



Republic of Uganda

Ministry of Water and Environment

OROM GRAVITY FLOW PIPED WATER SUPPLY AND SANITATION SYSTEM

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT





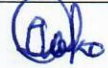
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Ministry of Water and Environment

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MAY 2023

ESIA TEAM AND DECLARATION

Following is the Environmental and Social Impact Assessment (ESIA) Team that undertook the ESIA for the proposed Orom Water Supply and Sanitation System located in Kitgum, Agago and Pader Districts. The assessment was done in accordance with the provisions of the *National Environmental Act No. 5 of 2019* of the Laws of Uganda, the *Environmental and Social Impact Assessment Regulations (2020)* and the *National Environment (Conduct and Certification of Environmental Practitioners) Regulations (2003)*. It was carried on behalf of Alliance Consultants Limited that was contracted by the Ministry of Water and Environment. We the undersigned declare that we have no business, financial, other interest in the Ministry of Water and Environment's proposed Orom Water Supply and Sanitation System.

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LIST OF ACRONYMS

AfDB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
APHA	American Public Health Association
AWWA	American Water Works Association
BMP	Best Management Plan
BoQs	Bills of Quantities
DLG	District Local Government
CESMP	Contractors Environmental and Social Management Plan
COVID-19	Corona Virus of 2019
DCDO	District Community Development Officer
DEO	District Environment Officer
DHI	District Health Inspector
DLG	District Local Government
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
E&S	Environment and Safety
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental, Social Management and Monitoring Plan
GO	Grievance Officer
GV	Given Values
GRM	Grievance Redress Mechanism
GoU	Government of Uganda
HDPE	High Density Polyethylene
HIV	Human Immune Virus
IFC	International Finance Corporation
ISO	International Organisation of Standardisation
IUCN	International Union for Conservation of Nature
LC	Local Council
MEMD	Ministry of Energy and Mineral Development
mg/L	Milligrams per litre
MWE	Ministry of Water and Environment
NDPIII	Third National Development Plan
NEMA	National Environment Management Authority
NWSC	National Water and Sewerage Corporation
OD	Outside Diameter
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OP	Operational Policies
PAPs	Project Affected Persons
PCR	Physical Cultural Resources
PHC	Primary Health Care
PPE	Personal Protective Equipment
PVC	Polyvinyl chloride
RAP	Resettlement Action Plan
RDC	Resident District Commissioner
RGC	Rural Growth Center
RPF	Resettlement Policy Framework
SEP	Stakeholder Engagement Plan
TC	Town Council
TDS	Total Dissolved Solids

ToR	Terms of reference
UGX	Uganda shillings
UNRA	Uganda National Roads Authority
uPVC	Unplasticised polyvinyl chloride
VEC	Valued Ecosystem Components
WASH	Water Sanitation and Hygiene
WEF	Water and Environment Federation
WMP	Waste Management Plan

EXECUTIVE SUMMARY

Introduction

The Government of Uganda (GoU), through the Ministry of Water and Environment (MWE) has embarked on improving safe water and sanitation coverage and supply in rural areas, small towns and rural growth centers. Orom rural growth center (RGC) and surrounding areas are some of the areas that currently have limited access to safe water and sanitation services. As a result, the Ministry of Water and Environment is proposing establishment of the Orom Water Supply and Sanitation System, in line the third National Development Plan (NDP III), and the Uganda's Vision 2040. The proposed project is estimated to cost Uganda Shillings eighteen billion eight hundred fifty-four million sixteen thousand four hundred thirty-eight only (UGX 18,854,016,438).

The objective of this study was to undertake an Environmental and Social Impact Assessment for the proposed project, in accordance with the National Environment Act, 2019, the National Environment (Environmental and Social Assessment) Regulations, 2020 and the African Development Bank (AfDB) Integrated Safeguards System (ISS).

The specific objectives were to:

- a) Survey of all the identified sites including preparing a map/sketch of each site showing important existing features in the surrounding areas in relation to the sites,
- b) Assessment of baseline environmental conditions for monitoring future project components,
- c) Evaluation of the relevant policy and legal framework pertaining the proposed project.
- d) Consultation with the relevant stakeholders and incorporate their comments into impact identification and mitigation,
- e) Identification of all potential impacts and propose feasible mitigation impacts
- f) Preparation of an Environmental and Social Management and Monitoring Plan (ESMMP) for the implementation of the proposed project. The ESMMP should outline: i) potential environmental and social impacts resulting from project activities; ii) proposed mitigation measures; iii) monitoring indicators; iv) responsibilities for implementation of the mitigation measures; v) responsibilities for monitoring the implementation of the mitigation measures

Approach and Methods for the ESIA

The ESIA for the proposed Orom gravity flow water supply and sanitation system was undertaken through a mixed methods approach to ensure a comprehensive assessment. These included:

1. Review of existing literature relevant to the project
2. Community and stakeholder consultations
3. Flora assessment
4. Fauna assessment
5. Water quality assessment
6. Noise level assessment

Details of developer and funder

The proposed project is being developed by the Ministry of Water and Environment under the Water Supply and Sanitation Program Phase III (WSSP III) together with Kitgum, Pader and Agago District Local governments. The WSSP III is being funded by the African Development Bank (AfDB).

Policy and legal framework

The policies relevant to the proposed Orom Gravity Flow Water Supply and Sanitation System that were reviewed include the following:

- The National Environment Management Policy for Uganda (2014)
- The National Water Policy (1999)
- The National Health Policy (1999)
- The National Land Policy (2013)
- The National Land-Use Policy (2007)
- The National Employment Policy for Uganda (2011)
- The National Environment and Social Safeguards Policy (2018)
- The Climate Change Policy (2015)
- The National Forestry Policy (2001)
- The National Gender Policy (2007)
- The National Cultural Policy (2006)
- The National Policy for Conservation and Management of Wetlands (1995)
- HIV/AIDS at Work Policy (2007)
- The National Child Labour Policy (2006)
- Uganda Vision 2040
- Third National Development Plan (NDPIII) 2020/21-2024/25

Several laws and regulations were also reviewed to check how the proposed project is affected by such laws and regulations. The following are some of the laws and regulations that were reviewed.

- a) The Constitution of the Republic of Uganda; 1995; amended as at 15th February 2006
- b) The National Environment no. 5 of 2019
- c) The Water Act, Cap 152 and The Water Resources Regulations, 1998
- d) The Land Act, Cap 227
- e) The Occupational Safety and Health Act, 2006
- f) The Workers' Compensation Act (2000)
- g) The Town and Country Planning Act, 2014
- h) The Public Health Act Cap 281
- i) The Local Governments Act Cap 243
- j) The Traffic Control and Road Safety Act (1998)
- k) National Forestry and Tree Planting Act (2003)
- l) The National Children's Act (1997)
- m) The National Environment (Environmental and Social Assessment) Regulations, 2020
- n) The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000
- o) National Environment (Conduct and Certificate of Environment Practitioners) Regulations (2003)
- p) The National Environment (Waste Management) Regulations (2020)
- q) The Water (Waste Discharge) Regulations, 1998
- r) The National Environment (Control of Smoking in Public Places) Regulations, 2004.
- s) The National Environment (Noise Standards and Control) Regulations, 2003.
- t) National Air Quality Standards, 2006 (Draft)

The African Development Bank (AfDB) Operational Safeguard (OS) policies such as OS 1: Environmental and social assessment, OS 2: Involuntary resettlement, land acquisition, population displacement and compensation, OS 3: Biodiversity and ecosystem services, OS 4: Pollution prevention and control, hazardous materials and resource efficiency and OS 5: Labour conditions, health and safety will be important.

Institutional framework

The ESIA study also looked at the different institutions and their roles in proposed Orom gravity flow water supply and sanitation system development. The institutional framework for the

proposed project includes Ministry of Water and Environment, National Environment Management Authority (NEMA), Ministry of Gender, Labour and Social Development (MoGLSD), Local Administrative structures in Kitgum, Pader and Agago Districts and African Development Bank.

Description of the project area, and Environmental and socio-economic baseline

The proposed Orom Gravity Flow Water Supply and Sanitation Project covers three districts in northern Uganda, namely: Kitgum, Pader and Agago. Kitgum Town is located approximately 440 km from Kampala, accessed mainly through the Kampala – Gulu highway. It can also be reached through the road from Lira Town. Kitgum District borders the Republic of South Sudan to the north, Lamwo District to the north and northwest; Karenga District to the northeast, Kaabong and Kotido Districts to the east and southeast, respectively; Agago and Pader to the south. The project beneficiaries in Kitgum District include: Labongo Layamo, Mucwini East, Mucwini West, Lagoro, Namukora North, Orom East, Kiteng, Omiya Anyima, Orom Sub-counties and Namukora Town Council.

Agago District is bordered by Kitgum District to the northeast, Abim District to the east, Otuke District to the south and Pader District to the west. The location of the district headquarters is approximately 80 kilometers by road southeast of Kitgum. The location lies approximately 370 kilometers by road north of Kampala, the capital city of Uganda. The proposed project will be implemented in two sub counties, which are Omiya Pachua and Paimol.

Pader District borders the districts of Gulu and Omoro to the east; Lira and Otuke to the south; Agago to the east; and Kitgum to the north. Acholibur Sub County was named as a potential beneficiary from the project.

Ground water, accessed through boreholes is the main source of potable water in the entire project area. However, there are a number of locations within the project area that have low-yield or no boreholes at all. There are also rivers in the project area, which are important sources of surface water.

The vegetation in the project area is mainly of woody savannah characterised by tree cover and grass layers. The dominant grasses are *Cyperus rotundus*, *Panicum maximum*, *Hyparrhenia rufa* and *Imperata cylindrica*. The project area is drier in the northeast and the vegetation includes shrubs.

A total of two hundred ninety-five (295) bird species from the thirty-eight (38) locations along the Orom Gravity Flow Water Supply and Sanitation System was recorded. The system covers three districts namely; Agago, Pader and Kitgum. In absolute terms, sites in Kitgum had the highest number of bird species, followed by Agago and Pader. Some of the species recorded are listed as species of conservation concern either globally, regionally or nationally. Among these species, two (Parrot and Bateleur Eagle) are listed as globally endangered (G-EN) by the IUCN, seventy are list on the regional red-list (Bennun & Njoroge 1996).

According to the Uganda National Population and Housing Census (UBOS, 2014), the project area had population of 156,056. The population is involved in several livelihood activities. The service industry such as hotels, lodges, restaurants, and bars are found in the main towns or trading centres of Kitgum Matidi, Lagoro, Mucwini, Namokora, Omiya Anyima, and Orom in Kitgum District, Kalongo, Patongo in Agago District and Acholibur in Pader District. In such centres, the butcheries, grain processing, carpentry and metal workshops, small scale trading in produce and merchandise (wholesale and retail shops) and transportation of goods and people can be found too. Other livelihood activities include crop production, goats and cattle rearing, poultry farming,

piggery, apiary, tourism, brick making, charcoal production. Most of these activities are practiced in the rural areas where the project sites are concentrated.

Description of the proposed project

The proposed Orom water supply and sanitation system is designed for the period between 2016 and 2050. At the ultimate year 2050, the maximum day demand is estimated to be 4539 m³/day. This is planned to be supplied with water from 20 boreholes in Kitgum, Pader and Agago Districts. The combined yield of all the boreholes is 354 m³/h, which is more than enough to satisfy the demand for water at the ultimate year. The system will have a system of 20 reservoirs with combined capacity of 1,380 m³ and distribution network of 262.2 km. The system will have eighty (80) house connections, 106-yard taps and 526 stand pipes.

It is proposed to construct 44No. VIP toilet blocks of 5 stances each for boys and girls, all fully equipped with hand washing facilities to be constructed at schools within the three districts. Other toilets will be constructed at selected markets and institutions like hospitals.

Stakeholder concerns and views

During the stakeholder consultations, the ESIA study team interacted with different stakeholders who gave their views, concerns and recommendations regarding the proposed Orom Gravity Flow Water Supply and Sanitation System. Some of the key issues that came out of the consultation are outlined below. The Developer should consider these issues and be integrated in the project design as well as overall implementation and management as some might hinder the progress of the project.

1. People who have been consulted are very excited about the proposed project. However, to enhance the benefits that are anticipated, the project design should include a sensitization/educational program component especially on safe water use and proper sanitation behaviour. Without this, the investment in the supply infrastructure alone may not lead to the desired benefits, for example improvement in public health. In partnership with the local authorities, this program should be designed, financed and implemented to leverage proper hygiene and water handling practices in the project area.
2. The district technical departments are willing to manage and sustain these projects, so they should be involved during design and implementation of the project.
3. Provide technical support through training to ensure sustainable use of the resources.
4. Community structures should be engaged to help in managing the project such as water user committees, association of hand pump technicians since they are based on the ground. The project should help in establishing community structures for managing the project where they are not existing and those existing should be empowered through sensitisation and trainings in governance and management of water sources.
5. Insecurity, internal and cross-border conflicts between ethnic groups and districts should be addressed so that they don't affect implementation of the project. Already the Karamojong warriors have been reportedly attacking project areas in search of water and raids. As a result, water users may not appropriately benefit from the intended project objectives.
6. The Contractor to operate the plant should have the technical knowhow and be able to employ skilled personnel for efficient operation and maintenance of the project infrastructure.
7. Public stand pipes need to be prioritised in the project to enable the poor people who cannot afford individual connections to their homesteads.
8. It is recommended that adequate and prompt compensation for PAPs' be implemented before project activity implementation.

Potential environmental and social impacts

The proposed project is associated with several positive impacts. These include:

- i. Employment opportunities and income
- ii. Acquisition/improvement of skills
- iii. Reduction of poverty and improved livelihoods of the local people
- iv. Improvement in public health
- v. Achievement of universal primary education
- vi. Promotion of gender equality and empowerment of women and the girl child
- vii. Affordable and reliable water supply
- viii. Reduction in distances moved in search for water
- ix. Improved social order
- x. Reduction in domestic violence

However, the proposed project will also be associated with negative impacts which must be mitigated. The following negative impacts have been identified:

IMPACT	Overall Significance
Pre-construction phase and Construction Phase	
Land take	Minor (4)
Loss of property	Minor (2)
Traffic disruption	Minor (1)
Loss of vegetation	Moderate (6)
Disruption of social order	Minor (4)
Faecal matter disposal	Minor (4)
Noise from construction machinery	Moderate (6)
Solid waste generation	Moderate (9)
Occupational health and safety issues	Minor (4)
Public health and safety issues	Moderate (9)
Increased susceptibility to soil erosion	Moderate (6)
Air pollution and climate change	Moderate (9)
Disturbance and interruption of commercial and social activities	Moderate (6)
Theft of construction materials	Major (12)
Operation and Maintenance Phase	
Water and soil pollution	Minor (4)
Occupational safety and health issues	Minor (2)
Generation of hazardous wastes	Moderate (9)
Incapacity to operate and maintain the project components by local people	Moderate (9)
Unaffordability of water charges	Moderate (9)
Noise pollution	Minor (4)
Air pollution	Moderate (9)
Reduction of water level in the aquifers	Major (12)
Human waste disposal	Moderate (6)
Conflicts with Karamojongs over water	Major (16)
Spread of sanitation and water borne diseases	Moderate (6)
Vandalization / theft project equipment	Moderate (6)
Decommissioning Phase	
Disruption of water supply	Moderate (9)
Traffic disruption	Moderate (9)
Disruption of social order	Minor (4)
Faecal matter disposal	Minor (4)
Noise pollution	Moderate (9)
Solid waste generation	Moderate (9)
Occupational health and safety issues	Minor (4)
Public health and safety issues	Moderate (9)
Increased susceptibility to soil erosion	Moderate (9)
Air pollution and climate change	Moderate (9)

Environmental and Social Management and Monitoring Plan (ESMMP)

The ESMMP has been provided to guide the implementation for this the project. The ESMMP provides for:

1. Integration of Safeguards into Procurement Process (Contracts)
2. Contractor Management Plans and Method Statements
3. Required Approvals, Permits and Licenses
4. Monitoring and Reporting Arrangements
5. Enforcement of Compliance

Further, a grievance redress mechanism (GRM) has been provided. The aim and purpose of this system is to make the grievance handling procedures accessible, prompt and affordable to the project affected persons (PAPs) given the generally low values of some of the properties to be affected; and also provide an alternative to the costly and time-consuming formal courts procedures for handling grievances and disputes. The GRM seeks to establish mechanisms for raising complaints related to compensation for loss of land and other livelihood properties and assets and having such complaints resolved as amicably as possible through acceptable and binding corrective actions.

The total cost of implementing the ESMMP is estimated at Uganda Shillings Three hundred twenty million three hundred thousand only (UGX 320,300,000), as reflected in the ESMMP matrix as follows:

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Positive Impacts						
Employment opportunities and income	<ul style="list-style-type: none"> ▪ Prepare a labour force management plan ▪ Preference for employment opportunities should be given to the local people where they have the required skills (for skilled labour activities). Otherwise, all activities which do not require skills such as casual activities should be given to the locals ▪ The use of appropriate labour-intensive methods for some of the construction activities (for example excavation for pipelines) should be undertaken to enable as many local people (including women) as possible get jobs ▪ Priority for sourcing materials for construction and other services such as food and accommodation should be given to local suppliers ▪ Ensure that children are not employed on the project 	<ul style="list-style-type: none"> -Labour force management plan in place -Details of the project staff, including origin, age 	5 million (for the labour force management plan)	Contractor MWE	CDO	Monthly
Acquisition/improvement of skills	<ul style="list-style-type: none"> ▪ Foreign companies (if contracted) should be required to have a joint venture with local companies to build their capacity. ▪ Contracts terms for construction works for the project's construction and O&M phase should emphasize knowledge transfer and the project developer should monitor and ensure that the objectives are met. ▪ O&M manual and standard operating procedures must be handed over to the operator 	<ul style="list-style-type: none"> -Details of the Contractor, including country of registration -Details of the Contracts agreement -Presence of the O&M manual 	0	Contractor MWE	CDO DWO	Once, before start of construction works
Reduction of poverty and improved livelihoods of the local people	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes 	Part of the contract	MWE	DWO CDO	Quarterly

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Improvement in public health	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water ▪ Sensitize communities of the dangers of using unsafe water sources 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes -Minutes of community sensitization 	1 million (for community sensitization)	MWE	DWO CDO	Quarterly
Achievement universal primary education	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes 	Part of the contract	MWE	DWO CDO	Quarterly
Promotion of gender equality and empowerment of women and the girl child	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes 	Part of the contract	MWE	DWO CDO	Quarterly
Affordable and reliable water supply	<ul style="list-style-type: none"> ▪ Encourage and promote catchment protection by the communities so as the water sources are not depleted 	<ul style="list-style-type: none"> -Number of trees planted -record of number campaigns done 	10 million	Operator MWE	DEO's CDO's	Yearly
	<ul style="list-style-type: none"> ▪ Set the prices for the water both connection and service fees as low as possible in tandem with income levels of the people 	<ul style="list-style-type: none"> -Cost of water per m³ 	0	Operator MWE	LCI's DWO	Yearly
	<ul style="list-style-type: none"> ▪ Install reservoirs that are enough to sustain supplying the community for longer hours in times of scarcity 	<ul style="list-style-type: none"> -Capacity of reservoirs installed 	0	MWE	DWO LCI's	At start of the operation

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Reduction in distance moved in search for water	▪ Install community water serving points in each village	-Number of serving points in the community	0	MWE Operator	DWO LCI's	Start of operation
	▪ Ensure continuous supply of clean water to the people throughout the day	-Number of hours water is supplied in a day	0	Operator	DWO's LCI's CDO's	Monthly
	▪ The water services should be made affordable for everyone though low tariffs.	-Cost of water per m ³	0	Operator MWE	LCI's DWO	Yearly
Improved social order	▪ Install community service points closer to the people.	-Number of serving points in the community	0	MWE Operator	DWO LCI's	Start of operation
Reduced domestic violence	▪ Ensure continuous supply of water throughout the day.	-Number of hours water is supplied in a day	0	Operator	DWO's LCI's CDO's	Monthly
	▪ Put at least community water point in each village to serve the people and also to prevent congestion.	-Number of serving points in the community	0	MWE Operator	DWO LCI's	Start of operation
	▪ Encourage people to store water in preparation for scarcity	-Number of people with tanks	0	Operator	DWO's CDO's LCI's	Yearly
Negative Impacts						
Pre-construction phase and Construction Phases						
Land take	▪ Prepare and implement a RAP ▪ All privately owned land to host project components should be duly compensated prior start of construction activities	▪ RAP in place ▪ Agreements of land sale	-50 million for a RAP -Cost of land to dependent on its actual value of land	Developer	CDO	Once, to be cleared before start of construction
Loss of property	▪ Prepare and implement a RAP ▪ All property should be valued and duly compensated prior to start of construction works	▪ Compensation agreement	Dependent on the value of property, as per the RAP findings	Developer	CDO	Once, to be cleared before start of construction
	▪ For property like crops, where possible, owners should be informed early about the project work plan and allowed to harvest them prior to start of construction	▪ Compensation agreement	Dependent on the value of crops	Developer	CDO	Once, to be cleared before start of construction
Traffic disruption	▪ Prepare and implement traffic management plan	▪ Traffic management plan in place	5 Million	Contractor	CDO	Weekly

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> ▪ Liaise with the local traffic authority to manage traffic at busy crossings e.g., markets, schools, churches 	<ul style="list-style-type: none"> ▪ Records of agreed work plans with traffic police 	2 Million	Contractor	CDO Traffic police Department, Kitgum, Agago and Pader	Weekly
Loss of vegetation and soil cover	<ul style="list-style-type: none"> ▪ Prepare a vegetation restoration plan 	<ul style="list-style-type: none"> ▪ A vegetation restoration plan in place 	10 Million	Contractor	DEO	Once, before start of construction activities
	<ul style="list-style-type: none"> ▪ Restrict clearance to only areas to be constructed. 	<ul style="list-style-type: none"> ▪ Presence of bare soils 	Part of the Contract	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> ▪ Landscaping and re-vegetation after construction especially around the water source and reservoir 	<ul style="list-style-type: none"> ▪ Presence of gullies due to soil erosion. 	2 million	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> ▪ Restrict alignment of the transmission route along road reserves 	<ul style="list-style-type: none"> ▪ Layout of the transmission line 	Part of the Contract	Contractor	DWO /DEO	Monthly
Disruption of social order	<ul style="list-style-type: none"> ▪ Prioritize employment of local people where they have the required skills 	<ul style="list-style-type: none"> ▪ Record of project staff and their area of origin 	Part of the Contract	Contractor	CDO	Weekly
	<ul style="list-style-type: none"> ▪ Sensitizing all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles ▪ Prepare a stakeholder engagement plan and ensure that stakeholder engagement is a continuous process throughout the project implementation 	<ul style="list-style-type: none"> ▪ Record of sensitization sessions ▪ Stakeholder engagement plan in place ▪ Records of stakeholder engagement 	1 million	Contractor	CDO	Monthly
Faecal matter disposal	<ul style="list-style-type: none"> • Prepare a waste management plan 	<ul style="list-style-type: none"> • A waste management plan in place 	15 million	Contractor	DEO	Once, before the start of construction works

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> Provide temporary eco-san toilet on site during site works 	<ul style="list-style-type: none"> Disease outbreak Bad odour and nuisance of flies 	Part of the construction contract	Contractor	DEO	Monthly
Noise from construction machinery	<ul style="list-style-type: none"> Schedule noise-intensive work for the least noise-sensitive time of the day (work between 8 am and 5 pm) 	<ul style="list-style-type: none"> Work schedule Complaints about noise; 	0	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> Provision of PPE to project workers 	<ul style="list-style-type: none"> PPE in use 	Part of the Contract	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> Regular noise assessments 	<ul style="list-style-type: none"> Noise assessment reports 	1 million	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> Sprinkle water to dusty grounds during the dry seasons 	<ul style="list-style-type: none"> Records of air water sprinkling 	2 Million	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> Cover earth materials with tarpaulin during transportation to minimise their falling off trucks; 	<ul style="list-style-type: none"> Presence of tarpaulins for covering loose material 	0.5 million	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> Provision of PPE to project workers; 	<ul style="list-style-type: none"> PPE in use 	Part of the Contract	Contractor	DEO	Weekly
Solid waste generation	<ul style="list-style-type: none"> Use the excavated material for backfilling. 	<ul style="list-style-type: none"> Heaps of waste & excavated material on site 	Part of the Contract	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> Provide waste bins for proper storage. 	<ul style="list-style-type: none"> Waste bins within the project area. 	0.2 million	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> Contract a waste management company where waste volumes are large 	<ul style="list-style-type: none"> Contract agreement with a waste management company 	2 million	Contractor	DEO	Monthly
Occupational health and safety issues	<ul style="list-style-type: none"> Prepare an occupational Health and safety plan 	<ul style="list-style-type: none"> An occupational health and safety plan in place 	10 million	Contractor	CDO DEO DHI	Once, before start of construction works
	<ul style="list-style-type: none"> Provide workers with PPE and sensitise them on basic safety precautions. 	<ul style="list-style-type: none"> PPE in use 	Part of the Contract	Contractor	DEO	Weekly

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> ▪ Provision of a first aid kit 	<ul style="list-style-type: none"> ▪ First aid kit 	3 Million	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> ▪ An occupational safety and health policy should be drafted and implemented 	<ul style="list-style-type: none"> ▪ A health and Safety Policy in place and being implemented 	2 Million	Contractor	DEO	Monthly
Public health and safety issues	<ul style="list-style-type: none"> ▪ Prepare a community health and safety plan 	<ul style="list-style-type: none"> ▪ A community health and safety plan in place 	10 Million	Contractor	CDO DEO DHI	Once, before start of construction works
	<ul style="list-style-type: none"> ▪ Cordon off all dangerous areas along public roads 	<ul style="list-style-type: none"> ▪ Marks of dangerous places 	2 Million	Contractor	CDO DEO	Weekly
	<ul style="list-style-type: none"> ▪ Project vehicles transport material along community roads should not exceed 40 km/h. 	<ul style="list-style-type: none"> ▪ Records of sensitization of project drivers on speed limits ▪ Speed limit signs on roads 	1 Million	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> ▪ Schedule of construction works along community access roads should be communicated to public at least a week prior to start of construction works 	<ul style="list-style-type: none"> ▪ Proof of communication of work schedule with communities ▪ Number accidents recorded 	0.5 Million	Contractor	DEO	Bi-monthly
	<ul style="list-style-type: none"> ▪ Prepare and implement an HIV/AIDS management plan 	<ul style="list-style-type: none"> ▪ An HIV/AIDS management plan 	10 Million	Contractor	DCDO	Quarterly
Increased susceptibility to soil erosion	<ul style="list-style-type: none"> ▪ Prepare an erosion control plan 	<ul style="list-style-type: none"> ▪ An erosion control plan in place 	10 Million	Contractor	DEO NEMA	Once, prior to start of construction activities
	<ul style="list-style-type: none"> ▪ Immediately dispose of any excavated soil to avoid loose soil being washed away by storm water. 	<ul style="list-style-type: none"> ▪ Presence of erosion gullies within the site premises 	1 Million	Contractor	DEO NEMA	Weekly
	<ul style="list-style-type: none"> ▪ Planting of bands of grass on erosion prone surfaces. 	<ul style="list-style-type: none"> ▪ Presence of bare soils on site 	2 Million	Contractor	DEO NEMA	Quarterly

