities would lose all potential benefits associated clean water. With respect to the socio-economic environment, the "no-action" option would eliminate the opportunity for jobs creation, and secondary socio-economic benefits, which the proposed development would have created. This Alternative is not sustainable in the long run because the growing demand for clean water in Namasale needs a solution. Therefore, this alternative is not recommended.

6.6.2 Project Option

Project option means proceeding with the current plan and implementing the project as it is with some modifications to avert environmental damage and risks associated with community and occupational safety. The proposed Namasale water and sanitation project is urgently needed by the community and local leaders to accelerate development in the project areas. All stakeholders consulted had no objection to the proposed project. They were very optimistic about the project citing its contribution to development in the districts, through job creation, revenue collection by government and other secondary socio-economic benefits, which the proposed development will create. In view of this discussion, the Project Option is taken as viable for implementation on condition that the identified impacts are mitigated as suggested.

6.6.3 Key Benefits of Improved Water Supply If Project Is Implemented

a) Easy access to potable water within homesteads at various levels – stand posts, yard taps and house connections;
b) Reduction in incidences of diarrheal and other water borne diseases; this leads to reduction in mortality and morbidity, especially of children;
c) Improvement in hygiene and sanitation from increased use of hand washing, personal hygiene and environmental sanitation;

d) Reduction in hours spent searching for and fetching water from distant sources which would significantly increase the time allowed for other activities; this is expected to lead to better livelihood for women and the girl child, who are traditionally, responsible for fetching water;
e) Reduction in domestic violence and abuse of women as people in the homestead compete for the little potable water;
f) Reduction incidences of promiscuity which are often carried out in the guise of fetching water, some involving children; this leads to incidences of child abuse, domestic violence and early pregnancies;
g) Possibility of improving the quality of life in the poor neighbourhoods of the town where the most vulnerable people live; these areas include Custom Road "A" Village, Central Ward and Eastern Division. The project will offer pro-poor preferential tariffs to these communities;
h) Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
i) Higher quality hotels, restaurants and entertainment places since the developers can erect and maintain high quality toilets;
j) Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
k) Increased revenue to the local authority and the country in general through the collection of taxes.

6.6.4 Key Benefits of Improved Sanitation Facilities If Project Is Implemented

a) Reduced incidences of diarrheal and other water borne diseases; this leads directly to lower rates of mortality and morbidity, especially of children;
b) Greater school attendance by the girl children since they are more comfortable with cleaner and safer toilets; this leads to increased gender awareness and improvement;
c) Reduced costs for collection and disposal of faecal and other matter from homesteads; this leads to improved environmental sanitation and its attendant benefits;
d) Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
e) Higher quality hotels, restaurants and entertainment places since the developers can erect and maintain high quality toilets;
f) Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
g) Increased revenue to the local authority and the country in general through the collection of taxes.

6.6.5 Conclusion on the 'No Project' Option

Namasale Town Council and en-route growth centre residents are in urgent need of a sustainable water supply and sanitation facilities. The existing piped water supply system is operating below demand. The current sanitation systems are unreliable, in sorry state and sub-standard. If this is allowed to continue, not only will the residents be exposed to public health risks but development opportunities will continue to be stifled and curtailed. This certainly will have local, national and regional implications. Secondary implications include continuing trends of water-related diseases, no direct or indirect employment opportunities associated with the project, and continuing degradation of the environment and water resources due to unplanned disposal of faecal sludge. In general, the minor benefits of the No-Project option are far outweighed by the benefits to be attained on implementing the Namasale Water Supply and Sanitation Project.

7 IMPACT IDENTIFICATION, MITIGATION, MANAGEMENT AND MONITORING

Introduction

This chapter identifies and evaluates significant environmental consequences of the construction and operation phases of the proposed project. While positive impacts should be enhanced, the proposed mitigation measures should be implemented as suggested to minimise or eliminate the predicted negative environmental and social impacts.

7.1 Impact evaluation and analysis

7.1.1 Impact evaluation and analysis

This section assesses the level of potential impacts based on various criteria including severity of impacts, duration, geographical scope, and the existence of readily identifiable cost-effective mitigations. The impact assessment also considers the impacts identified by the stakeholders consulted. The methodology for impact evaluation was as follows:

(a) Extent: within limited area (<500m from site), local (up to 10 km) or wide (regional or global)

(b) Duration: Temporary (1 year), short term (1-5 years), Medium term (5 -10 years), Long term (> 10 years – 50yrs) or Permanent;

(c) Magnitude of impact: Low, Medium or High/Very high

- **Very High (VH) and High (H):** These denote that the impact is un-acceptable and further mitigation measures must be implemented to reduce the significance.
- **Medium (M):** Impacts in this region are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical.
- **Low (L):** Impacts in this region are considered acceptable.

(d) Probability of occurrence: Highly unlikely, Unlikely, Possible, Likely or Almost certain as presented in table 7.1 below.

Table 7-1: Likelihood of occurence classification

Probability of occurrence		
Level	**Probability**	
5	Almost certain	• Very likely to occur (91 - 100%) Could occur either immediately or within a short period of time (likely to occur most weeks or months)

Probability of occurrence		
Level	**Probability**	
4	Likely	• This impact will probably occur in most circumstances if controls are not applied (several times a year) (61 - 90%)
3	Possible	• This impact could occur at some time if controls are not applied May happen every 1 to 15 years). It is expected that the impact will occur; Chance of occurrence (41 - 60%)
2	Unlikely	• This impact is not likely to occur. Chance of Occurrence 11 – 39%.
1	Highly unlikely	• Very unlikely to occur (0 - 10%)

(e) Overall assessment of impact: Negligible, minor, moderate, substantial or severe as presented in Table 7.2 and Table 7.3 below.

Table 7-2: Criteria for rating overall impact severity (environment parameters)

Impact rating	Description of impact
Severe	• Highly noticeable, irreparable effect upon the environment. • Significant, widespread and permanent loss of resource • Major contribution to a known global environmental problem with demonstrable effects. • Causing mortality to individuals of a species classified as globally or regionally endangered. • Major exceedence of water/air quality and noise guidelines representing threat to human health in long and short term. • Causing widespread nuisance both on and off site.
Substantial	• Highly noticeable effects on the environment, difficult to reverse. • Widespread degradation of resources restricting potential for further usage. • Significant contribution to a known global environmental problem when compared with the industry world-wide.

Impact rating	Description of impact
	• Sub-lethal effects upon a globally or regionally endangered species compromising reproductive fitness and/or resulting in long-term disruption/disturbance to normal behavior. • Air quality/noise approaching occupational exposure limits. Water quality parameters approaching maximum stipulated values. • Periodic widespread nuisance both on and off site.
Moderate	• Noticeable effects on the environment, reversible over the long term. • Localised degradation of resources restricting potential for further usage. • Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behaviour returning to normal in the medium term. • Elevated contribution to global air pollution problem partly due to preventable releases. • Frequent breaches of water/air quality and noise guidelines. • Causing localised nuisance both on and off site.
Minor	• Noticeable effects on the environment, but returning naturally to original state in the medium term. • Slight local degradation of resources but not jeopardising further usage. • Disruption/disturbance to normal behaviour of a globally or regionally endangered species returning to normal in the short term. • Small contribution to global air problem through unavoidable releases. • Elevation in ambient water/air pollutant levels greater than 50% of guidelines. • Infrequent localised nuisance.
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.

Impact rating	Description of impact
	• No reported nuisance effects.

Table 7-3: Criteria for rating overall impact severity (Social and economic parameters)

Criteria	Significance Definition	
Harm to People	Potential to cause multiple fatalities or widespread chronic health problems for many people	Severe
	Potential; to cause fatalities, mutilations or serious chronic health problems for up to 3 people	Substantial
	Potential to cause Lost Time Incidents	Moderate
	Not likely to result in Lost Time Incidents	Minor-Negligible
Assets	Extensive damage to infrastructure, possibly including off-site structures	Severe
	Major damage to on-site infrastructure, halting operations and incurring substantial delay to supply replacement equipment	Substantial
	Minor damage to individual item of equipment for which a spare part or replacement can be quickly mobilized to the development	Moderate
	Damage resolved by on-site reserves, maintenance equipment and on-site personnel	Minor-Negligible
Reputation	Incident attracting international negative press coverage causing lasting harm to corporate reputation, or for which the company could be prosecuted and fined a large amount of money	Severe
	Incident attracting critical reporting requiring the company to take measures to maintain its reputation, or for which the company could be prosecuted and receive a token fine or be required to pay compensation to third parties	Substantial
	Incident attracting local news coverage and complaints, and which involves expense in engaging	Moderate

Criteria	Significance Definition	
	local communities to apologize, clarify issues and make amends	
	Incident that does not provoke complaints	Minor-Negligible

7.1.2 Other considerations in impact analysis

In terms of phases involved, the environmental impacts of the proposed water supply can be grouped under two major categories. These include impacts associated with construction of the project and those associated with operation phase. However under IFC, the Environmental, Health, and Safety (EHS) guidelines are categorised as follows;

(a) Environmental;

(b) Occupational Health and Safety;

(c) Community Health and Safety.

Therefore, the discussion and presentation of impacts in this chapter has been based on the two major processes involved (construction and operation phases) as well as IFC Environmental, Health, and Safety (EHS) guidelines.

7.2 POSITIVE IMPACTS

7.2.1 Reduction in diseases

The proposed Namasale water and sanitation project will contribute towards reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhea. This is because the current water sources are prone to contamination (See section 4.1.5) and hence source of water borne diseases. The communities were also optimistic that the initiative would reduce the incidence of people using contaminated water and hence the water borne diseases such typhoid, intestinal worms and cholera that have a high occurrence in the area because of limited access to safe potable water (See section 5.5.1.3). This expected since the communities will access clean water for drinking and domestic activities. The project would have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced.

This positive impact will be enhanced if the following are done:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that operations and maintenance are properly done to avoid issues of water contamination
3. Ensuring that water is affordable and available all the time

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

7.2.2 Easing of the water fetching burden

One of the major positive impacts of this project will be the easing of the burden of fetching water which is one of the most arduous tasks for women and young girls in the rural areas (See section 1.5) Therefore, the time which has always been wasted on water fetching can be invested into the development of income-generating activities especially for the women. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

7.2.3 Human capacity building and creation of jobs

Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled laborers. Skilled personnel will be employed as Managers, Supervisors, and in other Technical positions whereas unskilled laborers will be support staff and perform non-technical work. The income accruing from such activities will obviously change their standards of living. During construction, about 50-100 people will be employed (see section 2.3) and about 10-20 people will get jobs during operation phase. More employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services. This will be enhanced through giving priority to local communities while recruiting workers for the project. This will not only enhance skills development in water construction but also environmental and social sustainability.

7.2.4 Improved service delivery

The enagament with communities indicated that there a number of service facilities (health centres and schools) (Sections section 5.5.2.2 and 5.5.2.3). The project will extend water to these facilities. The The proposed project would result in bringing improved water and sanitation services closer to the people. This impact will be enhanced through:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.

2. Ensuring that operations and maintenance are properly done to avoid issues of water contamination

3. Ensuring that water is affordable and available all the time

7.2.5 Eradication of poverty and improved livelihoods of the local people

As described in section 4.1.13, the poverty of the project area is high. The proposed project would result in increase of 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. This impact will be enhanced through putting in place initiatives to promote productive use of water

7.2.6 Improved health in the area

In section 5.5, the community engagements concluded that the project would enhance safe water coverage which would in turn improve the health of the area. The people would also have access to improved sanitation facilities. The project will have awareness programs tailored towards enhancing project benefits while minimizing negative impacts. 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. The project would have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced. Improved water supply and sanitation would promote good health and reduce health care costs thus making overall national savings for investment in other developmental activities.

7.2.7 Reduction of child mortality

Infant mortality rate of the project area is estimated at 199/1000 (section 4.1.13). With Safe drinking water, personal/household hygiene and improved sanitation infant/child morbidity and mortality would be reduced. Communities of the project area also recognised the role of safe water in reducing child mortality rates (See section 5.5.1.2). The marginal price of improved hygiene and sanitation promotion would make them cost effective health interventions. Community engagements also revealed that there are scores of children who have drowned in the lake in attempt to draw water (see section 5.5.2.3). Therefore, extending piped water would reduce such risks. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

7.2.8 Improved maternal health

Women in the project area are responsible for domestic chores including fetching water (see section 4.1.16). The Project would therefore result in reduced physical stress and improved health status of pregnant women, thereby reducing miscarriages, maternal deaths, and adverse impacts on foetuses and new-borns. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project footprintfoot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

7.2.9 Promotion of gender equality and empowerment of women and the girl child

As discussed in section 4.1.16, women women are the ones carrying out most of household activities including fetching water. Therefore, 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). This impact will be enhanced through:

(i) ensuring that women and girls are given priority while recruiting personnel for the project
(ii) Ensuring the all the households within the project footprint are either are connected or have access to clean and safe water.

7.2.10 Increased Revenue to the government

This water supply and sanitation project will generate revenue to the districts and the country in general. This will be in form of VAT on water supply and other taxes associated with extension such as expanded and improved business opportunities in the project areas. This will be enhanced by putting in place an efficient mechanism for revenue collection.

7.2.11 Increase in investment in the area

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

(i) Ensuring that the project uses locally produced materials where possible.
(ii) The water distribution network connections should target SMEs
(iii) The project should have an initiative of promoting productive use of water

7.2.12 Raise in value of land and property

The value of land within the project area could go up due to the likely increase in activity in the area.

7.3 Negative impacts

7.3.1 Construction phase environmental and social impacts

7.3.1.1 Loss of vegetation/crops

The project traverses areas that are under cultivation and some sections with natural vegetation (See sections 1.4.3, 1.4.4 and 4.3.12.1). The construction of the proposed water and sanitation project will lead to destruction of vegetation and crops that are within and in some cases outside or beside the water pipeline corridor. The project area has gardens (see plate 7.1). The contractor together with the crew

and equipment such as vehicles may cause sporadic destruction of crops during pitting of transmission trenches for water pipes and eventual laying of these pipes. The proposed water transmission and some distribution lines will traverse some gardens especially those that were cultivated in the road reserve such as a series of cassava, maize, beans, bananas and others. Vegetation/crop clearance and removal will take place at the WTP and the transmission/distribution mains. The removal of trees will be minimal (only done when necessary) but will contribute to increase of carbon dioxide in the atmosphere (trees fix carbon dioxide from the atmosphere). All these will contribute to the greenhouse effect that causes global warming, thus climate change. The reservoir sites and pipeline routes are mainly covered by short grass that will rejuvenate on completion of construction works. After clearance

In general, the impact of vegetation/crop clearance at the WTP sites, though permanent (at points that infrastructures will be erected), will be localized, minor in magnitude, is reversible and non-cumulative, thus a minor change will occur

Plate 7.1: Gardens of beans, maize, cassava and bananas in the road reserve between Biko and Namasale town

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Loss of crops along the water transmission & distribution corridor	Limited area	Medium	Temporally	Almost certain	Minor

Mitigation measures proposed

- Before carrying out valuation of the affected properties and crops, adequate sensitization meetings shall be conducted among all the affected persons to prepare them psychologically and to address any concerns at hand.
- A RAP shall be developed and implemented by MWE to ensure that affected property is compensated.
- As part of the RAP, a comprehensive property impact survey shall be conducted which shall indicate all affected properties within the water transmission corridor/way leave, their owners and the replacement costs. Valuation of such property shall be conducted by experienced valuers in association with the district land board and local leaders.
- Prior to compensating the affected persons, adequate community sensitization meetings shall be carried out to ensure that the PAPs are aware of the entire program including visitation schedule per village, parish and or sub-county and how each PAP with be contacted and approached for payment.
- Prior to the compensation process, the Project Affected Persons (PAPs) shall be individually notified about the compensation amount to be paid. The PAPs may accept or refuse the compensation proposed depending on their expectations, market rates and damages incurred.
- The construction of the proposed water transmission and distribution lines shall only commence when all the affected farmers have been fully sensitized of the pending activities. Prior to the construction phase, farmers shall be sensitized on the pending project at least 6 months in advance such that cultivation under the line and within the water pipe corridor is stopped or reduced. This will give affected farmers ample time to plan in advance.
- The contractor must be instructed to move in a definite order and the pattern of movement must follow the established corridor as agreed upon by the local government authorities and the Developer. Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated path ways or agreed upon access roads. This must be followed to avoid further destruction of crops by the contractor after compensation has already been effected.
- The contructor should restore sites where activities were carried out at the project sites. The topsoil that will have been removed before pitting the trenches for the pipeline should be put back to cover the trenches so that the crops can regrow in a natural environment. Excess soil, stones and boulders should be dumped in an area that has been approved by the District Environment Officer

7.3.1.2 Impact on structures

Although the proposed Namasale water and sanitation project will be undertaken using the road reserves of the existing public roads, the possibility of displacing some structures cannot be ruled out. Trenching within trading centers such as Namasale and Kayago may displace some kiosks, signpost, business stalls

that were constructed within the road reserve. The water treatment plant at Biko landing site may displace a household with one parmanent structure, under construction and some grass thatched houses (See section 1.4.2 and plate 7.2 for the structures that will be impacted). Therefore, such encumbered areas need to be approached with due care and compensation issues handled well in accordance with the law.


Plate 7.2: Some of the structures that will be affected at Biko landing site where the water treatment plant will be constructed.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Impact on structures	Local	Medium	Long term	Almost certain	Moderate

Mitigation measures

- MWE shall work with local council committees, sub-county committees, Councillors, district land boards, CAOs, RDCs, Politicians and other local leaders to sensitize all people to be affected on the intentions of land acquisition.
- MWE shall conduct a Resettlement Action Plan (RAP) in accordance with the Land Act and World Bank environmental and social Safeguard Policies especially Involuntary Resettlement (OP 4.12).
- MWE shall negotiate with land and structural owners in compliance with local market prices and government rates so as to establish rational figures for compensation and resettlement.
- All sorts of compensation and settlements must be done at least 6 months before structures are demolished.
- All physically or economically displaced people should be offered an option between either a full resettlement package, including the provision of replacement residential land and a house, or cash compensation.
- Any grievances in the course of project implementation shall be addressed in accordance with the grievance redress mechanism presented in section 9.3.

7.3.1.3 Impact on land in the water transmission & distribution corridor

Land in the project areas is mainly communally owned and governed by the customary system of land tenure system (see section 4.1.15). The project areas that will be affected have been modified by agricultural activities and only has patches on natural vegetation (see section 1.4.4). MWE will not permanently acquire a water transmission corridor from land lords although consent is officially obtained before the lines are constructed. However, what makes this impact to be of less magnitude is that the developer intends to use road reserves of the existing public roads which are government land probably up to 98%. The probability that proposed Namasale water transmission and distribution will affect private land is almost non-existent. However, if it is deemed inevitable to use private land for water distribution and its associated works, MWE will continue to engage the land lords for their free non-coerced consent for access to their land (This is inline with section 5.6 that recommends continuous sensitisation). However, land that shall be acquired for laying of the reservoir tanks and the water treatment plant shall be compensated for in accordance with the Land Act and World Bank Environmental and social safeguard policies.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Loss of land to the water corridor	Local	Medium	Long term	Almost certain	Moderate

Mitigation measures

- MWE shall engage all affected land owners and obtain consent before their land is used as water transmission corridor/way leave for the proposed Namasale water and sanitation project.
- Where the landlords object using their land without any compensation, MWE shall obtain an alternative route for the proposed water pipes.
- All land acquired for establishment of the water treatment plant, transmission pipes, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies. The compensation for married couple should be done after the wife has consented. This is aimed at promoting gender equality given that in the area, women rarely own land (see sections 4.1.15 and 4.1.16)

7.3.1.4 Loss of vegetation, top soil and terrestrial habitat alteration

The project largely crosses settled and built-up areas interspersed in rangelands with modified equatorial type, wooded savannah mosaic, savannah grassland, supporting an active agro-ecosystem

(see sections 1.4.2, 1.4.3, 1.4.4, 4.3.12.1, 4.3.12.4 and 4.3.12.5). For the most part, the Project Site traverses through an area previously mapped as Dry Acacia Savannah. The landscape in the Project Site is highly transformed from original natural state and in contrast, hosts few remaining species. Very little remaining natural vegetation cover of conservation importance remains, due to extensive human activities. There is no characterisation of rare and/or restricted-range species. The conservation value of species found was rated as below average, with no restricted-range or endemic species (see section 4.3.12.2). There was no natural forest within the project area however, along the water transmission and distribution network, there were pockets of planted forests mainly comprising of eucalyptus and pine trees

The clearing of corridor, movement of equipment and contractor staff and laying of pipes will lead to spot destruction of vegetation especially in areas under fallow and those planted with private wood Lots (plantation forests), and the likelihood of soil erosion due to removal of top soil.

These areas are mainly farmlands, savannah grasslands and woodlands. The surveys show that the project area is degraded and comprises mainly subsistence farmlands. At the time of the survey, about 50-70% of the water corridor segment has been turned into farmlands of beans, maize, cassava and bananas. The rest of the corridor is either land under fallow or homesteads/trading centres. There were no endangered species (both flora & fauna) encountered in the proposed water pipeline corridor. However, there were threatened species within the project area but outside the water pipeline corridor (See section 4.3.12.5). Although the systematic clearing of the 4-meter strip of land in the road reserve will result into destruction of vegetation, the impact on the conservation status of the affected flora & ecosystems is expected to be minor-low. The extent of damage is also minor-low. However, movements of the contractor and the entire crew may spread invasive species from one locality to another. Such species include *Eicchornia crassipes, Salvinia molesta, Senna siamea, Lantana camara, Mimosa pigra, Ricinus commuis* and *Senna spectabilis* and others as listed in chapter 4. Therefore the impact of construction activities on the vegetation and animal habitats is expected to be Negligible to Minor.

Plate 7.3: Modified farm lands along the proposed project

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Loss of vegetation and terrestrial habitat alteration	Local	Low	Temporary	Likely	Negligible-Minor

Mitigation measures

- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated path ways or agreed upon access roads. The designated path must avoid the threatened species as identified in section 4.3.12.5. This will avoid unintended damages to vegetation and animal habitats.
- The project shall be monitored by district and local authorities to ensure that when unplanned destruction of vegetation occurs during project implementation, shall compensate for loss of crops during the construction phase. The contractor shall work with the District Environment Officers to map out vegetation zones or project area segments with invasive species when invasive species are encountered, they will be removed and destroyed, for example, by burning. The equipment and cars shall be cleaned to ensure that the construction activities do not contribute to the spread of the plants.

- The Developer and the contractor must guard against fires arising from construction negligence because the impact of fire on vegetation and biological diversity can be immense especially in the savannah woodlands and grasslands. Therefore, the contractor must have a fire management plan in place. That at minimum covers the following mitigation measures:
    - Cooking for the construction crew shall be done in a gazetted area with good clearance from the bushy parts of the area.
    - No smoking shall be permited while at construction site.
    - If the site has flammable substances like petrol and diesel, the Contractor shall maintain on site a serviced fire extinguisher.
- After construction, there should be landscaping and then grass left to recolonise the disturbed area naturally. The Developer shall set aside funds to contribute towards local environmental programs. MWE may remit funds towards district and sub-county afforestation projects to compensate for biomass lost during corridor clearing and habitat fragmentation. In case the destruction is due to contractor's negligence, it will be the responsibility of the contractor to make compensation. MWE shall take the overall responsibility however, the contractor takes

liability of those plants/trees destroyed either knowingly or unknowingly and which is outside the Corridor.

- The contructor should restore sites where activities will be carried out at all the project sites. The topsoil that will have been reoved before pitting the trenches for the pipeline should be put back to cover the trenches so that the crops can regrow in a natural environment. Excess soil, stones and boulders should be dumped in an area that has been approved by the District Environment Officer.
- MWE should also identify and support afforestation initiatives to enhance tree cover areas as a way of reducing its project footprint.

7.3.1.5 Impact on fauna (wildlife, invertebrates, birds, etc.)

From the baseline data on fauna is presented in sections 4.3.13 to 4.3.18, the project will not be implemented in critical habitats like wetlands and bushes. Bush clearance at the project sites can specifically create a biotope in areas with dense vegetation and hence may become hunting grounds for carnivores. Clearing of trees may also disrupt or alter habitats for some of the birds while at the same time new and invasive species could gain ground. Fortunately, no trees shall be destroyed by the project. At all stages of planning, implementation and operations and post construction, it is possible to integrate biodiversity consideration to address the potential biodiversity impacts of the water pipeline project.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Loss of biodiversity	Local	Low	Temporary	Likely	Negligible-Minor

Mitigation measures

- The Developer and the contractor must guard against fires arising from construction negligence because the impact of fire biological diversity can be immense especially in the savannah woodlands and grasslands. Smoking areas shall be designated to avoid uncontrolled littering of cigerate buts that might be sources of fire.
- Implement environmental awareness programmes / training among the all project employees, particularly during construction. They should be trained to identify arboreal or burrowing species exposed by vegetation and soil stripping and should have immediate access to a competent specialist on site (e.g. the Environment Officer) who can capture and translocate them to an undisturbed area.

- There are no specific measures for the protection of invertebrates because of the difficulty in identifying these species for those unfamiliar with entomology and for practical reasons with respect to topsoil collection and storage. However, all mitigation measures related to minimising habitat fragmentation, prevention of soil and water pollution, minimising trampling and control of invasive species should be applied.
- Access and service roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation
- Following construction, rehabilitation of all areas disturbed during construction phase and that are not required for regular maintenance operations must be undertaken.
- All exposed area to be re-vegetated using indigenous species

7.3.1.6 Increased susceptibility to soil erosion

The site earthworks during construction of the water treatment plant at Biko, the water storage facility (reservoir) and the water distribution pipework network will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season. Minor excavation works will take place at the reservoir sites; soils excavated along pipe routes will be used for backfilling. Thus, minimal loss of top soil at these localities. However, extensive site levelling and excavation works will take place at the WTP sites given the requirements of the structures to be built.

During construction phase, ground levelling and soil excavations will expose soils to erosion depending on site terrain and intensity of erosion agents (wind and surface water runoff). This can lead to direct siltation of thewater source. However, the environmental impacts of the construction phase are readily foreseeable, of limited extent and of a short duration. The project area has mainly loamy sandy soils and with a slighltly gentle topography. In general, the impact of loss of top soil, though moderate in magnitude and irreversible, will be localized, temporary and non-cumulative and thus minor.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Increased susceptibility to soil erosion	Local	moderate	Temporary	Likely	Negligible-Minor

Mitigation measures

- The construction sites – water treatment plant and storage tanks 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 Contractor should backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation.
- MWE will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion.
- Care shall be taken of the management of the topsoil and used for replanting and restoration efforts. The top soil shall be heaped differentry from the underground soil and barricaded from being washed away by water.
- During excavation, top soil shall be hipped separately from Red soil. In backfilling the trenches, the reverse shall apply i.e Red soil first followed by top soil. The excess top soil shall be spread along the trench by the Contractor but in liason with the local people; special attention would be made not to dispose of such construction wastes in swamps on any sensitive ecosystem.

7.3.1.7 Generation of Solid Waste

Waste will be generated during construction and laying of water transmission and distribution pipes. Such waste may include plastic offcuts from the HDPE and uPVC pipes and other accessories associated with water and sanitation projects. Organic waste will also be generated at temporally eating places such as food stuffs and human excreta. Plastics waste such as mineral water bottles, polythene bags (Kaveera), Jerricans, cups, plates and other plastic accessories may be found along the corridor, at the site if not well managed. Such waste needs to be handled and must not remain in the road reserves or along the water trenches. The impact of littering waste is likely to be Negligible-Minor since much of the waste is not expected to be hazardous or infectious.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Generation of Solid Waste	Local	Low	Temporary	Likely	Negligible-Minor

Mitigation measures

- All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and given to recycling facilities. Other forms of waste which are inert or ceramic in nature may be

collected by NEMA gazetted waste handlers (Who shall be engaged by the Contractor) and taken to a NEMA gazetted waste disposal facilities for disposal.

- All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated Town Council landfills for disposal. This activity shall be supervised by the District Environment Officer and the supervising consultant.
- All plastic waste generated at rented residences for the workers or campsites[2] in the course of work such as mineral water bottles, polyethene bags, jerricans and cups shall be collected and given/sold either to the local people for re-using or taken for recycling in respective factories.
- Human excreta shall be managed using a mobile toilet and then disposed in pit latrines.
- The Contractor shall develop and implement a Waste Management Plan that put into consideration sorting at the source, proper storage and transportation. That will at minimum contain the types, nature and quantities of wastes expected to be generated as well as their corresponding methods of treatment and disposal. The plan shall also indicate the sites of proposal as well as the frequency of collection and disposal.

7.3.1.8 Spillage of hazardous chemicals

The treatment of water to required standards shall be done using chemicals and these chemicals include chlorine and Aluminium Suplated which are presented in section 6.6.3 and chapter 9. When a hazardous material is no longer usable for its original purpose and is intended for disposal, but still has hazardous properties, it is considered a hazardous waste. Hazardous materials in this sector may also include used oils from construction vehicles and other oils and fuels.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Spillage of hazardous chemicals	Limited area	Medium	Temporary	possible	Minor

Mitigation measures

- Regular servicing of project vehicles shall be outsourced to gazetted vehicle service centres (Vehicle maintenance and Servicing companies) either in Namasale or neighboring districts.

[2] The locations of camps have not been identified. This is because it is the contractor to look for areas of camps should s/he choose to cinstruct camps. Otherwise, rented houses should suffice

No vehicle shall be allowed to be serviced in sensitive ecosystems. The Service centre must present withproof that its fluids such as old car engine oil shall be is properly managed.

- All major vehicle repairs shall be conducted by qualified and experienced personnel at gazetted service centers (garages) away from the water transmission and distribution corridor.
- All other forms of hazardous waste at stored at the water treatment plant regardless of their hazardous properties such as cholrine plastics, polythene and others shall be collected out of the project site and disposed in gazetted NEMA waste disposal sites. The absolute hazardous chemicals should be managed inline with the chemicals and potentially harmful materials procedures presented in Chapter 9.

7.3.2 Impacts on Surface Water from excavation activities

During construction, excavations and and hipping of soils may affect surface flow regimes of some streams thereby causing flooding and/or water stagnation. Stagnant water may be a breeding ground for disease vectors like mosquitos which cause malaria. The soils may be washed away into water bodies therefore leading to silt loading and causing water turbidity. The impacts stated above are localised and of short term and therefore not expected to lead to cause adverse effects to surface flow regimes resulting from temporary disruption of existing/natural drains occurring during site preparation or risk of surface water contamination due to erosion and siltation.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Impacts on Surface Water	Local	Low	Temporary	Likely	Negligible-Minor

Mitigation Measure:

The Contractor shall construct a drainage system with silt traps to reduce impacts of storm water from the construction site. No spoil soil or any other materials shall be dumped or temporary stored in a known drainage system

7.3.2.1 Degradation of wetlands

There exists a Lake Kyoga shoreline swamp within the project area especially at Biko landing site adjacent to the area where some project infrastructure will be constructed. The project infrastructure i.e the water abstraction system and associated components, the water treatment plant and the transmission lines shall not be constructed in the shoreline wetland as the proposed site is already degraded. The abstraction point shall be installed used a pre-cast concrete structure heavy enough to withstand water waves. This will be delivered at the abstraction point using boats and therefore no disturbance of the

water bed will be disturbed. Therefore, the impact on the adjacent stretch of the shoreline wetland is expected to be minimum since the wetlands will not be affected by the project.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Impacts of project activities to wetlands	Local	Low	Permanent	UnLikely	Minor

Mitigation measure

- An abstraction infrastucure shall be installed within L. Kyoga shorelines and the abstraction pipe shall be installed through a degraded part of the shoreline that has no wetland vegetation. MWE shall apply for and acquire a lake shore user permit in accordance with the National Environment (Wetlands, Lake Shores and River banks) Management Regulations, 2000.
- No materials/waste shall be dumped in the nearby wetland and all the foreign materials introduced during construction period shall be removed and disposed off in gazetted areas

7.3.2.2 Exposure to high noise levels

The activities like movement of heavy equipment are likely to generate noise levels beyond those stipulated in The National Environment (Noise Standards and Control) Regulations, 2003. The current noise levels in the project area are presented in section 4.2.4. Exposure of workers to high noise levels can be a health concern and needs to be mitigated.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Exposure to high noise levels	Within limited area	Medium	Long-term	Possible	Moderate

Mitigation measures

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and

Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs;

- Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;
- The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the management of the Water Treament Plant.
- Periodic medical hearing checks should be performed on workers exposed to high noise levels.
- Sites must be hoarded to curb noise impacts to neighboring communities.

7.3.2.3

7.3.2.4 Air quality and Dust management

Construction dust can lead to lung and sight related health risks. Dust will be generated during excavation works, movement of haulage trucks, grading and levelling of ground surfaces, operationof stone crushers, etc. In general, the impact of dust emissions, though medium in magnitude, will be localized, temporary, reversible and is non-cumulative.

Exhaust emissions from vehicles and machinery (e.g. generators) are expected to occur particularly at the construction phase. This will consist mainly of poorly burnt fuels and oils, including nitrogenoxides, carbon oxides, hydrocarbons, particulate matter, etc. Nitrogen oxides react with moisture and other compounds to form nitric acid vapour and related particles. Small particles can penetrate lung tissue, thus worsening of respiratory diseases. Carbon monoxide is highly toxic and the most common type of fatal air poisoning in many countries (Omaye, 2002). Carbondioxide traps solar radiation being emitted from the earth, thus causing a rise in the earths' temperature, which leads to global warming. The warming of the earth results in the changing of weather patterns leading to climate change. In general, the impact of exhaust emissions, though important to local/immediate surrounding and moderate in magnitude, will be temporary, is reversible and non-cumulative.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Public health and climate change impact	Local	Medium	temporary	Almost certain	Moderate

Mitigation measures

- Timely automobile maintenance be carried out to limit carbon emissions;
- Workers operating/working near stationary emission emitting equipment/machinery (e.g. generators, excavators, etc.) be availed PPE (e.g. nose muffs); do not burn cleared vegetation.
- Construction sites shall be hoarded off to restrict dust to within site boundaries;
- Sprinkle water on vehicle pathways;
- PPE like dust masks shall be availed to workers whenever needed;
- Loose materials like sand that are susceptible to dust generation during haulage be covered with tarpaulin;
- Limit vehicle speed on murram roads.

7.3.3 Occupational health & safety during construction

7.3.3.1 Accidents and Injuries

Work at water and sanitation facilities like excavations and lifting of materials is often physically demanding and may involve hazards such as open water, trenches, and slippery walkways, working at heights, energized circuits, and heavy equipment. Work at water and sanitation facilities may also involve entry into confined spaces, including storage tanks, wet wells, and pump stations**.**

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Accidents and injuries	Within limited area	High	Temporary	Possible	Moderate

Mitigation measures

- Only trained and certified workers shall be allowed to install, maintain, or repair any equipment and tool associated with the Namasale water and sanitation project infrastructure.

- Install railing around all process tanks and pits. Require use of a life line and personal flotation device (PFD) when workers are inside the railing, and ensure rescue buoys and throw bags are readily available.
- Use PFDs when working near waterways (Lake Kyoga).
- Implement a confined spaces entry program that is consistent with applicable national requirements and internationally accepted standards. Valves to process tanks should be locked to prevent accidental flooding during maintenance.
- Use fall protection equipment when working at heights.
- Maintain work areas to minimize slipping and tripping hazards.
- Use proper techniques for trenching and shoring.
- Implement fire and explosion prevention measures in accordance with internationally accepted standards.
- When installing or repairing mains adjacent to roadways, implement procedures and traffic controls, such as:
    - Establishment of work zones so as to separate workers from traffic and from equipment as much as possible;
    - Limit speed limits of vehicles to 20 km/hour in working areas by installing speed humps as well as signages
    - Use of high-visibility safety apparel for workers in the vicinity of traffic;
    - No works shall be allowed at night
    - Locate all underground utilities before digging.
- All drivers to be employed by the contractor and the developer shall be qualified, skilled with valid driving permits. With an appropriate class depending on the size of vehicles.
- Traffic guides/flag men shall guide traffic and ensure road safety especially where road users are risk of being injured by construction equipment.
- Temporary road signage warning communities of water and sanitation construction works and heavy vehicles turning into/out of main road and sensitive sites shall be used.
- All construction workers shall be provided with adequate Personal Protective Equipment (PPE).
- The Contractor should also develop and implement a health and safety management plan which should be easily available to all workers.
- All company vehicles used in the transportation of construction workers, material and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form (Annex 4) before usage.
- The Contractor should prepare emergency plans, carry out drills on the usage during emergency events. The drills should be planned and conducted on a regular basis.

7.3.4 Community health & safety impacts during construction phase

7.3.4.1 Psychological impacts

Psychological impacts such as stress, trauma, shock and fear are associated with displacement and resettlement. The communities expressed fear and uncertainty especially those whose structures (houses, Kiosks, Stalls, gardens, trees and others) are assumed to be within the road reserve. Some of the affected people don't seem to be conversant with the land law and consequently compensation guidelines. The affected people seem to be in a state of uncertainty and need to be guided on the law. When people are not guided properly, they normally convert their fear and stress into organised rebellion and this can curtail the project.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Psychological impacts	Local	Medium	Temporary	Almost certain	Moderate

Mitigation measures

- Using several avenues including local and national media such as radio stations, TVs and sensitization meetings, all affected peoples' fears need to be addressed prior to compensation.
- The Developer needs to inform the public that Resettlement if any and compensation of Project-Affected People will be carried out in compliance with Ugandan legislation, and WB OP 4.12.

7.3.4.2 Degradation of the catchment

The project activities may degrade some of the catchment where the project will be implemented especially the nearby wetlands. This is because the loose soils during the construction stage may be washed away into the water catchments thereby causing their silting. Improper waste management that include open defecation by project workers or improper handling of used oils may pollute the water sources in the catchment and hence the water source. The project shall also lead to clearance of vegetation which contributes to climate change that affects the catchment's quality. Given no major vegetation cover will be affected, the impact shall be local and temporary in nature.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Degradation of the catchment	Local	low	Temporary	Almost certain	Minor

Mitigation measures

1. Spill control measures should be implemented to prevent spills from reaching water bodies. Measures should include appropriate materials handling and storage procedures, and development of contingency plans in the event of a spill.
2. Provision of suitable workers' amenities facilities. If possible, effluent should be disposed of off-site at a nearby STP
3. Locating stockpiles on flat areas, away from storm water. Ensure that sediment or erosion cannot reach a waterway; Diversion of overland flow around work areas / construction sites
4. The height and slope of stockpiles especially at the water treatment plant construction site should be limited to minimize erosion of unconsolidated materials during rainfall events
5. Promote soils erosion control measures to reduce surface runoff
6. Increase tree cover through appropriate afforestation or agroforestry practices with appropriate tree species.

7.3.4.3 Exploitation of Workers

Projects of such nature are normally labour intensive and need a multidisciplinary team of workers ranging from professionals, semi-skilled and casual labourers. According to section 2.3, several workers (50-100) will be contracted for corridor clearing, trenching of the water channels, and provision of food staffs, among others. Some Engineers (Mechanical & possibly Civil) will be contracted during project construction and operation. All staff under the contractor or under the Developer need to be procured under well-established working procedures and must be protected from exploitation. On average, an estimated 50-100 people are anticipated to constitute the workforce on the project.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Exploitation of Workers	Local	High	Temporary	Possible	Moderate

Mitigation measures

- While recruiting workers especially to fill up the non-skilled nature of jobs such as casual jobs or where skills can be obtained easily on job, the Developer or Contractor shall give the local people first priority.
- All staff shall be procured under a well-recognized contract.
- In the employment contracts, workers shall be entitled to work for 8 hours beyond which overtime will be paid.
- All workers shall be given appointment letters indicating their obligations as employees.
- All workers shall be entitled to free medical care if the cause of the injury or sickness is as result of working at the distribution line or any activities of the Contractor or Developer.
- All contract workers must be paid as per the contract. All casual labourers must receive a fair day pay for a fair days work done.
- Exploitation of workers and refusal to pay workers is an offence and the contractor must be monitored to ensure that all workers are paid.
- All workers must be paid promptly and correctly.
- Workers need to be sensitized of their rights and need to be represented by a mediator in the affected districts through the office of the labour officer.
- The contractor shall employ an onsite Environment Health and Safety Officer with a Safety Committee in place.
- The Contractor shall develop and implement a health and safety management plan that at minimum has safety risks and their corresponding mitigation measures.

7.3.4.4 Increase in HIV/AIDS and STDs during construction phase

The HIV prevalence rate in the project area is already high i.e. 7% (see section 4.1.17). Like any other project with mass recruitments, influx of labour at the construction phase is bound to occur. Most often these workers will not come with their families and some may be single. This will encourage the formation of new social networks with the resident community, increasing the risk of prostitution and the spread of HIV/AIDS and STDs. In general, the impact of increase in HIV/AIDS and STDs, though cumulative, will be largely localized/regional in context, high in magnitude, temporary and is reversible.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Exploitation of Workers	Local	High	Temporary	Possible	Moderate

Mitigation measures

- Sensitize workers on proper social behavior and conduct about community systems, HIV/AIDS and other sexually transmitted diseases.
- HIV/AIDS policies be developed at workplace.
- Free HIV/AIDS testing, counselling and condom distribution be encouraged for both workers and local community.
- Develop and implement an HIV Management Plan

7.3.4.5 Impact on Physical Cultural Property

Some cultural properties as highlighted in chapter 5 (section 5.11) exist in the project area (mainly cemeteries). Although most of the major cultural sites identified are quite far from the water pipeline, the possibility that some cultural features along the transmission route can be encountered can't be ruled out. Besides, new people may come into the project area as skilled labour force, from different tribes, religions and cultural practices. These may introduce new norms, cultural practices and behaviours to the community which may be regarded unacceptable by the host communities. Such practices may dilute/distort the shared beliefs, customs, values and language of the local community and can result into social disharmony. In general, the impact on culture and cultural property will be minor since a few or hardly any existing cultural property are likely to be affected.

Plate 7.4: Burial sites in the project area but are not going to be affected by the project

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Impact on Physical Cultural Property	Within limited area	Medium	Temporary	Possible	Minor

Mitigation

- Structures like shrines and graves if any will be relocated in accordance with the existing rituals and norms of the society. Loss of incomes shall also be compensated for since the owners may take some time without any income from them especially if it's deemed necessary to relocate them far from their original site due to cultural rituals involved. Details of compensation shall be contained in the RAP.
- Sites that are buried may be discovered during project implementation. Such discoveries of archaeological nature are termed as **'archaeological chance finds'**.These could be concentrations of pottery, animals and human bones, worked stone etc. Chance Find Procedures as presented in section 8.2 shall be adhered to. In summary, the following shall be undertaken:
  - On discovering evidence of possible scientific, Paleontological, historical, prehistoric, or archaeological remains, the contractor shall notify the Department of Museums and Monuments giving the location and nature of the finds.
  - The Contractor shall cease work in the vicinity of the site and request the responsible officer from the Department of Museums and Monuments to inspect the site and make recommendation on possible salvage within 72 hours.

- The Contractor shall exercise care so as not to damage artefacts or fossils uncovered during excavation operations and shall provide such cooperation and assistance as may be necessary to preserve the findings.
- The department of Museums and Monuments is located in Kampala, Kamwokya just before Uganda Wild Life Authority on the road to Ntinda (Kira road). The Commissioner Uganda Museum can be contacted on +256 772485624. A detailed chance find procedure has been presented in section 8.2.

- To mitigate damage to archaeological resources, it is proposed that the construction foremen will inform construction crew to be aware of the possibility of discovering fossils or archaeological remains, what form these would take (bones, fossils in rock, shards or pottery, arrow heads etc.) and the procedure to be followed shall be as stated above.
- Further still, the contractor shall develop and implement avoidance procedures. In the event of human remains, there shall be no further excavations or disturbance of the site until the responsible police authorities have been informed.

7.3.4.6 Interference with traffic and diminished road safety

The proposed project will cut across several access roads within the project areas. Crossing of some access roads may interfere with their integrity. Fortunately, this project is only crossing the unimproved roads (with no surface surface materials like murrum added). With the understanding that the water pipelines will be constructed along the main road reserves of the existing gravel public roads, the impact of construction works on road safety can be a major challenge. Unless proper mitigation measures are put in place, construction works across and along these roads could result into critical interferences with traffic or accidents. It's therefore necessary that key precautions be undertaken at such road crossing to avoid accidents and impairing traffic activities.

Plate 7.5: Some of the project area roads whose road reserves will host the proposed project

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Interference with traffic and diminished road safety	Within limited area	Very high	Temporary	Possible	Substantial

Mitigation measures

- To minimize interference with traffic, digging trenches and piping across roads and high ways shall be conducted in hours with less traffic preferably on weekends.
- The trench excavated across the roads, after laying the pipes should be backfilled with murrum, compacted and levelled to the level of the existing road. This is to ensure that the integrity of the road is not affected by the water line construction activities.
- Conspicuous notices shall be well placed on roads and guides on ground shall direct traffic in case of diversions or open trenches.
- The contractor will have to notify traffic police in advance and work with it during trenching across high ways and other major roads.
- All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits.
- Repairs of damaged roads and restoration of access routes and route deviations;

7.3.4.7 Public Health concerns

This project is expected to attract various categories of people who will seek employment on project activities during construction. It is apparent that part of the labour force will be procured and housed in lodges and houses among the locals. Some of these will be local labour while others will come from places far away from the project site. Those who will come from far are unlikely to be accompanied by their spouses. Many local people will also participate in providing services to workers. This will cause the establishment of social networks, which can promote the spread of socially transmitted diseases especially HIV/AIDS and other STIs. There has always been sporadic outbreak of communicable diseases in some districts of Uganda such as Cholera and others. According to the community, HIV/AIDS scares them most. Pressure on the existing health services is likely to increase. Although not many skilled workers are expected, the impacts of diseases have a multiplier negative effect. Garbage and human wastes generated by workers, if not properly managed may compromise water quality and may cause water related diseases in the area. Although some of the impacts are localized, they are significant and therefore the overall effect on public health of the residents is likely to be moderate if the mitigation measures are not properly implemented.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Public Health concerns	Local	High	Short – medium term	Possible	Moderate

Mitigation

- Workers and the community shall be sensitized on protective behaviour and practices during work by distributing appropriate education materials to workers and the surrounding community.
- The developer will establish a first aid facility at the construction sites to treat injury cases whenever they occur.
- The Contractor shall develop and implement an HIV prevention and management Plan.
- High risk groups such as the youths especially students shall be continuously sensitized on the dangers of casual sex, consequences of early marriages, teenage pregnancy and monitored to ensure that such groups are not at risk of falling victims.
- Provide surveillance and active screening and treatment of workers and the community where a communicable disease is discovered.
- All impacts of public health nature shall be mitigated using a well-coordinated approach that must involve health units in the affected sub-counties including collaborations with local NGOs involved in similar activities to pool resources (especially human resources) and increase efficiency of mitigation measures being instituted.
- Alcohol and Drug abuse shall be prohited to a;; project construction workers in the project areas.
- The contractor and subcontractors have adequate sanitation facilities for the workers at both places of residences and at all work places.
- The contractor or subcontractors shall procure a rent descent accommodation for all staff in the existing structures in the project area in consultation with MWE and local authorities.

7.3.4.8 Impact on schools and learning process

Section 4.1.9 presentsthe schools that are within the project area and and amap in figure 4.11 presents specific schools that will benefit from the projecr. A number of schools are fairly close to the road reserve and during construction activities are likely to impact on the learning process. Noise from trench excavation activities and laying of water pipes may will disrupt the learning process because these schools are all within the vicinity of the project area. The noise from the works site especially when construction is near the schools will disrupt the concentration of students. There is also a probability of occurrence of accidents in locations near schools. Male workers could lure school girls with money and

other gifts which could make them drop out of school. School attendance may be affected as some children might decide to skip school so as to earn money from the project while others may spend time simply watching construction works. This is a highly sensitive impact of moderate magnitude because its duration is short term.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Impact on schools and learning process	Local	Medium	Temporary	Likely	Moderate

Mitigation measures

- Schools shall be sensitized on the need to keep off construction sites.
- When working near schools, work should be scheduled to ensure minimal disruption for the learning. The schools should be notified of the work schedule ahead of time
- The contractor shall not employ any person below 18 years and any pupil or student above 18 shall not be employed during school time. Students above 18 years can be employed only during holidays.
- The Contractor should ensure that there is minimal contact between workers and school population.

7.3.4.9 Potential child abuse

The proposed project traverses' areas with a number of schools and settlements and it is likely that some project workers could engage in sexual relations with school and under aged children. This could result in increase in child pregnancy/marriage, sex work involving children and school dropout/Defilement of school children/marrying school girls. In addition, during the construction phase contractors could be tempted to use children as laborers in order to save money on labour costs, which amounts to child labour and abuse. Sensitivity is medium due to relative public awareness about child abuse which makes the overall impact significance substantial.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Potential child abuse	Limited area	Very high	Temporary	Possible	Substantial

Mitigation measures

- A child protection plan will be developed by MWE and provided to all the contractors and school management to discourage the contractors from using children as laborers. In addition, contractors will be required to avoid employing workers who are below eighteen years old. They will also be required to keep records that show the ages of their workers.
- Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 611. The existence of the hotline can be displayed throughout near the construction site and in the community at large.
- The contractor shall ensure that mechanisms for close monitoring of worker's behaviour/conduct are in place e.g. contractor could discreetly engage the police to identify anonymous informers from among the workers to monitor and report any negative behaviour by the workers including child abuse related misconduct, display a call line or suggestion box where the community can provide feedback on workers behaviour.
- MWE and the contractor shall ensure that all local leaders and women/child representatives are fully oriented to the labour force related risks for children engaging in construction related activities.
- Talks with the contractor and his workforce by relevant guests (including the police) on child protection shall be encouraged and appropriately scheduled, including continuous popularization of the child help line 611. Parents/guardians shall be sensitized and held accountable for children leaving and arriving home before dark.
- Any person involved in child abuse shall be dealt with in accordance with the law.

7.3.4.10 Gender concerns

The proposed water and sanitation project is likely to attract women who will be employed as labourers. During employment and execution of their duties, it is possible that their sexual rights as women may be abused by educe and unchecked sexual behaviors of contractors and their workers. Impacts relating to women will include issues like denial of employment opportunities, gender-based violence when husband forcefully demand their wives pay. Other potential negative impacts on women include exposure to HIV/AIDS and STIs and increased sexual exploitation of young girls which may likely lead to unwanted pregnancies, drop-out from school and others. These are large negative impacts which are

of medium significance and magnitude making the overall impact moderate. These are proposed to be mitigated through the following measures:

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Gender concerns	Local	Medium	Temporary	Likely	Moderate

Mitigation measures

- Workers will be sensitized on their sexual rights. MWE shall Work with the contractor on establishing zero tolerance policies and codes of conduct related to violence against women and girls (VAWG). All employees must be made aware of the zero-tolerance policy and codes of conduct for employees.
- All workers shall receive adequate briefing and education on the laws against defilement and other sexual offences.
- To the extent possible, there will be gender sensitivity in task allocation;
- The contractor shall conduct gender sensitization to the work force on matters such as gender sensitive communication and on the gender sensitive conduct of workers towards women including putting in place toilets segregated by gender amongst others and;
- There will be a Specialist (Social Specialist) to oversee amongst others gender mainstreaming in the project.

7.3.4.11 Disruption of social order

The proposed project construction activities will inevitably emit dust to the immediate neighborhood. The most prominent social concern associated with such projects is the use of vulgar language by construction workers. This is not culturally acceptable because it embarrasses people before their children, in laws, spouses and friends. This impact is highly sensitive but of medium magnitude because it lasts during construction which makes the overall impact moderate.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Disruption of social order	Local	Medium	Temporary	Likely	Moderate

Mitigation Measures

- The construction activities shall as much as possible be restricted to daytime only when noise pollution is least felt. No activities will be allowed on site beyond 7.00 pm in order to check on the noise pollution much felt at night.
- A code of conduct shall be put in place and shall be followed by the workforce to avoid causing unnecessary inconvenience to the community through use of vulgar language or any other activity that may bring about social disorder.
- A clause shall be included in the contract stating clear course of action where the contractor breeches this code.

7.3.4.12 Increased crime, drug abuse and prostitution

The influx of workers, typically young males seeking construction jobs is sometimes associated with a series of social challenges such as crime, alcoholism/illicit drug abuse and prostitution. These are often related to the spread of sexually transmitted diseases including HIV/AIDS. Vices such as drug abuse and prostitution would affect social coherence and security in project communities tarnishing the image and intent of an otherwise good project. Unless sensitization of all workers is undertaken by contractor, the likelihood of the impact occurring is medium (considering some level of awareness among general populace).

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Increased crime, drug abuse and prostitution	Local	Medium	Temporary	Likely	Moderate

Mitigation

- The contractor shall involve local (LC) leaders in labour recruitment to ensure that people hired have no criminal record.
- The local content provision shall be emphasised to minimize labour requirements needed from outside the community.
- Local governments and the contractor shall collaborate with police to contain criminal activities.
- The Developer together with the Contractor and the Amoltar district local government shall undertake comprehensive awareness to avoid/minimize risks related to drug us and prostitution.

7.3.5 OPERATION PHASE IMPACTS

7.3.5.1 Overview

Once the water treatment plant, transmission and distribution pipes have been been constructed, the environmental impacts associated with the operation phase will be minimum. Most of the impacts of the operation phase are associated with the quality of water treatment process, water transmission and management, social impacts, Sewage collection and management all of which have been discussed already in this chapter under construction phase. Additional impacts during operational phase as detailed down below;

7.3.5.2 Degradation of source water quality

The WTP will be constructed adjacent to the water source for the project (Lake Kyoga). The WTP will employ alum and lime in its treatment processes. Thus, the sludge will have to be disposed. Additionally, backwash (filter cleaning) wastewater will have to be disposed. The clarified backwash water will continuously release residues of aluminum sulphate, suspended solids, chlorine and nutrients. Over the long term, these residues will form a sludge on the lake bottom but this is expected to be of minor significance owing to the large dilution effect of the lake. In general, the impact of WTP residuals, if discharged into source water, though localized and temporary, will be limited because of the dilution factor and non-cumulative in effect, thus the impact will be minor. There are no vulnerable aquatic species in the lake or in the wetland because of the dilution factor of Lake Kyoga. It is anticipated aquatic biodiversity will not be affected. The coummunities may also contribute to degradation of the water source through degradation of wetland (due to agricultural encroachment) thus undermining capacity to filter sedimentation; Use agro pesticides that find their way into water at abstract point; Soil erosion/ surface erosion from gardens and along the access road resulting in sedimentation, and; Poor human and livestock waste disposal leading to contamination of water at the abstraction point.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Degardation of source water quality	Local	Low	Temporary	Likely	Negligible-Minor

Mitigation measures

Management of alum & lime sludge

- Do not discharge any sludge into Lake Kyoga or any nearby water body. Adopt mechanisms that lead to:

- Pollution prevention & waste reduction (resource recovery) at the WTP as a priority; followed by
- Residuals treatment and
- Safe disposal of wastes as a last option.