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Air pollution and climate change	<ul style="list-style-type: none"> ▪ Vehicles transporting construction material along community access roads should move as lower speeds, not exceeding 40 km/hr 	<ul style="list-style-type: none"> ▪ Speed signs on the roads 	10 million	Contractor	DEO NEMA LCI's	Monthly
	<ul style="list-style-type: none"> ▪ All loose material like sand, cement, murrum, soil should be covered with a tarpaulin during transportation 	<ul style="list-style-type: none"> ▪ Number of transport truck cover with tarpaulins 	4 million	Contractor	DEO Project engineer	Daily
	<ul style="list-style-type: none"> ▪ Water should be sprinkled on dusty ground where other measures cannot appropriately minimize dust emission 	<ul style="list-style-type: none"> ▪ Number of water bowsers ▪ Number of times roads are sprinkled with water 	5 million	Contractor	Project engineer LCI's	Weekly
	<ul style="list-style-type: none"> ▪ Repair and maintain construction equipment following the manufacturer's specifications, including on fuelling 	<ul style="list-style-type: none"> ▪ Logs for repairing the different equipment and vehicles 	0	Contractor	Project engineer Site engineer	Monthly
	<ul style="list-style-type: none"> ▪ Offset emitted carbon dioxide during construction activities by planting local trees at all devastated sites 	<ul style="list-style-type: none"> ▪ Number of trees planted 	5 million	MWE	DEO	Yearly
Disturbance and interruption of commercial and social activities	<ul style="list-style-type: none"> ▪ Local communities should be informed about the construction program in advance and adhere to it 	<ul style="list-style-type: none"> ▪ Copy of the communication made to the community 	10 million	Contractor MWE	DWO LCI's	Quarterly
	<ul style="list-style-type: none"> ▪ Access roads in the neighbourhood should be maintained and cleaned of earth and sand on a daily basis 	<ul style="list-style-type: none"> ▪ Number of roads maintained 	0	Contractor	District Engineers	Quarterly
	<ul style="list-style-type: none"> ▪ Temporary access ways should be provided with the approval of local authorities where access roads are closed 	<ul style="list-style-type: none"> ▪ Number of temporary access road provided 	0	Contractor	District Engineers	Quarterly
	<ul style="list-style-type: none"> ▪ Works should be carried out under mild weather; avoiding strong rains or winds 	<ul style="list-style-type: none"> ▪ Copy of the schedule for the civil works 	0	Contractor	Site Engineer Project Engineer	Monthly
	<ul style="list-style-type: none"> ▪ Obstruction of access to and use and occupation of roads, footpaths and bridges should be reduced 	<ul style="list-style-type: none"> ▪ Number of roads abstracted/closed 	0	Contractor	Site Engineer Project Engineer	Monthly
	<ul style="list-style-type: none"> ▪ Where livelihoods and property are affected, valuation and prompt compensation should be undertaken for the PAPs 	<ul style="list-style-type: none"> ▪ Number of people compensated ▪ Copies of compensation agreements 	To be determined based on number of affected	MWE	District Labour Officers LCI's	Monthly

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IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Theft of construction materials	<ul style="list-style-type: none"> ▪ -Verification of project employees should be done by the local authorities. 	<ul style="list-style-type: none"> ▪ -Records of employee verification exercise 	1 Million	CDO	CDO	Prior to the start of construction activities -Any time staff are required
	<ul style="list-style-type: none"> ▪ Security guards should be hired to provide security at the construction sites. 	<ul style="list-style-type: none"> ▪ -Presence of security guards 	6 Million	CDO	CDO	-Weekly
Operation and maintenance phase						
Water Pollution	<ul style="list-style-type: none"> ▪ Ensuring that storage containers are checked regularly for leakage 	<ul style="list-style-type: none"> ▪ Records of chemical leakage/ spillage ▪ Complaints from water users. 	0.3 Million	Developer / Operator	DEO	Monthly
Occupational Health and Safety	<ul style="list-style-type: none"> ▪ Prepare an occupational health and safety plan 	<ul style="list-style-type: none"> ▪ Same as in the construction phase 	Same as in the construction phase	Same as in the construction phase	Same as in the construction phase	Same as in the construction phase
	<ul style="list-style-type: none"> ▪ Workers should be given appropriate PPE when handling chemical 	<ul style="list-style-type: none"> ▪ Workers using PPE 	Part of the Contract	Developer / Operator	DEO	Quarterly
	<ul style="list-style-type: none"> ▪ Regular trainings on the operations of the water system 	<ul style="list-style-type: none"> ▪ Records of training on operation systems 	2 Million	Developer / Operator	DWO	Quarterly
	<ul style="list-style-type: none"> ▪ Installation of firefighting equipment at the abstraction point 	<ul style="list-style-type: none"> ▪ Presence of firefighting equipment 	2 Million	Developer / Operator	DEO	Quarterly
	<ul style="list-style-type: none"> ▪ A well-equipped first aid kit should be availed to project workers. 	<ul style="list-style-type: none"> ▪ Presence of a first aid kit. ▪ Records of injuries 	Part of the Contract	Developer / Operator	DEO	Quarterly
Generation of hazardous wastes	<ul style="list-style-type: none"> ▪ Maintenance of the solar power system should be undertaken by a licensed firm 	<ul style="list-style-type: none"> ▪ -License certificate of the hired maintenance firm 	5 Million	Developer / Operator	DEO DWO	Prior to start of operation, and annually thereafter
	<ul style="list-style-type: none"> ▪ Waste batteries and solar panels should be taken back to the supplier, who should handle it appropriately as hazardous waste. This should be agreed in the solar power supply contract 	<ul style="list-style-type: none"> -Solar power supply contract ▪ -Records of delivery of waste solar 	As per the supply contract	Developer / Operator	DEO DWO	Annually

ESIA for Orom Gravity Flow Piped Water Supply and Sanitation System Project

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
		batteries and panels to the supplier				
	<ul style="list-style-type: none"> ▪ Where such agreement is not reached, the Developer (MWE) should hire a licensed firm for handling hazardous waste 	<ul style="list-style-type: none"> -Contract agreement with the waste handling firm ▪ -Records of waste solar batteries and panels handled 	5 Million	Developer / Operator	DEO DWO	Prior to start of operation, and annually thereafter
Incapacity to operate and maintain the project components by local people	<ul style="list-style-type: none"> ▪ Train local community members in the operation and maintenance of the water supply infrastructure 	<ul style="list-style-type: none"> ▪ Number of trained community members in operation and maintenance of the piped water supply system 	3 Million	Developer/ Operator	DWO	Quarterly
	<ul style="list-style-type: none"> ▪ Prepare a quality management plan 	<ul style="list-style-type: none"> ▪ A quality Management plan in place 	15 Million	Contractor Operator	DWO CDO DEO	Quarterly
Unaffordability of the water charges	<ul style="list-style-type: none"> ▪ Levy charges in consideration of the income levels of the area. Charges for poor people should be just enough to cover the operational costs 	<ul style="list-style-type: none"> ▪ Records of water charges ▪ Complaints from the public 	0	Developer / Operator	DWO	Quarterly
	<ul style="list-style-type: none"> ▪ Provide many public standard pipes where poor people can obtain water cheaply 	<ul style="list-style-type: none"> ▪ Number of public stand pipes 	Part of the Contract	Developer / Operator	DWO	Twice a year
Noise pollution	<ul style="list-style-type: none"> ▪ Schedule noise-intensive work for the least noise-sensitive time of the day (work between 8 am and 5 pm) 	<ul style="list-style-type: none"> ▪ Copy of the schedule for works 	0	Operator	LCI's	Weekly
	<ul style="list-style-type: none"> ▪ Provision of PPE to project workers 	<ul style="list-style-type: none"> ▪ Number of workers with PPE's 	Part of operational costs	Operator	District Labour Officers CDO's	Monthly
	<ul style="list-style-type: none"> ▪ Regular noise assessments 	<ul style="list-style-type: none"> ▪ Copy of reports for noise assessment 	5 million	Operator	NEMA DEO	Quarterly
Air pollution	<ul style="list-style-type: none"> ▪ Vehicles transporting construction material along community access roads should move as lower speeds, not exceeding 40 km/hr 	<ul style="list-style-type: none"> ▪ Speed signs with speed limits along routes 	4.5 million	Operator MWE	Uganda Police	Quarterly

ESIA for Orom Gravity Flow Piped Water Supply and Sanitation System Project

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> ▪ Repair and maintain construction equipment following the manufacturer's specifications, including on fuelling 	<ul style="list-style-type: none"> ▪ Number of equipment repaired 	Part of operational costs	Operator	Project Engineer DWO	Quarterly
	<ul style="list-style-type: none"> ▪ Offset emitted carbon dioxide during construction activities by planting local trees at all devastated sites 	<ul style="list-style-type: none"> ▪ Number of trees planted 	5 million	MWE	DEO	Yearly
Reduction of water levels in aquifers	<ul style="list-style-type: none"> ▪ The design of the water supply system should cater for changes in precipitation due to climate change. 	<ul style="list-style-type: none"> ▪ Copy of the design report 	0	MWE	DEO DWO	Before start of operation of the system
	<ul style="list-style-type: none"> ▪ Reservoir should be installed that can store enough water to cater for the needs of the communities during times of storage. 	<ul style="list-style-type: none"> ▪ Number of reservoirs with the right capacity 	0	MWE Operator	DWO	Before start of operation of the system
	<ul style="list-style-type: none"> ▪ Encourage and promote catchment protection as part of corporate social responsibility through planting trees ▪ Obtain a water abstraction permit from DWRM, which will clearly specify the maximum allowable abstraction volumes from aquifers 	<ul style="list-style-type: none"> ▪ Report on CSR activities done ▪ Copy of the abstraction permit 	1 million	MWE Operator	DWO NEMA	Before start of operation of the system Yearly for the permits
Human waste disposal	<ul style="list-style-type: none"> ▪ The toilet facilities should be operated according to the procedures to be provided by the design team. 	<ul style="list-style-type: none"> ▪ Number of properly maintained toilet facilities 	0	Community (Markets, schools and other institutions)	MWE NEMA DEO District Health Officers	Monthly
	<ul style="list-style-type: none"> ▪ The toilets should be emptied and waste transported by a licensed company 	<ul style="list-style-type: none"> ▪ Number of toilets emptied ▪ Copies of receipts and licenses from the company 	10 million	Operator	MWE NEMA DEO District Health Officers	Every six months
	<ul style="list-style-type: none"> ▪ The waste should be disposed off to a designated area 	<ul style="list-style-type: none"> ▪ Copies of receipts for disposing off waste 	10 million	Community (Markets, schools and other institutions)	MWE	Monthly
	<ul style="list-style-type: none"> ▪ Fence off the project infrastructure to avoid vandalism 	<ul style="list-style-type: none"> ▪ Fence around the project facilities 	Part of operational costs	MWE Operator	LCI's DWO	At the start of the project

ESIA for Orom Gravity Flow Piped Water Supply and Sanitation System Project

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Conflicts with Karamajongs over water	<ul style="list-style-type: none"> ▪ Security should be provided at key infrastructure like pumps by Police or UPDF 	<ul style="list-style-type: none"> ▪ Number of security personnel at the sites 	20 million	Operator	MWE	Monthly
	<ul style="list-style-type: none"> ▪ Provisions should be put for watering of animals 	<ul style="list-style-type: none"> ▪ Number of animal watering point 	0	MWE	DWO District Engineers District Agricultural officers	At the beginning of operations
Spread of sanitation and water borne diseases	<ul style="list-style-type: none"> ▪ Ensure regular supply of sufficient water for flushing and washing hands by providing a reservoir tank at the toilet 	<ul style="list-style-type: none"> ▪ Presence of a reservoir tank at the toilet 	Part of the Contract	Developer / Operator	DWO CDO DEO	Quarterly
Vandalization / theft project equipment	<ul style="list-style-type: none"> ▪ Sensitize community members about the importance of the project 	<ul style="list-style-type: none"> ▪ Records of community sensitization 	2 Million	Developer / Operator	DWO CDO DEO	Once, prior to, and once after construction
	<ul style="list-style-type: none"> ▪ Hire a security guard to provide 24-hour security at sensitive components such as the abstraction/pumping station 	<ul style="list-style-type: none"> ▪ Presence of security guards 	To depend on the local security labour cost	Developer / Operator	DWO CDO DEO	Quarterly
	<ul style="list-style-type: none"> ▪ Fence off major project components such as abstraction and reservoir sites 	<ul style="list-style-type: none"> ▪ Fenced project site 	Part of the construction Contract	Developer / Operator	DWO CDO DEO	Twice a year
Decommissioning Phase						
Disruption of water supply	<ul style="list-style-type: none"> ▪ Inform the communities in the affected areas well in advance about the decommissioning activities ▪ Provide alternative source of water 	<ul style="list-style-type: none"> ▪ Records of sensitization meeting about project decommissioning ▪ Presence alternative water sources 	3 Million for sensitization meetings	Operator Decommissioning Contractor	DWO CDO DEO	Quarterly, within the last two years of decommissioning
Traffic disruption	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	2 Million	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Disruption of social order	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	1Million	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase

ESIA for Orom Gravity Flow Piped Water Supply and Sanitation System Project

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Faecal matter disposal	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	Part of the decommissioning contract	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Noise pollution	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	3500000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Solid waste generation	<ul style="list-style-type: none"> ▪ Same as for the construction phase ▪ Further, hazardous wastes associated with solar batteries and panels should be handled and disposed of by a licensed firm for handling such wastes 	<ul style="list-style-type: none"> ▪ Same as for the construction phase ▪ Agreement with a licensed hazardous waste management firm 	2200000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Occupational health and safety issues	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	3000000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Public health and safety issues	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	3500000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Increased susceptibility to Soil erosion	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	4000000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Air pollution and climate change	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	14000000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Total			320,300,000			

Further, the following other costs should be clear in the BoQs during the bidding process.

Item	Indicative Costs
Grievance Redress Mechanism	30,000,000
Stakeholder Engagement	30,000,000
Environment and Social Audit	35,000,000
Capacity Building and Trainings	20,000,000
Sub-total	115,000,000
Grand Total, including ESMMP (320,300,000)	435,300,000

Conclusions and recommendations

This environmental and social impact assessment for the Orom Gravity Flow Water Supply and Sanitation System has examined the project need, its compatibility with the surroundings, socio-economic benefits and the adverse social and environmental impacts. Enhancement measures have been proposed for the positive impacts, while mitigation measures to avoid, reduce and minimise the negative impacts were also 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, most the negative impacts of this project are rated as minor or moderate. However, adequate mitigation measures have been proposed to address them. When mitigation actions and environmental and social monitoring plans are implemented, the project would have minimal residual environmental effects. Hence the project can be implemented in a sustainable way.

a) Recommendations

This study therefore makes the following recommendations:

- Many times, Project Contractors do not comply with the recommendations given in the project environmental report. This could tantamount to violation of the law with possible halting of the whole project by the relevant authorities, including NEMA. A copy of this report would be availed to the Project Contractor, and advised to follow its recommendation.
- The project ought to be approved for implementation by the relevant authorities to enable fulfilment of the project main objective of improving access to safe water in the area

1 INTRODUCTION

1.1 Background

According to the Water and Environment Sector Performance Report, 2019, 44.3% and 10.9% of the population depend on boreholes and piped water respectively to access clean water in rural areas. In small towns and rural growth centers, only 55.9% of the population had access to improved water sources by 2019. In Kitgum District, five sub-counties have poor water supply coverage. The actual data in terms of safe water coverage for the scattered population range from 26% in Omiya Anyima Sub-county to 51% in Namokora Sub-county (SPR, 2014). The inadequate water supply situation in Kitgum is due to the fact that during the Lord Resistance Army (LRA) rebel insurgency most of the water facilities were concentrated in Internally Displaced Persons (IDP) camps, where people had taken refuge; many of which are now abandoned. While in the villages where people have now returned, there are very few water facilities. In addition, the groundwater potential is also very poor in the said area. This situation is no different in the districts nearby i.e., Agago and Pader. Extending safe water to the unserved population in the district, therefore, can be a stimulus to the district's productivity, and improvement in the quality of life.

The Government of Uganda has embarked on improving safe water coverage and supply across the entire country. The Water and Environment Sector Development Plan of Uganda prioritizes the construction of piped water supply systems in Rural Growth Centres (RGCs) to replace the currently overstretched hand-pumped borehole service technology. The demand in water supply for both domestic and other uses in the project area is very high.

As a result, the GoU, through the Ministry of Water and Environment (MWE) and the District Local Governments of Kitgum, Agago and Pader, plans to establish Orom Gravity Flow Water Supply and Sanitation System, covering over 20 Sub counties in the three districts. The proposed water supply and sanitation project shall ensure sustainable access to safe water and sanitation services in the project area. This will contribute to creating a more stable socio-economic environment and hence boost commercial development of the area. The project will also contribute to improvement of Water Sanitation and Hygiene (WASH) services, which are critical for the health and socio-economic development. The project shall also reduce walking distances to water access points, thereby saving time for the education of the children.

In recognition of the need for sustainable development, and in compliance with the National Environment Act of 2019 and regulations there under, the MWE initiated an Environmental and Social Impact Assessment (ESIA) process for the proposed project to identify and assess potentially negative and positive environmental and social impacts associated with the project and devise mitigation measures to avoid, minimize or mitigate the negative environmental and social impacts while enhancing the positive environmental and social impacts or benefits of the project.

From the initial environmental project screening that was undertaken, the proposed project was identified as one among those that require an Environmental and Social Impact Assessment by way of scoping as per Section 113 of the National Environment Act. As part of the detailed design and Construction Supervision of Orom Gravity Flow Water Supply and Sanitation System, an Environmental and Social Impact Assessment (ESIA) was carried out to analyze the project and possible alternatives, assess and evaluate impacts (both positive and negative), and suggest measures to mitigate negative impacts and enhance positive ones. As a result, Ministry of Water and Environment contracted NEMA certified ESIA practitioners to carry out the assessment.

Further, in line with African Development Bank (AfDB)'s integrated social safeguard system of 2015, it is a requirement for all investment projects that are likely to have detrimental site-specific environmental and/or social impacts to undergo an ESIA. The proposed Orom Gravity Flow Water Supply and Sanitation System will have such impacts. This Environmental and Social Impact statement presents the findings from the Environmental and Social Impact Assessment that was conducted for the proposed project and mitigation measures have been suggested as outlined in the Environmental and Social Management Plan (ESMP).

1.2 Objective of the ESIA

The main objective of the ESIA, which is in tandem with Terms of Reference (ToR) that were approved by NEMA (Annex I) is to carry out a comprehensive environmental and social impact assessment for the proposed Orom Gravity Flow Water Supply and Sanitation Project, and propose measures to mitigate the adverse impacts while enhancing the positive ones.

The specific objectives of the ESIA included the following;

- i) Survey of all the identified sites including preparing a map/sketch of each site showing important existing features in the surrounding areas in relation to the sites,
- ii) Assessment of baseline environmental conditions for monitoring future project components,
- iii) Evaluation of the relevant policy and legal framework pertaining the proposed project.
- iv) Consultation with the relevant stakeholders and incorporate their comments into impact identification and mitigation,
- v) Evaluation of the possible alternatives for the project activities and components;
- vi) Identification of all potential impacts and propose feasible mitigation impacts
- vii) Preparation of an Environmental and Social Management and Monitoring Plan (ESMMP) for the implementation of the proposed project. The

ESMMP outlines:

- potential environmental and social impacts resulting from project activities;
- proposed mitigation measures;
- monitoring indicators;
- responsibilities for implementation of the mitigation measures;
- responsibilities for monitoring the implementation of the mitigation measures

The purpose of this report is to provide NEMA and the Lead Agency with sufficient and relevant information on the proposed project that can allow them establish whether or not the project is likely to have significant impact on the environment, and thus determine the basis for approval.

1.3 Scope of the ESIA

The ESIA has been limited to the proposed area for the project and its associated activities. It covers all environmental aspects of the proposed project and their associated impacts. The data and information presented in this report give baseline conditions for monitoring the impacts of the project activities during construction, operation and decommissioning phases. The ESIA findings have been compared against national and international legal requirements, as well as the African Development bank (AfDB) environmental and social safeguards. The Environmental and Social Management and Monitoring Plan (ESMMP) has been developed to guide the implementation of the project activities in a sustainable manner.

1.4 Details of the Developer and Investment Cost

1.4.1 Details of the Developer

Project Title:	Proposed Orom Gravity Flow Water Supply and Sanitation System in Kitgum, Pader and Agago Districts
Developer:	Ministry of Water and Environment
Address:	Plot 21/28 Port Bell Road, Luzira, P.O. Box 20026 Kampala, Uganda
Tel:	+256-772-453-395
Email:	llolweny@yahoo.co.uk
Contact Person:	Name: Eng. Olweny Lamu Designation: Assistant Commissioner Research and Development Mobile: +256-772-453-395 Email: lloolweny@yahoo.co.uk

1.4.2 Investment Cost

The total cost of the project estimated based on the design assumptions and the preliminary engineering design is Uganda Shillings eighteen billion eight hundred fifty-

four million sixteen thousand four hundred thirty-eight only (UGX 18,854,016,438). inclusive of taxes. The detailed cost for each of the proposed project infrastructure are indicated in Annex II.

1.5 Structure of the ESIA

The structure of this report is in conformity with NEMA guidelines and the different sections are outlined below: -

An executive summary providing a brief overview of the proposed project and its anticipated positive and negative impacts among others.

- Chapter 1: Background information on the project, project objectives, and report structure.
- Chapter 2: Approach and methodology used during the environmental and social assessment
- Chapter 3: A review of policies, laws, regulations and standards in relation to the development of the proposed project.
- Chapter 4: Description of the baseline bio-physical and sociological information, area infrastructure and activities.
- Chapter 5: Description of the proposed project components, preparation, construction, operation and decommissioning phase activities.
- Chapter 6: Public consultations and disclosure, mentioning stakeholder concerns and measures to address them.
- Chapter 7: An analysis of alternatives, including the Project alternative, No Project option and comparison of the two options.
- Chapter 8: Evaluation of the identified environmental and social impacts during the construction, operation and decommissioning phases.
- Chapter 9: An Environmental, Social Management and Monitoring Plan for addressing negative impacts and assessing effectiveness of mitigation measures, scheduling monitoring frequency and assigning responsibility.
- Chapter 10: Grievance Redness Mechanism
- Chapter 11: Conclusions and Recommendations

2 APPROACH AND METHODS USED DURING THE ASSESSMENT

2.1 Introduction

The environmental and social impact study started with review of Terms of Reference (TOR) provided by the Developer, available literature and information on the proposed project after which a scoping report and TOR were prepared and submitted to NEMA. The Team took into account the existing legislation and regulations dealing with Uganda’s natural resources management. International and lender legislation and regulations were also reviewed. The Team visited the field and carried out field assessments, consultations, and field measurements. The methodology used for environmental impact assessment followed a sequence of five main steps summarized in Figure 2-1, with consultations incorporated at every phase.

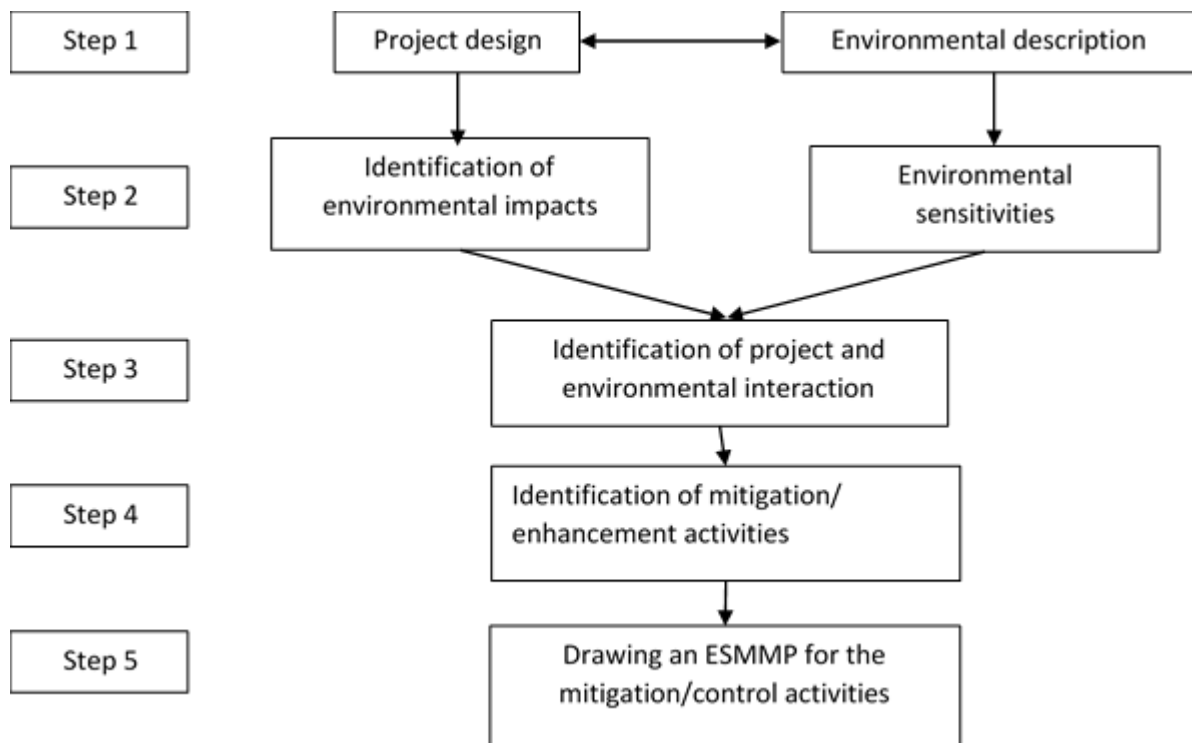


Figure 2-1: Methodology for Environmental and Social Impact Assessment (ESIA)

Step 1: Analysed the proposed project in terms of activities to be undertaken, and facilities to be established as well as collection of baseline information on the state of the environment. It included reconnaissance visits to the project and proposed site specific locations of the various infrastructure components.

Step 2: Identified project activities and facilities that might potentially cause interference with the environment. It also assessed any particular environmental sensitivities and conditions that are of relevance to the proposed project.

Step 3: Identified any potential impacts of the project on the environment depending on the analysis carried out in steps 1 and 2. In view of the project activities and associated facilities, as well as the specific environmental conditions, the potential significance of such impacts were determined in terms of extent, severity and duration.

Step 4: Identified the measures to be put in place to minimize or otherwise eliminate the negative impacts from the project, and measures to enhance the positive impacts.

Step 5: Established a plan for managing and monitoring impacts from the proposed project, to ensure that the project is sustainable and lives to achieve its intended objectives.

2.2 Activities and Methods

2.2.1 Field visits and inspections

Field visits and inspections were carried out by the ESIA Team so as to get acquainted with the project activities in the study area, and also map out sampling sites. The areas that were visited include:

- (a) The existing and proposed production boreholes in the project area where raw water will be abstracted;
- (b) The existing water storage reservoirs and the areas where establishment of new additional storage reservoirs is proposed;
- (c) Areas where water transmission lines will be laid;
- (d) Ecologically sensitive environments such as wetlands that might be affected during the project activities;
- (e) Areas proposed for the sanitation components, such as the toilets.