- Adopt the following pollution prevention & waste reduction mechanisms:
  - optimize intake location to lower turbidity & suspended loads by siting and installing intake infrastructure at a deeper and clearer point of the lake profile;
  - Optimize solids settling using the pH in clarifiers and sedimentation tanks to reduce coagulant chemicals (alum coagulation has a minimum solubility at pH 6 (Tchobanoglous, et al., 2003). Thus, adjusting of pH (i.e. above 6) to keep optimal coagulation conditions might help to reduce waste products but still effectively treat the source water);
  - Reduce softening chemicals by monitoring source water hardness (WTPs remove calcium hardness to a level that meets the requirements of the customer. By monitoring the calcium content of the influent, WTPs might reduce the amount of chemicals needed to precipitate the required fraction of calcium hardness, thus resulting in a minimized level of residuals requiring additional treatment or disposal); recycle/reuse sludge where applicable.
- Adopt the following residuals treatment mechanism:
  - Utilize drying beds in separating solids and liquid at the WTP facility.
  - Contract a NEMA approved WTP residual handler to collect hazardous solid wastes for safe disposal;
  - Landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically, not hazardous (EPA, 2011a), thus can be landfilled).
  - Do not discharge backwash water into Lake Kyoga or any nearby water body prior to dechlorination; adopt mechanisms that lead to:
  - Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by
  - Backwash water treatment; and adopt the following pollution prevention & waste reduction mechanisms:
  - Optimize the filter media by employing filter medium that ensure longer filter run times, thus infrequent backwashing while maintaining or improving on the finished water quality;
  - Return backwash water to the head of the source water treatment plant for reuse.
- Adopt the following backwash water treatment mechanism:

- Dechlorinate the free or total combined chlorine residual remaining after disinfection through the addition of sulfur chemicals such as sulfur dioxide, sodium sulfite, sodium bisulfite, sodium metabisulfite, and sodium thiosulfate (NB: do not overdose with sulphite). Too much sulfite can result in sulfate formation, which suppresses oxygen content and lowers the pH of the treatment residuals (EPA, 2000b)

Mitigation measures related to community activities

- Enforce Wetland policy and environmental regulations on lake shore and wetlands to protect or regulate the use of the adjacent lakeshore wetland.
- Adopt the catchment management plan appended to this report
- The project should have a component of capacity building to enable for safe handling and disposal of agro-pesticides by the communities as well as promote soil erosion control measures that reduce surface runoff and hence silt loading into the lake
- Restrict human and livestock access to water abstraction area
- Promote safe disposal of human waste among the neighbouring communities (e.g. use of pit latrines) to reduce pollution of the water source from unsafe disposal of human wastes.

7.3.5.3 Hazardous chemicals

Water treatment may involve the use of chemicals (Alum and Chlorine) for coagulation, disinfection and water conditioning. If these chemicals are not well managed, they may lead to pollution of water thereby posining fish. The chemicals also have a potential of affecting public health negatively. Therefore, appropriate measures need to be taken to prevent, minimize, and control potential environmental impacts associated with the storage, handling and use of disinfection chemicals in water treatment facilities.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Management hazardous chemicals	Limited area	Medium	Permanent	Almost certain	Substantial

Mitigation measures proposed

- For systems that use gas chlorination;
  - Install alarm and safety systems, including automatic shutoff valves that are automatically activated when a chlorine release is detected.
  - Install containment and scrubber systems to capture and neutralize chlorine should a Use corrosion-resistant piping, valves, metering equipment, and any other equipment

coming in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease.

- Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

- Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials.
- Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year.
- Isolate ammonia storage and feed areas from chlorine and hypochlorite storage and feed areas.
- Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply.
- Develop and implement a prevention program that includes identification of potential hazards, like chemicals, open trenches, speeding vehicles etc, written operating procedures, training, maintenance, and accident investigation procedures.
- Develop and implement a plan for responding to accidental releases. The plan should at minimum include who to contact (communication and reporting), how to act in an emergency and how to mitigate risk (procedures), and what resources to use. This plan should be communicated to all staff. Training of staff on the implementation of the plan should be done.
- All chemicals shall be transported, stored and handled appropriately and shall have respective material safety data safety data sheets well displayed in the store. In addition, the chemicals storage areas and transportation vehicles shall be well secured with appropriate labels. The project shall construct chemicals storage facilities. During operation, covered vehicles with labels like harzadous sustances in transit shall used to transport chemicals.

7.3.5.4 Chemical Exposure and Hazardous Atmospheres

Water treatment involve use of potentially hazardous chemicals, including strong acids and bases, chlorine, sodium and calcium hypochlorite, and ammonia, and workers may be exposed to these chemicals.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Chemical Exposure and Hazardous Atmospheres	Within limited area	High	Temporary	Possible	Moderate

Mitigation measures

- Prudent handling and storage of hazardous chemicals, as described in Section 6.2.3.3 above, will help to minimize potential risks to workers.
- Implement a training program for operators who work with chlorine and ammonia regarding safe handling practices and emergency response procedures.
- Provide appropriate personal protective equipment (including, for example, self-contained breathing apparatus) and training on its proper use and maintenance.
- Prepare escape plans from areas where there might be a chlorine or ammonia emission.
- Install safety showers and eye wash stations near the chlorine and ammonia equipment and other areas where hazardous chemicals are stored or used.
- Ventilate enclosed processing areas and ventilate equipment, such as pump stations, prior to maintenance.
- Periodically sample air quality in work areas for hazardous chemicals. If needed to meet applicable occupational health national requirements or internationally accepted standards, install engineering controls to limit worker exposure.
- Prohibit eating, smoking, and drinking except in designated areas.
- Rotate personnel among the various treatment plant operations to reduce inhalation of air-stripped chemicals, aerosols, and other potentially hazardous materials.

7.3.5.5 Impacts of project activities to the fisheries

During abstraction water, there is a risk of sucking fish alongside the abstracted water. This is likely to occur at the abstraction point 300m into L. Kyoga, However sucking of fish is less likely as the size of the filter is to small for fish to pass through. Improper management of water treatment chemicals may end up in the lake thereby poisoning fish (Chemicals i.e coagulants like alum and dissifencatnt like chlorine if not well managed will end up in the water body and may be uptaken by fish thereby either killing the fish or bioaccumulating in them (Refer to section 7.3.5.4)). However, poisoning of fish is less likely to occure because of the high dilution by the lake (L. Kyoga is the second largest lake in Uganda). Further, improper management of wastes especially organic based wastes may lead to increased organic waste loading in the lake thereby increasing risks of suffocating fish due to reduced dissolved oxygen in the lake. Given the dilution effect, this impact is minor. The impact on fish has a negative implication on the livelihood of the fishermen in the area and this will obviously have an impact on the entire chain of fish trading. Impact on fish also has an indirect impact on the nutritional values as either fish's price will be high and unfordable to many or the fish catch will be reduced. Further, if fish bioaccumulate chemicals in chemical wastes, it may end up in food chain thereby affecting public health.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Impacts of project activities to the fisheries	Local	Low	Temporary	Likely	Negligible-Minor

Mitigation strategies for protecting the fisheries

- In order to avoid fish being sucked into abstraction pipe, the pipe should be screened (Screen of atmost less than a 100th inch holes) at the suction end to prevent entrance and sucking in of the fish during water uptake.
- Chemicals and Chemicals containing substances shall be stored in a facility that is leak free to minimize the amount of chemicals entirng L. Kyoga. (Refer to section 9 for more details on chemicals handling).
- Chemical containing wastes shall not be disposed off directed into the environment but shall be disposed off to a NEMA approved disposal facility using a NEMA licensed waste transporter.
- Empowering fishermen through provision of incentives for protecting water source e.g., providing fishing gear that enables fishing activity in deeper waters of the lake.

7.3.5.6 Solid waste sludge

Solid waste residuals generated by water treatment include process residuals, used filtration membranes, spent media and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process, such as lime and coagulants. Pre-sedimentation, coagulation (e.g. with aluminum hydroxide [alum]), lime softening, iron and manganese removal, and slow sand and diatomaceous earth filtration all produce sludge. Composition of the sludge depends on the treatment process and the characteristics of the source water, and may include metals, lime, polymers and other organic compounds, microorganisms, etc. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration plants), ion exchange resins, granular activated carbon [GAC] and others. Therefore, the different types of wastes generated by the various water treatment processes shall be assessed for toxicity before they are disposed off.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Soil,water and air pollution	Limited area	Medium	Permanent	Almost certain	Substantial

Mitigation measures proposed

- First of all, minimize the quantity of solids generated by the water treatment process through optimizing coagulation processes.
- A NEMA approved waste handler should be engaged to collect and dispose off solid wastes at a gazette NEMA waste disposal facility
- Alternatively, landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically not hazardous (EPA, 2011a), thus can be landfilled).
- Regenerate activated carbon such as by returning spent carbon to the supplier.

7.3.5.7 Exposure to high noise levels

The water treatment plant is likely to generate noise levels beyond those stipulated in The National Environment (Noise Standards and Control) Regulations, 2003. The current noise levels in the project area are presented in section 4.2.4. Exposure of workers to high noise levels can be a health concern and needs to be mitigated. High noise levels is likely to be generated by the water pumps and generators among other tools and equipment that will be used at the water treatment plant at Biko landing site. The noise levels should not be above 85dBs as stipulated by the National Environment (Noise) Control Regulations, 2003.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Exposure to high noise levels	Within limited area	Medium	Long-term	Possible	Moderate

Mitigation measures

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs;
- Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;
- The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the management of the Water Treament Plant.

- The water treatment plant should continuously monitor the noise levels at the plant and in case, the levels go above the national standards, then the cause of the increase should be investigated and addressed.
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.
- Periodic medical hearing checks should be performed on workers exposed to high noise levels.
- Sites must be hoarded to curb noise impacts to neighboring communities.

7.3.5.8 Water Quality and Supply

The water quality analysis indicates that faecal coliforms are high and above portable water standards (See table 4-5). Although the proposed Namasale Water and Sanitation project is intended to supply clean and adequate water to the community of Namasale Town Council, the possibility and danger of supplying water which does not meet standards for drinking water cannot be ruled out especially if the treatment plant is not managed professionally. Such a scenario can endanger lives of thousands of people.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Failure to supply clean water to the community	Within limited area	Medium	Long-term	Possible	Moderate

Mitigation measures

- Ensure that treatment capacity is adequate to meet anticipated demand and quality.
- Construct, operate and maintain the water treatment facility in accordance with national requirements and internationally accepted standards to meet national water quality standards for Drinking Water Quality.
- The project should construct a user friendly and easy to maintain system to ensure that communities can easy access services but also in case of component fault/breakdown, it is easily detected and rectified by the concerned parties.
- The Client should develop and implement an effective emergency response plan that at minimum has the following elements; communication, response procedures and the key resources needed for response in case of an emergency. This plan is intended to ensure that in case of system breakdown or any other emergency related to the project, they are detected and

addressed very first without significantly impacting on the quality of water or service being offered.

7.3.5.9 Water distribution concerns

The water distribution system is a critical component in delivery of safe potable water. Even if water is effectively treated to remove contaminants and destroy pathogens, waterborne Diseases outbreaks can occur because of deficiencies in the water distribution system. Therefore, measures to prevent or minimize potential community health risks associated with the water distribution system need to be undertaken.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Water contamination during distribution	Within limited area	Medium	Temporary-short term	Possible	Moderate

Mitigation measures

- Construct, operate, and manage the water distribution system in accordance with applicable national requirements and internationally accepted standards.
- Construct and maintain the distribution system so that it acts as a barrier and prevents external contamination from entering the water system by, for example:
  - Inspecting storage facilities regularly, and rehabilitate or replace storage facilities when needed. This may include draining and removing sediments, applying rust proofing, and repairing structures;
  - Ensuring that all installation, repair, replacement, and rehabilitation work conforms to requirements for sanitary protection and materials quality;
  - Testing material, soil, and water quality and implementing best practices to prevent corrosion;
  - Preventing cross- connections with sewerage systems.
- Maintain adequate water pressure and flow throughout the system, for example by:
  - Implementing a leak detection and repair program;
  - Reducing residence time in pipes;
  - Maintaining positive residual pressure of at least 20 pounds per square inch (psi);
  - Monitoring hydraulic parameters, such as inflows, outflows, and water levels in all storage tanks, discharge flows and pressures for pumps, flows and/or pressure for regulating valves, and pressure at critical points, and using system modeling to assess the hydraulic integrity of the system.

- Prevent introduction of contamination from the distribution system itself, for example by:
    - Minimizing microbial growth and biofilm development (e.g. by ensuring adequate residual disinfection levels). Collect samples from several locations throughout the distribution system, including the farthest point, and test for both free and combined chlorine residual to ensure that adequate chlorine residual is maintained;
    - Choosing residual disinfectant (e.g. chlorine or chloramines) to balance control of pathogens and formation of potentially hazardous disinfection by products;
    - Using construction materials that do not contribute to release undesirable metals and other substance or interact with residual disinfectants.

7.3.5.10 Wastewater and septage collection

Measures to minimize potential community health risks in sanitation can be implemented both in the collection and treatment of wastewater and sludge. Collection of sewage and transportation away from public toilets that will be constructed under this program, while not alone sufficient to protect public health, is nevertheless generally the most important aspect of sanitation. Under the Namasale water and sanitation project, human waste will be managed by use of septic tanks (during both construction and operational phases) which shall be emptied and treated at a site (waste treatment plant) gazetted by NEMA. Therefore, measures need to be put in place to ensure all waste water and sewage from septic tanks is fully collected and disposed appropriately.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Failure to collect & dispose waste water and septage	Within limited area	Medium	Temporary -short term	Possible	Moderate

Mitigation measures

- Promortion of collection services, or ensuring that collection services are available, is of primary concern.
- Timely collection of sewage should be undertaken to prevent sewage over flows.
- There should be a system among the communities, their leaders and the health workers to monitor, detect and alert the responsible authorities to call for emptying of any septic tank that poses a danger to the community.

7.3.5.11 Loss of livelihoods

While most households would receive real tangible benefits from the operation of the improved infrastructure, there is one social group, the water vendors, who are likely to have their livelihoods

seriously undermined following project implementation. The water vendors are the men (very rarely are women) who currently collect water and sell it on to individual users.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Loss of livelihoods	Local	Medium	Temporary	Likely	Moderate

Mitigation Measures

- MWE should sensitise existing water vendors in the area about adapting to the new developments in the area. This would eliminate their negative attitude towards the proposed project and result in total project support.
- The community Development officer (CDO) should mobilise the local people (including water vendors) and sensitise them about the opportunities that the proposed project would bring in the area and how they can take advantage of piped water in the area to create jobs (such as washing bays) and spur development in the area.
- Vendors would be encouraged to become scheme or kiosk operators; vendors would be encouraged to tender for public water points.
- Vendors could continue selling water to those who would wish to get water at their door steps.
- Vendors would be encouraged to be involved in casual work in the course of the construction works.

7.3.5.12 Pressure on Social Infrastructure and Services

The development will come with pressure on infrastructure like electricity, water, waste management, traffic and other social services. This influx may also come along with different behaviors like theft, accidents and drug abuse among others that may cause social disruption.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Pressure on Social Infrastructure and Services	Local	Low	Temporary	Likely	Minor

Mitigation measures

MWE will work closely with NamasaleTown Council authorities to ensure resource utilisation without conflict.

7.3.5.13 Pollution from waste water from human occupancy

Sewage will be generated from office workers and visitors at offices. Any mismanagement will lead to pollution of the area as well as cause risk to public health of the office occupants.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Pollution from waste water from human occupancy	Local	High	Temporary	Likely	Moderate

Proposed mitigation measures

Well-designed water born toilet will be built to handle human excreta on site. A Periodic eco-san toilet maintenance regime will be put in place and implemented.

7.3.5.14 Pollution of water and cutting of Pipes

Digging and construction of commercial buildings within close vicinity/on the transmission lines could result in pollution and loss of water. This could be exacerbated by migration of more people who could construct more shop buildings/commercial buildings in the area close to the transmission lines. Conflicts related to access to piped water mainly among the current water suppliers and the project could also lead to some people trying to fail the project through cutting of pipes.

Risk assessment matrix

Impact	Extent	Magnitude	Duration	Probability of occurrence	Overall Assessment
Pollution of water and cutting of Pipes	Local	High	Temporary	Likely	Moderate

Mitigation Measures:

- The contractor should clearly mark the transmission line with visible land marks.
- The local authorities should encourage its people to respect road reserves and avoid building on water transmission lines
- Engage stakeholders in designing, management and monitoring the water supply
- Develop and implement a Grievance Redress mechanism to can adequately handle conflicts that may result from loss of livelihood for the current water suppliers

8 SOCIAL AND ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

8.1 GENERAL CONSIDERATIONS

The Environment and Social management and monitoring plan proposed in Table 9.1 specifies mitigation measures and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined in order to check progress and the resulting effects on the environment by the construction works of the project. Monitoring shall begin right away and shall continue through both the construction stage and through to the operation phase. One important aspect of monitoring shall be to assess the effectiveness of the mitigation measures suggested. Where they are found lacking, appropriate new actions to mitigate any adverse effects shall be undertaken.

Implementations of these measures have to be carried out at different stages of project construction & operation phases. During the detailed design stage, the consultant shall incorporate proposed mitigation measures in the design and tender documents. The contractual agreement shall also include articles to enforce the environmental issues. Construction stage activities are mainly the responsibility of the contractor and that of the construction supervision consultant. The actual physical implementation works are carried out mostly at this stage. The execution of construction works for the proposed Namasale water and sanitation project shall also equally treat the implementation of the physical works of environmental mitigation measures.

Table 8-1: Environmental and Social Management and monitoring Plan

Environmental & social impact	**Mitigation measures**	**Responsible party/Implementer (who)**	**Site of implementation (Where)**	**Optimal Timing for implementation (When)**	**Monitoring indicators**	**Party responsible for monitoring**	**Budget in UGX**
Psychological impacts associated with clearing of the water transmission corridor	Using several avenues including local and national media such as radio stations, TVs and sensitization meetings, all affected peoples' fears need to be addressed prior to compensation	MWE	-Along the proposed water transmission & distribution line as well as the locations for intake and storage tanks	During physical demarcation of the water transmission & distribution lines before any construction work commences	Number of sensitization meetings conducted per village.	-MWE -LC Committees -Amolatar Local government	30,000,000
Possible Land acquisition	Ensure that there is no land take by constructing the water transmission and distribution lines along the road reserve. Should it be inevitable to acquire land, then the RAP shall be undertaken and PAPs Compensated appropriately prior to land acquisition.	-MWE -Contractor	Along the water transmission & distribution corridor	During design, acquisition and construction of the distribution line	▪ Number of complaints on land matters ▪ Actual land taken	-Supervising consultant -LC Committee -Amolatar Local government	To be determined by RAP
Loss of crops within construction corridor	▪ RAP shall be developed and implemented by MWE to ensure that affected property is compensated. ▪ Alternatively, farmers can first be allowed to harvest annual crops before undertaking any works in such areas. Farmers should be given adequate time of about six months to harvest their crops before construction begins ▪ Adequate sensitization of PAPs about the project ▪ The project shall only be implemented in the acquired corridor	-MWE --Contractor	▪ Along the water transmission corridor ▪ Any other site to be acquired for purposes of constructing the water & sanitation project.	During design and acquisition of the water transmission corridor	▪ Number of people compensated ▪ Number of complaints unrespect of compensation ▪ Notices giving ample time to farmers to harvest the crops in the water distribution corridors ▪ No. of sensitization meetings conducted	-Supervising consultant -LC Committee -Amolatar Local government	To be determined by RAP

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Loss of vegetation and terrestrial habitat alteration	▪ Pay adequate compensation for trees lost (In case of any) to the water transmission corridor. ▪ Adequate sensitization of PAPs about the project. The contructor should restore sites where activities were carried out at the project sites to allow natural regrowth of vegetation ▪ Movement of equipment (vehicles, contractors and the entire construction crew) shall follow designated path ways or agreed upon access roads. ▪ The disturbed areas should be restored by backfilling and leaving the area to undergo natural recolonization of vegetation ▪ MWE shall set aside funds to contribute towards local environmental programs (afforestation projects to compensate for biomass lost during corridor clearing and habitat fragmentation). ▪ MWE should also identify and support afforestation initiatives to enhance tree cover areas as a way of reducing its project footprint. ▪ Avoid clearing natural trees, forests and vegetation at all costs, as these species are under pressure in the Project Area. ▪ When laying water pipes, ensure trenches are carefully placed and well away from trees and/or remnant forest. ▪ Locate material storage areas and construction yards in existing cleared areas in main towns for instance, and away from any wetland areas.	-Contractor	Along the wayleave	Monthly during construction	▪ RAP report approved by CGV ▪ Number of people compensated ▪ Number of complaints on compensation ▪ No. of sensitization meetings conducted ▪ No. of sites restored ▪ No of tree seedlings given to the local afforestation programs	-MWE -Supervising consultant -District environment officer	The cost for compensation shall be determined by RAP

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Impact on fauna (wildlife, invertebrates, birds, **etc.)**	▪ Guard agaist fire due to negligence ▪ Access roads should be kept to a minimum ▪ Awareness programs on biodiversity to employees ▪ Restoration plan developed and implemented. At minimum, a restoration plan should have materials to be used, action plan as well as a monitoring program	Contractor	Along the pipeline route, at the water treatment plant and intake point	Continuous during construction	▪ Awareness materials on fire outbreak ▪ Fire fighting equipment ▪ No. of access roads constructed ▪ Restoration plans developed and implemented	Supervising Consultnat and MWE	50,000,000
Damange to building structures	▪ Carry out comprehensive sensitistion of all PAPs ▪ Conduct a Resettlement Action Plan (RAP) for the areas that will be affected ▪ The PAPs shall be compensated in accordance with the national laws and World Bank policy requirements on involuntary resettlements ▪ Give PAPs adequate time(Atleast six months) after compensation to enable relocation	MWE	At the proposed water treatment plant site	Before construction	▪ CGV approved RAP report ▪ Sensitisation and engagement reports ▪ RAP implementation report ▪ Notices to the PAPs	Ministry of Gender, Labour and Social Development	To be determined by the RAP
Impacts on Surface Water flow streams	▪ The Contractor shall construct a drainage system with silt traps to reduce impacts of storm water from the construction site. ▪ No spoil soil or any other materials shall be dumped or temporary stored in a known drainage system	Contractor	Along the transmission route, at the water treatment plant and intake point	During construction	-Drainage system with silt traps at construction sites		

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Degradation of source water quality	▪ **Management of alum & lime sludge** ▪ Do not discharge any untreated sludge into Lake Kyogaor any nearby water body; ▪ Adopt mechanisms that lead to: Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by residuals treatment; and safe disposal of wastes as a last option. ▪ **Management of backwash water** ▪ Do not discharge backwash water into Lake Kyoga or any water body prior to dechlorination; ▪ adopt mechanisms that lead to: Chlorine use reduction & waste reduction (resource recovery) atthe WTP as a first ▪ Mitigation from potential commuty impacts on water source ▪ Enforce Wetland policy and environmental regulations on lake shore and wetlands to protect or regulate the use of the adjacent lakeshore wetland. ▪ The project should have a component of capacity building to enable for safe handling and disposal of agro-pesticides by the communities as well as promote soil erosion control measures that reduce surface runoff and hence silt loading into the lake ▪ Restrict human and livestock access to water abstraction area ▪ Promote safe disposal of human waste among the neighbouring communities (e.g. use of pit latrines) to reduce pollution of the water source from unsafe disposal of human wastes.	Operator	At the water treatment plant	During operation	▪ Availability of NEMA approved waste disposal site(s); or Availability of a NEMA approved WTP waste handler; ▪ Complaints from communities; Waste management records; capacity building records; intact adjacent wetland	MWE, NEMA and the district local government	20,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Exhaust emission from vehicle	Timely automobile maintenance to limit carbon emissions; Workers working near stationary emission emitting equipment be availed nose/mouth muffs);	Contractor	Project sites	During construction and operation	▪ Records of automobile maintenance; ▪ visible gaseous emission from vehicles, equipment & machinery; ▪ Records of complaints from onsite workers & neighboring communities. ▪ Records of PPE issuance	Supervising Consultnat and MWE and the district local governments	12,000,000
Dust Emissions	▪ Construction sites shall be hoarded off to restrict dust to within site boundaries; ▪ Sprinkle water on vehicle pathways in places near schools, hospitals and rural growth centres. This should be done twice a day during the dry season; ▪ PPE like dust masks shall be availed to workers whenever needed; ▪ Loose materials like sand that are susceptible to dust generation during haulage be covered with tarpaulin; ▪ Limit vehicle speed to 30Km/hr on murram roads especially in places near schools, hospitals and rural growth centres;	Contractor	Along the transportation routes within the project area	During Construction	▪ Hoarded off sites ▪ Evidence of PPE issuance ▪ Taupaline covered trucks ▪ Sign posts in the project area limiting speed	MWE NEMA Amolatar district Local Government Supervising Consultant	20,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Exposure to high noise levels	▪ The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the Contractor, Supervising Consultant and the management of the Water Treatment Plant. ▪ The Contractor and the water treatment plant management should continuously monitor the noise levels during construction and operation resctively and in case, the levels go above the national standards, then the cause of the increase should be investigated and addressed. ▪ Periodic medical hearing checks should be performed on workers exposed to high noise levels. ▪ Sites near sensitive places like hospitals and schools must be hoarded to curb noise impacts to neighboring communities	Contractor and Operator	At all project sites	During contruction and operators	▪ Record of PPE issuance ▪ Hourly Monitoring records	MWE Supervising Consultant	15,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Increased susceptibility to soil erosion	▪ The construction sites (water treatment plant and storage tanks) will be hoarded off to intercept any eroded soil material ▪ Trenches shall be backfilled immediately after laying the pipes ▪ The disturbed areas shall be restorated by proper landscaping and vegeation ▪ The clearance should only be to the extent of the project ▪ The top soil should be heaped differently and used last during backfilling to enable fast gowth of planted vegetation or natural vegetation colonization of the exposed surface	Contractor	At all sites of the project area	During construction	▪ Hoarding of of the project sites which are susceptible to erosion ▪ Restoration plans and reports ▪ Work procedures indicating how the disturbed soil shall be handled	MWE	40.000.000
Loss of fauna	▪ secure site boundaries with fences & lights be maintained throughout the night at the WTP site to keep away any amphibious that might encroach; ▪ Clearance of fauna habitat be limited only to localities required for development; ▪ Compensatory vegetation be planted once construction work is complete.	Contractor	Along the pipeline, at the WTP and the intake point	During construction	▪ Extent of clearance ▪ Records of compliance with the construction schedule ▪ Restored sites after construction	Supervising Consultnat and MWE, the district local governments and NEMA	15,000,000
Impact on Structures and land uses	▪ MWE shall work with local council committees, sub-county committees, Councillors, district land boards, CAOs, RDCs, Politicians and other local leaders to sensitize all people to be affected on the intentions of land acquisition. ▪ MWE shall conduct a Resettlement Action Plan (RAP) in accordance with the Land Act and World Bank environmental and social Safeguard Policies especially Involuntary Resettlement (OP 4.12).	MWE	At all project sites	Before and during construction	▪ Joint sensitisation plans and reports ▪ RAP approved by CGV ▪ Compesation reports ▪ Signed consent forms	-Ministry of Lands, Housing and Urban Development -Ministry of Labour, Gender and Social Development	50,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	▪ All sorts of compensation and settlements must be done at least 6 months before structures are demolished. ▪ MWE shall engage all affected land owners and obtain consent before their land is used, where the landlords' object using their land without any compensation, MWE shall obtain an alternative route for the proposed water pipes. ▪ All land acquired for establishment of the water treatment plant, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies.						
Generation of solid waste	▪ Recycle all metallic waste; ▪ Inert and all hazardous waste shall be handled by a NEMA registered waste management company ▪ All organic waste shall be disposed at the town council recognised landfills. ▪ All plastic waste shall be sent back to factories for recycling; ▪ Human excreta shall be managed by a mobile toilet and later disposed in local pit latrines or lagoons or nearby gazetted waste disposal sites ▪ **A waste management Plan shall developed and implemented**	-Contractor -Supervising Consultant	In the project area	Continuous during construction	▪ Presence of waste bins at all workstations ▪ Presence of mobile toilets at at workstations ▪ Presence of delivery notes for all forms of waste generated and disposed during construction. ▪ Waste Management Plan in place	-MWE -Supervising consultant -District environment officer -LC Committee -Amolatar Local government	15,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Degradation of the catchment	▪ Spill control measures should be implemented to prevent spills from reaching water bodies. Measures should include appropriate materials handling and storage procedures, and development of contingency plans in the event of a spill. ▪ Provision of suitable workers' amenities facilities. If possible, effluent should be disposed of off-site at a nearby STP ▪ Locating stockpiles on flat areas, away from storm water. Ensure that sediment or erosion cannot reach a waterway; Diversion of overland flow around work areas / construction sites ▪ The height and slope of stockpiles especially at the water treatment plant construction site should be limited to minimize erosion of unconsolidated materials during rainfall events ▪ Promote soils erosion control measures to reduce surface runoff ▪ Increase tree cover through appropriate afforestation or agroforestry practices with appropriate tree species.	Contractor/MWE	Along the proposed project sites	During construction	▪ Spill control protocols in place and under implementation ▪ Adequate and appropriate workers amenities ▪ Soil stockpiles management work procedures and reports ▪ Acres of trees planted or number or tree seedlings given out	MWE, NEMA, Amolatar district local government, NFA	Spill and stockpile control measures in works BoQs while support to tree planting is UGX.50,000,000
Spillage of hazardous chemicals	▪ All vehicle repairs shall be conducted by qualified and experienced personnel at gazetted service centers (garages) away from the consturction sites. ▪ All other forms of hazardous waste regardless of their hazardous properties such as plastics, polythene and others shall be collected out of the	-Contractor	Project area	Monthly during construction	▪ Number of vehicle servicing receipts for contractors vehicles. ▪ Records of hazardous waste management ▪ Concerns from the local leaders.	-MWE -Contractor -Supervising consultant	30,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	project site and disposed in gazetted NEMA waste disposal sites. ▪ Prudent handling and storage of hazardous chemicals, as described in Section 6.2.3.3 above, will help to minimize potential risks to workers. ▪ Implement a training program for operators who work with chlorine and ammonia regarding safe handling practices and emergency response procedures. ▪ Provide appropriate personal protective equipment (including, for example, self-contained breathing apparatus) and training on its proper use and maintenance. ▪ Prepare escape plans from areas where there might be a chlorine or ammonia emission. ▪ Install safety showers and eye wash stations near the chlorine and ammonia equipment and other areas where hazardous chemicals are stored or used. ▪ Ventilate enclosed processing areas and ventilate equipment, such as pump stations, prior to maintenance. ▪ Periodically sample air quality in work areas for hazardous chemicals. If needed to meet applicable occupational health national requirements or internationally accepted standards, install engineering controls to limit worker exposure. ▪ Prohibit eating, smoking, and drinking except in designated areas. ▪ Rotate personnel among the various treatment plant operations to reduce inhalation of air-				▪ Chemicals handling procedures in place ▪ Records of PPE issuance ▪ Hazardous chemicals managent plan and reports in place ▪ Safety signage prohibibiting activities like eating, smoking etc installed at the facility ▪ Safety evacuation routes and assesmbly points well designated	-District environment officer -LC Committee	

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	stripped chemicals, aerosols, and other potentially hazardous materials.						
Wetland degradation	▪ No materials or wastes shall be disposed of in the adjacent wetlands ▪ MWE shall apply for and acquired a lakeshore user permit ▪ Design support structures for longer spans, to avoid/reduce the number of anchoring structures that need to be located in sensitive wetland areas. ▪ Design to place the water distribution line well above existing wetland vegetation, as far as is possible, to avoid vegetation clearing in wetland and riparian areas.	MWE	Along the project site	For the entire project cycle	▪ Lakeshore user permit in place ▪ Records of waste disposal tracking ▪ Designs that are environmentally responsive	NEMA and the Amolatar district local Governent	Incorporated in the works BOQs
Management of solid waste (sludge) during water treatment	.Dispose hazardous sludge in a gazetted waste disposal site for hazardous waste.	-MWE -Water operator	Project area	Monthly during operation	▪ Concerns from the community and local leaders. ▪ Evdence that sludge is well managed	-District environment officer -MWE	To be determined after quantifying the quantities of wastes that will be generated. This is after the water treatment plant has been commissioned
Management of waste water at the treatment plant	.Recycle filter backwash and reject water streams into the process if possible.	-MWE -Water operator	At the water treatment plant	Monthly during operation	▪ Concerns from the community and local leaders. ▪ Evidence that waste water is well managed treated before being discharged into the environment	-District environment officer -MWE -Water operator	40,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
					▪ Waste water quality monitoring reports		
Management of water treatment chemicals	▪ Manage chlorine as stipulated in the Material Safety Data Sheet (MSDS) ▪ Store and manage other chemicals such as calcium hypochlorite, ammonia as stipulated in the MSDS ▪ Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures.	-Contractor -Operator -MWE -Water operator	At the water treatment plant	Monthly during construction and weekly during operation	▪ Evidence that all controls have been put in place to manage chemicals in an environmentally acceptable manner and as stipulated in the mitigation measures. ▪ Presence of a written and well implemented chemical management plan	-MWE -Water operator	5,000,000
Accidents and injuries due to Physical hazards	▪ All construction workers shall be provided with adequate Personal Protective Equipment (PPE) ▪ Only trained and certified workers shall be allowed to install, maintain, or repair the water and sanitation equipment. ▪ All drivers to be employed by the contractor and the Developer shall be qualified, skilled with valid driving permits. ▪ Traffic guides/flag men shall guide traffic and ensure road safety especially where road users are risk of being injured by construction equipment ▪ The Contractor shall develop and implement a safety management Plan ▪ The Contractor shall ensure that appropriate signage are placed in key areas ▪ The Contractor shall acquire workmans compensation insurance to ensure that in case of	-MWE -Contractor	Project area	During construction	▪ Proof of PPE issuance ▪ Concerns from the community and leaders ▪ Evidence of appropriate training of workers ▪ Presence of adequate PPE ▪ Presence of flag men and road signs at road crossing points ▪ **Workman's compensation insurance in place** ▪ **Safety Management Plan developed and implemented** ▪ **Appropriate signage installed in key areas**	-Contractor -Supervising Consultant --LC Committee -Traffic police	11,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	an accident compensation is done in accordance to the national laws						
Water quality and supply	▪ Evaluate the vulnerability of the treatment system and implement appropriate security measures ▪ The Operator should establish an effective emergency response plan to respond to breakdown during supply	-MWE -Contractor -Supervising Consultant -Water operator	Water treatment plant and the entire project area	Monthly during construction and weekly during operation	▪ Evidence that the quantity of and quality of water supplied is acceptable. ▪ Maintainance logs for the WTP ▪ Concerns from the community and local leaders on the quality and quantity of water being supplied to them. ▪ Emergency Response Plan developed and implemented	-Water operator -MWE	Incorporated in the BOQs
Waste water and septage collection	Put in place a system among the communities, their leaders and the health workers to monitor, detect and alert the responsible authorities to call for emptying of any septic tank that pauses a danger to the community	-MWE -Water operator	Project area	Monthly during operation	▪ Evidence that filled up septic tanks and emptied and sewage disposed in gazetted waste disposal sites. ▪ Concerns from the community and local leaders.	-Water operator -MWE	Covered under awareness budget
Psychological impacts	▪ Address all people's fears of losing property in the water transmission corridor using appropriate media and avenues. ▪ Compensate all PAPs in accordance with the Land Act and WB OP 4.12 prior to project implementation.	-MWE -Contractor	Project site and any other site to be used by the contractor	At least 6 months before construction and Weekly during construction	▪ Evidence that all PAPs were compensated ▪ Concerns from the PAPs and their leaders ▪ Grievance Redress mechanisms developed and implemented	-MWE -Supervising consultant -Contractor	Already covered

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
					▪ Awareness/engagement reports		
Exploitation of Workers	▪ For unskilled jobs, give the local first priority ▪ Procure all staff under a well-recognised contract ▪ Workers shall be given appointment letters indicating their obligations as employees. ▪ All workers to be employed in accordance with the provisions of the Employment and Occupational Safety and Health Acts of 2006.	-MWE -Contractor	At all work stations	Before contracting/recruiting workers during construction	▪ Number of local people working with the contractor ▪ Presence of written contracts for all employees. ▪ Evidence that all workers are paid in accordance with their respective contracts and on time. ▪ Number Concerns of complaints from workers	-MWE -Supervising Consultant -LC Committee	No additional costs
Impact on Physical Cultural Property	▪ Relocate shrines and graves in accordance with the existing rituals and norms of the affected society. ▪ Chance finds shall be handled in accordance with the chance find procedure in this report. ▪ All imported staff shall be reported to the Local Leaders. They will be briefed, guided and shall be expected to abide by the bylaws of the villages where works on the distribution line will be on-going.	-Contractor	Project area	During construction	▪ Number of graves and or shrines affected and relocated ▪ Concerns from the local community ▪ **-Chance Finds Procedure being implemented**	-MWE -Supervising Consultant -LC Committee -Community Development Officer	Covered under works BOQs

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Interference with traffic and diminished road safety	▪ Trenching across roads and high ways shall be conducted in hours with less traffic. ▪ Conspicuous notices shall be well placed on roads and guides on ground shall direct traffic in case of diversions or lose/sagging conductors and cables. ▪ Ensure all company vehicles are in sound mechanical conditions. ▪ Employ only drivers with valid driving permits and experience. ▪ The trench excavated across the roads, after laying the pipes should be backfilled with murrum, compacted and levelled to the level of the existing road. This is to ensure that the integrity of the road is not affected by the water line construction activities. ▪ The contractor will have to notify traffic police in advance and work with it during trenching across high ways and other major roads. ▪ Increase work site visibility ▪ Implement proper training in workplace safety. ▪ Ensure that all workers put on PPEs that have reflectors	-Contractor -Supervising Consultant	Project area especially where interference with traffic is likely.	As need arises during construction	▪ Number of accidents or near misses in records. ▪ Concerns from the local leaders community ▪ Maintenance logs for the project vehicles ▪ Restored portions of the road affected by trenching and water pipe laying ▪ Notices to traffic police on the program of trenching across the roads ▪ **PPE issuance records** ▪ **Workplace safety training plans developed and implemented** ▪ **Training records in place**	-Contractor -Supervising Consultant -Traffic police	No additional costs
Public Health concerns	▪ Workers will be sensitized on protective behaviour and practices during work. ▪ Monitor communities during high-risk seasons to detect and treat cases. ▪ Excessive alcohol abuse shall be discouraged as a company policy.	- -Contractor -Supervising	Project area	During construction	▪ Number of health awareness trainings undertaken among staff and the local community. ▪ Records of training and sensitization of the workers.	-MWE -Supervising Consultant	Covered under awareness budget

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	▪ The Contractor will establish a first aid facility at the construction sites to treat injury cases whenever they occur. ▪ Provide surveillance and active screening and treatment of workers and the community where a communicable disease is discovered. ▪ Develop and implement adequate SOPs- for Covid 19	-Consultant			▪ Presence of company policy prohibiting abuse of alcohol & drugs ▪ SOPs for Covid-19 in place ▪ Surevelence and Screening Procedures for communicable diseases in place.	-District local governments	
Gender concerns	▪ Main stream gender in project activities ▪ Workers will be sensitized on their sexual rights. -The Contractor shall develop and implement zero tolerance policies and codes of conduct related to violence against women and girls (VAWG). All employees must be made aware of the zero-tolerance policy and codes of conduct for employees. ▪ All workers shall receive adequate briefing and education on the laws against defilement and other sexual offences. ▪ To the extent possible, there should be gender sensitivity in task allocation; ▪ The contractor shall conduct gender sensitization to the work force on matters such as gender sensitive communication and on the gender sensitive conduct of workers towards women including putting in place toilets segregated by gender amongst others and;	-Contractor -Supervising Consultant	Project area	During construction	▪ Presence of facilities and activities at the work place that put gender into consideration including task allocation ▪ Gender policies and code of conducts developed and implemented ▪ Awareness plans and reports on gender issues	-MWE -Supervising Consultant	5,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Disruption of social order	▪ The construction activities shall as much as possible be restricted to daytime only when noise pollution is least felt. ▪ The contractor shall be prohibited from using vulgar language at work place and in the community. ▪ A code of conduct shall be put in place and shall be followed by the workforce to avoid causing unnecessary inconvenience to the community through use of vulgar language or any other activity that may bring about social disorder. ▪ A clause shall be included in the contract stating clear course of action where the contractor breeches this code.	-Contractor	Project area	During construction	▪ Number of Complaints from the community. ▪ Work code of conducted in place and signed by all employees ▪ Contract with a clause on penalties for misbehavior of the contractor and its employees	-MWE -Supervising Consultant -LC Committee -Community Development Officer	No additional costs
Increased crime, drug abuse and prostitution	▪ Recruit local people and where possible all casual jobs. ▪ Sensitize workers and community on dangers of risky behavior ▪ Main stream HIV/AIDS in the project ▪ The contractor shall involve local (LC) leaders in labour recruitment to ensure that people hired have no criminal record. ▪ Local governments and the contractor shall collaborate with police to contain criminal activities. ▪ The Developer together with the Contractor and the Amoltar district local government shall undertake comprehensive awareness to avoid/minimize risks related to drug us and prostitution.	-Contractor	Project area	During construction	▪ Number of sensitization meetings held ▪ Number of complaints/ ▪ concerns from the community ▪ MOUs with the district authorities and police managing criminalities ▪ Substance/drug abuse policy in place	-MWE -Supervising Consultant -LC Committee	10,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	▪ Develop and implement a substance/drug abuse policy						
Loss of livelihoods	▪ Sensitise existing water vendors in the area about adapting to the new developments in the area ▪ Mobilise the local people and sensitise them about the opportunities presented by proposed project ▪ Encouraged Vendors to to tender for public water points. ▪ Develop and implement a livilohood restoration program for the affected communties	MWE	Project areas	During operation	▪ No. of sensitization meetings targeting existing water vendors ▪ No. of Vendors operating public water points ▪ Livelihood restoration program developed and implemented	-Community Development Officer	Covered under awareness budget
Pressure on Social Infrastructure and Services	work closely with NamasaleTown Council and other authorities to ensure resource utilisation without conflict	MWE	Project area	During operation	MOUs, engagement minutes and number of conflicts recorded	MWE	No additional costs
Pollution from waste water from human occupancy	▪ Well-designed water born toilet will be built to handle human excreta at the water treatment plant ▪ A Periodic eco-san toilet maintenance regime will be put in place and implemented.	MWE Operator	Project area	During design, construction and operation	▪ Public toilets installed ▪ Toilet maintenance developed and implemented.	MWE	
Pollution of water and cutting of Pipes	▪ Mark transmission line with visible land marks. ▪ People should respect road reserves and avoid building on water transmission lines	Contractor Namasale Town Council	Along the water transmission lines	During Construction During operation	▪ Visible land marks ▪ Water transmission corridor un tampered with	MWE	Covered under works BOQs and awareness budget

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	▪ Develop a GRM that effectively manages conflicts resulting from the dissagrements from current water service providers and the project				▪ A functional GRM in place	Namasale Town Council	
Disruption of schools and learning process	▪ Schools shall be sensitized on the need to keep off construction sites. ▪ When working near schools, work shall be scheduled to ensure minimal disruption for the learning. The schools should be notified of the work schedule ahead of time ▪ The contractor shall not employ any person below 18 years and any pupil or student above 18 shall not be employed during school time. Students above 18 years can be employed only during holidays. ▪ The Contractor shall ensure that there is minimal interrraction between the workers and the school population	Contractor	At all the project sites	During Construction	▪ Engagement reports specific to schools ▪ Schedules for working near schools ▪ Engagement/appointment letters with National IDs attached	MWE, Ministry of Labour Gender and Social Development	Embedded in the works BoQs
Occupational health and safety of workers	▪ Contractor should have in place a Health and Safety Policy and Action Plan, addressing workers' occupational health and safety issues, workers' welfare and working conditions in line with the Occupational Health and Safety Act of 2006, and World Bank Group EHS general Guidelines, and the EHS guidelines for Water projects; ▪ Contractor should have HSE induction for all workers, and undertake daily tool box meetings prior to works, including work at heights;		Staging areas; along the water distribution routes	During construction and O/M	▪ OHS plan ▪ OHS incidents ▪ Record of PPE issuance ▪ OHS report ▪ Induction and training records	District Environment Officers Health Officers MWE Supervisng Consultant	20,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	▪ Ensure adequate provision of PPEs (gloves, safety shoes, safety belts, overalls and goggles), as well as continuous awareness on the need for use of PPEs and enforcement of usage; ▪ Ensure good housekeeping practices on site (have all equipment, materials, containers well stacked or stored) to avoid trips and falls on site; ▪ Workers should regularly be taken through safety drills and emergency preparedness training allowing for quick and efficient responses to accidents that could result in human injury or damage to the environment; ▪ First aid facilities should be provided on site and accessible to all personnel. It should among others contain rubber gloves, bandages, pain killers and cotton wool to cater for minor accident victim; ▪ Fence off materials storage areas and camp sites to discourage idlers to the sites; ▪ Keep all equipment and machinery in good working order to limit excessive fumes and noise; ▪ The contractor to have in place a traffic management plan, and guidelines for drivers to avoid accidents; ▪ Provide adequate sanitary facilities for workers at the construction camps/staging areas and work sites.						
Labour issues – employment	▪ Contractor to have in place a Labour force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to	MWE/Contractor/Operator		During construction and operational phases	▪ Labour Force Management Plan.	MWE/Supervising Consultant/District Local Govts	12,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
and working conditions	address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, and a grievance management mechanism; ▪ All workers to have contracts and identification tags; ▪ Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement. ▪ To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly. ▪ Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff.				▪ Workers code of conduct. ▪ Contracts for workers.		
Workers behaviour – affecting women, girls	▪ A code of conduct to be developed by Contractor for employees, to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation ▪ The code of conduct to address inappropriate and risky behaviour ▪ Envourage women and other affected persons to report cases of abuse	Contractor	Work sites, workers accormodation, urban centres along water distribution route	Construction phase	Cases reported; Cases concluded	MWE District Community Development Officer	2,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Community and workers' health including HIV/AIDS	▪ Contractor to have in place an HIV/AIDS Prevention and Management Policy, and to ensure all workers are sensitized; ▪ Contractor to liaise with District Authorities (Directorate of Medical Services) and other HIV/AIDS institutions for related services, including provision of condoms, sensitization, counselling; ▪ Sensitize community and schools about construction hazards as well as HIV/AIDS; ▪ Provide workers with condoms ▪ Communities will be encouraged to report cases of illicit sexual behaviour by contractor workers to REA and local authorities; ▪ All workers to have access to medical care. ▪ Work hand in hand with other Implementing Partners in regard to mitigation of HIV/AIDS. ▪ Ensure that HIV/AIDS awareness and mitigation measures target both men and women. ▪ The contractor to have in place a code of conduct for employees spelling out innappropriate and risky behaviour to be avoided	Contractor	Staging areas for workers and all Urban centres or rural growth centres where the water line traverses.	During construction	HIV/AIDS prevention and management policy Community outreach reports	MWE District Health Officers Sub County Health Inspectors and Community Development Officers.	20,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
Aquatic habitat alteration	▪ Minimize clearing and disruption to riparian vegetation to avoid exposing bare soils to erosion that may affect the water resources; ▪ Backfill the excavated soils immediately after erecting poles; ▪ Avoid disturbance to wetlands as much as possible.	Contractor	In wet areas and streams	During construction/installation	Extent of restoration works in wet areas.	MWE, District Environment Officers .	No additional costs because cost for backfilling soil should be covered under the same cost for the contractor who will be installing pipes
Grievance management	▪ Set up grievance management committees at Village, sub county and District Levels ▪ Inform affected communities on the functioning of the Grievance management committee ▪ Develop and implement a Public Consultation and Disclosure Plan.		In all villages affected by the water distribution lines	Construction phase	Functional GMC and reports; Public Consultation and disclosure plan	MWE, District Local Governments	20,000,000
Gender based violence	▪ The contractor is to ensure that women form part of the project workforce for technical and non-technical duties. ▪ Put in place punitive measures to be taken against project workers involved in spouse battery/child abuse. Empower the family/community to use grievance redress committees at village level to report cases of abuse.	Contractor Supervising Consultant	Project areas	Construction and operation phases	▪ Percentage of women employed on project ▪ Records of reports to LC1 or police of violent workers	MWE MGLSD Local leadership Women representative at local levels	15,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	▪ MWE will liase with local authorities and Community Based Organizations in the PACs to increase access to justice for women. ▪ Sensitizing and mobilizing communities in defense of women's right to a life free of violence, and increasing knowledge of women's rights. ▪ Awareness raising among women and men on the negativity/effects associated with violence in the home/community.						
Child Abuse	▪ No workers below the age of 18 will be employed in any aspect of the project. National identification/voter registration details will be required before workers are engaged on the project ▪ No individual involved in a sexual relationship with a minor will be engaged on the project ▪ Trainings to raise awareness on child sexual abuse will be provided to workers to reduce incidences of disturbance of school children especially girls	Contractor	Project areas	During construction	▪ National identification records of workers indicating age ▪ Records of requirements for employment indicating forms of child sexual abuse ▪ Records of trainings on child abuse	MWE MGLSD Local leadership Community welfare officer	As per budget on awareness raising campaigns
Sexual violence	▪ MWE should give take/train newly employed workers through the forms of sexual abuse and penalties associated with cases as such. ▪ Community members should be educated on the different forms of sexual abuse and channels through which cases can be reported (LC1, Police, Community Welfare Officer) and emergency contacts shared ▪ Any worker reported to have sexually abused a community member should be suspended from	Contractor	Project areas	During construction and operation	▪ Training records on sexual abuse for workers and communities ▪ Records of suspension from work of workers found to be sexually abusive ▪ Records of procedures for worker conduct including	MWE MGLSD Local leadership Community welfare officer	Covered under the budget for awareness raising campaigns

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	work and handed over to the police as the case goes to court. Victims should be enabled to pursue the case to a reasonable conclusion. ▪ Put in place punitive measures to be taken against project workers involved in spouse sexual abuse. Empower the family/community to use grievance redress committees at village level to report cases of abuse ▪ Ensure that all project workers can be easily identified through proper safety wear at site and identity cards when off site. In case of incidence, the community can easily identify perpetrators to the project personnel through the Grievance management mechanism ▪ The contractor will monitor workers at the construction site closely that anyone caught engaging in groping or insulting acts will be suspended from their work ▪ Trainings (to detect and mitigate) on all forms of aggression toward women and school going children will be undertaken prior to employment of workers on the project ▪ Awareness raising among women and men on the negativity/effects associated with sexual violence in the home/community.				punitive measures in case of sexual abuse		
Impacts due to lack of guiding tools	The Contractor shall develop a Construction Specific ESMP(CESMP) and the associated work procedures(Waste Management plans, Health and safety management plant, incident investigations procedures, labour management plans, HIV prevention plans, Traffic Management Plan, Waste Management Plan, Equipment Yard Management	Contractor	On the entire project	Before implementation begins	CESMP and associated work procedures	MWE and the Supervising Consultant	30,000,000

Environmental & social impact	Mitigation measures	Responsible party/Implementer (who)	Site of implementation (Where)	Optimal Timing for implementation (When)	Monitoring indicators	Party responsible for monitoring	Budget
	Plan, Code of Conduct for Workers, Construction Materials Acquisition Due Diligence Procedure, etc. etc)						

9 HANDLING OF CHEMICALS AND OTHER POTENTIALLY HARMFUL MATERIALS

Chlorine, a harmful and toxic chemical, will be employed at the WTP during project operation. Thus, it must be safely handled to prevent any accidents, including health and safety issues. The following chemicals that are associated with this project shall be handled as follows;

9.1.1 Design and Management of Chlorination Storage and Dosing Areas

The following special storage and handling features should be utilized and maintained during the WTP operation.

i. Storage and equipment rooms be equipped with doors, opening outward to the outdoors complete with panic hardware;
ii. Viewing window into chlorine storage and equipment rooms for operator security;
iii. Visual and audible emergency alarms at the chlorine room entrance;
iv. Exhaust fans with a typical rating to air changeover every minute;
v. A chlorine gas leak detector to generate alarms and attendant ammonia bottle to help locate a leak;
vi. A drench shower located where it is easily accessible in case of emergency, with single turn (butterfly valve) water tap;
vii. An emergency kit to repair leaking containers.

For systems that use gas chlorination:

i. Install alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected;
ii. Install containment and scrubber systems to capture and neutralize chlorine should a leak occur;
iii. Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease;
iv. Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

9.1.2 Handling of Chlorine during Operation

Chlorine reacts violently with hydrogen, acetylene gases and solvents creating heat (EPA, 2011b). The reaction of chlorine with ammonia can create explosive compounds and gases that are toxic to breathe. Chlorine also reacts with metals. In the presence of water, chlorine can create a highly corrosive and dangerous acid mist. Therefore:

i. Prepare and approve standard operating procedures for its storage and handling.
ii. Never store chlorine gas and ammonia in the same building or area.
iii. Keep chlorine isolated and in different rooms from the chemicals that it reacts with.
iv. Chlorine storage areas, storage containers and process equipment and lines should be properly labelled and appropriate hazard warning should be posted in accordance with site specific operating procedures.
v. Gas containers should be stored in separate or divided rooms separately from flammable materials and other chemicals such as ammonia and sulphur dioxide, if used elsewhere in the installation.
vi. Containers should be stored and used above ground level and always in a vertical position.
vii. Chlorine gas containers should be stored in marked areas shielded from external heat sources.
viii. The protective hood should be kept secure on all unused containers and should only be taken off only when the container is being used. All containers in use should be secured in position by chains or other methods as appropriate. Gas containers should only be lifted with suitably rated and tested equipment and never by their protective hoods.
ix. Empty cylinders should be clearly marked and segregated from unused cylinders.