During the field visits, the ESIA Team conducted baseline surveys and assessments, field measurements and stakeholder consultations. Issues that were of interest to the Team include but not limited to:

- Waste generation and management,
- Generation and management of hazardous wastes,
- Generation of dust and particulate matter,
- Water quality and noise level,
- Hydrology,
- Geology and soil types,
- Occupational safety and health issues,
- Traffic management and transport methods for project activities,
- Potential for accidents (e.g. in uncovered ditches, spills, traffic),
- Potential sources of water and soil pollution e.g. siltation from increased runoff,
- Legal compliance requirements,
- Environment, social management and monitoring programs,

- Community issues including compensation and resettlement,
- Terrestrial and aquatic fauna and flora and associated habitats,
- Aesthetic issues,
- Land use and other social economic livelihood activities in the project area,
- Cultural, heritage and religious issues,
- Technology transfer and utilization,
- Organizational aspects, roles and responsibilities,
- Collaborations with other stakeholders.

2.2.2 Water quality measurements and analysis

The physico-chemical and microbiological water quality at the proposed water abstraction points were determined. Sampling and analysis of water samples followed procedures certified by the International Organization of Standardization (ISO) and standard methods according to APHA/AWWA/WEF (1998).

2.2.3 Flora and fauna assessment

It is important to understand the vegetation of the proposed project area as this will play an important role in re-vegetation of places that will be excavated/laid bare during the project activities. It will be necessary that sites are restored to as much as practically possible to conditions they were in before project activities. Further, knowing the fauna in the project affected areas helps to understand whether the affected areas provide habitats to endangered/ threatened fauna species, and in that case require protection. The flora of the project area was assessed through field observations.

Birds were surveyed by Timed Species Counts (TSCs) (Freeman *et al.* 2003). The TSC method generates estimates of relative abundance by scoring 6 for species recorded in the first ten minutes, down to one for the last ten minutes of a one-hour count. The argument is that the common species are recorded in most counts, usually with a score of six, whilst rare species only score an occasional one. TSCs are good for quick assessment of species richness and abundance of an area and are thus good for inventorying areas in environmental assessments (Pomeroy & Dranzoa, 1997; Freeman *et.al*, 2003).

Birds were identified with the help of a pair of binoculars and where there was doubt about identification, the field guide (Stevenson and Fanshawe, 2002) was referred to. Other tools used during the assessment include; Camera, hand GPS, stop watch and recording forms.

Conservation status

Birds were further classified according to their conservation status i.e. whether they are species of conservation concern (C) as from (Bennun & Njoroge 1996) who described as

species of globally Red-listed (IUCN 2020) or Nationally by the Wildlife Conservation Society (WCS 2016) or Regionally. These categories are indicated as;

- a- CR Critical (Globally or Regionally or Nationally)
- b- EN Endangered (Globally or Regionally or Nationally)
- c- VU Vulnerable (Globally or Regionally or Nationally)
- d- NT Near-threatened (Globally or Regionally or Nationally)
- e- RR Regional Responsibility (Regionally)

Habitat specialization

Birds recorded were further classified into categories for specialty, where possible, based 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 specialist (species of typical forests interior)
- F - Forest generalist (species less specialized also occur in small patches of forests)
- f - Forest visitor (non-forest birds that also commonly use trees (Bennun *et al* 1996))
- G – Grassland species
- W - Water specialist (Wetland specialist)
- w - Water bird non-specialist (Wetland visitor)
- Ae – Aerial feeder

A species can fit in two ecological categories; for instance, it can be both a water non-specialist and 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.

Migratory classifications

Bird species with migratory tendency were also considered as derived from the Uganda Bird atlas (Carswell *et al.* 2005). There are of two categories of migrant species as considered below.

- Afro-tropical migrants (AM), these complete their migration journey within Africa
- Pale-arctic migrants (PM), these breed in Palearctic region between May and August but found in Uganda in the northern winter (October and March).

However, some species can be both Afro-tropical and Pale-arctic migrants

Transects covered

In all the three districts (Agago, Pader and Kitgum), birds were studied at key project sites including water abstraction points and water reservoir areas (Table 2-1).

Table 2-1: Survey locations and their details

District	Study location	GPS	General habitat
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Agago District	Lai Central Borehole	N03.136578 E033.436937	Grassland
	Lai Central reservoir	N03.123620 E033.432050	Savana Woodland
	Wipolo Central borehole	N03.140982 E033.429936	Savana Woodland
	Wipolo Reservoir	N03.154161, E033.422962	Savana Woodland
	Coodong reservoir	N03.236634, E033.447532	Savana Woodland
	Longor borehole	N03.26091 E033.409046	Savana woodland
	Pawel Borehole	N03.251797 E033.414401	Savana woodland
	Alok Ki Winyo borehole	N03.034056 E033.385052	Agriculture
Pader District	Losken Abstraction point	36N 0495343, 0353926	Savana woodland
	Lugede Abstraction Point	36N 0487383, 0349707	Savana woodland
	Lugede Village reservoir	36N 0489001, 0350655	Savana woodland
	Lageng Abstraction point	36N 0488594, 0346082	Savana Woodland
	Acholibur Reservoir	N03.137453, E032. 908049	Savana woodland
Kitgum District	Giligil Abstraction point	N03.405031, E033.390421	Savana woodland
	Kakoo Abstraction Point	N03.365740, E033.347772	Savana woodland
	Kalabong Reservoir	N03.411904, E033.365998	Savana woodland
	Lalekan Reservoir	N03.440537, E033.385063	Savana woodland
	Lamugo Abstraction point	N03.383787, E032.919222	Grassland
	Obem Reservoir	N03.411130, E032.931737	Grassland
	Palamene-lwala Abstraction point	N03.294273, E033.185454	Savana grassland
	Kabete Abstraction point	N03.395302, E032.986001	Savana woodland
	Pudo Reservoir		Savana woodland
	Mogila Abstraction point	N03.392768 E032.999426	Savana woodland
	Labilo B Abstraction point	N03.288206 E033.063972	Savana woodland
	Alel East Abstraction Point	N03.282992 E033.095368	Savana woodland
	Wang Kenya I Abstraction Point	N03.414695 E033.492009	Savana woodland
	Wang Kenya II Abstraction point	N03.408774 E033.490966	Savana Woodland
	Agoromin City Abstraction Point	N03.357788 E033.474320	Savana woodland
	Agoromin City Reservoir	N0.360587 E033.493976	Savana Woodland
	Agoromin Abstraction Point	N03.337863 E033.477986	Savana woodland
	Lapeitak I Abstraction Point	N03.397527 E033.523225	Savana woodland
	Lapeitak II Abstraction Point	N03.98002 E033.530884	Savana woodland
	Loluko Abstraction Point	N03.473870 E033.536561	Savana woodland
	Katwotwo Reservoir	N03.476015 E033.526349	Savana woodland
	Lobiro Abstraction Point	N03.482325 E033.526349	Savana woodland
	Lobiro Reservoir	N03.491513 E033.578988	Savana woodland
	Lakongera I Abstraction Point	N03.513701 E033.493056	Savana woodland
	Lakongera II Abstraction Point	N03.519540 E033.486658	Savana woodland

2.2.4 Noise measurements

According to the National Environment (Noise Standards and Control) Regulations (2003), and Section 106 of the National Environment Act, Cap 5 of 2019, the maximum

permissible noise levels (continuous or intermittent) from a factory or workshop range from 85 dB (A) to 109 dB (A), with duration of exposure ranging from 8 hours daily (or 40 hours weekly) for 85 dB(A) to 1.875 minutes daily (or 9.375 minutes weekly). This, must, however, be looked at alongside the maximum permissible levels for the general environment, which range from 45 dB (A) to 70 dB (A) during the day and 35 dB(A) to 60 dB(A) during the night.

Baseline noise measurements in the project area were carried using a Benetech GM1356 digital sound level meter with a range of 30—130 dB. The noise assessment was carried out at proposed abstraction, reservoir sites and any sensitive receptor near the proposed sites for the project. The noise assessment was done during day time hours. The results of air quality and noise measurements are presented in Chapter 4.

2.2.5 Community and stakeholder consultations

The success of a project depends on its acceptability by the members of the public and other stakeholders who it's intended to benefit. As a result, stakeholder consultations formed a very important part of this assessment (Plate 2-1).

The objectives of the consultation were to:

- provide information about the project and its potential impacts or benefits to those interested in or affected by the project, and solicit their opinions in this regard;
- provide opportunities to stakeholders to discuss their opinions and concerns;
- understand and manage expectations and misconceptions regarding the project; and
- inform the process of assessing significance of impacts and developing appropriate mitigation measures.

The aim of this consultation was to enable affected parties and other stakeholders present their views and concerns that would contribute to the formulation and refinement of the project design.

The Assessment Team consulted the relevant project stakeholders. Mobilization of all social groups including men, women, youth, water user committee members, local leaders, and other community opinion leaders in the project area. Necessary consultation tools and aides, such as area maps indicating the project design, location of project components and project information briefs were displayed and shared during community consultations and other stakeholder consultative meetings.

A two-level stakeholder consultative procedure was adopted. At the first level were community members who live along the proposed alignment of the water transmission/distribution lines and in proximity to the areas proposed for other project components. These consultations took place at the ward/parish and cell/village level through participatory community dialogues. The second level was district and sub-

county/division stakeholder consultations. The stakeholders consulted during the study included among others; Kitgum, Agago and Pader District Local Government officials, Town Council officials, MWE officials, Sub-county Leaders, Village Leaders, Land Owners, Umbrella North of Water and Sanitation officials who are currently the water service providers in project area, health center officials, as well as prospective water users within the proposed project areas.

The identification of stakeholders was based on the different activities involved in the project, the sectors the project lies in and the administrative locations of project components. The main considerations in the stakeholder group selection process were:

- Those involved in project preparation;
- Those whose activities coincide or overlap with those proposed by the project (such as relevant local government authorities, non-governmental organisations); and
- Those who may be directly affected by the project (The local population in the project area).

The key stakeholders that were identified include project host community members and area residents, the area local authorities like the village LC1 chairperson, the District Water Officers, District Environment Officers among others.

To ensure in-depth explorations and insights into the feelings and thoughts of the various interest groups, a purely qualitative approach was employed during the consultation. These were conducted through meetings with representatives from relevant local authorities and the project host community members and area residents.

The consultation process consisted of the following activities:

1. Socio-Economic Household Survey (SEHS),
2. Focus Group Discussions (FGDs),
3. Key Informant Interviews (KIIs).

Stakeholder's views and concerns were taken into consideration during impact identification and proposing of mitigation measures. Stakeholders' views are presented in Section Six (6) of this report.



Consultation with project neighbors in Lai Central, Agago District



Consultation at Labongo-Layamo Subcounty Headquarters, Kitgum District

Plate 2-1: Stakeholder Consultations.

2.2.6 Literature review

Key documents pertinent to the study were reviewed. Some documents were obtained from MWE. Key documents included:

- Relevant Ugandan legislation regarding development projects and environmental legislation for Uganda;
- International, regional, provincial or communal environmental related guidelines;
- African Development Bank (AfDB) environmental and social safeguards;
- Design Review Report for Orom Gravity Flow Water Supply and Sanitation System;
- Feasibility study report for Orom Gravity Flow Water supply and Sanitation Project.

2.2.7 Impact description evaluation

Describing a potential impact involved an appraisal of its characteristics, together with the attributes of the receiving environment. Each is assigned a numerical descriptor of 1, 2, 3, or 4, equivalent to very low, low, medium or high. The severity of impact was then indicated by the product of the two numerical descriptors, with severity being described as negligible, minor, moderate or major. A detailed description is indicated in Chapter 8.

3 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Local Policy Framework

The local policies and legislation that are relevant to the proposed Orom Gravity Flow Water Supply and Sanitation Project and the relevant clauses that are likely to be triggered by activities of this project are highlighted in Tables 3-1 and 3-2 respectively. By complying with these policy and legal frameworks, the project will be developed and implemented with minimum negative impacts to the environment. In that way, the project will be able to achieve its intended objectives of improving access to safe and adequate water in Orom Gravity Flow Water Supply and Sanitation Project in a sustainable manner.

Table 3-1: Policy framework relating to Orom Gravity Flow Water Supply and Sanitation Project

Policy Title	Policy Goal	Relevance to the Orom Gravity Flow Water Supply and Sanitation Project
The National Environment Management Policy, 2014	The National Environment Management Policy of 1994 was reviewed (resulting in one of 2014) due to the continued degradation of the environment and realisation of low participation of the private sector in environmental management. Among the key objectives of the policy is; <ol style="list-style-type: none"> I. To promote long-term, socio-economic development for improved health and quality of life through sound environmental and natural resource management II. To integrate, in a participatory manner, environmental concerns in all development policies, plans, activities and budgets at national, district and local levels. 	This ESIA (this report) was part of the project cycle and aims at formulating mitigation measures to reduce or otherwise eliminate adverse impacts of the project activities on the environment, hence making it sustainable. It also ensures that all environmental and social aspects are integrated into the development of the proposed Orom Gravity Flow Water Supply and Sanitation Project.
The National Water Policy, 1999	To promote an integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda.	The project aims to increase access to safe and affordable water in Kitgum, Pader and Agago districts and will put in place impact mitigation measures to ensure sustainable use of the water resources.
National Gender Policy, 1997	Provides a framework and mandate for all stakeholders to address the gender imbalances within their respective sectors.	The Gender Policy recommends that integration of gender issues in national policies and projects that will improve national welfare, contribute towards sustainable development, and improve the work of government ministries. The project

Policy Title	Policy Goal	Relevance to the Orom Gravity Flow Water Supply and Sanitation Project
		will consider gender aspects during the different phases of its implementation.
The National Health Policy (1999)	To prevent transmission of diseases through Primary Health Care (PHC) including Sanitation and Hygiene.	The project will be successful if people practice good hygiene and sanitation practices at household level and those working on the project.
Environmental Health Policy/National Sanitation Policy (2005)	To ensure achievement and maintenance of healthy living conditions in rural and urban areas in line with the Public Health Act.	Provision of safe water and sanitation systems will contribute to a healthy living in parts of Kitgum, Pader and Agago districts, thereby improving people's standards of living.
The National Policy for Conservation and Management of Wetland (1995)	This Policy's overall aim is to promote the conservation of Uganda's wetlands in order to sustain their ecological and socio-economic functions for the present and future wellbeing of the people. The Policy recognizes that wetland resources form an integral part of the environment and their conservation must be pursued in the context of an interaction between conservation and the overall development strategies.	There are wetlands on the project area that could be affected by the proposed project. Therefore, the Developer has identified the possible impacts on wetlands and mitigation measures suggested, which the Developer will apply to the latter.
The National Land Policy (2013)	To ensure efficient, equitable and optimal utilisation and management of Uganda's land resources for poverty reduction, wealth creation and overall socio-economic development.	The Developer has started with carrying out an ESIA, subject of this report, to ensure that the development is carried out in an environmentally sustainable way.
National Employment Policy for Uganda (2011)	To guide all stakeholders on creation and enhancement of the quality and availability of gainful employment opportunities.	The proposed project will create and enhance employment to people from the project area and the nearby areas as well as people from other parts of Uganda. This will in the end improve the lives of those people. The Developer will also be guided by the provisions of the employment laws of Uganda and other international organizations so as to help achieve the objectives of the policy.
The Environment and Social Safeguards Policy (2018)	This Policy was formulated to ensure that environmental and social concerns are integrated in all stages of project development and all levels including national, district and local levels, with full participation of the people as means of minimizing environmental and social impacts.	All the activities carried out during the proposed project will follow the 15 principles that are indicated in the Policy. Some of the Principles include; Conservation of Biological diversity, Climate Change, Protection of Natural Habitats, Compliance with the law, among others.

3.2 Local Legal and Regulatory Framework

This section presents in Table 3-2, relevant local legal and regulatory framework relating the Orom Gravity Flow Water Supply and Sanitation Project.

Table 3-2: Legal and regulatory framework relating to Orom Gravity Flow Water Supply and Sanitation Project

ACT	RELEVANT PROVISIONS	Relevance to Orom Gravity Flow Supply and Sanitation Project
The Constitution of the Republic of Uganda; 1995; amended as (2005 and 2016).	The State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner.	Chapter 15, Article 237, Clauses (1) (2) (a) & (b) gives the Government powers as guided by the Parliament to acquire land anywhere within the country and place it to the best use to benefit the citizens of the country, where deemed necessary. The establishment of this project will be done while following mitigation measures suggested in this report. All land acquisitions will adhere to the provisions of the 1995 National Constitution.
The National Environment Act Cap 5, 2019	Section 113 requires a developer of a project set out in Schedule 5 of the Act to undertake an environmental and social impact study as prescribed by the regulations. Section 126 requires the developer of a project listed in Schedule 5 and 10 to undertake an environmental compliance audit in the manner prescribed by regulations.	An environmental and social impact study of the proposed project has been carried out in adherence to the prescribed regulations.
The Local Governments Act Cap 243	Provides for the system of local governments based on the decentralization of district for the enforcement of environmental law. The functions of district local government (DLG) include: land surveying and administration, physical planning, environmental protection (forests and wetlands, streams etc.) and ensuring proper sanitation.	The developer shall work closely with the DLGs of Kitgum, Pader and Agago including other lower local government leaders in carrying out activities related to the project for example monitoring the implementation of the Environment and Social Management and Monitoring Plan (ESMMP) for the project.
The Public Health Act Cap 281	Section 7 provides local authorities with administrative powers to take all lawful, necessary and reasonably practicable measures for preventing the occurrence of, or for dealing with any outbreak or prevalence of, any infectious, communicable or preventable disease, to safeguard and promote the public health.	The developer shall provide for adequate sanitary facilities, proper solid and liquid waste management and provide and operate first Aid services especially in public places; and shall ensure that such facilities are available in all other privately allocated and developed areas requiring such to possess them. Anybody falling sick and needing services beyond the first Aid shall be referred to the nearest health centre. The developer will implement an HIV/AIDS prevention and

ACT	RELEVANT PROVISIONS	Relevance to Orom Gravity Flow Supply and Sanitation Project
		control plan as part of mitigation measures.
The National Environment (Environmental and Social Assessment) Regulations, 2020	<p>Regulation 12(1) requires the developer of a project under section 113 of the Act and set out in Schedule 5 of the Act to undertake scoping and an environmental and social impact study in accordance with these Regulations.</p> <p>Regulation 16(1) requires the developer to carry out consultations with relevant stakeholders, communities likely to be affected by the project and the public while undertaking the environmental and social impact study.</p>	<p>The study has been conducted in line to the provisions of the Regulations.</p> <p>Various stakeholders in the project area were consulted to find out their views on the proposed project.</p>
The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000	<p>Regulation 12(1) prohibits any person from carrying out an activity in a wetland without a permit issued by the Executive Director of NEMA.</p> <p>Under regulation 34(1), a Developer desiring to conduct a project which may have significant impacts on a wetland (for example dredging), river bank or lake shore, shall be required to carry out an environmental impact assessment in accordance with the Act</p>	No dredging will be carried out and this ESIA report was drafted to fulfil the requirements of these Regulations.
The National Environment (Audit) Regulations, 2020	Regulation 12(1) requires the developer of a project or activity listed in Schedule 3 to these Regulations shall carry out an environmental compliance audit.	The developer is liable to carrying out an environmental compliance audit as a regulatory requirement.
The Water Act, Cap 152 and the Water Resources Regulations, 1998	<p>The Act provides for hydraulic works and use of water.</p> <p>The Act provides for use, protection and management of water resources and supply; to provide for the constitution of water and sewerage authorities; and to facilitate the devolution of water supply and sewerage undertakings.</p> <p>Under Section 18 (2), a person wishing to construct any works or take and use water may apply to the Director of Water Development Directorate in a prescribed form for a permit to do so.</p>	No wastes will be discharged into water sources around the project area

ACT	RELEVANT PROVISIONS	Relevance to Orom Gravity Flow Supply and Sanitation Project
The Town and Country Planning Act, 1964	The Town and Country Planning Act 1964 govern land use and land planning in urban and rural areas.	The developer consulted Kitgum, Agago and Pader DLG on the proposed project and the project is within the land activities allowed by the district.
Water (Waste Discharge) Regulations, 1998	<p>The water (Waste Discharge) Regulations of 1998, are aimed at regulating the effluent or discharge of wastes on to land or into water.</p> <p>Under Section 31 (1) of the Act, a person commits an offence who, unless authorised under this Part of the Act, causes or allows wastes to come in contact with, or be discharged into water or allows water to be polluted.</p> <p>Under regulation 5(1), a waste discharge permit is required for a person who owns a facility which discharges or will discharge effluent or waste into the aquatic environment or on land.</p>	No untreated effluent will be discharged into the environment. Sludge from the water treatment process will be treated in sludge drying beds before disposal.
The Land Act, Cap 227	<p>Section 42 states that Government or Local Government may acquire land in accordance with the provisions of Article 26 and clause 237 of the constitution.</p> <p>Section 74 (i) states that where it is necessary to execute public works on any land (<i>e.g.</i> construction of road), an authorised undertaker shall enter into mutual agreement with occupier or owner of the land in accordance with this act, and where no agreement is reached, the Minister may, compulsorily acquire land in accordance with Section 43 of the Act.</p>	The developer will compensate or purchase all the required land (<i>e.g.</i> , at the proposed water abstraction/treatment site, reservoirs sites and some areas along the pipeline route) through mutual agreement with the owners. All PAPs have to be identified and compensated for their land, crops and other property on the land prior to construction activities.
Occupational Safety and Health Act, 2006	The Act aims at ensuring the existence of safety and health of workers at all work places and work environment.	The project shall adhere to occupational safety and health rules according to the mitigation measures suggested in this report.
The Traffic and Road Safety Act, 1998	This Act requires among other things that use of motor vehicles on any road should comply with road signs and speed limits. Furthermore, the employer is requested to keep records of drivers and their activities.	The Developer shall ensure that all project motor vehicle usage especially along public roads is conducted in line with this Act and ensuring that all project vehicle drivers have valid driving licenses.
The Physical Planning Act, 2010	The Act is the principal law pertaining to physical planning requirements, and makes it mandatory for any development within a designated planning area to obtain permission. Any development must be aligned with	The project is generally in line with district development plans.

ACT	RELEVANT PROVISIONS	Relevance to Orom Gravity Flow Supply and Sanitation Project
	national, regional and local development plans.	
Workers' Compensation Act, 2000	This requires compensation to be paid to a worker who has been injured or acquired an occupational disease or has been harmed in any way in the course of his/her work.	The developer shall ensure that all Contractors and sub-contractors provide personal protective equipment (PPE) to employees to minimize accidents and injuries. The Developer/Contractor will also have to provide such PPE equipment to all workers. Additionally, compensation will be paid to those affected.
National Environment (Conduct and Certificate of Environment Practitioners Regulations, 2003	Regulation 176 (1) states that no person shall conduct an EIA or carry out any activity relating to the conduct of an environmental impact study, or environmental audit as provided under the Act, unless the person has been duly certified and registered in accordance with the regulations	The lead consultants who carried out this EIA are certified practitioners.
The National Environment (Waste Management) Regulations, 2020	Regulation 5 requires a person who generates or handles waste to ensure that waste is managed in a manner that does not cause harm to human health or the environment.	The Contractors and Developer should be aware of the regulation requirements and legal standards when designing waste storage facilities.
The National Environment (Control of Smoking in Public Places) Regulations, 2004	Section 3 entitles every person to a healthy environment, free from second-hand smoke. It further obliges all persons to safeguard the health of non-smokers. Sections 4 & 5 prohibit smoking in public places.	The developer/contractor shall enforce the non-smoking ban, especially in all public work places during construction, operation and decommissioning phases of the project and will ensure that there are clear signs indicating that smoking is restricted and prohibited in such areas.
The National Environment (Noise Standards and Control) Regulations, 2000.	Regulations 6 & 7 (II) sets permissible noise levels, Part III (Regulations 8, 9, 10 & 11) calls for the control and mitigation of noise; Regulation 9 specifically prohibits the generation of noise by place and time. Part IV instructs for a licence for noise in excess of permissible levels.	The Developer/Contractor will enforce noise standards and working hours at the site allocated for development, both during the construction stage, as well as during operation and decommissioning phases. The data generated during the assessment should act as a baseline.
Fish Act, Cap 197	Provide for the control of fishing, conservation of fish, purchase, sale, marketing, processing and other related issues. It also delegates legal authority to local fisheries planning and management units.	The Developer will comply with this Act by contributing to the conservation of wetlands that will remain in the neighborhood of the project.

3.3 International Legal and Lenders Requirements

Uganda is a party to a number of international and regional agreements which requires her to comply with provisions of the agreements when setting up projects like the Orom Gravity Flow Water Supply and Sanitation Project.

International financial institutions, including the African Development Bank (AfDB), which is funding this project, have environmental and social safeguard policies (Table 3-3) that are designed to avoid, mitigate, or minimize adverse environmental and social impacts of projects supported by them. Further, Uganda is also party to several international treaties and conventions, which are summarized in Table 3-4 and Table 3-5.

Table 3-3: AfDB Operational Safeguards (OS) Policies

Operational Safeguard	Key Issue	Relevance/Applicability
OS 1: Environmental and social assessment	Mainstream environmental and social considerations, including those related to climate change vulnerability and thereby contribute to sustainable development in the region. It governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements.	An environmental and Social Impact Assessment (ESIA) has been conducted for this project (this Report) where potential impacts have been identified and mitigation measures proposed. This will ensure that the project is implemented in a sustainable way.
OS 2: Involuntary resettlement, land acquisition, population displacement and compensation	Mainstream resettlement considerations in AfDB operations. It consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement, and incorporates a number of refinements designed to improve the operational effectiveness of those requirements.	All people whose land is to be affected for example at the proposed water abstraction/treatment site, reservoir sites and some areas along the proposed pipeline route will be compensated prior to start of construction works.
OS 3: Biodiversity and ecosystem services	Identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats as well as observe, implement, and respond to requirements for the conservation and sustainable management of priority ecosystem services.	Mitigation measures have been proposed in this Report to minimize probable impacts of this project on biodiversity, including water resources so that their ability to provide ecosystem services to people are not compromised.
OS 4: Pollution prevention and control, hazardous materials and resource efficiency	Manage and reduce pollution in AfDB funded projects. It covers a range of key impacts including pollution, waste, and hazardous materials for which there are agreed international conventions, as well as comprehensive industry-	The project will set up a waste management plan to handle liquid and solid wastes, including those of hazardous nature.

Operational Safeguard	Key Issue	Relevance/Applicability
	specific and regional standards, to be followed to safeguard the environment and humans from being polluted as a result of the development activities.	
OS 5: Labour conditions, health and safety	Protection of workers' rights and provision of their basic needs. It establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation of the labourers.	The project will abide by the labour laws to protect the interests of workers. This will include for example: providing contracts to all hired workers, providing workers with personal protective equipment, setting up a grievance handling mechanism to enable workers express their complaints, among others.

Table 3-4: IFC Performance Standards (PS)

Performance Standard	Key Issue	Relevance/Applicability
PS1: Social & environmental assessment and management systems	It establishes the importance of: (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project.	An ESIA has been carried out. Potential impacts of the project have been identified and their mitigation measures proposed. Stakeholder involvement was a major component of the ESIA.
PS 2: Labour and working conditions	This performance standard is concerned with management of labour risks such as lack of contracts, insufficient wages, and exploitation of minors, discriminatory hiring, unsafe and unhygienic living conditions, internal grievance handling, excessive over-time and handling of casual labourers.	A grievance handling mechanism will be put in place where workers can lodge their complaints. The project will employ workers following the relevant labour laws of Uganda.