9.1.3 Storage and Handling of Alum during Operation

i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.
ii. Alum is readily soluble but the solution is corrosive to aluminum, steel and concrete so tanks of these materials need protective linings.
iii. Though a weak acid, avoid all unnecessary contact with it, as a matter of good working practice. Wear rubber or PVC boots, apron and overclothing as necessary depending on the condition of handling. The occupational exposure limit is 2 mg per cubic meter for an 8-hour reference period.
iv. Apply cold water to affected skin and eye areas. Move to fresh air, loosen clothing and seek medical attention in case of inhalation. Immediate medical attention should be sought for a person who has ingested the chemical and vomiting should not be encouraged.

9.1.4 Storage and Handling of Lime during Operation

i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.
ii. Ensure that bulk supplies of lime are pneumatically transferred to storage silos to prevent lime dust.

iii. Delivery and use of bags of slaked lime can give rise to severe dust problems if care is not taken. The occupational exposure standard is 5 mg per cubic meter for an 8-hour reference period. Ensure that workers wear protective gears.

iv. Enclose slurry storage tanks to avoid dust.

v. The pump and feed lines should be emptied of all lime by rodding if necessary and flushed with clean water. This should be done when the lime dosing plant is taken out of use, say when a change of duty pump is made.

9.1.5 Storage and Handling of Polyelectrolytes during Operation

i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.

ii. Polyelectrolytes are not acutely toxic but care should be taken to avoid swallowing, contact with the eyes or prolonged contact with the skin. Always consult the Safety Data Sheet for the product in use for details of any health hazards involved.

iii. Polyelectrolyte powder, dropped on a wet floor turns into a tough slippery jelly which is dangerous and difficult to clean up. Powder, if spilled, should be collected as dry material as far as possible before the area is washed liberally with (if possible) warm water.

iv. Some polyelectrolytes may contain a small proportion of acrylamide for which the occupational exposure limit is 0.3 mg per cubic meter for an 8 - hour reference period.

10 STAKEHOLDERS TO BE INVOLVED IN THE IMPLEMENTATION

The management and supervision of the ESMP is strictly the responsibility of the Ministry of Water and Environment as the Developer. During construction, the Contractor will be responsible for the day-to-day implementation of the ESMP. During the operation phase, the National Water and Sewerage Corporation (NWSC), who will take over management of the project, will be responsible for the implementation of the ESMP. The Developer, the Contractor and the Operator should employ an Environmentalist with relevant academic qualification and work experience. At the local level Amolatar District Local Government and Namasale Town Council will be responsible for the day-to-day monitoring of the ESMP in their areas of jurisdiction.

At the National level, two institutions i.e. the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSH) of the Ministry of Gender, Labour and Social Development will be involved. The role of NEMA is to monitor the project as per the Environment Act Cap 135 Section 7 and to approve external environmental compliance audits as per the Environmental Audit Regulations (1999). The role of DOSH is to issue permits and periodically inspect the project site. DOSH will issue workplace Certificates every six months it the project meets working conditions as set out in the Occupational Safety and Health Act 2006. The District and municipal councils will approve construction and occupancy permits in their area of jurisdiction.

As a means of impartiality, local NGO's or CBOs will be involved in the implementation of ESMP. Their role is to be neutral observers. They should have experience in environmental management and skills in conflict resolution.

10.1 Institutional and Implementation Arrangements (Adopted From IWMDP-ESMF, March 2018)

The Project will be implemented by MoWE and Namasale Town Council and in support of de-concentrated regional entities (WMZs, WSDFs), Amolatar District local government and their partners (e.g. District Officers, private sector operators) to deliver outputs. To facilitate integration within the sector, MOU/MOUs outlining joint responsibilities will be signed between the MWE, Namasale Town Council and entities responsible for specific activities (e.g. Districts).

The Project's primary stakeholders are the: a) MoWE through which the project will be implemented in coordination with its relevant departments (e.g. DWRM, DWD, DEA); ii) Amolatar local governments who will work with MoWE to develop catchment management plans and improve the framework for decentralized management of water resources; as well as to engage private operators to operate and manage small town water supplies; iii) and local communities and consumers who will participate in catchment based planning, and benefit from the outputs and outcomes of the project.

The MWE currently has adequate Environmental and Social Safeguards staffing, which is summarized in the table below. Respective Amolatar District Local Governments and Namasale Town Council have Environment Officers and Community Development Officers who will be involved in project monitoring and supervision.

Table 10-1: Environmental and Social Safeguards staffing

Organization	**Department**	**Environmental Specialist (No.)**	**Social Specialists (No.)**
Ministry of Water and Environment - DWD	Urban Water Supply and Sanitation department (including Decentralized Staff)	14	22
	Rural Water Supply and Sanitation Department	12	15
	Water for Production Department	4	2
	Water Utility and Regulation		
Ministry of Water and Environment - DEA	Wetlands Management Department	20	1
Ministry of Water and Environment - DWRM	Department of water Resources Planning and Regulation (Water Management Zones	Albert – 1 Upper Nile – 1 Victoria - 2 TOTAL - 4	Albert – 3 Kyoga – 2 Victoria – 2 Upper Nile – 3 TOTAL – 10

Note:

All Contractors and Consultants shall be required to hire Environmental, Social and Health and Safety Officers on site for implementation of Environmental, Social and Health and Safety activities. This Commitment shall be included in Bidding Documents and Contracts.

10.1.1 Roles and Responsibilities in the ESMP Implementation

The MoWE and Namasale Town Council and Amolatar District Local Governments are the implementing entities for the Namasale WATSAN Sub-project. The MoWE will coordinate with NEMA on ensuring that environmental and social issues are addressed effectively throughout the lifecycle of the Project.

NEMA was established by an Act of Parliament (NEA) as the principal agency responsible for the management of the environment and was created as a result of the National Environmental Action Plan (NEAP) of 1994. Implementation of the different environmental issues is done through the relevant government institutions (Lead Agencies) within whose mandate the respective issues lie. The role of NEMA is to coordinate the input by all the different lead agencies and ensure compliance with the National Environmental Policy and Law.

Implementation of the ESMP will involve multiple institutions at all levels as seen in Table below.

Table 10-2: involved institutions

Ministries and Departments	**Mandates/Responsibilities**
The Ministry of Water and Environment (MoWE)	The Ministry of Water and Environment (MoWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.
Ministry of Local Government -MoLG	The Ministry is mandated to carry out a number of responsibilities in the Local Government Act as follows: to inspect, monitor, and where necessary offer technical advice/assistance, support supervision and training to all Local Governments; to coordinate and advise Local Governments for

	purposes of harmonization and advocacy; to act a Liaison/Linkage Ministry with respect to other Central Government Ministries and Departments, Parastatals, Private Sector, Regional and International Organizations; and to research, analyze, develop and formulate national policies on all taxes, fees, levies, rates for Local Governments. Amolatar Town Council and Amolatar DLG fall under this Ministry and will be supervised and supported by MoLG.
STATUTORY AGENCIES	
National Environment Management Authority (NEMA)	NEMA retains its mandatory role of coordination, supervision and monitoring environmental issues. As for the implementation of the ESIA process, NEMA's role will involve coordinating the review of the ESIAs of the planned interventions with relevant line agencies. Other lead agencies that would participate in the review are the Ministry of Local Government and local governments. Specifically, the Environmental Monitoring and Compliance Department of NEMA is responsible for the review and approval of ESIAs, post-implementation audits and monitoring of approved projects. Although project sponsors have a responsibility for monitoring their own activities, NEMA carries out its own monitoring largely through District Environmental Officers and environmental inspectors at NEMA's head office/ Lead Agencies.
Uganda Wildlife Authority (UWA)	UWA in this case will have the role of monitoring the implementation of the ESMPs to specifically ensure that the provisions for mitigating the impacts across protected areas are implemented by the project. Specifically, in this project, UWA will provide support and guidance for management of Hippos.
DIRECTORATES	
Directorate of Environmental Affairs (DEA)	The DEA is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change.
Directorate of Water Development (DWD)	The DWD is responsible for providing overall technical oversight for the planning, implementation and supervision of the delivery of urban and rural

	water and sanitation services across the country, including water for production. DWD is responsible for regulation of provision of water supply and sanitation and the provision of capacity development and other support services to Local Governments, Private Operators and other service providers.
Directorate of Water Resources Management (DWRM)	The DWRM is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary waters resources and peaceful cooperation with Nile Basin riparian countries.
DISTRICT	
District Environment Officer (DEO)	The functions of the District Environment Officer is amongst others, advice the district Environment committee on all matters relating to the environment amongst others.
District Environmental Committees	The functions of the District Environment Committees include: to act as a forum for community members to discuss and recommend environmental policies and bye laws to the District Council and advice the District Technical Planning Committee, the District Council and NEMA on environmental management issues in the district.
NGOs	The NGOs working in the sector are coordinated at the national level through UWASNET, Uganda Water and Sanitation NGO Network an umbrella organization, which has been largely funded by sector development partners through MoWE.
Water Management at District Level	They receive funding from the center in the form of a conditional grant and can also mobilize additional local resources for water and sanitation programs. Local Governments, in consultation with MoWE appoint and manage private operators for urban piped water schemes that are outside the jurisdiction of NWSC.
COMMUNITY	
Beneficiary Communities	The Communities are responsible for demanding, planning, contributing a cash contribution to capital cost, and operating and maintaining rural water supply and sanitation facilities. A water user committee (WUC), which is sometimes referred to as a Water and Sanitation Committee (WSC) should

	ideally be established at each water point. Being the primary beneficiaries of the project, the community will be made to participate fully in all aspects of the program including project identification, preparation, implementation, operation and maintenance.

Roles of the Contractors during Project Implementation

All contractors hired to undertake project civil works shall be required to develop a Contractor's ESMP which will include among others the following aspects: the initial sub-project ESIA approved by both NEMA and World Bank, Health and Safety Management Plan, Traffic Management Plan, Waste Management Plan, Equipment Yard Management Plan, Labour Influx Management Plan which shall also include Code of Conduct for Workers, Construction Materials Acquisition Due Diligence Procedure, etc.

The Contractors shall hire the following key staff to undertake project implementation: Project Manager, Environmental Specialist, Sociologist, Health and Safety Officer. Their roles in terms of implementation of Environmental and Social Safeguard requirements among others shall include the following:

PROJECT MANAGER

- The Contractor shall employ a Project Manager who shall be charged with ultimate responsibility for implementation of C-ESMP and will therefore ensure that resources are duly provided.
- The Project Manager shall be responsible and ensure staff are adequately inducted and trained at site regarding environmental and social management including emergency procedures. The same applies to sub-contractors.
- The overall overseer on the contractors' side for the implementation of CESMP.

11 CHANCE FIND PROCEDURE

The following procedural guidelines shall be considered in the event that previously unknown heritage resources are exposed or found during the life of the project.

11.1.1 Initial Identification and/or Exposure

Heritage resources may be identified during construction or may be accidently exposed. The initial procedure when such sites are found aim to avoid any further damage. The following steps and reporting structure must be observed in both instances:

i) The person or group (identifier) who identified or exposed the burial ground must cease all activity in the immediate vicinity of the site;
ii) The identifier must immediately inform his/her supervisor of the discovery;
iii) The supervisor must ensure that the site is secured and access is controlled; and response time/scheduling of the Field Assessment is to be decided in consultation with MWE and the environmental consultant.

The Field Assessment could have the following outcomes:

i) If a human burial, the appropriate authority is to be contacted. The find must be evaluated by a human burial specialist to decide if Rescue Excavation is feasible, or if it is a major finding.
ii) If the fossils are in an archaeological context, an archaeologist must be contacted to evaluate the site and decide if Rescue Excavation is feasible, or if it is a major finding.
iii) If the fossils are in a palaeontological context, the palaeontologist must evaluate the site and decide if Rescue Excavation is feasible, or if it is a major finding.

11.1.2 Rescue Excavation

Rescue Excavation refers to the removal of the material from the "design" excavation. This would apply if the amount or significance of the exposed material appears to be relatively circumscribed and it is feasible to remove it without compromising contextual data. The time span for Rescue Excavation shall be reasonable rapid to avoid any undue delays, e.g. one to three days and definitely less than one week. In principle, the strategy during the mitigation is to "rescue" the fossil material as quickly as possible. The strategy to be adopted depends on the nature of the occurrence, particularly the density of the fossils. The methods of collection would depend on the preservation or fragility of the fossil and whether in loose or in lithified sediment. These could include:

- On-site selection and sieving in the case of robust material in sand; and
- Fragile material in loose sediment would be encased in blocks using Plaster-of-Paris or reinforced mortar.

If the fossil occurrence is dense and is assessed to be a "Major Find", a carefully controlled excavation is required.

11.1.3 Major Finds

A Major Find is the occurrence of material that, by virtue of quantity, importance and time constraints, cannot be feasibly rescued without compromise of detailed material recovery and contextual observations.

11.1.3.1 Management options for major finds

In consultation with MWE and the environmental consultant, the following

Options shall be considered when deciding on how to proceed in the event of a Major Find.

Option 1: Avoidance

Avoidance of the Major Find through project redesign or relocation. This ensures minimal impact to the site and is the preferred option from a heritage resource management perspective. When feasible, it can also be the least expensive option from a construction perspective. The find site will require site protection measures, such as erecting fencing or barricades. Alternatively, the exposed finds can be stabilised and the site refilled or capped. The latter is preferred if excavation of the find will be delayed substantially or indefinitely. Appropriate protection measures shall be identified on a site-specific basis and in wider consultation with the heritage and scientific communities. This option is preferred as it will allow the later excavation of the finds with due scientific care and diligence.

Option 2: Emergency Excavation

Emergency excavation refers to the "no option" situation where avoidance is not feasible due to design, financial and time constraints. It can delay construction and emergency excavation itself will take place under tight time constraints, with the potential for irrevocable compromise of scientific quality. It could involve the removal of a large, disturbed sample by an excavator and conveying this by truck from the immediate site to a suitable place for "stockpiling". This material could then be processed later. Consequently, the emergency excavation is not the preferred option for a Major Find.

11.1.4 Exposure of Fossil Shell Beds

Response of personnel

The following responses shall be undertaken by personnel in the event of intersection with fossil shell beds:

Action 1: The site foreman and Environment Consultant (EC) in charge must be informed;

Action 2: The responsible field person (site foreman or EC) must record the following information:

- Position (excavation position);
- Depth of find in hole;
- Digital image of the hole showing the vertical section (side); and
- Digital images of the fossiliferous material.

Action 3: A generous quantity of the excavated material containing the fossils shall be stockpiled near the site, for later examination and sampling;

Action 4: The Environmental Consultant is to inform MWE who must then contact the archaeologist and/or palaeontologist contracted to be on standby. The Environmental Consultant is to describe the occurrence and provide images via email.

Response by Palaeontologist

The palaeontologist will assess the information and liaise with MWE and the Environmental Consultant and a suitable response will be established. This will most likely be a site visit to document and sample the exposure in detail, before it is covered up.

11.1.5 Exposure of Fossil Wood and Peats

Response of personnel

The following responses shall be undertaken by personnel in the event of exposure of fossil wood and peats:

Action 1: The site foreman and Environmental Consultant must be informed;

Action 2: The responsible field person (site foreman or Environmental Consultant) must record the following information:

- Position (excavation position);
- Depth of find in hole;
- Digital image of the hole showing the vertical section (side); and
- Digital images of the fossiliferous material.

Action 3: A generous quantity of the excavated material containing the fossils shall be stockpiled near the site, for later examination and sampling;

Action 4: The Environmental Consultant is to inform the developer who must then contact the archaeologist and/or palaeontologist contracted to be on standby. The Environmental Consultant is to describe the occurrence and provide images via email.

Response by Palaeontologist

The palaeontologist will assess the information and liaise with the developer and the Environmental Consultant and a suitable response will be established. This will most likely be a site visit to document and sample the exposure in detail, before it is covered up.

11.1.6 Monitoring for Fossils

A regular monitoring presence over the period during which excavations are made, by either an archaeologist or palaeontologist, is generally not practical. The field supervisor or foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential

fossil and buried archaeological material. Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the Environmental Consultant. The Environmental Consultant will inform the archaeologist and/or palaeontologist contracted to be on standby in the case of fossil finds.

To this end, responsible persons must be designated. This will include hierarchically:

- The field supervisor or foreman who is going to be most often in the field;
- The EC for the project;
- The Project Manager

Shall the monitoring of excavations be stipulated in the Archaeological Impact Assessment and/or the Heritage Impact Assessment, the contracted Monitoring Archaeologist (MA) can also monitor for the presence of fossils and a make field assessment of any material brought to attention. The monitoring for fossils is usually sufficiently informed to identify fossil material and this avoids additional monitoring by a palaeontologist. In shallow coastal excavations, the fossils encountered are usually in an archaeological context. The monitoring for fossils then becomes the responsible field person and fulfils the role of liaison with the palaeontologist and coordinates with the developer and the Environmental Consultant. If fossils are exposed in non-archaeological contexts, the palaeontologist shall be summoned to document and sample/collect them.

11.1.7 Chance Find Procedures (Burial Ground and Grave-BGG)

In the event that previously unidentified BGG are identified and/or exposed during construction or operation of the proposed MWE project, the following steps must be implemented subsequent to those outlined under "Initial Identification and or Exposure" above.

i. The Project Manager (MWE) and/or the HRM Unit must immediately be notified of the discovery in order to take the required further steps:
ii. The Uganda Police will be notified on behalf of MWE;
iii. MWE in association with the Environmental Consultant will deploy a suitably qualified specialist to inspect the exposed burial and determine in consultation with Uganda police;
    - The temporal context of the remains, i.e.:
        - forensic,
        - authentic burial grave,
        - archaeological (older than 100 years); and
    - If any additional graves may exist in the vicinity.
iv. Shall the specialist conclude that the find is a heritage resource, MWE shall notify Uganda Museum who may require that an identification of interested parties be done through adequate consultations in order to relocate the grave.

11.1.8 Major institutions to contact while dealing with Chance Finds

Commissioner Uganda Museum

The Department of Museums and Monuments

Kira road, Kamwokya, Kampala

+256 772485624

Ministry of Water and Environment

P.O Box 20026, Kampala, Uganda

Tel +256414505942/+2564144505945

Email mwe@mwe.go.ug or ps@mwe.go.ug

12 GRIEVANCE REDRESS MECHANISM

12.1 Stage I: Grievance Resolution Committee

12.1.1 GRC Composition

The Grievance Resolution/Redress Committees (GRC) shall be established at Sub-county level (Namasale Town Council) and will include representatives from the sub-county and village administrative levels as well as community representatives. There is 1 Sub-county affected by the proposed water and sanitation project and thus 1 grievance committee will be instituted. The committee will comprise of the following members:

- LCIII Chairperson/a representative;
- Sub-county Chief (Town Clerk)/ a representative;
- Chairperson Area Land Committee / a representative;
- LCI Chairpersons for all the affected villages in Namasale Town Council;
- 5-10 Project Affected Persons (5 Males and 5 Females) as recommended by the PAPs in the sub-county;
- Any other person(s) recommended by the PAPs;

Presence of female members on the GRCs is crucial in order to ensure better consideration of gender issues for conflict resolution. The PAP representatives will be democratically chosen by the PAPs with the help of their leaders. The same committee shall also participate in the verification of PAPs during disclosure. Therefore, this committee will be set up before disclosure of compensation packages.

12.1.2 Accessibility and On-The-Spot Resolution

Village / LC1 members of the grievance committee will act as GRC focal persons at the village level in order to handle/receive complaints in order to enable access to GRC by any person at level of proximity. This will make the mechanism more functional, as well as allowing for on-the-spot clarification of issues that may only need clarification and guidance. Such on-the-spot clarifications can avoid formal sitting of a GRC for such minor issues. At this level, issues lodged, registered and retired/cleared would not need investigation. The possibility for the LC3 chairperson to appoint a representative for complaints management guarantees accessibility of LC3-level persons in the GRM process.

12.1.3 Complaints Lodging and Recording

The GRC will record and handle all complaints including those that are not related to compensation. Such grievances may relate to other aspects of the working environment such as labour, noise, dust, unsafe excavations, unsocial behaviour of the contractor or subcontractors, sexual harassment, defilement, elopement with people's wives and others. Complaints of PAPs on any aspect of compensation or addressed losses shall first be lodged in writing to the LC1 Committee representatives.

If the PAP is illiterate, the complaint will be made verbally to the LC1 Committee representative who will put it on paper. Complaints could also be made anonymously in petition collection boxes that will be put in accessible places, with an intake form for complaints. However, communities must be aware of the consequences of filing an anonymous complaint because no personal response can be provided and it will be difficult to evaluate if insufficient information is provided. Complaints originating from vulnerable households (minor-headed households, elderly, terminally ill, physically handicapped) will be treated with priority. Experience has also shown that GRCs receive issues beyond the project. In such cases, GRCs shall seek the help of MWE to redirect concerns to relevant agencies and units that are not project related. Additionally, consistent documentation for the system and its process is recommended - I.e. all complaints are registered and all resolutions reached at all stages are documented.

12.1.4 Investigation and Resolution of Complaints by GRC

Any complaint that cannot be resolved on-the-spot through clarification and guidance by the LC1 members of the grievance committee will require investigation by the GRC, including the relevant LC3 Chairperson or its representative. These complaints will be resolved by use of customary rules.

After receiving a complaint, the Grievance Resolution Committee will work hand in hand with the members of the project implementation team i.e. the Project Liaison Officer, Sociologist / RAP Specialist, Valuer, Surveyor and a Legal Officer. The project implementers (Project Implementation Unit) will also verify claims on the ground with the assistance of the grievance committee. If unresolved then the PAP can seek legal redress through the courts of law. Constant communication will be maintained throughout the negotiation process between the Committee and the concerned PAP(s), in order to allow for efficient negotiations. The grievance mechanism will ensure that all project affected persons including vulnerable groups – the elderly, women, the disabled can easily access help at no cost.

GRCs will have to pay special attention and consider emerging land and property issues especially in Biko & Namasale town due congestion and some unplanned developments in the area. Recommended solutions to both conflict-related and "regular" land conflicts during resettlement converge towards proper communication of compensation rules and procedures to all interested parties and implementation of mechanisms involving all parties to the conflict with as well as local representatives in discussions aiming towards mediation and peaceful conflict resolution. Such negative impacts can be mitigated by ensuring the collaboration of legitimate leaders and proper communication of compensation rules and procedures to all interested parties. Therefore, the grievance redress mechanism to be implemented during and after RAP implementation, as well as during the whole construction phase will enable to address conflicts that may arise.

12.2 Stage II: Courts Of Law

12.2.1 Overview

The constitution allows a right of access to the courts of law by any person who has an interest or right over property. If the grievance procedure fails to provide a settlement, complainants can still seek legal redress in courts of law as a last resort. The grievance system will operate from the disclosure of the census and asset inventories' results, up until one year after the completion of the RAP implementation process.

12.2.2 Grievance Resolution Process

Chart 12.1 presents a visual representation of the grievance resolution process.

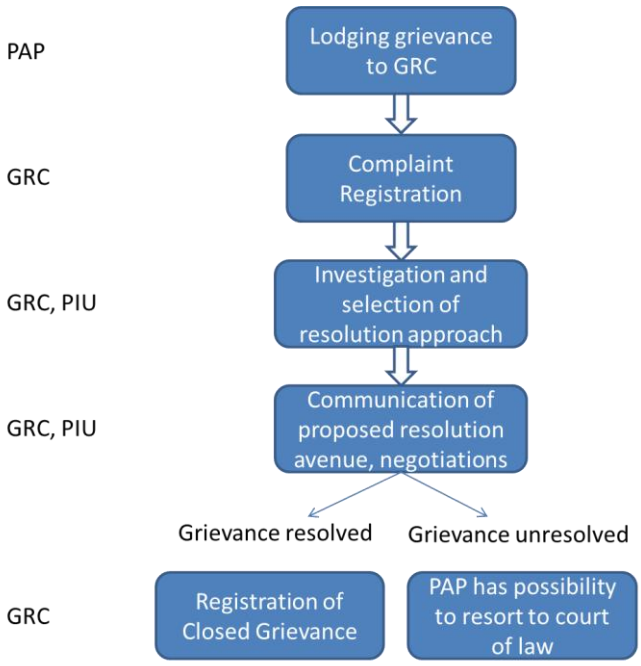

Chart 12.1: Grievance Resolution Process Flow Chart

The PAPs will be informed of the different grievance mechanisms in place for them to lodge their complaints and dissatisfactions through sensitization meetings. The grievance procedure will be simple and administered as far as possible at the local levels to facilitate access, flexibility and ensure transparency. All the grievances will be channelled through the Grievance Resolution Committees. Complaints will be filed in a Grievance Resolution Form. After registration of the complaint, an investigation will be carried out by the committee members to verify its authenticity thereafter a resolution approach will be selected based on the findings. The decisions of the action to be taken will be communicated to all involved parties mainly in written form.

The project implementing team responsible for grievance resolution will include a Project Liaison Officer, a Sociologist / RAP Specialist, a Surveyor, a Valuer and a Legal Officer. These will work

together with the grievance resolution committee to solve grievances and to ensure that grievances and clear solutions are properly recorded. Thus, all grievances received by the Grievance Resolution Committees will be forwarded to the implementing team. A way forward or grievance approach for each grievance will be selected together by the committee and project team or in close consultation.

All measures will be undertaken to ensure that the grievance is solved amicably between the concerned parties and the courts will be the last resort. Efficiency in solving the grievances will be of paramount importance. Grievances shall be resolved within a maximum period of 60 days after the date of registration. A grievance database clearly showing the date when the grievance was registered, the selected approach to resolve it and the status of the grievance shall be maintained by the project team. All the selected grievance resolution committee members shall undergo a capacity building training about their roles and requirements of the RAP before commencement of grievance resolution.

12.2.3 Monitoring Complaints

In addition to the Grievance Resolution Form, a Grievance Log will be kept by the project implementers, indicating the date the complaint was lodged, a brief description of the grievance, actions to be taken, status of the resolution etc. The Project Liaison Officer or RAP Specialist will monitor and document the progress of all complaints through monthly grievance resolution reports.

There is a high probability of complaints arising within and outside the construction sites. Site Disciplinary Committees (SDCs) shall be established to receive and resolve such complaints. Any complaints that may be handled by the SDCs shall be referred to the mainstream government institutions such as Uganda Police with the guidance of the area Local Council (LC) leadership. The LCs shall be represented in each SDC committee.

12.2.4 Monitoring and Evlaution

During construction, monitoring will be the responsibility of WMD Project Support Unit. NEMA and DOSH will periodically monitor the project as per their mandates. The major activities to be carried out during monitoring will include site inspection, review of grievances logged by stakeholders, and discussions with PAPs, construction workers and the local community who live near the project facilities in order to get neighborhood issues. The Local Councils (LC 1) of each project site, particularly the Chairman of the Environmental committee, should be involved during each site inspection. Community grievances should be discussed and solved at this level. It is recommended that the Project Support Unit should monitor the project every month by making a site inspection.