PS3: Resource efficiency and pollution prevention	Requires project to efficiently use resources and to minimize or avoid pollution to the environment	The Developer shall ensure that pollution control measures are in place and only the required resources are utilized.
PS4: Community health, safety and security	This performance standard looks at aspects that can expose the public to accidents, excessive noise, traffic congestion, diseases, insecurity, among others.	An ESMP has been put in place detailing the management of impacts related to community health, safety and security.
PS5: Land acquisition and involuntary resettlement	Establishes requirements for efficient and timely compensation and/resettlement of project affected persons	All the required land for project activities will be obtained following the laws of Uganda, and all people whose land is affected will be compensated prior to the start of project activities.
PS6: Biodiversity conservation and sustainable management of living natural resources	Requires that projects put up necessary measures to conserve biodiversity and natural habitats	An ESMP has been put in place with measures to ensure biodiversity is not adversely impacted by the implementation of the project.
PS7: Indigenous peoples	Promotes the protection of indigenous people	No indigenous peoples as defined under this standard are considered to be resident in the project area.
PS8: Cultural heritage	Requires that all resources of cultural importance are identified and protected	No cultural resources were identified during this assessment. However, any cultural resource that may be identified at any stage of project operation will be protected and relocated according to the established laws of Uganda. A chance finds procedure will guide handling and management of any PCRs that may be found during civil/earth works.

Table 3-5: Summary of International Treaties and Conventions

Treaty title	Key issues	Applicability
Stockholm Declaration (Declaration of the United Nations Conference on the Human Environment, 1972)	Principle 15 of the Stockholm Declaration states that, "Planning must be applied to human settlements and urbanization with a view of avoiding adverse effects on the environment and obtaining maximum social, economic and environmental benefits for all". In this respect, projects aimed at exploiting local people or the environment is discouraged.	During the ESIA process, wide stakeholder consultations were carried out to capture people's views about the project and avoid adverse effects on the environment, at both abstraction of water, treating it, conveying it, collecting the sewage and conveying it as well as treating it.
Kyoto Protocol to the United Nations Framework Convention	Promotion of sustainable forest management practices, afforestation and reforestation	Measures that promote environmental conservation in the project affected area have been suggested.

Treaty title	Key issues	Applicability
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (UCCD, 1992).	Integration and sustainability of natural resources, promotion of alternative sources of energy and alleviation of pressure on fragile natural resources.	Measures have been suggested to protect natural resources and fragile ecosystems for example, wetlands and forests.
Asbestos Convention (C162) of 1968 (International Labour Organization)	Advocates for development of national laws and regulations for prevention and control of, and protection of workers against health hazards due to occupational exposure to asbestos. The convention outlines aspects of best practice: monitoring the working environment, and Workers' health among others.	No asbestos materials are to be used in the project.
Convention on Biological Diversity (CBD), 1992	CBD is an international treaty to sustain the diversity of life on Earth. The convention's three main goals are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.	The developer shall comply by ensuring that the environment is sustainably managed so that the ecosystem services it provides can benefit the current and future generations.
EAC Treaty	Promotion of clean and healthy environment is a prerequisite for sustainable development.	Mitigation measures of all project components proposed in this Report aim at achieving a clean and healthy environment.

3.4 Institutional Framework

3.4.1 Ministry of Water and Environment

Ministry of Water and Environment (MWE) is responsible for ensuring sound environmental management that in turn ensures that there is sufficient water for domestic, agricultural and industrial uses. MWE has the responsibility for setting national policies and standards, managing and regulating water resources and determining priorities for water development and management.

3.4.1.1 The Directorate of Water Resources Management (DWRM)

The directorate is part of the Ministry of Water and Environment and 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.

3.4.1.2 The Directorate of Water Development (DWD)

The Directorate of Water Development (DWD) under MWE is the lead agency responsible for coordinating and regulating all water supply and sanitation activities. It provides technical support services and capacity development to local governments and other service providers. DWD comprises three Departments; Rural Water Supply and Sanitation; Urban Water Supply and Sanitation and Water for Production.

3.4.1.3 National Environment Management Authority (NEMA)

The National Environment Management Authority (NEMA) is a semi-autonomous institution, established under the National Environment Act, Cap. 153, in 1995, as the principal agency in Uganda, charged with the responsibility of coordinating, monitoring, regulating and supervising environmental management in the country. NEMA spearheads the development of environmental policies, laws, regulations, standards and guidelines; and guides Government on sound environmental management in Uganda. Air quality, effluent and noise standards issued by NEMA are key to project implementation.

3.4.2 Ministry of Gender Labour & Social Development

This ministry promotes issues of social protection, gender equality, equity, human rights, culture, decent work conditions and empowerment for different groups such as women, children, the unemployed youth, internally displaced persons, the older persons and persons with disabilities. The Ministry works with institutional structures at district levels including probation offices, community development offices, and labour offices.

The Department of Occupational safety and health of this ministry administers and enforces the Occupational Safety and Health Act, No.9, 2006, the Laws of Uganda and its subsidiary Legislation. Mandated to Evaluate and Control the Physical, Chemical, Physiological, Social and Technical factors that affect persons at Work and the Working Environment. As such it is a requirement for the project to obtain a Workplace registration certificate and certificates of examination of lifting equipment from this department during the contractor mobilisation phase. Additionally, it is mandatory to report fatal accidents and any lost time injuries of three days or more to this department.

3.4.3 Local Administration Structures

The proposed project falls within jurisdiction of Kitgum, Agago and Pader districts. Technical District personnel directly involved on the project include the Chief Administrative Officer, District Water Officer, and the Environment Officer.

3.4.4 African Development Bank (AfDB)

The implementation of the proposed Orom Gravity Flow Water Supply and Sanitation System will be funded by the African Development Bank under the overall framework of

the Water Supply and Sanitation Program Phase III in the Ministry of Water and Environment. Throughout the development of the water supply system, the AfDB will monitor and provide guidance to ensure that all the necessary environmental and social safeguards as provided for under the AfDB Integrated Safeguard System are adhered to.

4 DESCRIPTION OF ENVIRONMENT AND BASELINE CONDITIONS

4.1 Location of the proposed water supply and sanitation system

The proposed Orom Gravity Flow Water Supply and Sanitation Project covers places in three districts in northern Uganda and these are: Kitgum, Pader and Agago Districts. Kitgum Town is located approximately 440 kilometres from Kampala, accessed mainly through the Kampala – Gulu highway. It can also be reached through the road from Lira Town. Kitgum District borders the Republic of South Sudan in the north, Lamwo District to the north and northwest; Karenga District to the northeast, Kaabong and Kotido Districts to the east and south east respectively; Agago and Pader to the south. The project beneficiaries in Kitgum District include: Labongo Layamo, Mucwini East, Mucwini West, Lagoro, Namukora North, Orom East, Kiteng, Omiya Anyima, Orom Sub-counties and Namukora Town Council.

Agago District is bordered by Kitgum District to the northeast, Abim District to the east, Otuke District to the south and Pader District to the west. The location of the district headquarters is approximately 80 kilometers by road southeast of Kitgum. The location lies approximately 370 kilometers by road north of Kampala, the capital city of Uganda. The proposed project will be implemented in two sub counties, which are Omiya Pachua and Paimol.

Pader District borders the districts of Gulu and Omoro to the east; Lira and Otuke to the south; Agago to the east; and Kitgum to the north. Acholibur Sub County was named as a potential beneficiary from the project. The districts that the project area covers are given in Figure 4-1. The locations of the project components are summarized in Table 4-1.

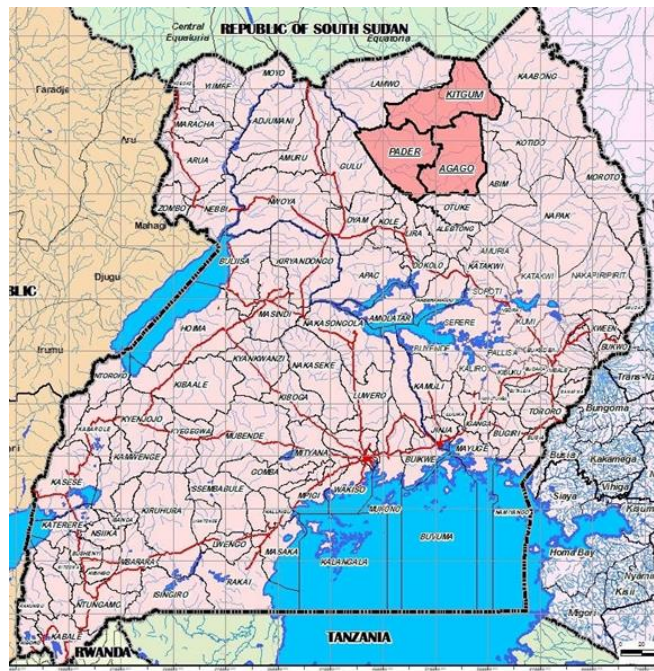


Figure 4-1: Location of districts constituting the proposed project area

Table 4-1: Locations of the components for the proposed project

Borehole No.	Village	Parish	Sub-County/TC	Coordinates	Remarks
OROM – AGAGO					
Paimol Health Center III Reservoir	Lai Central	Ngora	Paimol	N03.123620 E033.432050	Proposed
DWD 60627	Lai Central	Ngora	Paimol	N03.136578 E033.436937	Drilled
Paimol S/C Reservoir	Kokil	Pacabol	Paimol	N03.064996 E033.419348	Proposed
DWD 60626	Wipolo Central	Mutto	Omiya Pachua	N03.140982 E033.429936	Drilled and not built
Coodong Reservoir	Coodong	Longor	Omiya Pachua	N03.236634 E033.447532	Existing
DWD 60605	Longor	Longor	Omiya Pachua	N03.26091 E033.409046	Existing pumping station. Seasonal stream in the south
DWD 60608	Pawel	Laita	Omiya Pachua	N03.251797 E033.414401	Drilled
DWD 61453	Alok Ki Winyo	Mupere	Kalongo Town Council	N03.034056 E033.385052	Drilled
PADER DISTRICT					
DWD 60622	Loc Ken	Alima	Porogali	N03.202015 E032.958124	Drilled
Dure Reservoir	Loc ken	Alima	Porogali	N03.201940 E033.939732	Proposed
DWD 60596	Lugede	Ogogo	Acholibur	N03.163873 E032.886444	Existing pumping station. Pumps to Lugede reservoir
Lugede Reservoir	Munutam	Ogogo	Acholibur	N03.172310 E032.901086	Existing
DWD 60600	Lageng	Ogogo	Acholibur	N03.131220 E032.897094	Existing pumping station. Pumps water to Acholibur reservoir.
Acholibur Reservoir	Larumu	Gem Central	Acholibur	N03.137453 E032.908049	Existing
KITGUM DISTRICT					
DWD 61462	Giligil	Palabong	Namukora North	N03.405031 E033.390421	Existing pumping station
DWD 61463	Kakoo	Pagwok	Namukora Town Council	N03.365740 E033.347772	Existing pumping station.

Borehole No.	Village	Parish	Sub-County/TC	Coordinates	Remarks
Kalabong Reservoir	Winy rach	Kalabong	Namukora North	N03.411904 E033.365998	Existing
Lalekan Reservoir	Ladotonen West	Latekang	Kiteng	N03.440537 E033.385063	Existing and functional
DWD 60588	Lamugo	Ocetoki	Labongo Layamo	N03.383787 E032.919222	Drilled
Obem Reservoir	Obem North	Pamolo	Labongo Layamo	N03.411130 E032.931737	Proposed
DWD 61457	Palamene-lwala	Palameny	Omiya Anyima	N03.294273 E033.185454	Drilled
Omiya Anyima Reservoir	Palamene-lwala	Palameny	Omiya Anyima	N03.270478 E033.202626	Proposed
DWD 60772	Kabete	Pudo	Mucwini West	N03.395302 E032.986001	Existing pumping station.
Pudo Reservoir	Lakweleokado	Pudo	Mucwini West	N03.395273 E032.976407	Existing. Receives from Kabete
DWD 60593	Mogila	Pudo	Mucwini East	N03.392768 E032.999426	Existing pumping station.
DWD 61454	Labilo B	Labilo	Lagoro	N03.288206 E033.063972	Drilled
Obyen Reservoir	Labilo B	Labilo	Lagoro	N03.318398 E033.062149	Proposed
DWD 61455	Alel East	Labilo	Lagoro	N03.282992 E033.095368	Drilled
Pawidi Reservoir	Alel East	Labilo	Lagoro	N03.257208 E033.124088	Proposed
Wang Kenya I - DWD 60631	Wang Kenya	Lolia	Orom	N03.414695 E033.492009	Drilled
Wang Kenya II - DWD 60632	Wang Kenya	Lolia	Orom	N03.408774 E033.490966	Drilled
Orom Reservoir	Lenga Central	Lolia	Orom	N03.401673 E033.469073	Proposed
DWD 61458	Agoromin City	Lolwa	Orom	N03.357788 E033.474320	Existing pumping station.
Agoromin City Reservoir	Lunganyora	Lolwa	Orom	N0.360587 E033.493976	Existing
DWD 61459	Agoromin	Lolwa	Orom	N03.337863 E033.477986	Drilled
Lapeitak I - DWD 61460	Logwokimer	Lolia	Orom East	N03.397527 E033.523225	Drilled
Lapeitak II - DWD 61461	Lapeitak	Lolia	Orom East	N03.98002 E033.530884	Drilled

Borehole No.	Village	Parish	Sub-County/TC	Coordinates	Remarks
DWD 60639	Loluko	Katwotwo	Orom East	N03.473870 E033.536561	Existing pumping station.
Katwotwo Reservoir	Loluko	Katwotwo	Orom East	N03.476015 E033.526349	Existing
DWD 60642	Lobiro	Katwotwo	Orom East	N03.482325 E033.526349	Existing pumping station.
Lobiro Reservoir	Lotany	Katwotwo	Orom East	N03.491513 E033.578988	Existing
Lakongera I - DWD 60635	Lakongera	Okute	Orom East	N03.513701 E033.493056	Drilled
Lakongera II - DWD 60637	Lakongera	Okute	Orom East	N03.519540 E033.486658	Drilled
Akilok Reservoir	Akilok Central	Okute	Orom East	N03.543683 E033.438250	Proposed
Lakwanya 1 - DWD 60648	Lakwanya	Lolia	Orom East	N03.398670 E033.531992	Drilled

4.2 Biophysical Environment

4.2.1 Water resources / hydrology

4.2.1.1 Groundwater

Ground water is the main source of potable water largely in use in the entire project area. However, there are a number of locations within the project area that have low-yielding or no boreholes. One of the main aims of this project is to transition the supply from boreholes to Multi-village Large Piped Water Supply Scheme (MLPWS). The hydrogeology of the area indicates low ground water potential in the project area.

A total of 453 records of borehole logs in the project area were analysed. It was observed that the average drilling depth varies from 56.9 to 78.5 mbgs. This implies that boreholes (sustainable aquifers) are generally deep in the region. The average depth to bedrock varies from 18.9 to 38.0 mbgs – much smaller than the average drilling depth. This implies that most aquifers are confined. The average total yield in m³/hour is shown in Figure 4-2.

Judging from the logs of existing boreholes in Kitgum District, the groundwater potential is very low. The average depth to first water strike varies from 33.6 to 52.6 mbgs – which is below the bedrock. The average total yield in the sub counties varies from 1.2 to 4.6 m³/hour but the mean yield in the project area is 1.97 m³/hour with a standard deviation of 3.33 m³/hour.

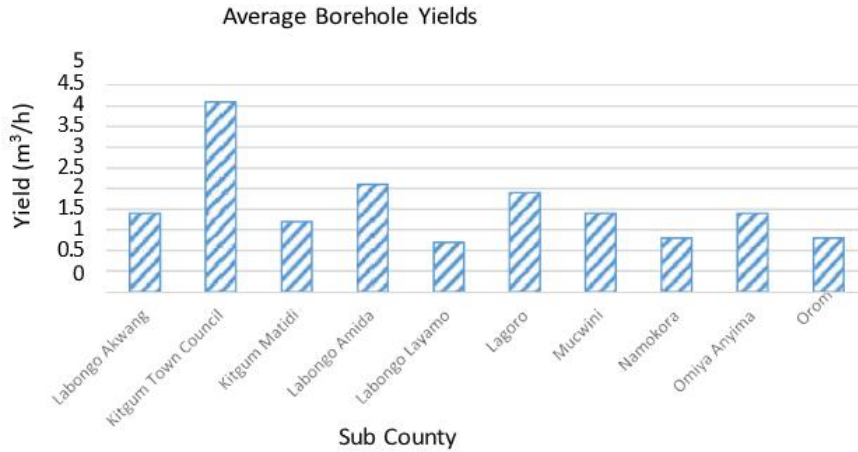
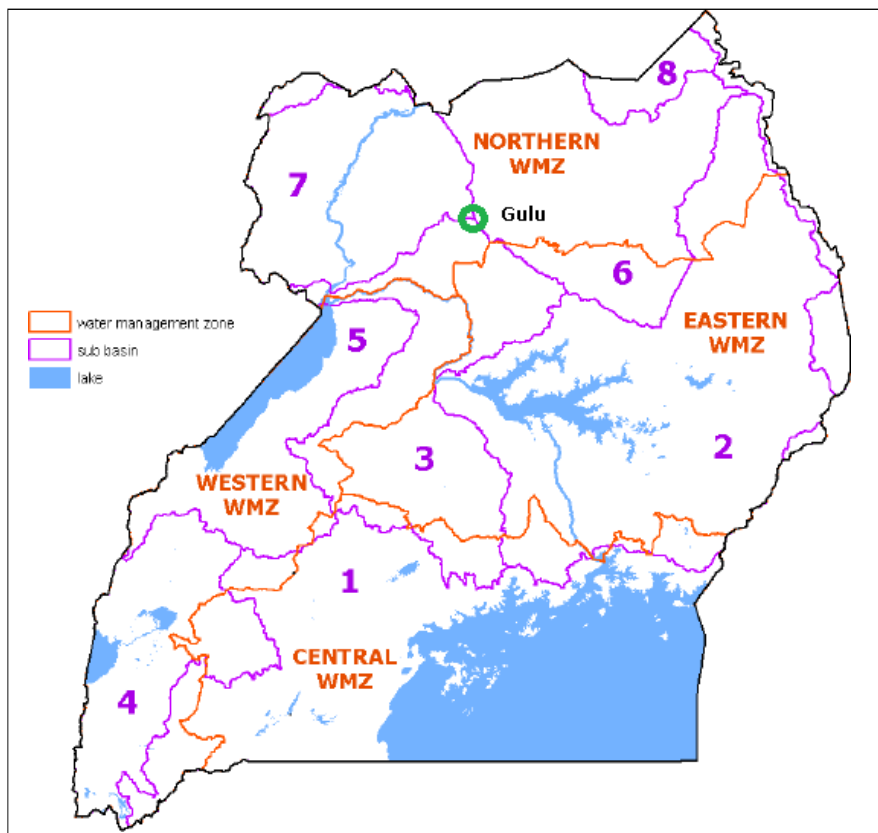


Figure 4-2: Borehole yields for selected sub counties in Kitgum district

4.2.1.2 Surface Water

The project area lies within the Northern Water Management Zone in sub basin No. 6 and borders sub basin No. 8 to the east (Figure 4-3). The major surface water bodies in the district are wetlands, streams, rivers and dams.



Source: DWRM (2012): National Water Resources Assessment.

Figure 4-3: Major Catchment Areas of Uganda

4.2.1.3 *River Systems*

All the rivers identified as the project water sources drain, through interconnections, into River Pager. Thus, understanding the hydrology of River Pager, which is a gauged river, will offer insights into flow regimes of the stream or river catchments which are not gauged.

4.2.1.4 *Wetland Systems*

The project area is generally a flat area with a number of hills. The elevation varies from about 900 m to over 2300 m above sea level at the highest point. The project area is drained into River Aswa sub basin, with key water sources being mountain-based springs that feed into rivers. Much of the low-lying areas are drained by perennial rivers and seasonal streams which subsequently flow into Pager River. Pager River drains into the Aswa River which subsequently flows into the river Nile.

Seasonal wetlands are used mainly as grazing land (rangelands), especially in the dry season. Seasonal wetlands in this area are also used for subsistence farming. These seasonal wetlands cannot be considered as viable water sources since they always run dry during the long dry seasons.

4.2.1.5 *Dams*

There are man-made two dams in the project area with a third, about 30 km from Paimol. The water level in the dam at Namokora recedes greatly in the dry season. This is also true for that in Labongo Layamo. Longor dam at the border of Abim and Kotido contains a substantial amount of water. However, this was not considered as a supply source.

4.2.1.6 Water quality

Water sampling was done on eight (8) water sources including boreholes that are used for water by the communities. Sampling was done on these boreholes as the ones drilled for the proposed project were sealed hence sampling could not be done. The water quality of the proposed abstraction boreholes is presented in Annex III. The water in 50% of the sampled villages had high fluoride content which exceeds the set national standard (Table 4-2). The results show that the water in the project area is generally of good quality, and even before treatment, most parameters fall within the recommended standards for drinking water.

Table 4-2: Water quality from selected water sources in the project area

Parameter	Unit	Selected villages								National standards for potable water
		Lageng	Alel East	Palemene	Kakoo	Agromin City	Langor	Lai Central	Locken	
pH	-	7.2	7.1	7	6.8	6.8	6.9	7	6.9	6.8-8.5
Electrical Conductivity	µs/cm	383	321	277	421	273	249	250	676	1000
Colour apparent	Co-pt	35	0	0	0	0	0	0	0	15
Turbidity	NTU	2	0	0	0	0	0	0	0	5
TDS	mg/l	191	160	138	210	136	124	125	338	700
TSS	mg/l	0	0	0	0	0	0	0	0	0
Total Alkalinity as CaCO ₃	mg/l	233	150	113	119	201	88	103	121	500
Total Hardness as CaCO ₃	mg/l	346	252	196	202	160	126	152	168	500
Magnesium	mg/l	26	20.8	20	20.8	12.4	13.6	16.4	21.2	50
Sodium	mg/l	11.5	10.4	9.2	11.5	7.6	9.5	9.8	18.6	200
Chloride	mg/l	23	23	47	70	47	37	21	58	250
Fluoride	mg/l	1.15	1.1	1	1.12	0.28	0.14	0.27	1.14	1
Total iron	mg/l	0.03	0.03	0.02	0.04	0	0.02	0	0.05	20.3
Sulphate	mg/l	8	0	34	23	3	25	22	150	200
TP	mg/l	1.03	1.08	1.12	1.18	1.93	1.12	1.08	1.56	-
TN	mg/l	1.85	1.54	1.63	2.05	2.14	1.14	1.36	2.57	-

4.2.2 Geology and Soils

The Geology in the project area is predominantly composed of crystalline Precambrian Basement rocks. They comprise crystalline and metamorphic rocks over 550 million years old. The area is predominantly underlain by granite and gneiss rocks.

The soil type in Kitgum vary with localities but is generally well-drained sandy, clay, loam and sand clay. In some places the following soil exists:

Ferrosoils: These are strongly weathered and generally with low fertility. It covers much of the district.

Gleysols: These are poorly drained soils, liable to water logging. They are found along Pager River.

4.2.3 Climate and Topography

Kitgum District has dry and rainy seasons. The district receives average annual rainfall of 1300 mm. Rain starts in late March or early April and ends in November. Rainfall is bimodal with peaks in April and August. It is dry-hot and windy from December to mid-March. The average monthly minimum and maximum temperature is 27°C and 34°C respectively.

The topography of the project area varies in elevation from 900 masl around Kitgum town to 2176 masl atop the Orom hills. The supply area is generally at elevations of between of 900 -1250 masl. There are numerous hills within the project area which could be used as locations for service reservoirs.

Since Agago district was cut from Pader district, both have the same characteristic climate and topography. They have a tropical wet and dry or savanna climate (Classification: Aw). The district's yearly temperature is 25.02°C and it is 1.55% higher than Uganda's averages. Both districts typically receive about 168.7 mm (6.64 inches) of precipitation annually.

The topography of the area ranges from 1,000 masl to 2,000 masl. The elevation is characterised by rocky hills in the areas of Kalongo Town Council and Paimol Sub-county. The highest point is Ogili at 1992 masl.

4.2.4 Noise Measurements

The noise levels recorded at different sites in the project area are presented in Table 4-3. The results showed that baseline noise levels are within the permissible standards.

Table 4-3: Noise measurements in the project area

Location	Coordinates	Average Noise Level (dB)	Major Sources
PADER			
DWD 60622	N03.201920 E032.958122	44.3	Grazing animals
DWD 60596	N03.164085 E032.886493	50.3	People
Proposed Dure Reservoir	N03.201940 E033.939732	47.1	People talking, Wind
Lugede Reservoir	N03.163814 E032.886062	55.2	Moving motor bike
DWD 60600	N03.130984 E032.897636	51.2	Moving vehicles, people
Acholibur Reservoir	N03.137453 E032.908049	48.7	People
AGAGO DISTRICT			
Paimol HC III	N03.123612 E033.432586	51.1	People talking
Proposed Paimol S/C Reservoir	N03.064996 E033.419348	47.3	Wind
DWD 60627	N03.136578 E033.436937	43.6	Wind, People talking
DWD 60626	N03.140982 E033.429936	45.2	Birds, People talking
Coodong Reservoir	N03.236634 E033.447532	53.2	Moving motor bikes
DWD 60605	N03.26091 E033.409046	48.4	People talking
DWD 60608	N03.251797 E033.414401	44.2	Wind
DWD 61453	N03.034023 E033.384939	45.6	Birds, People talking
KITGUM DISTRICT			
DWD 61462	N03.405031 E033.390421	50.1	Birds, wind, People talking
DWD 61463	N03.365740 E033.347772	47.8	People talking
Kalabong Reservoir	N03.411904 E033.365998	52.1	Moving vehicles, people talking
Lalekan Reservoir	N03.440537 E033.385063	53.3	Moving motorcycles, people talking
DWD 60588	N03.383787 E032.919222	46.2	People talking, wind
Obem Reservoir	N03.411130 E032.931737	51.6	Music playing, wind
DWD 61457	N03.294273 E033.185454	46.9	Birds, wind
Obyen Reservoir	N03.318398 E033.062149	45.3	People talking, wind
DWD 60772	N03.395302 E032.986001	49.2	Wind, People talking
Pudo Reservoir	N03.395273 E032.976407	48.3	People talking
DWD 60593	N03.392768 E032.999426	49.8	Wind
Proposed Omiya Anyima Reservoir	N03.270478 E033.202626	46.5	People talking
DWD 61454	N03.288206 E033.063972	45.1	Birds, animals grazing, people talking
DWD 61455	N03.282992 E033.095368	47.5	People talking
Wang Kenya I - DWD 60631	N03.414695 E033.492009	46.1	Wind, people talking
Wang Kenya II - DWD 60632	N03.408774 E033.490966	49.9	Moving vehicles
Orom Reservoir	N03.401673 E033.469073	55.3	Moving vehicles
DWD 61458	N03.357788 E033.474320	50.2	People talking
Agoromin City Reservoir	N0.360587 E033.493976	52.4	Moving motorcycle
DWD 61459	N03.337863 E033.477986	47.1	Birds, people talking
Lapeitak I - DWD 61460	N03.397527 E033.523225	47.5	Wind, People talking
Lapeitak II - DWD 61461	N03.98002 E033.530884	48.1	Wind, people talking
DWD 60639	N03.473870 E033.536561	50.1	Moving vehicles
Katwotwo Reservoir	N03.476015 E033.526349	49.3	Wind, Birds
DWD 60642	N03.482325 E033.526349	52.7	Moving vehicles
Lobiro Reservoir	N03.491513 E033.578988	49.7	Wind, Birds

Lakongera I - DWD 60635	N03.513701 E033.493056	48.3	Wind, people talking
Lakongera II - DWD 60637	N03.519540 E033.486658	49.2	Wind, people talking
Lakwanya 1 - DWD 60648	N03.398680 E033.531994	49.7	Wind, people talking

4.2.5 Vegetation cover/flora and land use

The vegetation in the project area is mainly of woody savannah characterised by tree cover and grass layers. The dominant grasses are *Cyperus rotondus*, *Panicum maximum*, *Hyparrhenia rufa* and *Imperata cylindrica*. *Acacia cambrelium* constitutes the dominant tree. The project area is drier in the northeast and the vegetation includes shrubs. A list of flora identified is attached in Annex V.

Wooded grasslands

These are largely dominated by *Chloris gayana*, *Eragrostis superba*, and *Sporobolus pyramidalis* as the grass dominant species. These areas have been subjected to frequent bush fires. Other species constituting this vegetation type include *Combretum molle*, *Panicum maximum*, *Conyza sp.*, *Ageratum conyzoides* and *Tridax procumbens*, *Vitellaria paradoxa*, *Acacia sieberiana*, *Solanum incanum*, and *Euphorbia bicolor* among others (Plate 4-1).



Plate 4-1: Wooded grassland

Farmlands

The main crops grown include maize, cassava, beans, sorghum and cotton. The gardens are sometimes interspersed with fallow land. The areas under fallow are dominated by *Albizia*, *Vitellaria paradoxa*, and *Acacia* scattered trees while the herbaceous vegetation is dominated by *Bidens pilosa*, *Panicum maximum*, and *Ageratum conyzoides*. These agro ecosystems are widely distributed throughout the project area and in some parts all the natural vegetation has been removed to pave way for subsistence farming as indicated in Plate 4-2.



Plate 4-2: Farmland in the project area

4.2.6 Fauna

A total of two hundred ninety-five (295) bird species from the thirty-eight (38) locations along the Orom Gravity Flow Water Supply and Sanitation System was recorded. The system covers three districts namely; Agago, Pader and Kitgum. In absolute terms, sites in Kitgum had the highest number of bird species, followed by Agago and Pader. Table 4-4, also indicates that some of the species recorded are listed as species of conservation concern either globally, regionally or nationally. Among these species, two (Parrot and Bateleur Eagle) are listed as globally endangered (G-EN) by the IUCN, seventy are list on the regional red-list (Bennun & Njoroge 1996).

Table 4-4: Summary of our survey findings across sites in the three regions along the project area

District	Survey locations	Number of species	Number Red-listed species		
			Global	Regional	National
Agago	8	90	0	4	1
Pader	5	73	0	1	0
Kitgum	25	132	2	65	1

Overall, the most abundant species was Piapiac *Ptilostomus afer* followed by Common Bulbul *Pycnonotus barbatus* and Common Swift *Apus apus* (Table 4-5). Although none of them is listed as species of conservation importance, all fit to be considered as indicator species on which changes in the environment could be measured.

Table 4-5: The ten most abundant species recorded in the project

2016					
No ^a	Species Name (Scientific name)	Habitat	Red list	Abundance	
564	PIAPIAC (<i>Ptilostomus afer</i>)		LC	8.08	
914	COMMON BULBUL (<i>Pycnonotus barbatus</i>)	f	LC	7.44	
100	COMMON SWIFT (<i>Apus apus</i>)		LC	5.28	
676	RED-CHEEKED CORDON-BLEU (<i>Uraeginthus bengalus</i>)		LC	5.20	
91	AFRICAN PALM SWIFT (<i>Cypsiurus parvus</i>)		LC	4.92	

62	RED-EYED DOVE (<i>Streptopelia semitorquata</i>)	f	LC	3.40
359	SPECKLED MOUSEBIRD (<i>Colius striatus</i>)		LC	3.40
958	RUPPELL'S STARLING (<i>Lamprotornis purpuroptera</i>)		LC	3.36
337	BLACK KITE (<i>Milvus migrans</i>)		LC	2.56
63	VINACEOUS DOVE (<i>Streptopelia vinacea</i>)		LC	2.04

According to WCS(2016), LC: Least Concern, f: forest edge

Regarding migratory species, we recorded a total of twenty-seven (27) migratory species and of these, 16 were Palearctic migrants whereas 18 were Afro-tropical migrants. The highest number of migrants was recorded in Kitgum areas (21 species), followed by Pader (14 species) and Agago (11 species).

Results from sites in Agago District

A total of ninety (90) bird species were recorded from the eight (8) locations along the water supply system in Agago District, with the highest number being recorded in Lai Central reservoir area (34 species), followed by Lai Central Borehole areas and the lowest in areas near Wipolo and Longor (Figure 4-4).

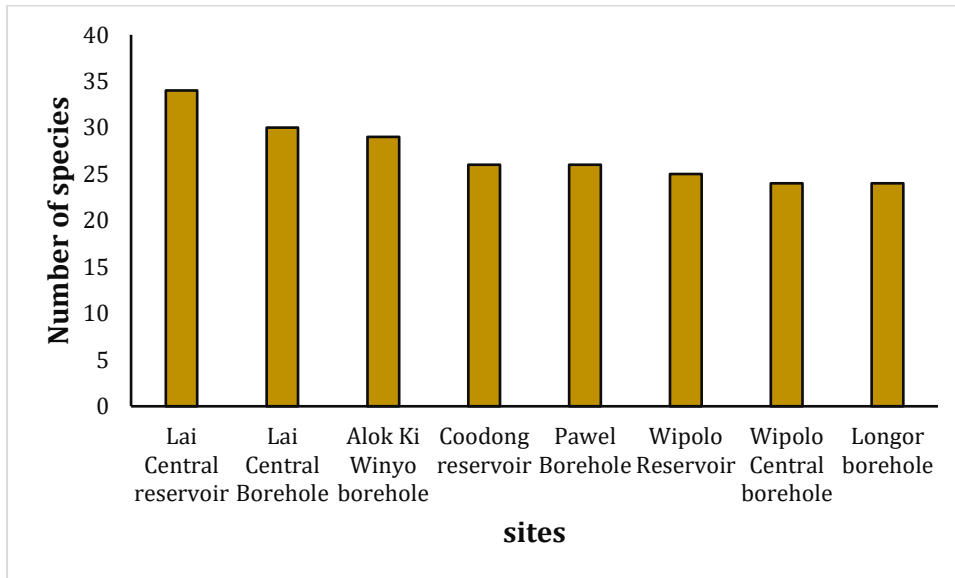


Figure 4-4: Number of bird species recorded in various locations in Agago District

Of the species recorded, Piapiac *Ptilostomus afer* was the most abundant, followed by Common Bulbul *Pycnonotus barbatus* and African Palm swift *Cypsiurus parvus*, these species were recorded in all the eight study locations and detected within the first minutes of the one-hour count.

The locations studied supports species of various ecological categories including tree species, grassland species (Plate 4-3), water birds and Aerial feeders. Regarding the ecological categories of the species (Figure 4-5), majority were forest edge species (f), followed by Grassland species (G). The habitat along the project in Agago does not support either forest interior species or water specialists

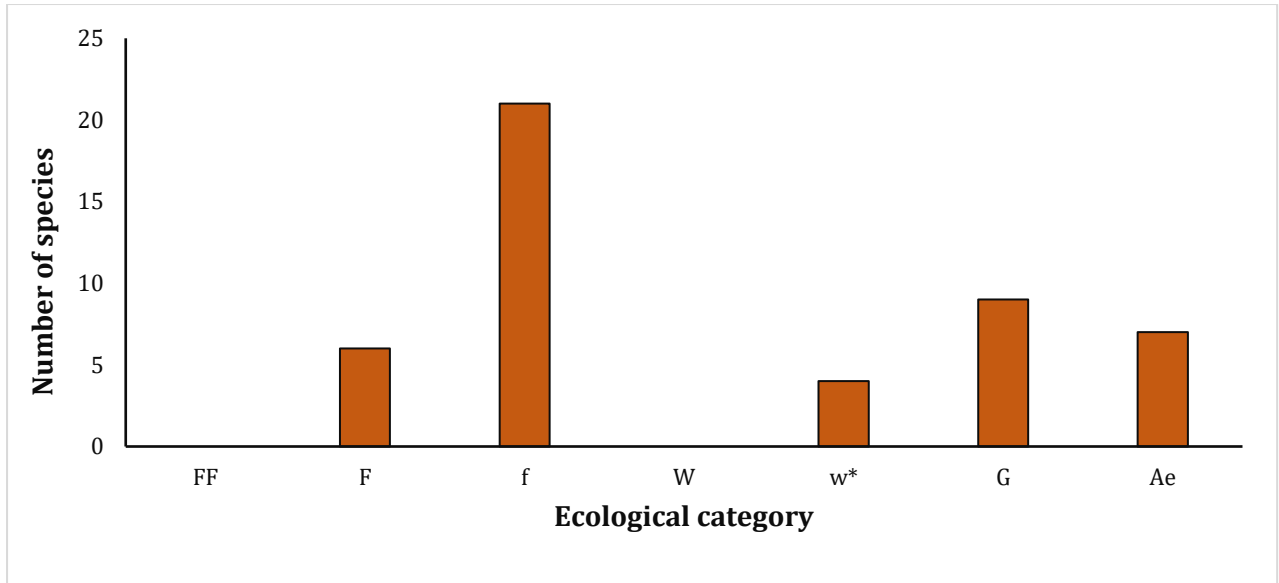


Figure 4-5: Number of species recorded under various ecological categories (FF - Forest specialist, F - Forest Generalist, f - Tree Species, W - Water specialist, w - Water non-specialist, G - Grassland specialist, Ae - Aerial feeder.)



Plate 4-3: Pin-tailed Whydah *Vidua macroura*, one of the Grassland species encountered

Species of conservation concern in Agago District

All species recorded were not listed by the IUCN (2023) as species of global conservation concern. However, four with the exception of the Woolly-Necked Stork (U-VU) are being considered important at the regional level (Table 4-6) and were only recorded in Lai and Alok ki Winyo areas.

Table 4-6: List of species of conservation concern and their level of relative abundance.

2016 No	Species Name (Scientific name)	Ecology	Red-list	Abundance
870	WHITE-HEADED SAW-WING (<i>Psalidoprocne albiceps</i>)	F	R-RR	0.75
431	SPOT-FLANKED BARBET (<i>Tricholaema lachrymose</i>)		R-RR	0.38
617	CARDINAL QUELEA (<i>Quelea cardinalis</i>)	AM	R-RR	0.38
166	WOOLLY-NECKED STORK (<i>Ciconia episcopus</i>)	W	R-NT, U-VU	0.25

R-RR: Regional responsibility, U-VU: Uganda Vulnerable, f: Forest edge, AM: Afrotropical migrant, W : water bird

Migrants

Table 4-7 lists all the migratory species recorded in Agago areas. These included six (6) Palearctic migrants and six (6) Afro-tropical migrants. One species (Black-Kite) make migration journeys both within Africa and Palaerctic region. Palaerctic migrants breed in the Palaerctic region and found in Uganda during the northern winter, typically between October and March whereas Afro-tropical migrants complete their journeys within Africa. The most abundant migratory species was Common Swift *Apus apus*, followed by Grey-headed Kingfisher *Halcyon leucocephala* and Black-Kite *Milvus migrans*. Whereas, migratory species were recorded in all locations, high concentrations were found in Lai and Alok ki Winyo areas.

Table 4-7: List of Migrant bird species recorded (PM-Palearctic migrant, AM-Afro-tropical migrants)

2016 No ^a	Species Name (Scientific name)	Ecology	Migration	Abundance
100	COMMON SWIFT (<i>Apus apus</i>)	Ae	PM	3.13
467	GREY-HEADED KINGFISHER (<i>Halcyon leucocephala</i>)	fw	AM	2.63
337	BLACK KITE (<i>Milvus migrans</i>)		PM/AM	1.75
470	WOODLAND KINGFISHER (<i>Halcyon senegalensis</i>)		AM	1.25
560	GREY-BACKED FISCAL (<i>Lanius excubitoroides</i>)	fw	AM	1.13
312	STEPPE EAGLE (<i>Aquila nipalensis</i>)	G	PM	0.86
886	COMMON SAND MARTIN (<i>Riparia riparia</i>)	W,Ae	PM	0.63
617	CARDINAL QUELEA (<i>Quelea cardinalis</i>)		AM	0.37
618	RED-HEADED QUELEA (<i>Quelea erythrops</i>)		AM	0.38
732	YELLOW WAGTAIL (<i>Motacilla flava</i>)	wG	PM	0.25
872	COMMON HOUSE MARTIN (<i>Delichon urbicum</i>)	Ae	PM	0.25

a- According to WCS (2016), Ae: Aerial feeder, f: forest edge, G: Grassland species, w: wetland visitor

Results from sites in Pader District

A total of seventy-three bird species (73 species) were recorded from the five locations in Pader District. Of the five locations, species richness was highest at Losken abstraction point areas (39 species), followed by Lageng abstraction area (37 species) and lowest at Acholibur reservoir area (Figure 4-6). Among the species recorded, Piapiac *Ptilostomus afer* was the most abundant followed by Common Bulbul *Pycnonotus barbatus* and Bronze Mannikin *Spermestes cucullate*.

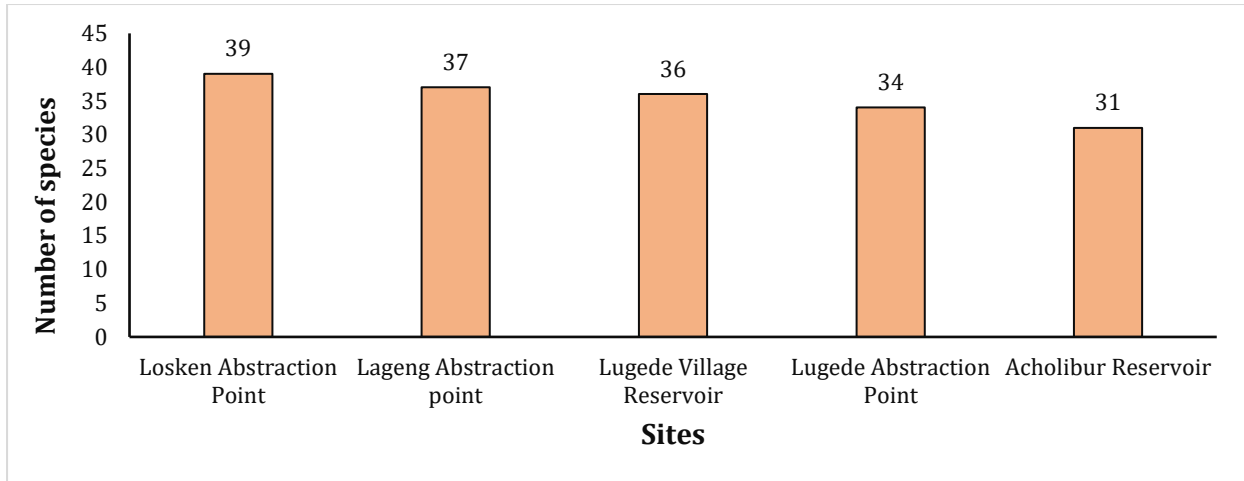


Figure 4-6: Number of species recorded across five locations along the water system in Pader District

The locations sampled supports various categories of birds including tree species (F and f), water birds (w), Grassland species (G) and some species which feed while in flight (Ae). Majority of the species were forest edge species (f), there were a few forest generalists (F) and Grassland species (Figure 4-7). The general habitat in the localities surveyed does not support either forest interior species (FF) or Water specialists (W).

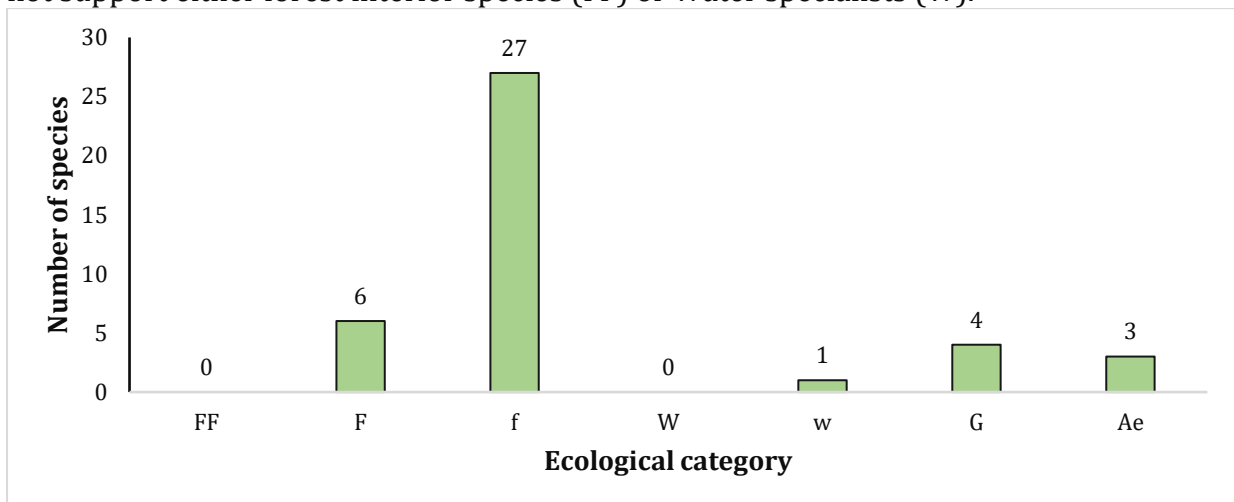


Figure 4-7: Number of species recorded under various ecological categories (FF - Forest specialist, F - Forest Generalist, f - Tree Species, W - Water specialist, w - Water non-specialist, G - Grassland specialist, Ae - Aerial feeder.)

Species of conservation concern in Pader

All the species recorded in Pader are not listed by the IUCN (2023) as species of global conservation concern. However, two species and Red-Chested Sunbird (*Cinnyris erythrocerus*) are listed at national and regional conservation level respectively, these were recorded in Losken and Lugeng areas. The most abundant species in the region is Piapiac *Ptilostomus afer* (Plate 4-4).



Plate 4-4: Piapiac *Ptilostomus afer*, the most abundant species in the region

Migrants in Pader

Migrant species recorded in the sampled locations are shown in Table 4-8. In Total, fourteen (14) were recorded. These included eleven (11) Palearctic migrants and four (04) Afro-tropical migrants. One species (Black Kite) belongs to both categories. Migrants were most common in Losken Abstraction point areas and Lageng Abstraction point. Common Swift *Apus apus* was the most abundant Palearctic Migrant, followed by Northern Wheater *Oenanthe oenanthe*.

Table 4-8: Palaerctic Migrants (PM) and Afrotropical Migrants (AM) and their abundance

2016 No ^a	SPECIES NAME (Scientific name)	Ecology	Migration	Abundance
100	COMMON SWIFT (<i>Apus apus</i>)		PM	3.2
560	GREY-BACKED FISCAL (<i>Lanius excubitoroides</i>)	fw	AM	1
1021	NORTHERN WHEATEAR (<i>Oenanthe oenanthe</i>)		PM	1
886	COMMON SAND MARTIN (<i>Riparia riparia</i>)		PM	0.6
916	WILLOW WARBLER (<i>Phylloscopus trochilus</i>)	f	PM	0.6
1016	WHINCHAT (<i>Saxicola rubetra</i>)		PM	0.6
441	WHITE-THROATED BEE-EATER (<i>Merops albicollis</i>)	f	AM	0.4
337	BLACK KITE (<i>Milvus migrans</i>)		PM/AM	0.2
338	GRASSHOPPER BUZZARD (<i>Butastur rufipennis</i>)		AM	0.2
341	COMMON BUZZARD (<i>Buteo buteo</i>)		PM	0.2
379	EURASIAN HOOPOE (<i>Upupa epops</i>)		PM	0.2
447	EUROPEAN BEE-EATER (<i>Merops apiaster</i>)	f	PM	0.2
	EURASIAN REED WARBLER (<i>Acrocephalus</i>			
863	<i>scirpaceus</i>)	w	PM	0.2
1025	ISABELLINE WHEATEAR (<i>Oenanthe isabellina</i>)		PM	0.2

a- According to WCS (2016), f: forest edge, w: wetland visitor

Results from sites in Kitgum District

One hundred thirty-two (132) species were recorded from the twenty-five (25) selected locations in Kitgum. Generally, species richness was low across the twenty-five locations,

with the richest site having just 25 species. Among the recorded species, Piapiac *Ptilostomus afer* was the most abundant, followed by Common Bulbul *Pycnonotus barbatus* and Red-Cheeked Cordon Bleu *Uraeginthus bengalus*.

The locations surveyed supports species of various ecological categories including tree species (F and f), water birds (w), grassland birds (G) and those that feed while in flight (Ae). A majority of species recorded were tree species (Figure 4-8) (f and F) and Grassland species (G). Although, there was a record of one Forest interior species (Grey Parrot), Savana woodlands are not ideal for specialists such as water birds and forest interior birds.

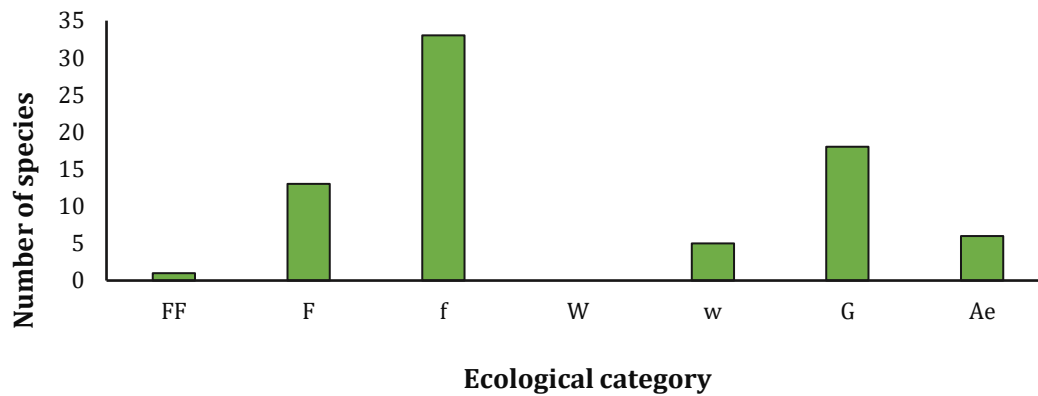


Figure 4-8: Number of species recorded under various ecological category in Kitgum (FF - Forest specialist, F - Forest Generalist, f - Tree Species, W - Water specialist, w - Water non-specialist, G - Grassland specialist, Ae - Aerial feeder.)

Species of global conservation concern recorded in Kitgum

Two species of global conservation concern (Bateleur and Grey Parrot; Plate 4-5) and five species of regional conservation importance were recorded (Table 4-9). Both the Bateleur and the Grey Parrot are listed as Endangered and are threatened by poisoning and Illegal Wildlife Trade respectively.

Table 4-9: Species of conservation concern recorded and there level of abundance

2016 No ^a	Species Name *Scientific name)	Ecology	Conservation	Abundance
431	SPOT-FLANKED BARBET (<i>Tricholaema lachrymose</i>)		R-RR	0.60
817	GREY-CAPPED WARBLER (<i>Eminia lepida</i>)	fw	R-RR	0.16
295	BATELEUR (<i>Terathopius ecaudatus</i>)	G	G-EN	0.08
298	BROWN SNAKE EAGLE (<i>Circaetus cinereus</i>)		R-NT	0.08
870	WHITE-HEADED SAW-WING (<i>Psalidoprocne albiceps</i>)	f	R-RR	0.08
488	GREY PARROT (<i>Psittacus erithacus</i>)	FF	G-EN,R-NT,U-VU	0.04
617	CARDINAL QUELEA (<i>Quelea cardinalis</i>)	AM	R-RR	0.04

According to WCS (2016), R-RR: Regional Responsibility, G-EN: Globally Endangered, R-NT: Regionally Near Threatened, U-VU: Uganda Vulnerable, f: forest edge, G: Grassland species, w: wetland visitor, FF: Forest specialist, AM: Afrotropical migrant



Plate 4-5: Bateleur *Terathopius ecaudatus*, one of the globally endangered species recorded

Migrant in Kitgum sites

In Total, twentyone (21) migrants were recorded (Table 4-10). These included thirteen (13) Palearctic migrants and nine Afro-tropical migrants. The Black Kite belongs to both categories (PM and AM). The most abundant was Common Swift, followed by and Black Kite whereas Steppe Eagle and Willow Warbler were among the rare migrant species. Although migratory species were recorded in most areas, highest concentration were in Lobiro reservoir areas and Agoromin Reservoir areas.

Table 4-10: Palaerctic Migrants (PM) and Afrotropical Migrants (AM) and their abundance

2016				
No ^a	Species Name (Scientific name)	Ecology	Migration	Abundance
100	COMMON SWIFT (<i>Apus apus</i>)		PM	3.64
337	BLACK KITE (<i>Milvus migrans</i>)		PM/AM	1.96
886	COMMON SAND MARTIN (<i>Riparia riparia</i>)	W	PM	0.84
880	BARN SWALLOW (<i>Hirundo rustica</i>)	w	PM	0.64
467	GREY-HEADED KINGFISHER (<i>Halcyon leucocephala</i>)	fw	AM	0.60
441	WHITE-THROATED BEE-EATER (<i>Merops albicollis</i>)	f	AM	0.36
560	GREY-BACKED FISCAL (<i>Lanius excubitoroides</i>)	fw	AM	0.28
574	WESTERN VIOLET-BACKED SUNBIRD (<i>Anthreptes longuemarei</i>)	f	AM	0.20
447	EUROPEAN BEE-EATER (<i>Merops apiaster</i>)	f	PM	0.16
470	WOODLAND KINGFISHER (<i>Halcyon senegalensis</i>)		AM	0.16
863	EURASIAN REED WARBLER (<i>Acrocephalus scirpaceus</i>)	w	PM	0.16
884	BANDED MARTIN (<i>Neophedina cincta</i>)	G	AM	0.16
556	ISABELLINE SHRIKE (<i>Lanius isabellinus</i>)		PM	0.12
732	YELLOW WAGTAIL (<i>Motacilla flava</i>)	wG	PM	0.12
1021	NORTHERN WHEATEAR (<i>Oenanthe oenanthe</i>)		PM	0.12
341	COMMON BUZZARD (<i>Buteo buteo</i>)		PM	0.08
458	BROAD-BILLED ROLLER (<i>Eurystomus glaucurus</i>)	fw	AM	0.08
619	RED-BILLED QUELEA (<i>Quelea quelea</i>)		AM	0.08

1016	WHINCHAT (<i>Saxicola rubetra</i>)		PM	0.08
312	STEPPE EAGLE (<i>Aquila nipalensis</i>)	G	PM	0.04
916	WILLOW WARBLER (<i>Phylloscopus trochilus</i>)	f	PM	0.04

According to WCS (2016), f: forest edge, G: Grassland species, w: wetland visitor

4.3 Socio-economic Profile of the Project Area

4.3.1 Population

The population data for the project area was obtained from the Uganda National Population and Housing Census (UBOS, 2014). According to this data, the project area had population of 156,056. The historical growth rate for the period 1991 to 2002 for Kitgum and Pader was 4.02% and 4.84% respectively. For the period 2002 to 2014, the rate was 1.67% and 2.13% for Kitgum and Pader districts respectively (UBOS, 2014). This translates to a decline in the growth rate of 50%. Agago district, which was created recently out of Pader, therefore, the growth rates for Pader do apply as well. The design is based on a Base Year of 2016, Initial Year of 2020, and Ultimate Year of 2050. The TOR mentions that the horizon should be 30 years.