As part of the evaluation strategy, two types of environmental audits are recommended i.e. internal and external audits. The Contractor with the supervision of the Project Support Unit should carryout

quarterly internal environmental audits while an external annual environmental audit should be carried out by a NEMA registered and certified Environmental Auditor. This should be in accordance with the Environmental Audit Regulations 2006. During the construction phase, the Construction Supervision Team (the Design Consultants) will compile concise monthly monitoring reports. At the end of each quarter, the Contractor will write an Internal Quarterly Environmental Audit Report. The Project Support Unit will review the reports and approve them. The Project Support Unit on behalf of MWE as the Developer should commission the annual external environmental audit report. It will be submitted to NEMA for a Compliance Certificate.

12.2.5 Capacity Building and Technical Assistance

The goal of the IWMDP is to the maximum extent possible utilize existing institutional structures and capacity within the MOWE and NWSC to implement the Project. In order to successfully implement the guidelines and recommendations in the ESMF, it is important to ensure that target groups and stakeholders who play a role in implementing the ESMP are provided with the appropriate and continuous Environmental and Social Safeguards capacity development.

The key institutions/group of people whose capacity needs to be enhanced to effectively implement and monitor the ESMP of this project are:

(i) Beneficiary Communities: There is a need to carry our training and awareness trainings for the key community members on the safeguards aspects of the project. Further, they need to be facilitated to enable them effectively monitor the ESMP implementation proces

(ii) Staff of the respective District Local Governments: The staff at the district level needs to be trained on key aspects of the project. They also need to be facilitated to enable them effectively monitor the ESMP implementation proces

(iii) There is a need for the project to foster inter institutional monitoring of the implementation of the project's ESMP. An interinstitutional monitoring committee should be formed, trained and their activities facilitated.

13 ENVIRONMENTAL MONITORING PROGRAMME

13.1 Overview

The general approach to effective monitoring is to compare the pre- and post- project situations, measuring relevant environmental impacts against baseline conditions. Baseline data establish a reference basis for managing environmental impacts throughout the life of the project. A monitoring process will therefore be introduced to check progress and the resultant effects on the environment as the implementation of the Namasale water and sanitation project proceeds.

MWE will undertake the necessary monitoring measures for short- and long-term monitoring programme respectively. However, during monitoring close links shall be maintained with other relevant lead agencies. The key lead agencies that shall be kept in the loop will include Amolatar Local Government, NEMA and DWRM. It is the role of the Developer to ensure that the Contractor implements the proposed mitigation measures presented in this ESIA report. The planned mitigation measures indicated in chapter 8 (Project Impacts) and chapter 9 (EMP) shall be the starting point. These shall be planned and checked against their effectiveness in reducing the negative impacts/or enhancing the benefits identified in this report.

The process shall also include regular reviews of the impacts that cannot be contemplated at the time of doing this Environment Impact Assessment. Action shall be taken in response to the unforeseen changes and subsequently scale up the mitigation and monitoring measures. Monitoring shall undertake appropriate new actions to mitigate any negative effects.

The issues to monitor may include the following:

- Monitoring the clearing of the water transmission and distribution corridors including all forms of compensations and or resettlements made in respect of the displaced families or persons.
- Monitoring and supervision of the excavations for the water pipes and subsequent laying and burying of pipes.
- Monitoring the occupational health and safety of workers and the community among others.
- Monitoring the fate of solid waste/debris disposal and other wastes after it has reached and has left the site.
- Monitoring behavioural changes among the community and Contractors staff.
- Monitoring Water Quality
- Monitoring Noise and dust pollution
- Monitoring Biodiversity changes

The Developer will monitor the actual environmental impacts of the proposed water and sanitation project to ensure that mitigation measures are implemented and standards adhered to. To be able to fulfill this requirement, it will be necessary to work with indicators of environmental change outlined

in the ESMP. The indicators will be monitored as indicated in the ESMP and for some impacts, it may be weekly, monthly, quarterly, annually and at project decommissioning. Capacity to conduct monitoring will be built through training. The major objectives of the monitoring plan shall be;

- To assess compliance with the National Environment Management Authority (NEMA) EIA approval certificate conditions;
- Measure and improve the effectiveness of the Environment Management Plan (EMP);
- Assess the chemical, physical, and biological impacts of the project to the general environment.

A monitoring program will check on progress of the project and the resulting impact on the environment. It will also include regular reviews of the impacts that could not be adequately assessed before the project started, or which may arise unexpectedly. In such cases, appropriate new actions to mitigate any adverse effects will be undertaken. Furthermore, an environmental audit report will be prepared annually and submitted to NEMA for review and approval.

13.2 Monitoring Team

While the Developer will do his own internal monitoring; a monitoring team headed by the District Environment Officer of Amolatar district and composed of the local environmental authorities, representatives from the District and NEMA and any other lead agencies may also carry out monitoring. The Contractor shall undertake monitoring of key environmental parameters like water quality, noise and air pollution etc and make monthly reports to the Developer.

13.3 Decommissioning

The Namasale water and sanitation project has been planned to operate up to 2040 after which a system upgrade may be required. Therefore, for the next 22 years, full scale decommissioning of the project is not anticipated to take place except a site construction decommissioning approach which can be considered at the moment in this study. Therefore, the practical decommissioning will for now involve the following:

- Restoration of disturbed sites through levelling and re-vegetation measures;
- Removal of obsolete equipment and associated equipment parts;
- Demobilization and return of imported labour force after the project;
- Grievance management mechanisms with the host communities before site closure;
- Repairs of damaged roads and restoration of access routes and route deviations;
- Removal of construction debris and unused materials.

Although limited adverse impacts may occur, the contractor and the Developer shall prevent any condition from developing on site during construction, operation and decommissioning that would prevent restoring the site to a useful condition upon removal of the water transmission lines. Within 12 months before facility removal, the operator shall develop a decommissioning plan, detailing the following;

a) Requirements and procedure for removing equipment and structures from the site,
b) Requirements and procedures to restore the site to a useful condition;
c) Site investigation to determine contaminated areas and extent of contamination;
d) Description of options for remediation of contaminated areas on site, post decommissioning land use, information on how possible socio-environmental impacts will be minimized during decommissioning and measures to protect the public against risk or danger resulting from site conditions prevailing after decommissioning,
e) Plan on how decommissioning will be funded.

The developer shall submit the decommissioning plan to NEMA for approval. Decommissioning shall also have a restoration plan to adequately remediate any onsite contamination and restore site to the maximum extent consistent with anticipated post decommissioning use.

14 WATER SOURCE PROTECTION AND CATCHMENT MANAGEMENT PLAN

The water catchment area and the water point source for the project are degraded. The main drivers of this degradation is population growth, poor agricultural practices, rapid urbanization, climate change, anthropogenic activities like pollution from factories, open defecation and deforestation caused by land convention for agriculture and energy needs from fuelwood. Souce protection and catchment management is provided for in the project but under a separate component "Investment in Integrated Water Resources Development and Management Component". The threats caused by anthropogenic activities, the hazards they are likely to cause and control measures are herewith outlined in Table 13.1 below:

Table 14-1: Water source protection measures at water source

Water Source protection	Underlying Cause	
Sustaining water quality at abstraction point	Loss/degradation of wetland(due to agricultural encroachment) thus undermining capacity to filter sedimentation and or stabilize the lake shore bank	▪ Enforce Wetland policy to protect or regulate wetland ▪ Enforce environmental regulations (lake shore and wetlands) ▪ Demarcate and protect wetland/lake shore protection Zone
	Use agro pesticides that find their way into water at abstract point	- Improved capacity for safe handling and disposal of agro-pesticides - Promote soils erosion control measures so as to reduce surface runoff
	Soil erosion/ surface erosion from gardens and along the access road resulting in sedimentation	- Promote soils erosion control measures to reduce surface runoff

Water Source protection	Underlying Cause	
	Poor human and livestock waste disposal leading to contamination of water at the abstraction point	- Restrict human and livestock access to abstraction and water - Ensure safe disposal of human waste (e.g. use of pit latrines)
	Market adjacent to the proposed abstraction point	- Relocate the market to safe location where effect of market on water can be minimal/avoided.
	Sand mining/ extraction within upstream wetlands	- Halt/stop rock/ sand mining or extraction activities.
Sustaining water Quantity	Poor agricultural land uses in the catchment affect hydrological system(underground water) e.g. through increased surface	- Promote sustainable land management/agricultural practices in the catchment - Regulate wetland use upstream(agriculture + sand mining)
	Declining tree/vegetation cover that affect hydrological system (underground water)	- Increase tree cover through appropriate afforestation or agroforestry practices with appropriate tree species. - Maintain vegetation around the abstraction point.

Water Source protection	Underlying Cause	
Maintenance of water supply infrastructure	Insecurity water supply infrastructure due to vandalism and thefts	- Fence/provide protection of supply infrastructure. - Develop and apply conflict mitigation/management strategies
Ensuring adequate and equitable access to piped water	Population growth or concentration along supply routes resulting into increasing Conflicts related to access to piped water among current and potential water users	- Promote alternative water supply/water harvesting/ water storage technologies.
		- Engage stakeholders in designing and monitoring the water supply - Develop and apply conflict mitigation/management strategies.
Sustaining livelihoods	Declining Soil fertility and over-all land productivity	- Promote sustainable land management practices (soil fertility management, control of soil loss, etc.) - Promote technologies for enhancing land productivity (e.g. improved varieties of crops, disease and pest control, etc.)
	Conflicting or competing land (e.g., cultivate wetland edge) and water uses	- Zoning protection areas of the wetland, lake and infrastructure

Water Source protection	Underlying Cause	
	(e.g. fishing near/ around the abstraction point)	- Empowering stakeholders to plan for and manage their waste sources (provision of incentives for protecting water source e.g., fishing gear that enables fishing activity in deep waters) - Increase awareness on the relationship between land/ water use and water quality and water availability

15 SUMMARY OF RECOMMENDATIONS

Generally, the purpose of this project is to increase sustainable access to safe water and basic sanitation in Namasale town council. From the assessment, the positive impacts outweigh the negative impacts. Further, the negative impacts of the project are identifiable and mitigatable. The report presents specific mitigation measures for each impact identified. The mitigation measures are aimed at either eliminating the impact or reducing its magnitude and or severity or both. Therefore, ESIA team recommends that the project should proceed but with the following recommendations;

1. Prepare an abbreviated Resettlement Action Plan on which actual compensation and resettlement shall be based. This will include:
   a) A Socio-economic Survey of the people who have either been displaced, lost property including land, crops as well as loss of income due to change in business premises {Directly Project Affected Persons};
   b) A Cadastral Survey of the individual peoples' portions of land to be acquired by the project;
   c) A Property Valuation report indicating each PAPs entitlement.
2. Construct the proposed water project along the road reserves of the existing public roads as proposed by the Developer in order to avoid several delays, impacts and negotiations associated with land acquisitions with private landlords.
3. Detailed design for the water transmission and distribution lines shall be undertaken in close consultation with UNRA so as to take care of the new road designs which UNRA may be planning to implement in the project area.
4. Conduct and implement pre and post construction phase mitigation measures by coordinating with local authorities and involving the district and sub-county officials.
5. Ensure that the ESMP as detailed out is implemented
6. The environmental management and monitoring plan shall be attached as a condition for the project construction contract so as to make the contractor aware of his environmental obligation before securing the contract and enhance the implementation of the EMP. Overall; this will enhance environmental standards in the whole project.
7. In case of any archaeological finds during excavation, these shall be reported and handed over to the Department of Museums and Monuments in the Ministry of Tourism, Wildlife and Antiquities for further follow up in accordance with the Chance Find procedure developed for this project.

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LIST OF ANNEXES

ANNEX 1: DETAILS OF STAKEHOLDER CONSULTATION

Meeting held with Namasale Town Council Agriculture Officer

Meeting held with	**Name**	**Designation**
	Mr. Abako Calvin	Agriculture Officer Namasale T.C
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place:	3rd/09/2018 Office of the Agriculture Officer	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecosev Ltd)	
Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency.	
Responses to issues raised by the consultant (quoted verbatim)		
About the project	The officer said that he had heard about the project during one of the technical planning committee meetings but was not aware of the alignment of the water supply system. He mentioned that people have been expecting this project for a long time and would be happy to learn about the planned implementation. The agricultural officer added that sensitization should be done throughout the communities likely to be affected. The Agriculture officer indicated that there is a landing site which has underground cables for power supply owned by UEDCL.	
Damage to crops	His biggest concern was in regard to the crops that were likely to be destroyed because some were due for harvest. Despite this he said he did not expect objection from the community.	

About hygiene	He noted that poor hygiene and shortage of clean water were highlighted as the main challenges within the project area. Therefore extension of water would improve people's hygiene because current sources i.e. open sources and boreholes were not safe.
Concluding remarks	He concluded his remarks seeking to know when the project would start. He was informed that some of the preliminary studies would be undertaken before the project is implemented and as such the officers from ESIA could not tell exactly when it would start but said shortly after the said preliminaries.

Meeting with Amolatar District CAO and L.C V Chair Person

Meeting held with	**Name**	**Designation**
	Obong Thomson Ongom Simon Peter	CAO AMOLATAR District chairperson Amolatar
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place:	4th/09/2018 Office of the District Chair Person	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecosev Ltd)	
Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency.	
Responses to issues raised by the consultant (quoted verbatim)		

Access to safe water	They said that the initiative would reduce the incidence of people using contaminated water and pointing at the associated diseases such water use causes. They anticipated that people would be happy about the project and stressed that the ESIA team should engage all technical political people at the district. Namasale is a multicultural Society and has been ear marked as a convocational centre for the entire country. The chairperson stated that Namasale had a water problem despite being located near two big water bodies i.e. the Nile and L. Kyoga. He was optimistic that this water project would improve the situation.
Time fram for the ESIA	They wanted to know how long the ESIA study would take before project implementation to which a response was given that it would be after approval has been secured.
Procurement for works	They wanted know whether the resources would be disbursed through the normal district process but they were informed that this is a project.
Closing remarks	As district leaders they pledged to support the team during execution of the assignment.

Meeting held with Namasale Town Council

Meeting held with	**Name**	**Designation**
	List of Those present is appended	Town council leaders
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place:	4th/09/2018 Namasale Town Council main hall	
Agenda	1. Prayer 2. Introductions 3. Remarks from LC 4. Communication from team 5. Reactions 6. Closure	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecosev Ltd)	

Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency.
Responses to issues raised by the consultant (quoted verbatim)	
	Prayer to grace the meeting was led by M. Simple Auma The CDO who represented the Town Clerk said Namasole landing site is densely populated and multi ethnic with 4 divisions and 28 cells. She noted that they experienced a challenge of water because they have 16 boreholes but only 10 are functional. For the past three years, several people have come in regard to the proposed water project but this is yet to materialize. She noted that Biko H.C II doesn't have water and also highlighted that some school shared boreholes with the community. The CDO was opportunistic that the proposed project would lead lead to improved access to clean water within the area

It was noted that Wabinua Primary school was not mentioned yet the only borehole they possess had broken down.

Reactions

They wanted to know whether the proposed water network would take care of Alemere and Anoga trading centers which had been left out.

The ESIA team informed the Town Council official and leaders that this particular project would follow the proposed plan and other towns would only be considered under subsequent expansion plans.

They indicated that the Northern water umbrella proposed a different abstraction site but this project is considering Biko.

They were informed that a feasibility study was conducted and Biko was established as a sustainable source of water for the proposed scheme.

They noted that Namasale has about 5 landing sites namely; Biko, Namasale, Oribichan, Kayago and Lenko that need water.

They said that there was need to sensitize the local community.
A series of community meetings will be conducted with all communities traversed by the water system.

They also wanted to know when the project would start because different teams have come and gone but the water has not yet arrived.
It was confirmed that different studies are undertaken to ascertain impacts and further informed that conducting of an EIA meant that the project was close to being implemented because this is one of the final requirements to securing funds from World Bank.

Water Sources
It was reported that there were 16 Water sources but five were not functional.

The meeting expressed concern about the likely damage to trees and structures due to the project.
The community was informed that a RAP team would value all property within the area to ascertain property likely to be affected and make recommendations about compensation alternatives.

PCR: No known cultural site in the project area however a Muslim burial center near the mosque was identified.

Gender issues	Improved access to water will ensure improved livelihood for the women. Maternal health at Biko H/C will improve with the extension of piped water.
Closing remarks	Representative of Namasale TC at the district said that they were blessed to have access to safe water happy that this has finally come to realization He said the area had a total population is 12000 people emphasizing that all areas should get water which to foster development in the area. He encouraged the EIA team to Involve leaders so as to ensure that people are mobilized.

Meeting held with the Senior Environment officer

Meeting held with	**Name**	**Designation**
	Mr. Omara Apollo	Senior Environment officer
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place:	5th/09/2018 Office of the Senior Environment officer	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecosev Ltd)	
Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency.	
Responses to issues raised by the consultant (quoted verbatim)		
Key issues raised • He noted that there is seasonal drop in the water levels therefore as the technical team plans, they should bear this in mid. • The lake which is the proposed main water source for this water scheme has an invasive weed (gaintsalvenia) which sometimes covers the lake's surface. • He noted that there are suds in the lake that keep changing position depending on the direction of wave. His concern was that these are likely to interfere with the water in-take point. • In regard to land issues the senior environment officer noted that the water intake and treatment plant would be located within the protection zone. He added that area residents know the extent of these buffer zones that are locally known as NEMA land. • He mentioned that there are designated landing sites that usually smaller but fishing communities tend to settle around them • Concerning physical cultural resource the SEO said there is Abbako national prayer alter but added that this was about 15km from the project area hence unlikely to be affected.		

Meeting held with the Resident District Commissioner

Meeting held with	**Name**	**Designation**
	Mr. Richard ogwang Mr. John Bosco Mugaga	Resident District Commissioner District Internal security Officer
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place:	5th/09/2018 Office of the Senior Environment officer	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecosev Ltd)	
Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency.	
Responses to issues raised by the consultant (quoted verbatim)		
• The RDC noted that my places in the district needed water. • He said it is a presidential directive to have a bore hole per village noting that this is difficult because some areas have salty water while some don't have viable underground water sources. • He noted that currently the safe water coverage in the district was at 70% although these there are variations among sub counties. • The other concern he highlighted was likely land wrangle from project but he was informed that the water pipe would mainly follow the existing road reserve therefore this is unlikely to occur.		

Meeting held with the community of Lenko landing site.

Meeting held with	**Name**	**Designation**
	Wabinua A, Wabinua B, Oribchan and Odokolit Villages	Project Affected Persons (PAPs)
Number of participants	Males: 39 Females:05	

Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.
Date held & Place: Coordinates:	4th/09/2018 Lenko landing site 453979.5N, 168703.7E
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecoserv Ltd) Full list of community members is appended.
Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency. The purpose of this meeting is to capture expectations, fears concerns and suggestions from stakeholders. Therefore ask questions and seek clarification about the proposed project in regard to environment and social issue.

Reactions /Concerns

Will water be extended to the villages or just along the road to the landing site?

The meeting was informed that water will be given in phases and this is the layout for the first phase, thereafter consideration could be made for the extension.

The waiting time has been long and resentment against government was growing but now they are happy. Won't the proposed piped water affect property/house?

A response was to the effect that a detailed assessment of this would be done of existing property and crops.

Is it piped water or shallow wells.

They were informed that it would be tap water

Different people have come on the issue of water eg, Northern Umbrella, are these lies

Emphasis was that government cannot plan for Namasale trading center only and as such different areas have been incorporated to get funds for a consolidated project. A feasibility study was done and used to secure funds for the EIA study is part of the requirements before funding is secured.

The community sought clarification as to whether what the team was presenting about was not politics
The team confirmed that they were not politicians, and as such did not work on political inspirations stressing that whatever was presented was what is in the pipeline based on information

This program is good but government said this since 2002. Let what this project is promising be what was originally agreed on. The community stressed that all schools should be supplied with water.

Will local people be given opportunity to work or contractors will come with workers?
They ESIA team told the meeting that the contractor will use local people but if people are not willing to work, lazy or are thieves.

There was a generator used to pump water which was supplied to Namasale trading center how will this water scheme run?
They said that the generator was a different arrangement not under ministry of water.

Will the water be free of charge?
The water cannot be free of charge, however a reasonable fee will be paid for maintenance purposes

The contractor for the power line engaged local labour but did not pay some of the laborer's, what advise can you give us?
In regard to unpaid labour while working with the electricity contractor, complaints could be lodged through local leaders at the trading Center and district level. The community was advised to take on assignments only after reaching formal agreements or contracts to that effect.

Fear was expressed about the likelihood of some community members attempting to bride the implementing team to alter the designs to suit their interests.
They were informed that for this first phase the contractor will adhere to the available plan because this is what was developed after the feasibility study.

A member raised a request that a booster for supply be placed at Kayago and Lenko to benefit the respective places.

A member said that there is a challenge of lack of public toilets. Recommendation for a sanitary facility at Lenko would be recommended in the ESIA.	
Closing remarks	A member requested the team to keep real what they had submitted. They also requested that the progress of the project be shared with the community instead of keeping silent after this phase.

Meeting held with Kayago community

Meeting held with	**Name**	**Designation**
	Kayago A, Kayago B, Kayago C and Apitopat Villages	Project Affected Persons
Number of participants	Males: 18 Females: 8	
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place: Coordinates:	4th/09/2018 Kayago landing site 454586.0N, 166022.6E	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecoserv Ltd) Full list of community members is appended.	
Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency. The purpose of this meeting is to capture expectations, fears concerns and suggestions from stakeholders. Therefore ask questions and seek clarification about the proposed project in regard to environment and social issue.	
Key issues raised		

They wanted to know wether the water will be piped
Yes it will be piped water which will be abstracted and treated at Biko before distribution

Will it be free of charge?
No but the cost will be affordable because the ultimate goal is to increase access to safe by majority of the population.

They indicated that there is a nearby water source at Kayago why therefore should water be got form Biko?
Government cannot put up different small treatment plants for every town. Instead it cluster and towns next to each other are served from the same source. Otherwise the project would be too costly.

Can water be extended to my house?
Not under this phase. This project aims at ensuring that there is clean water and the distribution will follow the laid out plan.

They said a number of children and women have drowned in the lake in attempt to draw water. They also said a number of diseases such as cholera and stomach upsets often break out at the landing site because of lack of clean water.
They wanted to know where the water would be got. From underground or the lake
The water will be got from the lake.

Will there be a treatment plant and laboratory for monitoring the quality?
Yes the treatment plant will be at Biko and routine water quality tests will be conducted to ensure that the water supplied is safe for human consumption.

The proposed line will come from Biko to Lenko through people's gardens and property will they be compensated?
The RAP team will deal with valuation of property within the corridor and private propert will be compensated for. However this will be minimal because the line will follow the road reserve which is government land.

When will the work start?
The ESIA and RAP are some of the studies undertaken before the project commences. If all goes according to plan, the area is likely to get the water next year.

There should be a booster at Kayago because of the large population.
The feasibility study established that the capacity of the facilities to be put at Biko was sufficient to supply the entire Namasale Town Council.

They noted that machine to be used run on power but this is yet to be extended to Biko. How will this be done?
The process to extend power will be accelerated because that are has been surveyed and will soon be connected to the national grid.

The community noted that there is a challenge of not having a public toilet which has led to littering of the area with faecal matter.
They also said they should be informed about the progress of the project because very often they is limited information sharing with the community.

Meeting held with communities of Namasale Central

Meeting held with	**Name**	**Designation**
	Kasubi, market area, Trading centre, Kamaul and Bung Cells	Project Affected Persons
Number of participants	Males: 26 Women:13	
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place: coordinates	4th/09/2018 Market zone 457186.0N, 165494.0E	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecoserv Ltd) Full list of community members is appended.	

Introductory remarks	The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency. The purpose of this meeting is to capture expectations, fears concerns and suggestions from stakeholders. Therefore ask questions and seek clarification about the proposed project in regard to environment and social issue.

Key issues raised

The project could take part of my land, how will government or World Bank compensate me.
The road reserve is where most of the infrastructure will be placed however in the event that other private property is damaged, it will be paid for. The pipes will be underground so only crops will be paid for.

When will this project begin?
ESIA and RAP are the final studies and these have been commissioned, probably next year, however we cannot give a specific date or month.

Will the water be accessed at a cost or it will be free of charge
There will be a smaller user fee for maintenance.

Who will be in charge of the system and facility?
An operator is not known now but will be engaged and these are the ones we shall pay to run and maintain the system; as of now such operator is not known but when the project commences he/she will be introduced to the public.

I have not heard about institutions, i.e. schools that will benefit from the project.
It was clarified that the project would benefit both individuals and institutions within the project area.

Will there be a requirement for financial contributions from the community?

The residents were informed that the system would follow the set layout and it will be free of charge. Extending to homes will be done later by the service providers but it is not catered for under this project.

Who will be charged with maintenance of the system?
The project is for government and it will be in charge of maintaining it.

Will the distribution be to homes or there will be a central place?
The first phase will follow the set layout plan as per feasibility study. Extension to homes will be later. Public stands will be put in major trading at subsidized costs

Are all the five cells in central wad provided for and will there be compensation for the owners of the land where the reservoir is located.
Yes all the cells are catered for according to the map. In regard to compensation they were informed that the RAP team would determine and handle allaspects related to compensation.
Will costs for extension to the households be met by users or will it be free of charge.
The cost of extending the utility services to households will be met by respective people who seek for extension.

A tarmac road is expected, won't the line end up in peoples land
The water system will mainly follow the road reserve therefore minimal interference with private property is expected.

In case there is compensation, will it be before or after the project
Before the project starts because it is a requirement by WB that the corridor is secured before funds are released.

There's a water system, were operators can complain about lack of chlorine and fuel, how will this be managed.
There will be a laboratory for quality assurance. Routine/periodic quality tests will be undertaken to ensure that the water supplied is good for human consumption.

Will the plant be run by electricity or generator?
It will be run by electricity but there will be a backup generator to cater for any interruptions.

The meeting was further informed that there was one public toilet at the market. It was clear that this is about 300m from the trading centre which has a concentration of people. It was stressed that community members have been affected by bilihazia because of using contaminated water therefore if a public toilet is provided the state of sanitation would improve.

Meeting held with communities of Biko and Aweipeko Cells

Meeting held with	**Name**	**Designation**
	Biko and Aweipeko Cells	Project affected communities
Purpose of meeting:	To obtain technical and social economic input into the Environmental and Social Impact Assessment process for the proposed Namasale Town Council Water Supply and Sanitation Project.	
Date held & Place: Coordinates	5th/09/2018 Biko landing site 459735.4N, 165378.0E	
Number of participants	Males: 34 Females: 13	
Present:	Mr. Tumusiime Alfred, Team Leader (Ecoserv Ltd) Ms. Olivia Namutosi, Sociologist (Ecoserv Ltd) Mr. Moses Kato, GIS Specialist (Ecoserv Ltd) Full list of community members is appended.	

Introductory remarks	The prayer was led by Aweipeko's general secretary followed by introductions of the members. The chairperson thanked members for coming and informed them about the planned piped water extension that had been proposed for a long time. She anticipated that cholera and malaria would reduce when clean water is extended. She noted that human waste that littered around ended contaminating the lake which is the major source of water to the community The team leader gave a brief over view of the proposed Namasale water and sanitation program which will have its abstraction point and treatment plant in Biko cell. He added that the treated water would then be supplied to all main centres within Namasale the furthest being Lenko cell. The water system will mainly run along the road reserve therefore minimal interference with private property is expected. He informed stakeholders that the ESIA is being conducted in accordance with Ugandan laws and regulation and also as a part fulfillment of the requirements by the world bank which is the funding agency. The purpose of this meeting is to capture expectations, fears concerns and suggestions from stakeholders. Therefore ask questions and seek clarification about the proposed project in regard to environment and social issue.

Key issues raised

Peoples property is likely to be affected, how will this be handled in the event that those whose land is affected object to the proposed development

The pipe will go through the road reserve, which is government land. If there is anything on the land, It will be compensated for. A RAP team will come to establish the value of what will be destroyed. Where the treatment plant is proposed, whatever is destroyed will be equivalent to establishing the house.

Part of the land belongs to NEMA

Yes where the intake and treatment plant are proposed to be constructed belongs to NEMA but government acknowledges that people derive a livelihood from the same. Therefore the RAP team will ascertain what is likely to be damaged and the appropriate compensation schemes.

Will the water be free or at a cost?

No but the cost will be relatively low because the ultimate goal is to improve access to clean water to the majority of the population.

A question was to the effect that since only young people had attended, could it be that the elders were not in support of the project?
As the ESIA team we don't know why this happened this way because the call was to mobilise all community members. However those of you who are around will pass on the message.

Supposing people refuse the project, what happens?
That is why we conduct stakeholder meetings to capture views fears and expectations which are then conveyed to decision making authorities.

Will there be compensation and will it be equal to property lost?
Preliminary studies by the feasibility team indicated the likely water corridor and no such property was affected. Secondly the pipe will run along the road reserve so the likelihood of affecting property is low. However in the event that this happens, the RAP team will ascertain the modalities of handling this.

If a house is destroyed will it be compensated for?
Yes but only if there is no alternative way of avoiding it.

The community highlighted Angoryeni andOpoulum as settlements having considerable populations but are not catered for under this project.

They mentioned that there is one public toilet which requires emptying.
Questions

The communal burial ground was the only area of cultural importance noted at Biko landing site. This they said is used as a burial ground for people decease people whose ancestral homes are not known.
Will you come with your workers?
The contractor is advised to get labor from project host communities therefore there is a likelihood of local people getting employed during the project implementation phase.

Do residents have a right to ask for water extensions to my household?
Under this phase, it will be in trading centers but later a service provider will be engaged to extend water to private property

ANNEX 2: LIST OF PEOPLE CONSULTED

ESL Ecoserv ltd
Plot 39 – Babiha Avenue, Kololo
P.O. Box 10950 Kampala.
Tel: +256774 181912

THE REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 5th/09/2018

Location of meeting: Amolatar District office & RDC's office

X - 459735.4
Y - 165378.0

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION	SIGNATURE
01	Omara Apollo	Senior Environment Offr	geoffrey@yahoo.com	AMOLATAR DLG	
02	Comm Richard Ogwang	RDC Amolatar	rogwang@gmail.com	Amolatar	
03	Capt SB Mugagga	ASSO Amolatar		Amolatar	
	Biko Land site meeting (Biko & Atelipeko villages)			Village	
1	HARRIET- OKUSA	TEACHER	0786703544	AMOLATAR	
2	Santa Imat	Bussiness woman	—	Mbiko	santa
3	WIMU ATOKI		0776451677		
4	Gwentaum Mudashir	Residence	0784826241	Mbiko	
5	ADAN CHARLES	Angaorgyemi	0785321372	Angaorgyemi	
6	OCHAN AGNES	MBIKO CELL	0777153719	Mbiko	
7	APER JAMES	MBIKO CELL	0774515605	MBIKO	
8	Okecha Emmanuel	Farmer	—	Mbiko	okecha

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THE REPUBLIC OF UGANDA

MINISTRY OF WATER AND ENVIRONMENT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 3rd |sept| 2018

Location of meeting: Amolatar District Local Government

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION	SIGNATURE
	3rd sept 2018				
01	ABOKO CALVIN	AGRIC. OFFICER	0773-110565. calvinaboko@gmail.com	NTC	[signature]
02.	OBONG THOMSON	D/CAO	0772487457	Amolatar DLG	[signature]
3	OKIGOM SIMON PETER	LC V C/P	0783416606	(ADLG)	[signature]
4	AKOME DORCUS Alules	SEC HEALTH, Edu	0776083255	ADLG	[signature]
5	ALUNA JAMES	SEC WORKS	0772634227	)	[signature]
6	Opio Francis Obote	sec production	0785535905	ADLG	[signature]
7	Orech Edward	Water Offr	0774141254	ADLG.	[signature]
	Namasale Town Council (4th sept 2018)				
1.	Ongodia James Carl	AFDO-NTC	0774938921	NTC	[signature]
2-	Obonyo Smith	Town Agent	0788862325	NTC	[signature]
3	Amujo Esther	Ag Town Clerk	0773488569	NTC	[signature]
4.	OJOK OBOTE JASPHER	C/P Finance/Admin ADLG	0392-003670	ADLG	[signature]
5	OPIO DAVID BERNARD	Health Inspector	0774717500	NTC	[signature]

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THE REPUBLIC OF UGANDA

MINISTRY OF WATER AND ENVIRONMENT

X – 453979.5
Y – 168703.7

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018

Location of meeting: Namasale Town Council

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION	SIGNATURE
1.	Tumusiime Alfred	Envt Specialist	0782335405	Ecoserv Ltd	
2.	TIBAMULEKE JOHN.	O/C station Namasale police	0775416252.	UPF.	
3	OKIDI BESTGRASIOUS	Intelligence officer Nisale	0782125618	UPDF	
4	EBUKU VINCENT	HTR WABINUA PS	0782054185	WABINUA PS	
5	EKOPU CAROLINE KOILDA	STAFF REPRESATIVE	0775059477	BIKOHI CII	
06	Ogwang George - L.	Phy. Planner	0774199046	N.T.C	
07	ALGE CHRISTINE	Office att	0788952098	NTC	
08	Auma Simpo	Stenographer	0785456918	NTC	
09	Judith Ajo	Town Treasurer	0772435631	NTC	
10	Aboko Calvin	Agricultural Officer	0773-110565	NTC	
11	Ogema Emmanuel Okello	Town Agent	0788196859	NTC	
12	OTTO DWANI FEDNEY	HEADTEACHER NAMASALE PS	0787840897	NAMASALE PS	
13	Oyuka Moses	Town Agent	0772257502	NTC	

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018 2:00pm X – 454586.0

Location of meeting: Kayago Trading Centre (Kayago A, Kayago B, Kayago C and Apitopat) Y – 166022.6

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION Village	SIGNATURE
01	Moses Kato	Gis specialist	0776-723371	Ecoserv	[signature]
02	Tumusiime Alfred	Envt specialist	0782335405	Ecoserv Ltd	[signature]
03	Amuso Esther	Clerk	0773488869	NTC	[signature]
04	Okecho Paul	Clmn LC1 Kayago B	0782411610	Kayago B Cell	[signature]
05	Otaka Alfred	Elder Kayag	0781416229	"	[signature]
06	Adiga Saffi	Vice Clmn LC1 Kayago B	0784381515	Kayago 'B' Cell	[signature]
07	Emmasu Moses	V/Chairman C	0775975598	Kayago C cell	[signature]
08	Amar	-	-	Kayago B	-
09	Fred Talibu	-	-	Kayago	[signature]
10	Aisha Twaha	-	-	Kayago	
11	Amisi Ali	-	0780842291	Kayago	[signature]
12	Mugaid Muzamil	Fisher man	0770707130	Kayago B	[signature]
13	Anga Osuman	Fisher man	0788 246429	Kayago B	[signature]

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MINISTRY OF WATER AND ENVIRONMENT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018 2:00pm

X – 454586.0

Y – 166022.6

Location of meeting: Kayago Trading Centre

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION Village	SIGNATURE
1	Okima Isaac	Fisherman	0702626180	Apitopat	[illegible]
2	OGECH George	–	–	Apotopat	[illegible]
3	Azle Micheal	Fisherman	0782335345	Kayago-A-Cell	[illegible]
4	Ayo Nixon	B/man	0773622841	Kayago TC	—
5	Okoda Musa	Bung call	0785 064570	N/i	[illegible]
6	Rachuenda Ida	– do –	0771806663	Kayago C	[illegible]
7	Francis Kayuma	Kayago	– –	Kayago A	[illegible]
8	Oten Robert	Kayago B	0782382554	B/man	[illegible]
9	Abudu Sesanga	Kayago	0778472464	Boda	[illegible]
10	Molly Akello	Kagago	0782262875	Kayago B	[illegible]
11	Alobo Rema	~~Kayago B~~	0780676636	—	[illegible]
12	Nabutoko Maria	Resident	–	Apitapat	—
13	Odongo George	Water Sale	0781428591	Apito Pad	odongogeorge

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MINISTRY OF WATER AND ENVIRONMENT

NAMASALE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR ~~KYEGEGWA-MPARA-RUYONZA~~ TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

X- 459735.4
Y- 165378.0

Date of the meeting: 5th/09/2018

Location of meeting: BIKO LANDING SITE (Biko and Awaipeko)

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION village	SIGNATURE
1	OGWANG SAM	Apur	0781182848	Aweipeko	[signature]
2	OCOL ALFRED	Apur	0778030322	AWEIPEKO	[signature]
3	EBONG DAVID	FISHERMAN	0788036935	MBIKO	[signature]
4	EYEK JAPET	Fishmen	0785088542	MBIKO	[signature]
5	EJOBU Samuel	Fishmen	07788013	mBiko	[signature]
6	Otidi Jimmy	farmer	—	Mbiko	otidi
7	Elweu Dulie	—	0785089555	MBIKO	[signature]
8	Olwom Ambrose	Fismen	0789827547	mbiko	[signature]
9	SEMOGERERE ABEY	Fismen	—	mBiko	[signature]
10	Otim BRAUAN	FISMAN	—	mBiko	[signature]
11	Segawa Stephen	—	—	mbiko	[signature]
12	OKULLO JOSHA	fismen	—	mbiko	[signature]
13	OGWAL HENY	—	—	mbiko	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE ~~KYEGEGWA-MPARA-RUYONZA~~ TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

X – 459735.4
Y – 165378.0.

Date of the meeting: 5th/09/2018

Location of meeting: Biko and Awelpeko

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION	SIGNATURE
1	OGANA H. EMMANUEL	S/Protection	0781473469	Biko	[signature]
2	Odongo Bosco	GBJ. SEC Awelpeko	0779473839	Awelpeko	[signature]
3.	AGNESS ANGELLO CIPLICI	CIPLICI MBIKO	0776117482	MBIKOCELL	[signature]
4	Benon Odile	APUR	0771733223	Agwenicell	[signature]
5	Okun Bonny	Apur	0788106105	mbiko	[signature]
6	APIO MARY	business		Biko	[signature]
7	AKWERO FILDA	APUR	0787611568	MBIKO	[signature]
8	KAURI HASSAN	FISHERMEN	0782198806	MBIKO	[signature]
9	Denis Rigan Pule-Opio	Business	—	mBiko	[signature]
10	SUSAN OKORI	Apur	—	MBIKO	[signature]
11	OKELLO ISAAC	FORMER COUNCILLOR	0782481958	ANGADOYEMI	[signature]
12	Fiabi Apeca	fisher Monger	—	Mbiko	[signature]
13	ADAM HUSSEIN	[signature]	—	Mbiko	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018 4:00 pm X: 457186

Location of meeting: Namasale Town Y: 165494 (Kasubi, Market a Trading centre Kam Bung

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION Village	SIGNATURE
01	I.F. Otur Odia	Elda	..	Awejeka	
02	Ogwal Ceasar	C/person LC1	0771830827	N'Sale T/C	
03	Kaweki Rose	Sec Paplish	0772564397	N'Sale K/S	
04	Adebo Bonny	Teacher	0789276171	Namasale C/O	
05	Douglas Sam Akii	Farmer	0783225244	N/Sale	
06	Iwanie Peter	M	0782776038	M	
07	Okello Francis	M	0771784918	NSLC	
08	Awor Nelson	C/P	0787448656	Meike Gra	
09	Okello Moses	C/P LC1	0757568607	Bung Cell	
10	Ecodu Samuel	V.C. man	0781550832	Market Area	
11	Ongom Samuel	Peasant Farmer	0779310754	Angac-Kiemi	
12	Ihasuke Faruk	Businessman		Kasubi	

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MINISTRY OF WATER AND ENVIRONMENT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018 4:00pm. X: 457186

Location of meeting: Namasale Town Y: 165494

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION VILLAGE	SIGNATURE
1	AHELLO FLORENCE	P. FARMER	MARKET AREA CELL/0773807520	MARKET AREA	[signature]
02	OPETO RICHARD	DEPUTY H/TR	NAMASALE P/S 0775157721	BUNG	[signature]
3	obote moses	puroduction	Namasale 0772083244	Kabaulo	[signature]
4	Ochiba Okello	Peasant farmer	–	Market Area	[signature]
5	Odongi Alonciou	–	0774649745	Market Area	[signature]
6	Alok Molly	C/P W. Affairs	–	Kamawulu	[signature]
7	ODEKE MOHAMMED	M'	077 4474511	-	[signature]
8	OPOKE J	–	–	–	[signature]
9	ACENG HARRIET	SCC	–	Kamawulu	[signature]
10	APIO BRENDA ORECH	Finance	0784263780	Kamaulu	[signature]
11	JASINTA Alupu	–	0786331374	KASUBI	[signature]
12	GKANYU JOEL	–	–	MAKET KASUBI	[signature]
13	OKELLO MOSES OKAO	P/FARMER	0785804262	M/AREA	[signature]
14	APENYO JAMEX	U/SP	0771486719	KASubi	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018 4:00pm X: 457186

Location of meeting: Namasale Town Y: 165494

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION / VILLAGE	SIGNATURE
01	Tumusiime Alfred	Env't Specialist	0782335405	Ecoserv Ltd	
02	Moses Kato	Pis Specialist	0776-725371	Ecoserv Ltd	
03	Okwir Sam	Chairman L.C.I	0779520530	Market area	
04	Otello charles Bwoya	Vice LC II	0787965924	TC Cell	
05	Obada Anthony Darling	Secretary LC II	0774979442	Kasubi cell	
06	Okodi James Peter	Kasubi cell	0772894040	Kasubi cell	
07	OCEN ROBERT	KAMULI	0784460796	C/V	
08	Otello Clara	councillor M.R	0785350956	Merakaka	
09	EMAMU RICHARD		0775954422		
10	Ojira Patrick	Councillor	0788792179	Maralata	
11	Grace Awel		-	Marwiga	
12	Ojok Boniface-otello	Member of NSME TOWN	0773898965	MARKET AREA	
13	Obanga David	member of NSME TOWN	0770799300	"	

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMUNGALWE-KALIRO TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

X : 454586
Y : 166022

Date of the meeting: 4th Sept 2018

Location of meeting: Namasale Town Council (Kabinua Ward - Lenko landing Site)

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION	SIGNATURE
1	Tumusiime Alfred	Envt Specialist	0782335405	Ecoserv Ltd	[signature]
2	Epuu Moses	Vice Chair person Wabinua B	0772084842	Wabinua B cell	[signature]
3	Okuk Moses	residence	0789386840	Aretgik cell	[signature]
4	Okello Nelson	Religious	0787372260	Wabinua A cell	[signature]
5	Apea Denis	Residence	0775298673	Wabinua B cell	[signature]
6	Oti M Peter	PRSID NP	0789097869	Wabinua B cell	[signature]
7	Etuku Morih	"		Wabinua B' cell	[signature]
8	Okech Moses	"	0786845089	Wabinua B cell	[signature]
9	Ojara George	"	"	Wabinua B cell	[signature]
10	Odongo Christ	"	"	Wabinua B' cell	[signature]
11	Akaa Peter	Farmer	–	Wabinua B cell	[signature]
12	Emoo Jimmy	"	0775007467	Wabinua B' cell	[signature]
13	Oyaya Denis	G.SEC	0776059053	Kabinua B	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018

Location of meeting: Lenko Trading Centre / Landing site (Wabinua A village, Wabinua B, Oribichan and Odorolit villages)

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION village.	SIGNATURE
1	ORUK WIXSON	C/MAN LC1	0775467284	ODOLOLIT	
2	OKENG BONNY	— —		Lenco	
3	Ogwang David	C/man LC1	0785423750	Aruk ogik	
.		C/man LC1	0778		
4	Makoha Musafa	B/man	0778602	—	
5	OKELLO RONNIE	F/man	0774966192	WABINUA "B"	
6	ACIRA EMMANUEL	F/ MAN	—	WABINUA B	
7	WAMARA FRANCIS	F/MAN	0772387449	WABINUA B	
8	OKELLO JASPHER	FARMER	-	ARUWI-OGIK	
9	EBULU GODFREY	P.F	—	WABINUA "A" CELL	
10	OCAYA DENIS MUSA	F. MAN	0783976499	WABINUA B CELL	
11	WAIGUKU JHON	F. MAN	—	11	—
12	OTIM Jonathan	student	—	wabinua B	

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Y 168703.7

NAMASALE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR ~~KYEGEGWA-MPARA-RUYONZA~~ TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th Sept 2018 11:00 am

Location of meeting: Lenko Trading Centre/Landing Site (Wabinua A, Wabinua B, Oribichan and Okoikdit Villages)

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION Village	SIGNATURE
13	OPOK ROBERT	Secretary CMAN LC1	0771584242	WABINUA B	[signature]
14	NABATANZI SARAH	fishmonger	–	WABINUA B	[signature]
15	AUMA BETTY	–	0771407321	WABINUA B	[signature]
16	OGWOK TONNY		0774832693	WAINUA B	[signature]
17	WEIL SAM	V/ MAN LC1	0772032296	Wabinua A	[signature]
18	Olaka Moses	wabinua B	0789108688	,, ,,	[signature]
19	ETUM BUSEO	Youth	0773217750	wabinua B	[signature]
20	OBONGI JACOB	Youth	0787872235	Wabinua B	[signature]
21	Otee Stephen	APCR	0784991192	WABINUA A	[signature]
22	OBWIR James	ACR	–	wabinua (B)	[signature]
23	Okodo Moses				
	Okello Bill	APUR	0789664356	WABINUA A	[signature]
		Apur	039		

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS - CONSULTATIVE MEETING

Date of the meeting: 4th/09/2018 11:00 am

Location of meeting: LENKO

S/N	NAME	POSITION	Email Address/Phone number	INSTITUTION	SIGNATURE
				Village	
	Okello Bill	Apuv	0392003725	Wabinua's	[signature]
	Opio Charles	Apur	0782954770	Odeikolit	[signature]
	Dbore Habu	Fisman			[signature]
	Amute Nirsoto	Apur	0783910553	Arwot-Olik	[signature]
	Opwonya Bosco	Apakor Lc	0771687966	Wabinua	[signature]
	Egor Paul	CPNRM NTC	0787965915	Wabinua	[signature]
	Oburu Nixon	Elm Lc1	—	Wabinua's	[signature]

ANNEX 3: WATER TEST RESULTS

NATIONAL WATER AND SEWERAGE CORPORATION

CENTRAL LABORATORY - BUGOLOBI

P.O BOX 7053 KAMPALA Email: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: Ministry of Water & Environment (c/o Ecoserv) **Serial No: ES/RF/2018/1377**

Address: Kampala **Sampled by: Client's Staff**

Date Sample Received: 28/09/2018 **Date of Report: 10/10/2018**

Parameters	Units	Borehole Namasale Town centre E:456799, N:165236 Amolator District	National Standards for Potable Water
Sample Number	--	**K4703/2018/C/B**	
B.O.D	mg/L	1.2	NS
Bact: Total coliforms	CFU/100mL	**201**	0
COD	mg/L	3	NS
Calcium: Ca^{2+}	mg/L	60.8	150
Chloride	mg/L	90	250
Nitrate-N	mg/L	0.0	45
pH (Physical-Chemical)	-------	7.03	5.5-9.5
Sulphate	mg/L	21	400
Total Phosphorous (TP)	mg/L	0.14	2.2
Turbidity	NTU	1.27	25

Remarks

The water Sample showed complying physiochemical characteristics compared to the National Standards for Natural potable water. However, the bacteriological characteristics did not comply with the National Standards for Natural potable water

ANALYSED BY: Robinah Muhairwe & Kennedy Araa

AUTHORISED BY: **Manager Central Laboratory Services :** .....

APPROVED BY: **Senior Manager - Water Quality Management Department :** .....

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

NATIONAL WATER & SEWERAGE CORPORATION
P.o. Box 7053 Kampala, Uganda
Tel:+256631331511 1 715
Email:external.services@nwsc.co.ug
REF. NO: 1377
SIGN:
DATE: 10/11/2018
EXTERNAL SERVICES

NATIONAL WATER AND SEWERAGE CORPORATION

CENTRAL LABORATORY - BUGOLOBI

P.O BOX 7053 KAMPALA Email: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: Ministry of Water & Environment (c/o Ecoserv) **Serial No: ES/RF/2018/1377**

Address: Kampala **Sampled by: Client's Staff**

Date Sample Received: 28/09/2018 **Date of Report: 10/10/2018**

Parameters	Units	Lake kyoga(Biko Landing Site), Community water, FetchingPoint Amolator district N459802, E165045	National Standards for Potable Water
Sample Number	--	**K4699/2018/C/B**	
B.O.D	mg/L	3.63	NS
Bact: Total coliforms	CFU/100mL	**50**	0
COD	mg/L	12	NS
Calcium: Ca^{2+}	mg/L	4.8	150
Chloride	mg/L	28	250
Nitrate-N	mg/L	0.09	45
pH (Physical-Chemical)	-------	7.40	5.5-9.5
Sulphate	mg/L	1	400
Total Phosphorous (TP)	mg/L	0.09	2.2
Turbidity	NTU	2.42	25

Remarks

The water Sample showed complying physiochemical characteristics compared to the National Standards for Natural potable water. However, the bacteriological characteristics did not comply with the National Standards for Natural potable water

ANALYSED BY: Robinah Muhairwe & Kennedy Araa

AUTHORISED BY: **Manager Central Laboratory Services :** .....

APPROVED BY: **Senior Manager - Water Quality Management Department :** .....

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

NATIONAL WATER & SEWERAGE CORPORATION ES P.o.Box 7053 Kampala, Uganda Tel:+256631331511 1715 Email:external.services@nwsc.co.ug REF. NO.: 1377 SIGN: DATE: 10/10/2018 EXTERNAL SERVICES

ANNEX 4: DAILY VEHICLE INSPECTION FORM

VEHICLE REGISTRATION NUMBER:_____ WEEK ENDING DATE_____

	ITEM DESCRIPTION	G= GOOD ORDER B= BAD CONDITION						
		MON	TUE	WED	THU	FRI	SAT	SUN
1	LEAKS – WATER / FUEL							
2	OIL LEAKS – ENGINE / DIFFERENTIAL / GEARBOX / HYDRAULIC							
3	TYRES – FRONT / REAR / SPARE / PRESSURE / NUTS							
4	WINDSCREEN / WINDOWS / MIRRORS							
5	BODY WORK – DOORS / HANDLES / CHASSIS / PANALS							
6	VEHICLE LICENCE / REGISTRATION PLATES - VALIDITY							
7	EXHAUST – ENGINE SMOKE / PROPERLY SECURED							
8	LEVELS – OIL / WATER / BRAKES / CLUTCH / HYDRAULIC							
9	BATTERY – WATER LEVEL / CONNECTIONS / CABLES							
10	ABNORMAL WEAR ON STEARING							
11	BRAKES – FOOT / HAND / AIR							
12	LIGHTS – MAIN / STOP / PARK							
13	INDICATORS – FRONT / REAR							
14	REFLECTORS – FRONT / REAR AND REAR CHEVRONS							
15	JACK / WHEEL SPANNER / WARNING TRI-ANGLES							
16	HORN / WINDSCREEN WIPERS							
17	INTERIOR – SEATING / INSTRIMENTATION / HOUSEKEEPING							
18	FIRST AID KIT							
19	FIRE EXTINGUISHER							
20	LOADING AREA EQUIPMENT PROPERLY SECURED							
21	PROPER HOUSEKEEPING ON LOADING AREA							
20	VEHICLE ROADWORTHY							
21	**REMARKS:**							
22	NAMES OF PERSON CONDUCTING INSPECTION:							

DAILY VEHICLE LOGSHEET					
DATE	ODOMETER START OF TRIP READING	ODOMETER END OF TRIP READING	TRIP DISTANCE (KM)		TRIP DETAILS

Supervisor's Name:_____ Sign:_____

ANNEX 5: LIST OF PLANT SPECIES IN THE PROJECT AREA

	Phytosocial description of site		Acacia-Kigelia-Ficus bushed grassland with scattered trees	Cyperus-Phragmites-Echinochloa lakeshore marsh	Acacia-Harrisonia-Hyperrhelia bushland	Cyperus-Cynodon-Leersia riverine marsh		IUCN (Global) Status	National Status
	Site name		NA01	NA02	NA03	NA04	NA05		
	Coordinates (36N)		459799 165030	459700 165349	453864 168646	454563 165730	457050 164688		
Species	**Life form**	**Locality status**							
Acanthospermum hispidum	Herb	Ind	3			**1**		Not Evaluated (NE)	Not Evaluated (NE)
Asystasia gangetica	Herb	Ind		1	3			Not Evaluated (NE)	Not Evaluated (NE)
Justicia pingua	Herb	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Alisma plantago	Herb	Ind		2				Not Evaluated (NE)	Not Evaluated (NE)
Achyranthes aspera	Herb	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Alternanthera nodflora	Herb	Ind				5		Not Evaluated (NE)	Not Evaluated (NE)
Alternanthera pungens	Herb	Ind	35	5				Not Evaluated (NE)	Not Evaluated (NE)
Amaranthus dubius	Herb	Ind	3	2			10	Not Evaluated (NE)	Not Evaluated (NE)
Amaranthus lividus	Herb	Ind	3	8			2	Not Evaluated (NE)	Not Evaluated (NE)
Amaranthus spinosus	Herb	Ind		1				Not Evaluated (NE)	Not Evaluated (NE)
Ethulia conyzoides	Herb	Ind			4			Not Evaluated (NE)	Not Evaluated (NE)
Gomphrena celosioides	Herb	Ind			7	1	4	Not Evaluated (NE)	Not Evaluated (NE)
Mangifera indica	Tree	Ind			10			Not Evaluated (NE)	Not Evaluated (NE)
Centella asiatica	Herb	Ind	1				3	Not Evaluated (NE)	Not Evaluated (NE)
Borassus aethiopum	Tree	Ind			8			Not Evaluated (NE)	Not Evaluated (NE)
Phoenix reclinata	Tree	Ind		5				Not Evaluated (NE)	Not Evaluated (NE)
Ageratum conyzoides	Herb	Ind	2		1			Not Evaluated (NE)	Not Evaluated (NE)
Aspilia africana	Herb	Ind			1			Not Evaluated (NE)	Not Evaluated (NE)
Aspilia kotschy	Herb	Ind				2		Not Evaluated (NE)	Not Evaluated (NE)
Bidens pilosa	Herb	Ind	2	4				Not Evaluated (NE)	Not Evaluated (NE)
Chromolaena odorata	Herb	Inv		2				Not Evaluated (NE)	Not Evaluated (NE)
Crassocephalum cecrepidioides	Herb	Ind			4			Not Evaluated (NE)	Not Evaluated (NE)
Emilia disfolia	Herb	Ind		3				Not Evaluated (NE)	Not Evaluated (NE)
Tagetes minuta	Herb	Ind		5			2	Not Evaluated (NE)	Not Evaluated (NE)
Tithonia diversifolia	Shrub	Ind			3			Not Evaluated (NE)	Not Evaluated (NE)
Vernonia amygdalina	Tree	Ind	1					Not Evaluated (NE)	Not Evaluated (NE)
Kigelia africana	Tree	Ind	15				1	Not Evaluated (NE)	Not Evaluated (NE)
Markhamia lutea	Tree	Ind		5				Not Evaluated (NE)	Not Evaluated (NE)
Spathodea nilotica	Shrub	Ind	2				3	Not Evaluated (NE)	Not Evaluated (NE)
Steriospermum kunthianum	Tree	Ind			2			Not Evaluated (NE)	Not Evaluated (NE)
Cordia monoica	Shrub	Ind			2			Not Evaluated (NE)	Not Evaluated (NE)
Cadaba farinosa	Shrub	Ind			5			Not Evaluated (NE)	Not Evaluated (NE)
Capparis erythrocarpos	Shrub	Ind	3					Not Evaluated (NE)	Not Evaluated (NE)