It is expected that the institutional, industrial and commercial activity will grow at the same rate as the future domestic growth rate of 1.67% for Kitgum and 2.13% for Pader. The growth rates adopted for the project area are given in Table 4-11.

Table 4-11: Project Area population growth rates per annum

Supply Area	Period			
	1991 - 2002	2002 - 2014	2014 - 2030	2030 - 2050
	%			
Kitgum	4.02	1.67	1.7	2.4
Agago and Pader	4.83	2.13	2.2	2.5

Source: (Uganda Bureau of Statistics, 2014) and Project Estimates

4.3.2 Economic/Livelihood Activities

The service industry such as hotels, lodges, restaurants, and bars are found in the main towns or trading centres of Kitgum Matidi, Lagoro, Mucwini, Namokora, Omiya Anyima, and Orom in Kitgum District, Kalongo, Patongo in Agago District and Acholibur in Pader District. In such centres, the butcheries, grain processing, carpentry and metal workshops, small scale trading in produce and merchandise (wholesale and retail shops) and transportation of goods and people can be found too. Other livelihood activities include crop production, goats and cattle rearing, poultry farming, piggery, apiary, tourism, brick making, charcoal production (Plate 4-6). Most of these activities are practiced in the rural areas where the project sites are concentrated.



Trading in Acholibur Town, Pader District



Cattle grazing in Orom, Kitgum District



Akilok business centre, Kitgum District



Farmland in Alel East, Kitgum District

Plate 4-6: Some of the economic activities taking place in the proposed project areas

Institutions are found throughout the project area (Plate 4-7). These include schools, health centres, mosques and churches. Schools include Labongo Layamo Seed Secondary School, Atimkikom Primary School, Mucwini West S/C,



Akilok HC III, Kitgum District



Obem P/School, Labongo-Layamo, Kitgum District



Dure HC II, Pader District



Kokil HC II, Paimol S/C, Agago District



Orom P/S, Orom S/C, Kitgum District

Plate 4-7: Some of the institutions that will benefit from the proposed project

4.3.3 Accessibility and Communication

A large part of the project area is now connected to the national electricity power grid and is linked by wireless telephone services provided by mobile and fixed line telephone service providers. Television reception is mainly through the use of satellite dishes. There are many local radio stations as well.

A number of roads pass through the project area (Plate 4-8). These include the road to Kidepo Valley National Game Park and Kaabong District from Kitgum town and that from Namokora to Adilang. The road from Kitgum town to the border with South Sudan also passes through part of the project area. Roads in other districts of Agago and Pader are also of gravel standard and interlinked.



Gulu-Kidepo road in Orom East Sub-County, Kitgum District



Tarmacked Kitgum – Pader road

Plate 4-8: Road network in the project area

5 DESCRIPTION OF THE PROPOSED PROJECT

5.1 Introduction

This chapter describes the project activities and/or characteristics expected in all stages of implementation i.e., preparation/construction, operation and decommissioning phases. The description is based on the proposed site plans and anticipated activities during the project implementation. The project activities will include civil works such as laying foundation, construction of the perimeter wall fence, pump control houses, sanitation facilities, pumping stations and reservoirs, landscaping, haulage of raw materials, installation of solar panels, and recruitment of construction workers among others during the construction phase.

The operation phase activities will be basically maintenance of the project site to keep it to the required standard. The activities in the different phases of the development are further explained below.

5.2 Construction Phase Activities

5.2.1 Site Clearing, excavations, levelling and compaction

The first stage of the construction phase will be site clearing to remove the vegetation especially on the lower side of the project site. This will be followed by setting out of site for construction alignment and leveling using various survey and construction equipment and materials. This will be followed by the excavation phase which will generate a lot of cut and spoil material.

Compaction works will involve use of machinery e.g., compactors. This stage of construction will be essential prior to constructing the foundation through creation of a stable working space.

5.2.2 Concrete works

Concrete columns will be erected to form a firm foundation and frame for the control house, storage reservoir tanks, solar panel racks, and concrete works for the production well bases.

5.2.3 Installation of chain-link fences

The pumping stations and storage reservoirs will be enclosed in chain-link fences to prohibit access by the communities, animals, and generally unauthorized persons. In addition, security personnel involving guards will be in place to avoid unauthorized access to the facility.

5.2.4 Construction of sanitary facilities like toilets

Adequate sanitary facilities will be constructed to cater for both genders. In addition, septic tanks will be constructed to handle wastewater that will be generated in the sanitary facilities. The two will be interlinked with a pipe network.

5.2.5 Installation of solar panels and pumps

Solar panels will be installed at each pumping station. The systems will consist of multi crystalline PV solar panels, with a control unit, support structure, and electrical accessories and cabling. Water pumps will also be installed to boost pressures to the storage reservoir through the transmission lines.

5.2.6 Labor and raw materials requirements

The raw materials required during the construction phase include water, ordinary sand, hard core and stone aggregates, roofing sheets, paint, cement, earth bricks / cement and sand blocks, various sizes and types of iron bars, timber/ poles, among others. These will be accessed from private dealers/suppliers within and around the project area and other business centres.

The Contractor will be informed to use as much as possible manual labor and save for those activities that will require use of machines. It is anticipated that most of the works in this phase will be labor intensive. All the construction works will be restricted to the project site.

The construction phase will have a workforce of 50 workers whereas the operation phase will have a workforce of about 10 workers. Most of the construction phase workers will be sourced from the community where the proposed project will be located.

5.3 Operation Phase Activities

The activities of the proposed project during the operation phase are likely to have a negative effect on the bio-physical and socio-economic environment and this requires that mitigation measures should be adhered to in order to have environmentally and social-friendly operations. Regular maintenance activities will be required to improve efficiency and minimise adverse effects to the environment. Some of the activities of the operation phase include:

5.3.1 Maintenance of project components

Components such as water pumps, transmission pipes, storage reservoirs, production wells, fence, and solar panels among others will be regularly inspected to ascertain their effectiveness. Faulty components will be repaired or replaced to ensure sustainability of the project.

5.3.2 Solid waste management

Solid waste like plastics, food remains, paper and others will be generated from activities in the storage and office spaces. With effective waste management practices onsite, solid waste generation rate is not expected to be a big threat to the environment.

Effective collection, storage, and disposal of all wastes and housekeeping will be given priority and periodically undertaken. Waste bins will be acquired and installed in different locations at the project site. The waste bins will be regularly emptied and waste transported by the contracted waste collection company for final disposal. Management

will ensure that the bins are covered to prevent birds or any animals from feeding on them.

Wastewater that will constitute sewerage will come from sanitary facilities. Sewerage generated will be disposed of into an on-site septic tank before it is collected and transported for treatment.

5.4 Decommissioning Phase Activities

The decommissioning phase will majorly involve demolition of temporary structures such as workers camps, sanitary facilities after the end of the construction phase. Other decommissioning activities such as demolition of pump control houses and storage reservoirs, uninstalation of production wells, transportation and disposal of construction debris among others will be carried out at the end of the lifecycle of the project.

5.5 Existing Water Supply and Sanitation Systems

5.5.1 Existing Water Supply System

The majority of the population use boreholes fitted with hand pumps, dams, springs, and rain water harvesting tanks for their water supply (Plate 5-1). Some of the piped water supply systems were installed at the peak of the LRA insurgency in the region at centres serving as IDP camps. On average, the individual systems consist of borehole intakes, transmission mains, reservoir, and basic water distribution network as detailed below. Such systems are found at Kitgum Matidi, Lagoro, Mucwini, and Namokora Trading Centres. In addition to the above piped water schemes, there is the NWSC system for Kitgum town.



Piped water in Agoromin City Kitgum District



River Omoro in Kitgum District



Borehole in Kokil Village, Paimol S/C, Agago District



Existing pumping station DWD 60596 in Lugede, Acholibur, Pader District

Plate 5-1: Existing water sources in the project area

5.5.2 Existing Sanitation System

The Socio-Economic Household Survey investigated the sanitation and hygiene situation in the project area and it was found out that there are few centralized sewerage facilities in the entire project area. At household level, 74% of those interviewed used sanitary facilities while 26% did not. The most common (64.2%) type of facility used in the sampled population is the traditional pit latrine. The VIP latrine follows closely with about 30%. About 65.6% of the households did not have a hand washing facility while 34.4% percent had. Among those who had the facility, over a half (61.4 %) had container without tap. Most of the households were using the back yard (63%) to dispose of waste water from kitchen, while the soak pit was being used for waste water from the bathroom.

The majority of the households (53%) use a compost pit to dispose refuse. Others burn or bury solid waste in the ground. The households were also asked whether refuse separation was being practiced. The study revealed that only 23% separated their rubbish.

5.6 Proposed Water Supply System

The water supply project was designed with the ultimate year being 2050, 2016 and 2020, being the initial and base year respectively.

The proposed project comprises of: water abstraction system, transmission mains, reservoir, distribution mains and intensification lines, water supply points. The individual water supply systems will supply sources based on groundwater. Water will be pumped from drilled production boreholes, and conveyed by pipelines to storage reservoirs. Distribution from the reservoir tank will be by gravity through pipelines to the consumers. The reservoirs in each of the supply areas will feed the distribution networks. The detailed description of the project components is in the following sections.

5.6.1 Production Boreholes

A total of 27 boreholes have been drilled throughout the project area as indicated in Table 5-1 and Plate 5-2. Some of these boreholes have been developed for example (DWD 61462, DWD 60642, DWD 60639, and DWD 60605) into pumping stations that have been connected to the reservoirs in the respective supply areas and water is distributed to different communities.



Drilled Borehole DWD 60632 – Wang Kenya 02 in Orom Sub county, Kitgum District



Pawel BH – DWD 60608 in Agago District



A developed Kakoo Pumping Station (DWD 61463) in Namokora Town Council, Kitgum District



A developed Lugede Pumping Station (DWD 60596) in Acholibur, Pader District

Plate 5-2: Some of the boreholes drilled in the project area

Table 5-1: Summary of water borehole details drilled in the project area

Borehole No.	Village	Parish	Sub-County/TC	Remarks
AGAGO DISTRICT				
DWD 60627	Lai Central	Ngora	Paimol	Drilled
DWD 60626	Wipolo Central	Mutto	Omiya Pachua	Drilled
DWD 60605	Longor	Longor	Omiya Pachua	Existing pumping station
DWD 60608	Pawel	Laita	Omiya Pachua	Drilled
DWD 61453	Alok Ki Winyo	Mupere	Kalongo Town Council	Drilled
PADER DISTRICT				
DWD 60622	Loc Ken	Alima	Porogali	Drilled
DWD 60596	Lugede	Ogogo	Acholibur	Existing pumping station.
DWD 60600	Lageng	Ogogo	Acholibur	Existing pumping station.
KITGUM DISTRICT				
DWD 61462	Giligil	Palabong	Namukora North	Existing pumping station.
DWD 61463	Kakoo	Pagwok	Namukora Town Council	Existing pumping station.
DWD 60588	Lamugo	Ocetoki	Labongo Layamo	Drilled
DWD 61457	Luwala	Palameny	Omiya Anyima	Drilled
DWD 60772	Kabete	Pudo	Mucwini West	Existing pumping station.
DWD 60593	Mogila	Pudo	Mucwini East	Existing pumping station.
DWD 61454	Labilo B	Labilo	Lagoro	Drilled
DWD 61455	Alel East	Labilo	Lagoro	Drilled
Wang Kenya I - DWD 60632	Wang Kenya	Lolia	Orom	Drilled
Wang Kenya II - DWD 60631	Wang Kenya	Lolia	Orom	Drilled
DWD 61458	Agoromin City	Lolwa	Orom	Drilled
DWD 61458	Agoromin	Lolwa	Orom	Existing pumping station.
Lapeitak I - DWD 61460	Logwokimer	Lolia	Orom East	Drilled
Lapeitak II - DWD 61461	Lapeitak	Lolia	Orom East	Drilled
DWD 60639	Loluko	Katwotwo	Orom East	Existing pumping station.
DWD 60642	Lobiro	Katwotwo	Orom East	Existing pumping station.
Lakongera I - DWD 60635	Lakongera	Okute	Orom East	Drilled

Borehole No.	Village	Parish	Sub-County/TC	Remarks
Lakongera II - DWD 60637	Lakongera	Okute	Orom East	Drilled
Lakwanya 1 - DWD 60648	Lakwanya	Lolia	Orom East	Drilled

The combined maximum day demand of water is 4,577 m³/day giving a borehole requirement of 458 m³/h over a 10-hour pumping period and 286 m³/h over a 16-hour pumping period. The production wells have a total supply of 517 m³/h. The details of the drilled boreholes are summarized in Table 5-2.

Table 5-2: Summary of water borehole details drilled in the project area

#	Supply Area	Village Name	DWD Number	Driller's yield (m³/h)	Discharge* (m³/h)
1	Acholibur	Lageng	60600	36.0	38.0
		Lugede	60596	21.0	20.0
2	Agoromin	Agoromin City	61457	35.0	32
		Agoromin	61459	9	10
3	Akilok	Lakongera 01	60635	32.0	19.8
		Lakongera 02	60637	81.0	40.57
4	Dure/Ngekidi	Locken	60622	17.4	19.8
5	Kalabong	Giligil	61462	7	8
		Kakoo	61463	8.7	7
6	Lakwanya	Lakwanya 1	60648	40.5	29.41
		Lakwanya 2	60777	24	20.39
7	Lapene	Lapeitak 1	61640	7	8
		Lapeitak 2	61461	12	7.5
8	Lolia/Katwotwo	Lobiro	60642	18.1	16.27
		Loluko	60639	25.1	20.12
9	Longor	Longor	60605	36.0	22.5
		Pawel	60608	36.0	7.2
10	Paimol HC	Wipolo	60626	8.2	8
		Lai Central	60627	10.2	13.02
11	Paimol Sub County	Alok ki Winyo	61453	15.0	12.5
12	Pawidi	Alel East	61455	5.1	7
		Labilo 'B'	61454	30	29
13	Pudo	Mogila	60593	8.0	10.0
		Kabete	60772	63.5	37.33
14	Obem	Lamugo	60588	6.1	6.1
15	Omiya Anyima	Palameny	61456	8.0	7.5
16	Orom Trading Centre	Wang Kenya 1	60631	6.1	5
		Wang Kenya 2	60632	8.6	9.91

The design of the production boreholes involves the following:

- Determination of pump parameters (head, flow and power) and pipeline size
- Civil works for the associated power supply

- Power source for each site
- Pumping mains from the borehole(s) to the storage reservoir.

5.6.2 Storage Reservoirs

The water reservoirs will be designed to:

- Provide for fluctuations in consumer demand during the day (e.g., the peak hour flow), without having to design the treatment plant and transmission mains to match this peak flow. It thus provides a balance between the demand rate (at maximum day demand) and consumption rate (peak hour flow).
- Provide a reserve capacity for supply interruptions, and allow time for system repairs and essential maintenance upstream of the storage area to be made without interrupting flow to the consumers.

The proposed reservoirs will complement the existing reservoirs (Plate 5-3). The storage capacity has been calculated at 30% of the maximum day demand (MDD). However, due to the need for the balancing of supply for emergency, an additional 10% of maximum day demand was added to create a final storage capacity 40% of MDD.

The proposed project will involve the construction of 20 elevated hot-pressed steel sectional panel storage tanks with respective storage capacities in the proposed supply service areas as indicated in Table 5-3. It was proposed that selected locations within the project area have independent storage reservoirs and distribution networks. The proposed locations of the reservoirs are presented in Table 5-4.

Table 5-3: Supply Area Service Tank Capacities

Supply Area	Storage Tank Capacity (m ³)
1 Acholibur	180
2 Agoromin	40
3 Akilok	100
4 Omiya Pacwa/Coodong	45
5 Dure - Ngekidi	90
6 Kalabong	40
7 Katwotwo	65
8 Lakwanya	30
9 Lalekan	30
10 Lapene	70
11 Locomo	30
12 Longor	50
13 Paimol - Health Centre	150
14 Paimol - Sub County	50
15 Pawidi	50
16 Pudo	75
17 Labongo Layamo - Obem	25
18 Obyen	50
19 Omiya Anyima	130

Supply Area	Storage Tank Capacity (m ³)
20 Orom	80
Total	1,380

Source: Design Estimates

Table 5-4: Location of the proposed project reservoirs

OROM - AGAGO					
Paimol Health Center III Reservoir	Lai Central	Ngora	Paimol	N03.123620 E033.432050	Proposed
Paimol S/C	Kokil West	Pacabol	Paimol	N03.064996 E033.419348	Proposed
Coodong Reservoir	Coodong	Longor	Omiya Pachua	N03.236634 E033.447532	Existing
PADER DISTRICT					
Lugede Reservoir	Munutam	Ogogo	Acholibur	N03.172310 E032.901086	Existing
Acholibur Reservoir	Larumu	Gem Central	Acholibur	N03.137453 E032.908049	Existing
Dure	Locken	Alima	Porogali	N03.201940 E033.939732	Proposed
KITGUM DISTRICT					
Kalabong Reservoir	Winy rach	Kalabong	Namukora North	N03.411904 E033.365998	Existing
Lalekan Reservoir	Ladotonen West	Latekang	Kiteng	N03.440537 E033.385063	Existing and functional
Obem Reservoir	Obem North	Pamolo	Labongo Layamo	N03.411130 E032.931737	Proposed
Pudo Reservoir	Lakweleokado	Pudo	Mucwini West	N03.395273 E032.976407	Existing. Receives from Kabete
Agoromin City Reservoir	Lunganyora	Lolia	Orom	N0.360587 E033.493976	Existing
Katwotwo Reservoir	Loluko	Katwotwo	Orom East	N03.476015 E033.526349	Existing
Lobiro Reservoir	Lotany	Katwotwo	Orom East	N03.491513 E033.578988	Existing
Orom	Laditoywe	Loliya	Orom	N03.401673 E033.469073	Proposed
Akilok	Akilok Central	Okuti	Orom East	N03.543683 E033.483250	Proposed
Omiya Anyima Reservoir	Palamene-lwala	Palameny	Omiya Anyima	N03.270478 E033.202626	Proposed
Pawidi Reservoir	Alel East	Labilo	Lagoro	N03.257208 E033.124088	Proposed



Plate 5-3: An existing Longor reservoir in Paimol Sub County, Agago District

Due to the topography of the supply area and the low pressures experienced in the distribution network around the tank and in the far reaches of the network, it is recommended to erect the reservoir tank on 18 m high steel towers. For supply areas with hills nearby, the height of the reinforced concrete base walls has been set to 5 m.

The reservoir shall be provided with inlet, overflow, outlet, and drain pipe work. The following fittings shall also be provided for the reservoir;

- Internal ladder of galvanised steel,
- Wall mounted level indicator,
- Vents on the tank roof,
- Roof level access cover of galvanised steel.

The access covers shall be at least 100 mm above the finished level of the roof and shall be lockable. The roof vents shall be similarly set out and shall be fitted with vermin proofing and mosquito proofing fabric.

The site works for the reservoir will consist of the following:

- The general earthworks,
- The site pipe work,
- The site drainage,
- Miscellaneous works.
- The outlet from the reservoir shall be fitted with new bulk flow meters.

5.6.3 Distribution Networks

The ultimate design year of 2050 peak flow requirement was used. A peak hour factor of 2.0 was used. Due to the nature of the flat topography in several supply areas, in some pipe sections the flow velocities lower than 0.6 m/s have been considered to achieve the recommended residual pressures.

The network was designed for those areas with defined access roads but the possibility of extending it was catered for since the supply areas is expected to expand. Consequently, the smallest size of distribution pipe chosen is OD 50 HDPE. Pipes smaller than OD50, will be laid as network intensification lines or as service connections. Table 5-5 shows the estimated sizes and length of the distribution pipes for the different supply areas.

Table 5-5: Supply Area Distribution Mains Pipe Materials, Lengths and Sizes

Pipe Material	HDPE				uPV				DI				
	Outside Diameter (OD)												
Supply Service Area	50	63	75	90	110	160	200	225	300	HDPE	uPVC	DI	Total
Acholibur	3,063	2,613	5,444	5,872	2,512	497		3,495		16,992	6,504		23,496
Agoromin				1,057	1,245	3,746				1,057	4,991		6,048
Akilok	1,539		5,220		10,332	10,533				6,759	20,865		27,624
Omiya	267	605			2,489	1,702				872	4,191		5,063
Dure - Ngekidi		3,784	4,435			3,294		13		8,219	3,307		11,526
Kalabong	771	2,143	2,839		5,204	3,830				5,753	9,034		14,787
Katwotwo				5,509	13,059	2,506				5,509	15,565		21,074
Lakwanya		1,895	8,237	77						10,209	0		10,209
Lapene		2,143	2,839							4,982	0		4,982
Locomo				1,432	3,998	620	672			1,432	5,290		6,722
Longor	1,186	1,361	3,047		2,734	114				5,594	2,848		8,442
Paimol Health centre	413		2,588	71	3425	10,749		24		3,072	14,198		17,270
Paimol Sub county	839	1,138		5,434	4,305	1,687				7,411	5,992		13,403
Pawidi	84	3,694	764			719				4,542	719		5,261
Pudo		247		1,323	6,991	8,072		2,052		1,570	17,115		18,685
Lamugo					5,407	8,063		194		0	13,664		13,664
Obyen	3,417	2,363	9,876		3,335	350				15,656	3,685		19,341
Omiya Anyima					2,402	14,583	2,486		496	0	19,471	496	19,967
Orom	752	752	2,377	5,231	2,790	2,754				9,112	5,544		14,656
Total	12,33	22,738	47,666	26,006	70,228	73,819	3,158	5,778	496	108,741	152,983	496	262,220

5.6.4 Service Connections

The location of the service pipes will be determined when applications for connections are received. On the basis of the population to be served at the tariff of UGX 66/20 litres, the total number of connections required in the ultimate year 2050 has been estimated as detailed below. The number of service connections computed from the projected population and criteria above is given in Table 5-6.

Table 5-6: Number of service connections required in the project area

House Connections	Yard Taps	Standpipe
80	106	525

The combined number of all categories of service connections is about 750. It is important to note that this is an estimate and the figure may be deceptive especially if compared with the reality on the ground.

5.6.5 Network Intensification

As a measure to increase the densification of the distribution networks and to increase the customer base, and allow a neater layout of the service connection pipes, some pipe work intensification will be required. The intensification lines will be demand-driven, and installed where there are adequate applications for connections.

5.6.6 Water Office Blocks

It is proposed to construct four office blocks within the project area. These are to be located in Acholibur, Obyen, Orom and Paimol. These locations are fairly centrally placed to cater for a cluster of supply areas. Each office block will have a floor area of 99 m². The blocks will be constructed, to house the staff responsible for the operation and maintenance of the system. The office block will consist of the following:

- Manager's Office,
- Accounts Office,
- General office,
- Store,
- Water borne toilet.

The office will have the following details:

- Concrete grade C20 floors with ceramic tiles;
- Rendered and painted walls internally and externally;
- Glazed ceramic tiles for shower walls in the toilet;
- Pre-painted galvanised corrugated iron sheets of gauge 26 sheeting on hard wood trusses;
- 1no. 1000 litre elevated Polyethylene water tank on 2 m high steel structure;
- Hard wood faced flush doors for internal doors, mild steel frame external doors with burglar proofing grills;

- Septic tank and soak away pit;
- Wheel chair access ramp at entrance;
- Chain-link fence and double leaf access gate

5.6.7 Power Requirements

The locations of the water supply areas are spread out throughout the project area. At some of the locations the mains electricity grid is available. At other locations it is not available. The most reliable power supply option to a majority of the boreholes sites is by the extension of the Uganda Electricity Transmission Company Limited (UETCL) power mains augmented by use of a standby generator. However, it is prudent to consider other power supply options, namely, renewable energy, most especially solar, and to maybe in combination with wind generators. This is vital since there have been huge improvements in solar powered water pump systems. The three power supply options for the operation of the submersible borehole pumps were re-considered as follows:

- Power from the Uganda Electricity Distribution Company Limited (UEDCL) power grid. This option requires the supply and installation of 3-phase transformers, and extension of overhead power line with three-line conductors to the pump houses.
- Power from a generator installed at each of the borehole pump houses. The generators will be 415Volts, 50Hz, 3 phase air cooled diesel electric generators with weather proof silencer canopies complete with a tank of fuel that can run it for a least a day.
- Power from a solar system installed at the borehole pump houses. The systems will consist of multi crystalline PV solar panels, with a control unit, support structure, and electrical accessories and cabling.

Solar power source was evaluated as the least costly source to install, operate and maintain. However, it was established that solar power is not independently adequate to pump water to meet the project area's water demand. As a result, solar power will be complemented by hydropower from the national grid to support constant water supply in some of the supply areas.

The pump power requirement and other costs is summarized in Table 5-7.

Table 5-7: Supply Area Pump Parameters

Days in a Year	365	US\$ to UGX Rate		3650																	
Operating Hours per Day	8																				
Cost of one unit of Energy, (UGX/kWh)	648.3																				
Unit Cost of Solar Panels (UGX/W)	10,500	per Watt																			
Unit Cost of Solar Panel Support (UGX/W)	5,250	per Watt																			
Parameter	Supply Area	Acholibur		Agoromin		Akilok		Dure	Katwotwo		Longor		Paimol HC		Pawidi	Pudo	Obem	Obyen	Omiya Anyima	Orom Trading Centre	
	Location	Lageng	Lugede	Agoromin City	Agoromin	Lakongera 01	Lakongera 02	Locken	Lobiro	Loluko	Longor	Pawel	Wipolo	Lai Central	Alel East	Mogila	Lamugo	Labilo B	Palameny	Wang Kenya 01	Wang Kenya 02
	Borehole No.	60600	60596	61457	61459	60635	60637	60622	60642	60639	60605	60608	60626	60627	61455	60593	60588	61454	61456	60631	60632
	Units																				
Power on Pump	kW	22	47	32	11	29	44	28	20	26	21	7	8	16	9	16	10	44	11	7	14
Static Lift and Loss to GL	m	82	72	91	91	92	91	95	73	76	92	94	74	76	77	78	74	100	75	101	96
Pressure at Head of Transmission Line	m	162	148	185	219	194	141	186	136	150	207	215	173	159	207	213	215	207	202	181	186
Flow	m ³ /h	38	20	30	9	20	41	20	18	25	23	7	6	13	6	10	6	28	7	5	10
Velocity in Main	m/s	0.87	0.75	1.13	0.94	0.96	0.94	0.74	0.75	0.87	1.09	0.75	0.89	0.94	0.89	1.04	0.89	0.64	1.04	0.74	1.04
Energy per Year	kWh ('000)	65	136	92	33	85	127	81	60	75	62	20	23	46	27	47	29	128	31	20	41
Cost of Energy per Year - Electricity Grid	UGX('000,000)	42	88	60	21	55	83	53	39	49	40	13	15	30	18	31	19	83	20	13	26
Length of Pumping Main: Source to Tank	m	4980	2080	2110	3580	3550	1850	1000	1650	4700	3945	6115	2270	1700	2540	3230	4580	3060	3020	2865	2080
Pipe Material		UPVC	UPVC	HDPE	UPVC	UPVC	UPVC	UPVC	UPVC	UPVC	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	UPVC	HDPE	UPVC	UPVC
Proposed Power Supply Option		Hybrid	Solar	Solar	Solar	Solar	Solar	Solar	Solar	Solar	Solar	Solar	Hybrid	Hybrid	Solar	Hybrid	Solar	Hybrid	Solar	Solar	Solar
Solar Panel + Structure Installation Cost	UGX('000,000)	353	733	497	176	459	687	439	322	407	334	110	124	246	148	254	154	691	169	108	220
Electricity Grid Cost per year	UGX('000,000)	21											7	15				42			

5.6.8 Pump station

It is proposed to construct pump control houses at each production well site. This will be constructed and shall be semi-detached combining the pump as well as accommodation for a caretaker having a total floor area of 9.0m X 4.0m. The pump houses will contain the associated pipe work, fittings and electrical switchgear. A single-roomed 4.0m X 4.0m floor area for pump attendant and a guardhouse with a waterborne toilet will also be constructed at each of the borehole sites.

5.7 Proposed Sanitation System

5.7.1 Public Toilets

The sanitation interventions in the project area will include the design and construction of toilets, at the locations to be selected by the respective local authorities.

It is proposed to have public toilets in Acholibur, Akilok, Orom, Paimol, Pawidi and Pudo. These shall be located at the market, and another at the Sub-county offices where a fee to be determined will be charged to the user for every use of the facility.

The block shall contain:

- a) Five (5) toilet stances for women;
- b) Three (3) stances for men and 1no. urinal;
- c) One separate stance each, for person with special needs (female and male).

The toilet blocks will measure 13 m X 7.0 m with the following details:

- Septic tank of effective capacity 15.4 m³ in brickwork and reinforced concrete, rendered smooth inside, complete with inlet and outlet manholes benching, heavy duty concrete manhole covers, OD 110 PVC ventilation pipe work clipped to toilet wall;
- Concrete grade C20 floors with terrazzo finish;
- Rendered and painted walls internally and externally;
- Glazed ceramic tiles for showers and urinals in toilet;
- Pre-painted galvanised corrugated iron sheets of gauge 28 sheeting on hard wood trusses;
- 1no. 2000 litre and 1no 1000 litre Polyethylene water tanks elevated at 4 m and 2 m heights respectively on a steel structure;
- Hard wood faced flush doors for internal doors, mild steel frame external doors with burglar proofing grills;
- Foul water drainage to soak pits;
- Wheel chair access ramp at entrance

5.7.2 Female Institutional Toilet

Additional sanitation works under the project will include the construction of 1no 5-stance lined VIP institutional toilet for females. The 5-stance lined VIP female toilet will consist of:

- a) Four toilet stances, one of which is for the people with special needs;
- b) One stance for a shower.

The toilet whose plan is 6.40 m X 4.85 m has the following details:

- Lined Pits 2.15 m X 1.0 m X 2.2 m high which are accessible through access manholes at the rear of the structure;
- Concrete grade C20 floors with screed finish;
- Rendered and painted walls internally and externally;

- Glazed ceramic tiles to shower walls in the toilet;
- Pre-painted galvanised corrugated iron sheets of gauge 28 sheeting on hard wood trusses;

5.7.3 Male Institutional Toilet

Additional sanitation works will include the construction of 1no 5- stance lined VIP institutional toilet for males. The 5-stance lined VIP male toilet will consist of:

- a) Two toilet stances, one of which is for the people with special needs;
- b) One stance for a shower;
- c) 1no. urinal.

The toilet whose plan is 7.78 m X 4.85 m has the following details:

- Lined Pits 2.15 m X 1.0 m X 2.2 m high which are accessible through access manholes at the rear of the structure;
- Concrete grade C20 floors with screed finish;
- Rendered and painted walls internally and externally;
- Glazed ceramic tiles for urinal and shower walls in the toilet;
- Pre-painted galvanised corrugated iron sheets of gauge 28 sheeting on hard wood trusses;
- 1no. 1500 litre elevated Polyethylene water tank on 4 m high steel structure;
- Hard wood faced flush doors for internal doors, mild steel frame external doors with burglar proofing grills;
- Hand-wash water drainage to soak pits;
- Wheel chair access ramp at entrance.

5.7.4 Institution (Educational) Sanitation

Most of the schools use unlined pit latrines, however none did have any provision for pupils with special needs. The project proposes to establish sanitation facilities to selected schools within the project area. The factors for the selection include:

- a) Most needy school in terms of unavailability of toilets using the pupil to stance ratio guideline set by the Ministry of Education.
- b) Highest enrolment number which will result into a larger reach in terms of sanitation awareness and sensitization.
- c) Current status of the existing sanitation facilities.

Therefore, it is proposed to construct 44No. VIP toilet blocks of 5 stances each for boys and girls, all fully equipped with hand washing facilities.

5.7.5 Sludge Disposal Mechanism

The toilets will be designed so as to hold a year's sludge after which they are to be de-sludged and the waste taken for further treatment at designated treatment areas.

6 STAKEHOLDER CONSULTATIONS

6.1 Introduction

This section presents details of the stakeholder consultations that were undertaken for the project. It contains the stakeholders that were consulted and the key issues and concerns that were identified during the consultation.

6.2 Concerns/ views of the stakeholders

The Concerns/ views of the consulted stakeholders are presented in Table 6-1, and their details are presented in Annex IV. Generally, the stakeholders consulted welcome the project because of the foreseen benefits that the communities and institutions would accrue from the project which majorly include addressing water supply shortages, long distances to the existing water sources as well as inadequate water sources compared to the increasing populations and the number of communities sharing the few available sources with domestic animals leading to water being contaminated and unsafe for domestic use.

Table 6-1: Stakeholder concerns/comments on the Orom WSP proposed project

Stakeholders	Views/Concerns	Response
Kitgum District		
Kitgum District leaders: DWO/D/Engineer Senior Environment Officer District CDO - James PAS	<ul style="list-style-type: none"> The project is welcome in the district since there is already a water problem. Water is cross-cutting in every area of life such as cooking, production, cultivation so it will be used to alleviate poverty in the area. People will have clean water hence reduction on water borne diseases in the communities. With regard to sustainability plan, when the project is developed, it will constitute a community management committee. It will be gazetted from the Umbrella for Water and Sanitation Gravity flow water is affordable; therefore, people will pay for water at a subsidized price which can cater for operation and maintenance. The price in rural settings, a unit which is 50 jerrycans equivalent of 1,000 litres is at 2000/- which is about 40/- per jerry can so on average, each household needs about 400/- daily to buy water. Thirty days means they will pay 12,000/- per month. The community is able to pay the user fees. However, user fees should be lower than the National Water and Sewerage Corporation pricing. The district technical department are willing to manage and sustain these projects. Provide technical support through training to ensure sustainable and use of the resources Community structures should also help in managing the project such as water user committees, association of hand pump technicians Also related to environmental concerns, the area is relatively intact. People cultivate around this area so make sure you to avoid pollution by use of chemicals. Development of the project will happen on community land and therefore they will need compensation. Therefore, intensive sensitization of 	<p>The project aims at increasing water supply in the area so the problem of water shortage will be addressed.</p> <p>All stakeholders will be engaged through the entire implementation of the project</p> <p>Any property, including land to be affected will be valued and compensated appropriately prior to start of construction activities</p> <p>Mitigation measures have been proposed in this report to minimize project impacts on the environment. The Contractor and Operator will be cautioned to ensure that mitigation measures are implemented</p>

Stakeholders	Views/Concerns	Response
	<p>the communities about land issues and water usage needs to be done.</p> <ul style="list-style-type: none"> • There are graves on the land where the project will take place so rituals have to be done according to the culture of the area. • Some areas have no potential to drill water sources. • The communities in the district are hardworking people so they will make better use of the water from the project for economic activities. • There is need to do a lot of social screening especially people do a lot of illegal activities so there is need for environmental restoration to maintain the project. • The river can be used for other many things such as irrigation, domestic and other economic activities • People need to be sensitised about waste disposal into the river. • Need to look at the livelihoods of people, how they can sustainably use the water, water for irrigation in the lower lands. • Link with the department during implementation of the project. • Address the grievances, land disputes, etc. And these issues should be handled professionally. • Courtesy calls with the office of the RDC to track the progress, to move together, the leaders should be aware. 	
<p>Namokora Town Council, Kitgum Town Clerk, Town Agent</p>	<ul style="list-style-type: none"> • The project is long overdue. We wanted it earlier. • Is it under Ministry of Water and Environment? • There are available water sources managed by Umbrella • The project started three years back. The water pump is in Kakoo. The borehole has been drilled • The challenge is that there is no one managing it. It is in isolated place. There are no households in the place. There is a UPDF soldier guarding the borehole. • There is no access road. In the rain season, it is extremely bad. • The Kakoo water source is not functional and yet there is high demand for water. • There was a conflict between the Ministry of Water and Environment and the community. The ministry wanted to pay 6 million for the space being used. • During the dry season, there is no water. Water supply in the area is not adequate. • The project has delayed too much • People keep asking us about the water project • There is need for security. It can be vandalised especially the panels. The running water washes away • There is need to plant some trees to retain water and water levels. • Only one UPDF guards the area but during the day time nobody is there. Therefore, there is no security during day time • The Karamojong come and raid the area • Also, animals (elephants) come and attack people's crops. 	<p>The project is under the MWE but managed through its structures including the district authorities.</p> <p>Proper management of the project will be established to maintain proper supply of water to the intended beneficiaries including provision of security to the water sources and addressing concerns of the PAPs.</p> <p>The project is supposed to supply water for domestic use not for production e.g., irrigation. That is another sector under water for production.</p> <p>Public standpipes are included in the project design</p>

Stakeholders	Views/Concerns	Response
	<ul style="list-style-type: none"> • The borehole in Kako is meant to supply water across the cells or villages including sub-county but now it is not operational. • Orom water supply can be used for small scale irrigation. We actually need this water for irrigation. • We have one reservoir supplying the town. • There are many birds in the area, however hunting is not regulated. Some boys hunt them to supplement their nutrition. • The unique practice is that the small-town council should not keep animals. Most populations are cultivators but farming is far from town. And there is no water where farming is taking place. People migrate to the farms so they need water. Apparently, they drink dirty water so water should be supplied there. • Farming is seasonal because there is no water reservoir. As a result, most people are idle, are drinking and dancing. As such the dry season needs to be supported with water for vegetable growing and small-scale farming. • Also, as a result of the water project, people can start fishing and sell fish to make money. • Animals move for a long distance of about 15-20 km to drink water and back. • There is bush burning in the dry season so when there is plenty of water, animals may not be moved for long distances. • People will be able to pay for the water usage although most NGOs who were operating in the area during the insurgency were providing them with free services including water. So, there is need to change mindset from wartime to now. • People are used to be given handouts when they participate in development projects. • There are some taps where people pay for water. • Under this project, there should be public connections whereby people can pay some little money which they can afford to access water. • Public connections would be more affordable than getting from private connections at the landlords. However, those who can afford they can collect water from the landlords' connections. • According to the design of town, toilets should use water. Therefore, there is need for piped water. • There will be need to plant trees around the water sources, for example, plant shrubs around the water sources. • Some trees in the area have been cut without replacement. This is being orchestrated by the big shots in government especially UPDF generals and commandos who are untouchable by the local authorities. • There is rampant charcoal burning which destroys most important trees that would preserve environment and conserve water in the area. It was noted that there were no measures in place to stop 	

Stakeholders	Views/Concerns	Response
	<p>this problem. There are designed policies for environmental conservation but only on paper without implementation.</p> <ul style="list-style-type: none"> • They have also bye-laws on environmental conservation where water is the bottom line however not implemented as stated. 	
<p>Local leaders: LCI, chair, Kako East, Namokora S/C; LCI Chair, Kiteleng, Namokora Town Council</p>	<ul style="list-style-type: none"> • We have piped water but tap owners cry of high prices (tariffs). • Considering water metre reading, people don't know it is done so they think they hike the measurements to get more money from the tap owners. • There is allegation that water metres readers don't tell the tap owners the correct figures the metres read. As a result, they doubt the metre readings. • In the dry season, we get a lot of problems. There is water scarcity. The taps dry off. I complain of the reading when I have not used a lot of water and when the bill is high. • People from MWE drilled one borehole in Kiteleng but the water yield is low. • Community members from Kiteleng complain that piped water should also be extended to their cell. • We communicated to Umbrella requesting for water to extended to our area but up to now there is no feedback. 	<ul style="list-style-type: none"> • The proposed project seeks to increase to safe water in the area, which will consequently result into reduced water charges • The operator will sensitize and train customers how to read the meters, and how to calculate the units used to avoid doubts about the water charges • The project seeks to extend water to as many people as possible within the supply area.
<p>Namokora North Sub- County Chief, Councillor LCIII chairman Vice chair/councillor, Secretary general purpose, Councilor,</p>	<ul style="list-style-type: none"> • We welcome the project. We have water shortage in the sub-county. • You have come at the right time; the situation of water is very poor. About three villages share one borehole. When the borehole is faulty, the spares to repair it are very expensive. • Boreholes are few • There was water extension in the sub-county but immediately after hand over, the system failed. • We expected another extension but they cannot extend when there is no water. • In one school, they complain that they are not using water but they distribute bills with amount of money for water used. • There is demand for water but water is not available. One part of the system is not working. • People use one borehole so people still complain of water problem. • Although there is a reservoir in Ubuto, there is no water in the area. • Extension at Kako is not functional. There are pipes but there is no water in them. • In other places, it is dry so they cannot yield any water. • In four parishes, you find one borehole per parish serving four villages. • In one parish, there are 3 boreholes and all of them are not functional. So, this project is needed to 	<p>The project will increase access to safe and adequate water</p> <p>The project will develop a grievance management system where all communities' complaints can be lodged and addressed</p> <p>A feasibility assessment was undertaken to establish boreholes with sufficient yield to sustain the water demand in the area</p> <p>The design of the project provides for water supply not only to domestic users but also to institutions such as schools and health centres</p>

Stakeholders	Views/Concerns	Response
	<p>increase the supply of water in the area and the school should have its own water source.</p> <ul style="list-style-type: none"> • You should extend water to all schools so that they don't share with the communities which are already overpopulated. • People should not pay service fee when water is provided by government. • They removed a line from Kako extension so that MWE to buy a line, is the ministry informed about it and what are they planning to do? 	
<p>Labongo Layamo sub-county: Sub-county Chief, LCIII chairman,</p>	<ul style="list-style-type: none"> • The sub-county leaders welcomed the project. • The sub county doesn't have enough water and therefore, water should be extended nearer to the community. • Few water sources that supply the community and the population grows daily. • They use the same water sources with animals. • The schools and HC III in the sub county need water. • The people are will to pay for water if it the water is extended to them. • One community is doing a demonstration on irrigation (planting seedlings) • They have 4 parishes but the project is supplying only one parish, water should be extended to other parishes. • There is no water at the sub- county offices. • The community relies on seasonal springs that dry up in the dry season. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water • The design of the project provides for water supply not only to domestic users but also to institutions such as schools and health centres
<p>Labongo Layamo sub-county (community members)</p>	<ul style="list-style-type: none"> • They have a serious water problem in the area. • Some areas have no water and therefore they cannot drill boreholes. • Water can be brought near at the sub county and they buy water from there. • The community welcomes the project because it will solve their water problems. • They expect the piped water to exceed the proposed area so that they can all benefit. • They can use the water if extended for horticulture, brick making among others so that they improve on their livelihood. • They are experiencing issues of domestic violence because of lack of water (women don't cook and men don't bath and this causes fights at home) • Children and women move long distances looking for water to use at home. • Their animals move long distances to look for water and some end up dying. • Community is vulnerable therefore the water price should be fair and affordable for them. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water. This will help to reduce issues of water scarcity and domestic violence • Public standpipes are included in the project design where individuals who cannot afford house connections can obtain water
<p>Mucwini sub-county: Sub-county Chief, LCIII chairman CDO Community members</p>	<ul style="list-style-type: none"> • 7 households were connected to piped water but are not receiving water. • Some community members filled forms for connection but the connection didn't reach some villages like Orima, Juba among others. • People are willing to allow the distribution mains to pass through their land without compensation. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water. This will help to minimise water scarcity issues in the area

Stakeholders	Views/Concerns	Response
	<ul style="list-style-type: none"> In some areas though connected the water supply is not constant e.g., Wang Kong, Akara among others. 5 villages were connected but do not receive water. 	
Logoro sub-county: Parish Chief Community members	<ul style="list-style-type: none"> The sub-county needs water urgently Currently they depend on River Pagera which is a seasonal river and dries up in the dry season. The water from the river is of poor quality and their children end up falling sick. They are forced to move very long distances trying to look for water for use and home and their animals. They, therefore welcome the project because it will enhance their livelihood. 	<ul style="list-style-type: none"> The project seeks to increase access to safe and adequate water
Orom sub-county: Chairman LCIII Parish chief community members	<ul style="list-style-type: none"> Some parishes don't have water; therefore, water should be extended to all parishes. They have a serious water problem in the area and some people move 6 km looking for water. Since the area is not secure because of the Karamajong constant invasion, some have been killed while looking for water from the available streams The available borehole in the community has very low yield and in the dry season, there is no water at all. Many cases of domestic violence because of lack of enough water to supply the community. Their animals are sometimes stolen by the Karamajongs while looking water. The project is welcomed because it will solve their water problems. 	<ul style="list-style-type: none"> The project seeks to increase access to safe and adequate water. This will help reduce water scarcity, including reducing distances travelled to access water
Pader District		
Pader District Water Officera	<ul style="list-style-type: none"> For water, we won't buy land During implementation, uncouth people get money from the community members. And the communities do not get the services. What is normally done is that the Contractor and Consultant collude to cheat the communities and the communities resist and the project fails Sometimes there is conflict of interest - Contractor and Consultant collude and do not pay the causal labourers. As a result, there is no checks and balances. Lack HIV/AIDS sensitisation measures are not usually followed when it comes to implementation and yet they are well laid down in the document. Regarding environmental concerns, it will destroy a lot of vegetation/environment When holes are not closed properly, it leads to galleys which are dangerous to human being. More trees are cut and are not replaced. So, there is need to plant new trees. Roads used to the project are not usually watered during the dry season and yet they are being used by trucks and tractors. There will be all types of pollution. these need to be mitigated. 	<ul style="list-style-type: none"> Proper management structures of the project will be instituted and all stakeholders will be engaged to oversee its management so most management weaknesses will be minimised. The project will establish a grievance handling mechanism where community members can lodge their grievances The project will develop and HIV/AIDS management plan Mitigation measures have been proposed to address all negative impacts of the project

Stakeholders	Views/Concerns	Response
Communities: Locken village, Porogal S/C	<ul style="list-style-type: none"> • We welcome the project. • We have few water sources but the population is large. • We need more water and also to repair the existing borehole. • Three villages are sharing one borehole. About 1,500 people use one borehole. • You should construct more boreholes here. • We have one borehole which was constructed long time ago and I you can repair it. • We can pay if you provide the water. Each household is capable of paying 2,500/- per month for the water used. • We can repair boreholes with the money we collect monthly. • Water should be distributed to our homes. We are willing to pay the bills. • We have many water problems. Water is contaminated because the borehole is rusty. Two, the borehole is always faulty because it is not repaired as it takes to be repaired. 	<p>The project seeks to increase access to safe and adequate water</p> <p>Only boreholes which were identified as for this project will be considered because they were assessed as having sufficient yield</p>
	<ul style="list-style-type: none"> • The project has been appreciated in the area since it will solve the water related challenges in the sub-county. • The sub-county seriously depends on boreholes. The water coverage is about 70%. • Partners help in water service provisioning in the district for example Lutheran World Federation (LWF) has rehabilitated a number of boreholes in the area. • The main challenge is at the border with eastern part of Karamoja in Karyeng. There are some water points - simple pipe schemes which the Contractor failed to drill due to some technology challenge. • Piped water system does not function because the system has broken down. They tried to repair the reservoir, due technology, the engineers failed. They attempted twice and failed. 	<p>The project seeks to increase access to safe and adequate water</p> <p>The operator of this project will employ qualified staff to ensure that the project operates well to meet its objectives</p>
Langwerolin village	<ul style="list-style-type: none"> • We appreciate the project because there is no water source in the community • They have connected water pipes to this community but there is no water. • We receive water bills and yet we have no water at the taps. We are wondering whether we should continue paying for the water we are not using. • As long as water is flowing very well, we have no problem with the proposed project. • The water connections are faulty. The taps leak. • They made us fill the forms for water connections and they did not come back. • We are willing to pay 200/- per jerrycan. • The problem is that water is not in the pipe. • We have one borehole serving the whole village. • We pay money to repair the borehole and monthly service fee when water is not coming. 	<p>The project seeks to increase access to safe and adequate water</p> <p>The project operator will employ skilled staff to handle issues of operation and maintenance to ensure that the project meets its objectives</p>

Stakeholders	Views/Concerns	Response
	<ul style="list-style-type: none"> • If they want to connect us, how much is the connection fee? We can afford 50,000/- and the bill. • The pipe is already constructed, what we need is water. • When you open the tap, it will bring only gas instead of water and they bring a bill to be aid at the end of the month. Most people in this community face the same problem. We are paying for loss. Why should we continue paying? 	
Agago District		
<p>District leaders (Natural Resources Officer, Water officer and Environmental officer)</p>	<ul style="list-style-type: none"> • There is water stress experienced in the district since the existing reservoirs cannot supply adequate water especially during the dry season to meet the population demand. Therefore, we welcome the proposed water project. • There is need for alternative sources of water. • Umbrella budget is small, it cannot cater for extension of water services to all the communities, institutions and towns that need water. • The budget for Umbrella North cannot also sustain the maintenance of water sources in the area. Their main problem is budget constraint. • Distribution network is also a problem. • Omiya Pachwa Project reservoir managed by Umbrella has good water yields • Water users complain of high tariff. They feel they should be given free water because they cannot manage the tariff. • They can afford 2,500/- without money for installation • The community members also complain of high service fee. • They should sell at 100/- per jerry can or 80/- or put up a kiosk for them. • We have not received a copy of the design report. How do we monitor the project without a design report? We should have a copy of the design report. • The rates at kiosks should be lower to cater for low-income earners and vulnerable groups in the district e.g., at 100/- per jerry can. • We have successfully drilled water in the eastern part of the district. It should be able to supply enough water to the communities. • The project does not fall in any sensitive environmental area therefore there is no wish to find no chance so there will be no compensation and displacement of communities. 	<p>The project seeks to increase access to safe and adequate water</p> <p>The water will be accessed at a modest fee to cater for operation and maintenance of the scheme. Generally, the water charges will be lower than currently, in line with approved charges for rural areas</p>

Stakeholders	Views/Concerns	Response
	<ul style="list-style-type: none"> • The district should establish a committee to oversee operation of water services, trained in operation and maintenance (O&M), HIV and financial literacy. • Boreholes are drilled and sealed underground for safety purposes as they look for power to push water for distribution. • The ministry should devise better technologies to get better yields. 	
<p>Paimol Sub-county chief (SAS)</p>	<ul style="list-style-type: none"> • The project has been appreciated in the area since it will solve the water related challenges in the sub-county. • The sub-county seriously depends on boreholes. The water coverage is about 70%. • Partners help in water service provisioning in the district for example Lutheran World Federation (LWF) has rehabilitated a number of boreholes in the area. • The main challenge is at the border with eastern part of Karamoja in Karyeng. There are some water points - simple pipe schemes which the Contractor failed to drill due to some technology challenge. • Piped water system does not function because the system has broken down. They tried to repair the reservoir, due technology, the engineers failed. They attempted twice and failed. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water • The project operator will employ skilled staff to handle issues of operation and maintenance to ensure that the project meets its objectives • Further, all stakeholders in the project area will be engaged in operation and maintenance of the project so that it succeeds. Some of the stakeholders will be consolidated to be members of water user committees and grievance mechanism committees at various levels of management and governance.
<p>Group discussion: Kokil West, Paimol S/C, Agago District</p>	<ul style="list-style-type: none"> • We welcome the water project since there is water scarcity in this area. • We have few boreholes and all do not function. • The distance to the functional borehole is far. • In the olden days like 1950s, there was no scarcity of water because they were many water sources including gravity water flow but now there is only one borehole located at the school in the community where all community members fetch water. • The solar power at the borehole was spoilt so it cannot pump water to the tank reservoir. • The pipes were installed but there is no water that flows there. • National Water and Sewerage Corporation came in the area and community members surrendered their lands 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water • The project operator will employ skilled staff to handle issues of operation and maintenance to ensure that the project meets its objectives • Any private property, including land to be affected will be compensated prior to

Stakeholders	Views/Concerns	Response
	<p>to be used for water installation in the area from Kareng. They were also willing to install water in their homes.</p> <ul style="list-style-type: none"> • They should upgrade the existing source so that water can be extended to their community. • There are people spreading false information that they have land issues that would hamper water installation. We welcome the project. 	<p>start of the construction activity</p>
<p>Paimol HCIII, nurse</p>	<ul style="list-style-type: none"> • We need a lot of water for the health centre. • Are you going to install a new reservoir or work on the old one? • There is one reservoir for the rain water but the solar power was removed. • Our mothers need water in the maternity ward. • They use a borehole but it has low water yield to sustain the whole health centre and the maternity ward. • Not enough water for the maternity so they move up the hill to collect water. • People are willing to pay for the water. • We get many patients who use a lot of water beyond our budget. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water • Institutions such as health centres and schools are considered in the project design
<p>Group Discussion: Lai Central, Lumu trading centre, Paimol S/C, Agago District</p>	<ul style="list-style-type: none"> • We welcome the project. We have scarcity of water. Water which was provided by government long time ago, is no more. • The boreholes are not functional • Those days people were in IDP camps but now the population has multiplied and as a result the borehole got faulty. There is no mechanism to repair it and other sources of water. • The only water source which can supply us with water is at the church in Ibok. • If the project can be constructed in this area, it can supply water to all people in this area. • In Arol, there was water provided by the government. the borehole is not working. It lacks the pipe. • Most boreholes are not repaired. They lack spare parts. • In Agwicili, there is a borehole and a swallow well. Both of them are not functioning. The pipe got spoilt and the handle is faulty. The rope sank and there is no support to remove it. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water • The project operator will employ skilled staff to handle issues of operation and maintenance to ensure that the project meets its objectives • Further, all stakeholders in the project area will be engaged in operation and maintenance of the project so that it succeeds. Some of the stakeholders will be consolidated to be members of water user committees
<p>Resident, Omiya Pachwa</p>	<ul style="list-style-type: none"> • In Pawel, Omiya Pachwa, one borehole serves three villages, about 600 people. • The borehole yields enough water but it is locked in the evening so that the Karamojong warriors should not come to fetch water and also destroy it. • Water at the borehole is available all the time. • A borehole is averagely 1 km radius from the homes. So, distance to the borehole is the main challenge in this community. 	<ul style="list-style-type: none"> • The project seeks to increase access to safe and adequate water in the project area. This will minimize the distances travelled to access water and also minimise the dangers communities face

Stakeholders	Views/Concerns	Response
	<ul style="list-style-type: none"> • There is insecurity from the Karamojong warriors and it is worse at night. This also affects water service provisioning and delivery in the area. The community is protected by the military but they don't reach all the areas. In some areas, people have been put in camps. The animals are also centrally collected in one area (kraal) and protected by the army. Movements at night are restricted. • The warriors from Karamoja keep checking at the boreholes so that they can use the water. 	<p>while looking for water, such as encountering Karamojong warriors</p>
<p>Mixed Group Discussion: reflections of Views of Water Vendors in Orom Project Area</p>	<ul style="list-style-type: none"> • The project is welcome since the borehole/water source is far away from the communities • The borehole yields enough water but it is locked in the evening so that the Karamojong warriors should not come to fetch water and also destroy it. • Most of the water sources in Orom project area are not functional • The Karamojong are a threat to the security of the area and will hamper proper water vending by using the water from the project. • There is acute shortage of water due to limited number of water sources (boreholes). • Water from the boreholes is contaminated because some boreholes are rusty due to poor maintenance. • The water sources should be centralised in one place like a kiosk where vendors can access it and it should be cheap. 	<ul style="list-style-type: none"> • The project will provide enough water to even cater for the needs of the water vendors but they will be required to pay some money which will contribute to the operation and maintenance of the project. • This project will provide water of adequate quality for human consumption • The project design includes public standpipes at centralized locations where people who cannot afford house connections can access water

6.3 General recommendations to enhance sustainability of project

- People who have been consulted are very excited about the proposed project. However, to enhance the benefits that are anticipated, the project design should include a sensitization/educational program component especially on safe water use and proper sanitation behaviour. Without this, the investment in the supply infrastructure alone may not lead to the desired benefits, for example improvement in public health. In partnership with the local authorities, this program should be designed, financed and implemented to leverage proper hygiene and water handling practices in the project area.
- The district technical departments are willing to manage and sustain these projects so they should be involved throughout the entire process of project implementation.