	Phytosocial description of site		Acacia-Kigelia-Ficus bushed grassland with scattered trees	Cyperus-Phragmites-Echinochloa lakeshore marsh	Acacia-Harrisonia-Hyperrhelia bushland	Cyperus-Cynodon-Leersia riverine marsh		IUCN (Global) Status	National Status
	Site name		NA01	NA02	NA03	NA04	NA05		
	Coordinates (36N)		459799 165030	459700 165349	453864 168646	454563 165730	457050 164688		
Species	**Life form**	**Locality status**							
Capparis fascicularis	Shrub	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Commelina africana	Herb	Ind			4		5	Not Evaluated (NE)	Not Evaluated (NE)
Commelina benghalensis	Herb	Ind		5				Not Evaluated (NE)	Not Evaluated (NE)
Ipomoea cairica	Climber	Ind	4					Not Evaluated (NE)	Not Evaluated (NE)
Diplocyclos palmatus	Climber	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Cyperus articulatus	Herb	Ind				20		Not Evaluated (NE)	Not Evaluated (NE)
Cyperus cyperoides	Herb	Ind	8				1	Not Evaluated (NE)	Not Evaluated (NE)
Cyperus denudatus	Herb	Ind		3				Not Evaluated (NE)	Not Evaluated (NE)
Cyperus dives	Herb	Ind				10	7	Not Evaluated (NE)	Not Evaluated (NE)
Cyperus dubius	Herb	Ind		2				Not Evaluated (NE)	Not Evaluated (NE)
Cyperus papyrus	Herb	Ind		80		70	10	Not Evaluated (NE)	Not Evaluated (NE)
Kyllinga eratior	Herb	Ind				5	4	Not Evaluated (NE)	Not Evaluated (NE)
Acalypha bipartita	Shrub	Ind	7					Not Evaluated (NE)	Not Evaluated (NE)
Acalypha creanata	Herb	Ind			4			Not Evaluated (NE)	Not Evaluated (NE)
Erythrococca bongensis	Shrub	Ind				2		Not Evaluated (NE)	Not Evaluated (NE)
Euphorbia candelabrum	Shrub	Ind	5					Not Evaluated (NE)	Not Evaluated (NE)
Jatropha curcas	Shrub	Ind			3	4		Not Evaluated (NE)	Not Evaluated (NE)
Shirakiopsis elliptica	Tree	Ind		6			2	Not Evaluated (NE)	Not Evaluated (NE)
Ricinus communis	Shrub	Inv	5				3	Not Evaluated (NE)	Not Evaluated (NE)
Thevetia peruviana	Shrub	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Aeschynomene elafroxylon	Tree	Ind				20		Not Evaluated (NE)	Not Evaluated (NE)
Aeschynomene uniflora	Shrub	Ind				20		Not Evaluated (NE)	Not Evaluated (NE)
Desmodium salicifolium	Herb	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Mimosa pigra	Shrub	Inv			4			Not Evaluated (NE)	Not Evaluated (NE)
Rhynchosia minima	Herb	Ind	1					Not Evaluated (NE)	Not Evaluated (NE)
Senna bicapsularis	Herb	Ind	3					Not Evaluated (NE)	Not Evaluated (NE)
Senna occidentalis	Shrub	Ind	5					Not Evaluated (NE)	Not Evaluated (NE)
Senna siamea	Shrub	Inv	5					Not Evaluated (NE)	Not Evaluated (NE)
Tamarindus indica	Tree	Ind			15		2	Not Evaluated (NE	Vulnerable (VU)
Tephrosia pumila	Herb	Ind				1		Not Evaluated (NE)	Not Evaluated (NE)
Acacia brevispica	Shrub	Ind	4		60			Not Evaluated (NE)	Not Evaluated (NE)
Acacia hockii	Shrub	Ind		2	1			Not Evaluated (NE)	Not Evaluated (NE)
Acacia polyacantha	Tree	Ind			1		2	Not Evaluated (NE)	Not Evaluated (NE)
Acacia sieberiana	Tree	Ind	10			20		Not Evaluated (NE)	Not Evaluated (NE)
Albizia coriaria	Tree	Ind	2	8			1	Not Evaluated (NE)	Near Threatened (NT)
Alysicarpus rugosus	Herb	Ind				10	4	Not Evaluated (NE)	Not Evaluated (NE)

	Phytosocial description of site		Acacia-Kigelia-Ficus bushed grassland with scattered trees	Cyperus-Phragmites-Echinochloa lakeshore marsh	Acacia-Harrisonia-Hyperrhelia bushland	Cyperus-Cynodon-Leersia riverine marsh		IUCN (Global) Status	National Status
	Site name		NA01	NA02	NA03	NA04	NA05		
	Coordinates (36N)		459799 165030	459700 165349	453864 168646	454563 165730	457050 164688		
Species	**Life form**	**Locality status**							
Piliostigma thonningii	Shrub	Ind			1			Not Evaluated (NE)	Not Evaluated (NE)
Senna spectabilis	Tree	Inv	10	5			2	Not Evaluated (NE)	Not Evaluated (NE)
Sesbania sesban	Shrub	Ind			3			Not Evaluated (NE)	Not Evaluated (NE)
Teramnus repens	Herb	Ind				4		Not Evaluated (NE)	Not Evaluated (NE)
Hoslundia opposita	Shrub	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Leonotis nepetifolia	Herb	Ind	8					Not Evaluated (NE)	Not Evaluated (NE)
Ocimum americanum	Herb	Ind				3		Not Evaluated (NE)	Not Evaluated (NE)
Grewia mollis	Shrub	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Grewia similis	Shrub	Ind	1					Not Evaluated (NE)	Not Evaluated (NE)
Grewia trichocarpa	Shrub	Ind	3					Not Evaluated (NE)	Not Evaluated (NE)
Hibiscus calyphyllus	Herb	Ind		10				Not Evaluated (NE)	Not Evaluated (NE)
Sida acuta	Herb	Ind	20					Not Evaluated (NE)	Not Evaluated (NE)
Sida ovata	Herb	Ind	2			1		Not Evaluated (NE)	Not Evaluated (NE)
Sida rhombifolia	Herb	Ind	8				4	Not Evaluated (NE)	Not Evaluated (NE)
Sida sp	Herb	Ind	4					Not Evaluated (NE)	Not Evaluated (NE)
Urena lobata	Shrub	Ind			10			Not Evaluated (NE)	Not Evaluated (NE)
Triumfetta annua	Shrub	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Triumfetta rhomboidea	Shrub	Ind			3			Not Evaluated (NE)	Not Evaluated (NE)
Walthelia indica	Shrub	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Wissadula rostrata	Herb	Ind	7					Not Evaluated (NE)	Not Evaluated (NE)
Melia azedarach	Tree	Ind			8			Not Evaluated (NE)	Not Evaluated (NE)
Corbichornia decumbens	Herb	Ind		3				Not Evaluated (NE)	Not Evaluated (NE)
Artocarpus heterophyllus	Tree	Ind	5					Not Evaluated (NE)	Not Evaluated (NE)
Ficus natalensis	Tree	Ind	10					Not Evaluated (NE)	Not Evaluated (NE)
Ficus sycomorus	Tree	Ind		10		10		Not Evaluated (NE)	Not Evaluated (NE)
Ficus sp	Tree	Ind						Not Evaluated (NE)	Not Evaluated (NE)
Eucalyptus sp	Tree	Ind			15			Not Evaluated (NE)	Not Evaluated (NE)
Syzygium cumini	Tree	Ind			5			Not Evaluated (NE)	Not Evaluated (NE)
Jasminum eminii	Climber	Ind	3					Not Evaluated (NE)	Not Evaluated (NE)
Cycnium tubulosum	Herb	Ind				5		Not Evaluated (NE)	Not Evaluated (NE)
Brachiaria leersioides	Grass	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Chloris gayana	Grass	Ind	4			15		Not Evaluated (NE)	Not Evaluated (NE)
Chloris pycnothrix	Grass	Ind			2	2	2	Not Evaluated (NE)	Not Evaluated (NE)
Cynodon dactylon	Grass	Ind	40	10		70	10	Not Evaluated (NE)	Not Evaluated (NE)
Echinochloa pyramidalis	Grass	Ind		45				Not Evaluated (NE)	Not Evaluated (NE)
Eleusine africana	Grass	Ind			1			Not Evaluated (NE)	Not Evaluated (NE)

	Phytosocial description of site		Acacia-Kigelia-Ficus bushed grassland with scattered trees	Cyperus-Phragmites-Echinochloa lakeshore marsh	Acacia-Harrisonia-Hyperrhelia bushland	Cyperus-Cynodon-Leersia riverine marsh		IUCN (Global) Status	National Status
	Site name		NA01	NA02	NA03	NA04	NA05		
	Coordinates (36N)		459799 165030	459700 165349	453864 168646	454563 165730	457050 164688		
Species	**Life form**	**Locality status**							
Eragrostis sp	Grass	Ind				2		Not Evaluated (NE)	Not Evaluated (NE)
Hyparrhenia filipendulla	Grass	Ind			30			Not Evaluated (NE)	Not Evaluated (NE)
Hyperthelia dissoluta	Grass	Ind			15			Not Evaluated (NE)	Not Evaluated (NE)
Leersia hexandra	Grass	Ind				50	10	Not Evaluated (NE)	Not Evaluated (NE)
Panicum maximum	Grass	Ind	5					Not Evaluated (NE)	Not Evaluated (NE)
Paspalum scrobiculatum	Grass	Ind	2		3			Not Evaluated (NE))	Not Evaluated (NE)
Phragmites mauritianum	Grass	Ind		35				Not Evaluated (NE)	Not Evaluated (NE)
Sorghum arundinaceum	Grass	Ind	1					Not Evaluated (NE)	Not Evaluated (NE)
Sporobolus festivus	Grass	Ind			5			Not Evaluated (NE)	Not Evaluated (NE)
Sporobolus pyramidalis	Grass	Ind	3			45		Not Evaluated (NE)	Not Evaluated (NE)
Eicchornia crassipes	Herb	Inv		30				Not Evaluated (NE)	Not Evaluated (NE)
Rubia cordifolia	Climber	Ind		4				Not Evaluated (NE)	Not Evaluated (NE)
Harissonia abyssinica	Shrub	Ind	4					Not Evaluated (NE)	Not Evaluated (NE)
Salvinia molesta	Herb	Inv		20				Not Evaluated (NE)	Not Evaluated (NE)
Cardiospermum grandiflorum	Climber	Ind	2					Not Evaluated (NE)	Not Evaluated (NE)
Vitellaria paradoxa	Tree	Ind	4					Vulnerable (VU)	Vulnerable (VU)
Solanum incanum	Shrub	Ind	15	4				Not Evaluated (NE)	Not Evaluated (NE)
Typha capensis	Herb	Ind			20	45		Not Evaluated (NE)	Not Evaluated (NE)
Lantana camara	Shrub	Inv	5			4	5	Not Evaluated (NE)	Not Evaluated (NE)
Cissus rotundifolia	Climber	Ind	4					Not Evaluated (NE)	Not Evaluated (NE)
Cyphostemma serpens	Climber	Ind				4		Not Evaluated (NE)	Not Evaluated (NE)

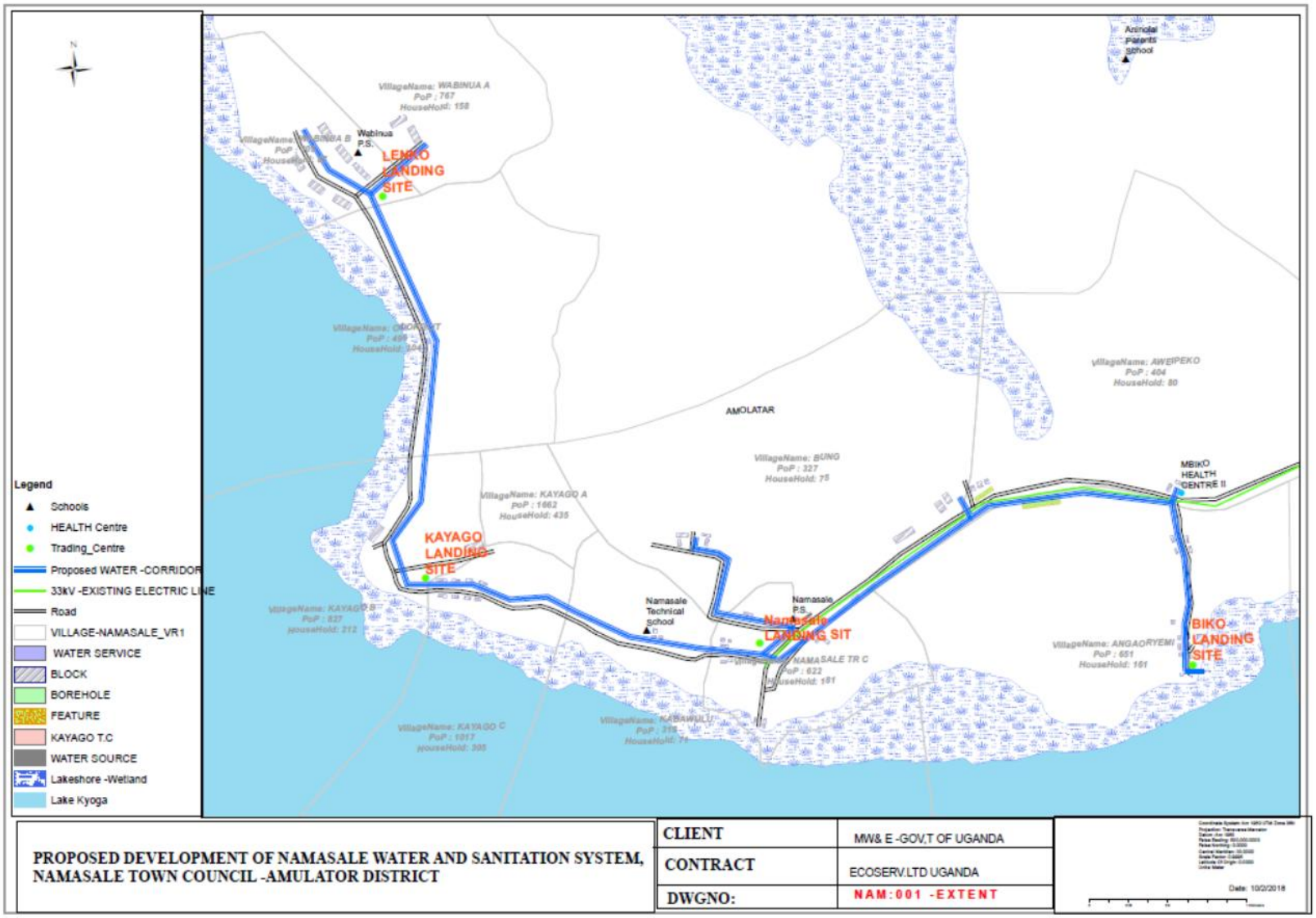
ANNEX 6: LIST OF BIRD'S SPECIES IN THE PROJECT AREA

Family	Common Name	Scientific name	Habitat	Conservation status	Biko landing site	Angauryem village	Biko	Kayago landing site	Namasale landing site	Lenko	Abundance
Monarchidae	African Blue flycatcher	*Elminia longicauda*	f,G	LC	0	0	1	0	0	0	1
Accipitridae	AFRICAN FISH EAGLE	*Haliaeetus vocifer*	W	LC	1	0	0	0	0	0	1
Columbidae	African green pegion	*treron calva*	Af	LC	1	0	0	0	0	0	1
Jacanidae	African jacana	*Actophilornis africana*	W	LC	1	0	0	2	1	1	5
Accipitridae	African Marsh-Harrier	*Circus ranivorus*	W	R-NT	1	0	0	0	1	0	2
Apodidae	African palm swift	*Cypsiurus parvus*	Gen	LC	0	0	0	2	1	0	3
Motacillidae	African pied wagtail	*Motacilla anguip*	Gen	LC	0	1	2	0	0	0	3
Sylviidae	African reed warbler	*Acrocephalus baeticatus*	W	R-NT	0	0	0	1	2	3	6
Charadriidae	AFRICAN WATTLED LAPWING (Plover)	*Vanellus senegallus*	W	LC	2	0	0	0	0	0	2
Gruidae	Balearica regulorum	*Grey crowned crane*	wG	LC	0	0	0	4	0	0	4
Rallidae	Black Crake	*Amaurornis flavirostris*	W	LC	1	0	0	0	1	1	3
Malaconotidae	Black headed gonolek	*Laniarius erythrogaster*	Gen	LC	3	0	0	0	0	0	3
Ploceidae	*Black-headed Weaver*	*Ploceus melanocephalus*	Gen	LC	0	1	3	5	0	3	12
Coliidae	Blue naped mousebird	*Urocolius macrourus*	G, Af	LC	0	2	0	0	0	0	2
Columbidae	Blue spotted wood dove	*Turtur afer*	Af	LC	1	3	2	0	0	0	6
Estrildidae	*Bronze Mannikin*	*Lonchura cucullata*	G	LC	0	0	5	0	3	0	8
Leiothrichidae	Brown barbler	*Turdoides plebejus*	Af, G	LC	0	3	0	0	0	0	3
Psittacini	Brown parrot	*Poicephalus cryptoxanthus*	f	LC R-NT	2	0	0	0	0	0	2
Ardeidae	Little egret	*Egretta garzetta*	W	LC	5	0	0	3	0	6	14
Ardeidae	Cattle egret	*Bubulcus ibis*	G,w	LC	7	2	0	0	0	0	9
Pycnonotidae	Common bulbul	*Pycnonotus barbatus*	Gen	LC	3	2	1	0	0	0	6
Estrildidae	COMMON WAXBILL	*Estrilda astrild*	wG	LC	5	0	3	0	1	0	9
Cisticolidae	Croaking cisticola	*Cisticola natalensis*	G	LC	0	0	0	0	0	0	0
Ardeidae	Goliath Heron	*Ardea goliath*	W	R-NT	1	0	0	0	1	0	2
Sylviidae	Greater Swamp Wabler	*Acrocephalus rufescens*	W	LC	0	0	0	0	2	1	3

Cisticolidae	Grey backed camaroptera	*Camaroptera brevicaudata*	f	LC	0	2	0	0	0	0	2
Passeridae	Grey headed sparrow	*Passer griseus*	G	LC	0	0	2	0	0	0	2
Ardeidae	Grey heron	*Ardea cinerea*	w	R-NT	1	0	0	0	1	0	2
Threskiornithidae	Hadada Ibis	*Bostrychia hagedash*	w	LC	2	1	0	0	3	0	6
	Hammerkop		w	LC	0	0	0	0	0	3	3
Columbidae	Laughing dove	*Spilopelia senegalensis*	f,G	LC	0	0	1	0	1	0	2
Apodidae	Little Swift	*Apus affinis*	w	LC	3	1	0	0	0	0	4
Accipitridae	Lizard buzzard	*Kaupifalco monogrammicus*	f,G	LC	0	0	1	0	0	0	1
Ploceidae	Northern brown throated weaver	*Ploceus castanops*	W	R-RR	1	0	0	0	0	0	1
Ciconiidae	Open billed storke	*Anastomus lamelligerus*	W	LC	2	0	0	0	0	0	2
Corvidae	Piapiac	*Ptilostomus afer*	Gen	LC	0	3	0	0	0	0	3
Alcedinidae	Pied Kingfisher	*Ceryle rudis*	W	LC	1	0	0	0	1	0	2
Ardeidae	Purple Heron	*Ardea purpurea*	W	R-NT	0	0	0	1	2	1	4
Alcedinidae	Pygmy King fisher	*Ispidina picta*	Af	LC	0	1	0	0	0	0	1
Ploceidae	Red billed quelea	*Quelea quelea*	Gen	LC	0	11	0	0	0	0	11
Columbidae	Red eyed dove	*Streptopelia semitorquata*	Gen	LC	0	2	2	0	0	0	4
Macrosphenidae	Red faced Crombec	*Sylvietta whytii*	Gen	LC	1	1	0	0	0	0	2
Cisticolidae	Red-faced Cisticola	*Cisticola erythrops*	G.w	LC	2	2	1	0	0	1	6
Sturnidae	Ruppell's long tailed starling	*Lamprotornis Purpuropterus*	Gen	LC	3	3	2	0	0	0	8
Charadriidae	SPUR-WINGED LAPWING (Plover)	*Vanellus spinosus*	WG	LC	2	0	0	0	0	2	4
Muscicapidae	Swamp fly catcher	*Muscapa aquatica*	W	LC	1	0	0	2	1	1	5
Cisticolidae	*Tawny flanked prinia*	*Prinia subflava*	G	LC	0	0	2	0	0	0	2
Muscicapidae	White browed robin-chat	*Cossypha heuglini*	Gen	LC	0	0	1	0	0	0	1
Anatidae	White faced whistling duck	*Dendrocygna viduata*	W	LC	3	0	0	0	0	0	3
Cuculidae	White-browed Coucal	*Coucal superciliosus*	Af	LC	1	0	0	0	1	0	2
Phaenicophilidae	White-winged Warbler	*Bradypterus carpalis*	W	LC	1	0	0	1	0	3	5
Cisticolidae	Winding Cisticola	*Cisticola galactotes*	G,w	LC	3	0	0	2	3	5	13
Hirundinidae	Wire tailed Swallow	*Hirundo simthii*	w	LC	7	0	0	3	0	0	10
Ciconiidae	Yellow billed storke	*Mycteria ibis*	w	LC	1	0	0	0	1	1	3
Lybidae	Yellow fronted tinker bird	*Pogoniulus chrysoconus*	G,Af	LC	0	1	0	0	0	0	1
Ploceidae	YELLOW-BACKED WEAVER	*Ploceus melanocephalus*	W	LC	0	0	0	0	3	0	3
Cisticolidae	Zitting cisticola	*Cisticola juncidis*	G	LC	0	0	1	0	0	0	1

	DIVERSITY				**3.2**	**2.6**	**2.63**	**2.27**	**2.82**	**2.42**

ANNEX 7: PROJECT DRAWINGS



Appendix 8: NEMA approved TORs

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17,19 & 21, Jinja Road.
P.O.Box 22255, Kampala, UGANDA.

Tel: 256-414- 251064, 251065, 2510
342758, 342759, 3427
Fax: 256-414-257521 / 232680
E-mail: info@nemaug.org
Website: www.nemaug.org

NEMA/4.5

12th June 2019

The Permanent Secretary,
Ministry of Water and Environment,
P.O. Box 20026,
KAMPALA.

Tel No: +256 414 505942/ +256 414 450945

RE: REVIEW OF TERMS OF REFERENCE FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED NAMUNGALWE-KALIRO, KYEGWEGWA-MPARA-RUYONZA AND NAMASALE TOWN WATER SUPPLY AND SANITATION SYSTEMS PROJECT IN IGANGA, KALIRO, KYEGEGWA AND AMOLATAR DISTRICTS

This is in reference to the Terms of Reference for carrying out an Environment and Social Impact Assessment (ESIA) for the proposed Namungalwe-Kaliro, Kyegwegwa-Mpara-Ruyonza and Namasale Town Water Supply and Sanitation Systems Project in Iganga, Kaliro, Kyegegwa and Amolatar Districts that was submitted to this Authority on 17th January, 2019 for consideration. This Authority has finalised the review and grants formal **APPROVAL** of the said TOR.

Please, note that approval of the TOR DOES NOT CONSTITUTE PERMISSION to start implementing any of the proposed project activities. In addition, you are advised to consider certain key aspects during the conduct of the EIA and preparation of the EIA report, as per the guidance below.

(i) Carry out comprehensive consultations involving among others; the local communities, Iganga, Kaliro, Kyegegwa and Amolatar Districts Local Governments, Uganda National Bureau of Standards (UNBS) and Department of Occupational Safety and Health (Ministry of Gender, Labour and Social Development), and ensure that the stakeholder views/ concerns are well documented and included in the EIA report. In addition, consult with Department of Physical Planning at the Districts Local Governments in regard to the suitability of the site for the proposed activity.

(ii) Provide concise baseline information/data relating to the project area, and sets of clear coloured photographs showing the current state of the said project area taken from within the proposed project site and clearly showing the neighborhood.

(iii) Provide **coloured location / google maps** that are clear, and well-labelled *(preferably each covering A-4 or larger paper size)*, and sets of **GPS coordinates** for the proposed project area showing actual boundaries/ extent the project area.

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(iv) Carry out analyses of soil, water, and air quality taking into account key parameters relevant to the nature of the project, as well as level of noise relating to the project-affected area, and **append the results of baseline soil, water, and air quality and noise levels analyses** to the EIA report.

(v) Provide **comprehensive narratives on proposed project components and activities,** support structures/facilities and size of the workforce both men and women.

(vi) Provide comprehensive narrative on **potential pollution sources**, the methods of handling, containing and disposing of the different kinds of waste.

(vii) Provide **comprehensive analyses of alternatives/options**, in terms of project design, project location, and the proposed technology, among other aspects.

(viii) Provide detailed **mitigation and environmental management and monitoring plans** *(preferably in table matrix format)* in the EIA report, to cater for the environmental impacts associated with the proposed project activities.

(ix) Consider any other critical environmental aspects/concerns which may have not been initially foreseen during the preparation of the Scoping Report/ToR, and **include an evaluation of such concerns in the EIA report.**

(x) **Carry out separate EIA reports for each of the above mentioned projects.**

(xi) Append to the EIA report **authentic copies of land acquisition and ownership documents** that are clear and legible.

(xii) Append to the EIA report **well-labelled copies of the proposed site layout plan** *(preferably covering A-3 or larger paper size)* that shows the layout and placement of the different project components.

(xii) Indicate the actual project (investment) cost **including a copy of the investment licence issued by Uganda Investment Authority and/or certificate of valuation** issued by a qualified and certified valuer /quantity surveyor.

(xiii) Note that only registered EIA Practitioners including the team leader should be contracted to carry out the EIA for the proposed project.

This is, therefore, to recommend that you proceed with carrying out the EIA for the proposed project.

We look forward to your cooperation and the receipt of a comprehensive EIA report, for our further action.

Nancy Allimadi
FOR: EXECUTIVE DIRECTOR