- Provide technical support through training to ensure sustainable use of the resources.
- Community structures should be engaged to help in managing the project such as water user committees, association of hand pump technicians since they are based on the ground. The project should help in establishing community structures for managing the project where they are not existing and those existing should be empowered through sensitisation and trainings in governance and management of water sources.
- Insecurity, internal and cross-border conflicts between ethnic groups and districts should be addressed so that they don't affect implementation of the project. Already, the Karamojong warriors have been reportedly attacking project areas in search of water and raids. As a result, water users may not appropriately benefit from the intended project objectives.
- The Operator of the project should have the technical knowhow and be able to employ skilled personnel for efficient operation and maintenance of the project infrastructure.
- Public stand pipes need to be prioritised in the project to enable the poor people who cannot afford individual connections to their homesteads.
- It is recommended that adequate and prompt compensation for PAPs' be implemented before start of any construction activity.

7 ANALYSIS OF ALTERNATIVES

7.1 Introduction

Analysis of project alternatives as part of this environmental and social impact assessment considers other practicable strategies that can be taken to minimize or eliminate the negative impacts while enhancing the positive ones. This ensures that the project is implemented with minimal damage to environmental and socio-economic components.

7.2 The Project Need

Extension of a Piped Water Supply and Sanitation System to the proposed project area will generally come along with several benefits. These will include; meeting the increased demand for clean and affordable water, provision of job opportunities, improved sanitation and public health reduction, reduction of cases of the water borne diseases (e.g., cholera, dysentery) related to using unsafe water among others. The availability of clean, safe and affordable water and sanitation will also change the economic and wellbeing of people in the project area and Kitgum, Agago and Pader Districts in general.

7.3 The “No- Action” Alternative

Analysis of the “No project option” as an alternative, provides an environmental and socio-economic baseline against which impacts of the proposed action can be compared. This alternative means that the status quo remains and the proposed piped water supply system is not established in the area. The alternative ignores all positive impacts such as creation of employment to both skilled and unskilled labour, and provision of convenient, safe and affordable water and sanitation that are likely to be realized in the area. The No-Action alternative is clearly not recommended.

7.4 Water Source Alternatives

Two water resource options were evaluated; ground water and surface water resources. The water resources assessment established that there are no reliable surface water sources around the project area. Thus, the surface water alternative was not explored. Therefore, the only available water source for consideration, and which was selected, was the ground water source.

7.5 Power Source Alternatives

The power sources considered in the analysis included solar, diesel and hydroelectricity from the national grid. The evaluation of the power source alternative considered the associated cost for power source to pump the required water volumes and the investment costs. Solar power source was evaluated as the least costly source to install, operate and maintain. However, it was established that solar power is not independently adequate to pump water to meet the project area’s water demand. As a result, solar power will be complemented by hydropower from the national grid. Given that solar power is dependent on the sunshine, the project area is sufficient to support a solar system.

7.6 Design Considerations

Putting in place a piped water supply system according to approved designs will be a priority as it helps in enhancing the future planning project area. Therefore, it will be paramount that the proponent ensures that the facilities especially at the water source have the following in place.

- Well-designed drainage system
- Sufficient walkways within established infrastructure especially at the pumping station
- Consideration of solid waste management and other waste refuse
- Proper landscaping
- Sufficient sanitary facilities for workers
- Well-built and firm reservoir
- Well maintained power supply system for example regular maintenance of the Solar Panels.
- Well maintained water transmission line

7.7 The Action Alternative

This option implies that MWE, alongside the District Local Governments of Kitgum, Agago and Pader implement the proposed project as per the proposed project designs and recommendations by different stakeholders. A comprehensive environmental and social impact assessment has been undertaken. Details of the study are the subject of this report. The study has found no significant issues (environmental and socio-economic) to stop the implementation of the project. Mitigation measures for the identified negative impacts of this alternative have been thoroughly discussed throughout this ESIA report. If they are implemented as proposed, the project will not cause damage to the environment. It is here thus we recommend that this alternative is the most appropriate.

8 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

8.1 Introduction and Approach to Impact Assessment

This chapter identifies, describes and evaluates significant environmental and social consequences (both positive and negative) of the construction and operation phases of the proposed Orom gravity flow Piped Water Supply and Sanitation System. While positive impacts should be enhanced, the proposed mitigation measures should be implemented as suggested to minimize or eliminate the predicted negative environmental and social impacts.

8.1.1 Impact Description Evaluation Methodology

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

- Adverse or beneficial;
- Direct or indirect;
- Short, medium, or long-term in duration; and permanent or temporary;
- Affecting a local, regional or global scale; including trans-boundary; and
- Cumulative (such an impact results from the aggregated effect of more than one project occurring at the same time, or the aggregated effect of sequential projects. A cumulative impact is “the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions”).

Each of these characteristics is addressed for each impact. Consideration of the above gives a sense of the relative intensity of the impact. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study.

8.1.2 Impact Evaluation

Each impact is evaluated using the criteria listed in Table 8-1. To provide a relative illustration of impact severity, it is useful to assign numerical or relative descriptors to the impact intensity and receptor sensitivity for each potential impact. Each is assigned a numerical descriptor of 1, 2, 3, or 4, equivalent to very low, low, medium or high (Table 8-2). The severity of impact was then indicated by the product of the two numerical descriptors, with severity being described as negligible, minor, moderate or major (Table 8-3). This is a qualitative method designed to provide a broad ranking of the different impacts of a project. Illustrations of the types of impact that were assigned the different grades of severity.

Table 8-1: Classification of impact evaluation

No.	Classification	Description
1	Extent:	Evaluation of the area of occurrence/influence by the impact on the subject environment; whether the impact will occur on site, in a limited area (within 200 m from site); locally (up to 10 km from site); regionally (district wide, nationally or internationally i.e., >10 km from site).

No.	Classification	Description
2	Persistence/Duration:	Evaluation of the duration of impact on the subject environment, whether the impact was temporary (<1 year); short term (1 – 5 years); medium term (5 – 10 years); long term (10 – 50 years); and permanent (>50 years).
3	Social Context / Sensitivity or Potential for Stakeholder Conflict:	Assessment of the impacts for sensitive receptors in terms of ecological, social sensitivity and such things as rare and endangered species, unusual and vulnerable environments, architecture, social or cultural setting, major potential for stakeholder conflicts. The sensitivity classification is shown below: High sensitivity: Entire community displacement, destruction of world heritage and important cultural sites, large scale stakeholder conflict, etc. Medium sensitivity: Displacement of some households, moderate level of stakeholder concern Low sensitivity: No displacements, no potential for stakeholder conflict.
4	Regulatory and Legal Compliance:	Evaluation of the impact against Local and International legislative requirements. High: Prohibition terms for specific activities/emissions. Major breach of regulatory requirements resulting in potential prosecution or significant project approval delays. Medium: Potential breach of specific regulatory consent limits resulting in non-compliance. Low: No breach of specific regulatory consent limits anticipated.
5	Overall Impact rating (Severity):	Using a combination of the above criteria, the overall severity of the impact was assigned a rating Severe, Substantial, Moderate, Minor and Negligible. Note: These are just guidelines that constitute professional judgement required in each individual case.

8.1.3 Impact Significance or Severity

The textual description of the descriptors ranging from “Very low” to “High” is presented in Table 8-2. Impact significance is determined from an impact significance matrix (Table 8-2) which compares severity of the impact with probability of its occurrence. Impact significance criteria are as follows:

Table 8-2: Criteria for rating impact intensity and likelihood

Criteria	Rating scales	Score
Intensity (the expected)	Very Low- where the impact affects the environment in such a way that natural, and /or cultural and social functions and processes are negligibly affected and valued, important, sensitive or vulnerable systems or	1

Criteria	Rating scales	Score
magnitude or size of the impact)	communities are negligibly affected. Therefore, the environmental changes are within the existing limits of natural variations.	
	Low - where the impact affects the environment in such a way that natural, and/or cultural and social functions and processes are minimally affected and valued, important, sensitive or vulnerable systems or communities are minimally affected. No obvious changes prevail on the natural, and / or cultural/ social functions/ process as a result of project implementation.	2
	Medium - where the affected environment is altered but natural, and/or cultural and social functions and processes continue albeit in a modified way, and valued, important, sensitive or vulnerable systems or communities are moderately affected.	3
	High - where natural and/or cultural or social functions and processes are altered to the extent that they will temporarily or permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. The changes to the natural and/or cultural / social-economic processes and functions are drastic and commonly irreversible.	4
	None - where the impact will not materialize	0
Probability (The likelihood of the impact occurring)	Low - where the possibility of the Impact materializing is very low (<20%)	
	Medium - where there is a good possibility (30%-60% chance) that the impact will occur.	
	High - where it is most likely (60% -100% chance) that the impact will occur.	

Table 8-3: Determination of Significance or Severity

Impact Significance		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

- **Major:** The impact exceeds the accepted limit or standard, or has a large magnitude and occurs to highly valued/sensitive resource/receptors. These denote that the impact is unacceptable and further adequate mitigation measures must be implemented to reduce the significance. More details are provided in **Error! Reference source not found.**
- **Moderate:** The impacts in this region are within accepted limits and standards and are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical. Adequate mitigation measures make the impact minor or avoidable.
- **Minor:** Impacts in this region are considered acceptable as their magnitude is sufficiently small and within accepted standards, and/or the receptor is of low sensitivity/value. Adequate mitigation measures make the impact negligible/non-existent.
- **Negligible:** Impacts in this region are almost not felt.

Table 8-4: Impact significance assessment criteria and rating scale

Impact Rating	Impact Description
Major	<ul style="list-style-type: none"> • Highly noticeable, irreparable effect upon the environment • Significant, widespread and permanent loss of resource • Major contribution to a known global environmental problem with demonstrable effects • Causing mortality to individuals of a species classified as globally or regionally endangered • Major expedience of water/air quality and noise guidelines representing threat to human health in long and short term • Causing widespread nuisance both on and off site
Moderate	<ul style="list-style-type: none"> • Noticeable effects on the environment, reversible over the long-term Localised degradation of resources restricting potential for further usage • Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behaviour returning to normal in the medium term • Elevated contribution to global air pollution problem partly due to preventable releases • Frequent breaches of water/air quality and noise guidelines • Causing localised nuisance both on and off site
Minor	<ul style="list-style-type: none"> • Noticeable effects on the environment, but returning naturally to original state in the medium term • Slight local degradation of resources but not jeopardising further usage • Disruption/disturbance to normal behaviour of a globally or regionally endangered species returning to normal in the short term • Small contribution to global air problem through unavoidable releases • Elevation in ambient water/air pollutant levels greater than 50% of guidelines • Infrequent localised nuisance
Negligible	<ul style="list-style-type: none"> • No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action • Unlikely to affect resources to noticeable degree • No noticeable effects on globally or regionally endangered species • No significant contribution to global air pollution problem

	<ul style="list-style-type: none"> • Minor elevation in ambient water/air pollutant levels well below guidelines • No reported nuisance effects
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Cumulative impacts were also assessed, in view of the valued ecosystem components as follows:

Step 1: The Team identified the incremental effects of the project on the identified Valued Environmental Components (VECs) within the environs of the sites. The VECs were selected based on information related to current or anticipated future degraded or stressed conditions, anticipated presence of other human activities that will adversely affect the same VEC.

Step 2: Identified other past, present, and reasonably foreseeable future actions within the space and time boundaries that have been, are, or could contribute to cumulative effects (stresses) on the VECs or their indicators as identified.

Step 3: For the selected VECs, the experts compiled appropriate information on their indicators, and described and assessed their historical to current conditions where possible. Depending upon the availability of information, the identified trends in the conditions of the VECs and their indicators shall be determined and analysed.

Step 4: The team shall further link the Project to other actions like the upcoming projects in the study area to the selected VECs and their indicators.

Step 5: Assessment of the significance of the cumulative effects on each VEC over the time and the incremental effects (the direct and indirect effects) on specific VECs were included.

Step 6: For VECs or their indicators, were identified and subjected to negative incremental impacts from the Project and for which, the cumulative effects are significant, developed appropriate action-specific “mitigation measures” for such impacts. The mitigation measures were mainly based on those identified in the study.

8.1.4 Development of Enhancement and Mitigation Measures

Enhancement measures for each identified positive impact have been proposed. Similarly, the mitigation measures for each of the negative impacts have been proposed. The Contractor / Developer should ensure that the proposed impact enhancement and mitigation measures are implemented.

8.2 Potential Positive Impacts of the Project

Table 8-5 summarizes the positive social impacts that are likely to result from the proposed project.

Table 8-5: Positive Impacts of the Proposed Project

No.	IMPACT	REMARKS
1	Employment opportunities and income	<ul style="list-style-type: none"> ▪ Employment opportunities will be available for numerous disciplines/professions during construction (short-term) and operation and maintenance (long-term) phases. Not only will the skilled be employed but equally unskilled personnel. The possible direct jobs include community workers (casual labour) and semi-skilled such as trenchers, plumbers, masons, painters, carpenters, mechanics, electricians, mixer operators, steel benders, drivers, community educators, porters, cooks, security guards, etc.).

No.	IMPACT	REMARKS
2	Acquisition/improvement of skills	<ul style="list-style-type: none"> ▪ People who have ever worked on similar projects before will improve on their skills. ▪ People who have never worked on such projects will acquire such skills which they would use to seek employment in future. ▪ The Project will provide grassroots management opportunities for the local people to both manage their piped water supply and protect their local environment.
3	Reduction of poverty and improved livelihoods of the local people	<ul style="list-style-type: none"> ▪ Water is a catalyst for socio-economic development e.g., through irrigation. The community members in Agago, Pader and Kitgum will be able to use the water grow vegetables even during the dry season which they sell to earn a living.
4	Improvement in public health	<ul style="list-style-type: none"> ▪ People will have access to safe water, which will help reduce the prevalence of water-borne diseases ▪ Improved water supply will promote good health and reduce health care costs thus making overall national savings for investment in other developmental activities.
5	Achievement of universal primary education	<ul style="list-style-type: none"> ▪ Access to good water would save time and keep children healthy so that they would be able to attend school regularly. ▪ The sanitation facilities in schools will also improve on the wellbeing of the school children
6	Promotion of gender equality and empowerment of women and the girl child	<ul style="list-style-type: none"> ▪ 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).
7	Affordable and reliable water supply	<ul style="list-style-type: none"> ▪ Currently many areas have few boreholes that cannot sustainably supply water. ▪ With the project, water will be supplied both in the wet and dry season. ▪ The rate set for buying water was said to be affordable by the people in the proposed project area
8	Reduction in distances moved in search for water	<ul style="list-style-type: none"> ▪ It was indicated that community members move over 10 km in such for water for home use and watering animals. With the construction of the proposed water supply system, the water will be brought closer to the community through community stand pipe connections and in homes.
9	Improved social order	<ul style="list-style-type: none"> ▪ The proposed water supply and sanitation project will encourage people to do farming during the dry season instead of resorting to taking alcohol since they have water, they can use to irrigate their crops.
10	Reduction in domestic violence	<ul style="list-style-type: none"> ▪ Cases were women and children are beaten for delaying at water sources and also failure to provide food to their husbands. Such cases will be reduced since the water will be brought closer to the people.

8.3 Negative Impacts during the Construction and Operation Phase

The potential negative impacts of the proposed Orom Gravity Flow Water Supply and Sanitation Project are summarized in Table 8-6.

Table 8-6: Potential Negative Impacts

IMPACT	REMARKS	Intensity	Sensitivity	Overall Significance
Pre-construction phase and Construction Phase				
Land take	<ul style="list-style-type: none"> Land will be required to accommodate project components like reservoirs and pumping stations. 	2 Low	2 Low	4 Minor
Loss of property	<ul style="list-style-type: none"> Properties such as crops, houses may be destroyed, especially those that may be found at sites for water abstraction, reservoir, along the alignment of the transmission system, along access corridors 	1 Very Low	2 Low	2 Minor
Traffic disruption	<ul style="list-style-type: none"> Project construction machinery, including trucks transporting material to the sites may disrupt traffic along public roads 	1 Very low	1 Very low	1 Minor
Loss of vegetation	<ul style="list-style-type: none"> Vegetation clearance to pave way for construction activities 	2 Low	3 Medium	6 Moderate
Disruption of social order	<ul style="list-style-type: none"> Influx of foreign labour (outside of the project area e.g., from other districts) during construction works may results into disruption of the cultural norms and customs. These may include drug misuse, inappropriate sexual behaviour, vulgar language among others Some stakeholders were also concerned that there are some issues which have not yet been clearly communicated to them such as how compensations will be made, whether water will be free or at a cost 	2 Low	2 Low	4 Minor
Faecal matter disposal	<ul style="list-style-type: none"> Faecal matter originating from construction staff 	2 Low	2 Low	4 Minor
Noise from construction machinery	<ul style="list-style-type: none"> Noise pollution may arise from construction equipment. This may cause a nuisance to the public and construction staff 	2 Low	3 Medium	6 Moderate
Solid waste generation	<ul style="list-style-type: none"> Solid waste will come especially from excavated material, unused construction material, packaging material, etc 	3 Medium	3 Medium	9 Moderate
Occupational health and safety issues	<ul style="list-style-type: none"> Health and safety of workforce due exposure to unsafe site conditions, lack of protective gear etc. 	2 Low	2 Medium	4 Minor
Public health and safety issues	<ul style="list-style-type: none"> Health and safety impact such injury due to falling debris from works along public routes, falling in excavated areas along public routes, accidents from project vehicles transporting material along community access roads, etc Spread of sexually transmitted diseases such as HIV/AIDS especially from labour force coming from outside the project area 	3 Medium	3 Medium	9 Moderate

IMPACT	REMARKS	Intensity	Sensitivity	Overall Significance
	<ul style="list-style-type: none"> Accidents from construction trucks along public access roads 			
Increased susceptibility to soil erosion	<ul style="list-style-type: none"> Vegetation clearance may expose top soil to erosion during rain and heavy winds events 	3 Medium	2 Low	6 Moderate
Air pollution and climate change	<ul style="list-style-type: none"> Dust emission from murrum access road, uncovered loose construction material or construction waste, fumes from construction machinery, including greenhouse gases like carbon dioxide 	3 Medium	3 Medium	9 Moderate
Disturbance and interruption of commercial and social activities	<ul style="list-style-type: none"> Laying of transmission and distribution lines might be close or across some busy town centers and people's gardens. People may have to stop their activities to allow for laying of the water pipes which might cause losses. 	3 Medium	2 Low	6 Moderate
Theft of construction materials	<ul style="list-style-type: none"> Construction staff and community members may steal construction material, which can compromise project progress and quality of work 	3 Medium	4 High	12 Major
Operation and Maintenance Phase				
Water and soil pollution	<ul style="list-style-type: none"> Soil erosion may result from spillage/leakage of water treatment chemicals such as chlorine 	2 Low	2 Low	4 Minor
Occupational safety and health issues	<ul style="list-style-type: none"> Health and safety of workforce due exposure to unsafe site conditions, lack of protective gear etc. 	1 Very Low	2 Low	2 Minor
Generation of hazardous wastes	<ul style="list-style-type: none"> The solar batteries used on the project will require routine replacements after the lifespan. Some solar panels may also fail, requiring replacement 	3 Medium	3 Medium	9 Moderate
Incapacity to operate and maintain the project components by local people	<ul style="list-style-type: none"> Local communities may not have adequate capacity to operate and maintain the project components, which may fail the project 	3 Medium	3 Medium	9 Moderate
Unaffordability of water charges	<ul style="list-style-type: none"> People in the project area current access water free of charge from the existing water sources. Some stakeholders were scared that they might fail to afford the water charges, which may be hiked by managers of the water scheme 	3 Medium	2 Low	6 Moderate
Noise pollution	<ul style="list-style-type: none"> The generators and pumps that will be installed at the pumping stations might emit noise that could cause distress within the neighbouring communities 	2 Low	2 Low	4 Minor
Air pollution	<ul style="list-style-type: none"> Air pollution due to the generators, project vehicles and other equipment that will be used in maintenance might emit fumes that could cause respiratory infections to the community. The 	3 Medium	2 Low	6 Moderate

IMPACT	REMARKS	Intensity	Sensitivity	Overall Significance
	fumes from such equipment and vehicles also contribute to climate change through contributing to greenhouse gases in the atmosphere			
Reduction in water level in the aquifers	<ul style="list-style-type: none"> The water for the system will be pumped from boreholes that are located in various area. These could be depleted if not properly managed as some were indicated to be below the supply demand for the area, they are to supply 	3 Medium	4 High	12 Major
Human waste disposal	<ul style="list-style-type: none"> Faecal matter and wastewater will be generated from the toilet facilities that will be constructed at selected markets, schools, institutions as well as office for operating the water supply and sanitation system. Human waste is known to lead to diseases like typhoid, cholera etc., if not properly managed. The smell from such waste could also become a nuisance hence making the working environment in such areas very bad. 	2 Low	3 Medium	6 Moderate
Conflicts with Karamajongs over water	<ul style="list-style-type: none"> Areas of Orom are prone to attacks from Karamajong warriors who move in search for water. In some cases community member are killed in the process. The communities fear that the water facilities will be targeted by the warriors as they search for water for their animal hence vandalising them. 	4 High	4 High	16 Major
Spread of sanitation and water borne diseases	<ul style="list-style-type: none"> Poor operation and maintenance of the public toilet e.g., lack of water for flushing and washing hands and failure to empty the septic tank may expose the public to water-borne and sanitation diseases like cholera, diarrhoea, dysentery etc 	3 Medium	3 Medium	9 Moderate
Vandalization / theft project equipment	<ul style="list-style-type: none"> The project equipment may be vandalized or stolen by community members, including solar panels, valves, pipes 	3 Medium	3 Medium	9 Moderate
Decommissioning Phase				
Disruption of water supply	<ul style="list-style-type: none"> The decommissioning of the project may affect water supply to the consumers. This might affect public health (through using unsafe water sources) and person hygiene 	3 Medium	3 Medium	9 Moderate
Traffic disruption	<ul style="list-style-type: none"> Project demolition and removal project infrastructure may disrupt traffic along public roads 	3 Medium	3 Medium	9 Moderate
Disruption of social order	<ul style="list-style-type: none"> Influx of foreign labour (outside of the project area e.g., from other districts) during demolition works may result into disruption of the cultural norms and customs. These may include drug misuse, inappropriate sexual behaviour, vulgar language among others 	2 Low	2 Low	4 Minor
Faecal matter disposal	<ul style="list-style-type: none"> Faecal matter originating from demolition staff and also from the toilet facilities might be a 	2 Low	2 Low	4 Minor

IMPACT	REMARKS	Intensity	Sensitivity	Overall Significance
	nuisance to the community if not handled properly.			
Noise pollution	<ul style="list-style-type: none"> ▪ Intermittent noise from demolition equipment and heavy vehicles might cause distress to people in the vicinity of the demolitions area. 	3 Low	3 Medium	9 Moderate
Solid waste generation	<ul style="list-style-type: none"> ▪ Solid waste will be generated especially from demolition debris. ▪ Solar panels and solar batteries which will be used will also be a source of hazardous waste 	3 Medium	3 Medium	9 Moderate
Occupational health and safety issues	<ul style="list-style-type: none"> ▪ Health and safety of workforce due exposure to unsafe site conditions, lack of protective gear etc. 	2 Low	2 Medium	4 Minor
Public health and safety issues	<ul style="list-style-type: none"> ▪ Health and safety impact such injury due to falling debris from works along public routes, falling in excavated areas along public routes, accidents from project vehicles transporting material along community access roads, etc ▪ Spread of sexually transmitted diseases such as HIV/AIDS especially from labour force coming from outside the project area ▪ Accidents from demolition trucks along public access roads 	3 Medium	3 Medium	9 Moderate
Increased susceptibility to Soil erosion	<ul style="list-style-type: none"> ▪ Inappropriate demolition practices using heavy equipment and that expose the soil may induce/accelerate soil erosion and siltation of water courses. Contamination may occur as a result of accidental or structural spillage of fuels and lubricant chemicals, as well as from leakage from inadequately protected solid waste storage facilities and sites. 	3 Medium	2 Low	9 Moderate
Air pollution and climate change	<ul style="list-style-type: none"> ▪ Emissions from demolition equipment and vehicles, and dust emissions from the grounds. ▪ Fumes from construction machinery, including greenhouse gases like carbon dioxide 	3 Medium	3 Medium	9 Moderate

8.4 Proposed Enhancement and Mitigation Measures

8.4.1 Proposed Enhancement Measures

The enhancement measures for the identified positive impacts related to this project have been proposed, as presented in Table 8-7.

Table 8-7: Proposed impact enhancement measures

No.	IMPACT	REMARKS
1	Employment opportunities and income	<ul style="list-style-type: none"> ▪ Prepare a labour force management plan ▪ Preference for employment opportunities should be given to the local people where they have the required skills (for skilled labour

No.	IMPACT	REMARKS
		<p>activities). Otherwise, all activities which do not require skills such as casual activities should be given to the locals</p> <ul style="list-style-type: none"> ▪ The use of appropriate labour-intensive methods for some of the construction activities (for example excavation for pipelines) should be undertaken to enable as many local people (including women) as possible get jobs ▪ Priority for sourcing materials for construction and other services such as food and accommodation should be given to local suppliers ▪ Ensure that children are not employed on the project
2	Acquisition/improvement of skills	<ul style="list-style-type: none"> ▪ Foreign companies (if contracted) should be required to have a joint venture with local companies to build their capacity. ▪ Contracts terms for construction works for the project's construction and O&M phase should emphasize knowledge transfer and the project developer should monitor and ensure that the objectives are met. ▪ O&M manual and standard operating procedures must be handed over to the operator
3	Reduction of poverty and improved livelihoods of the local people	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water
4	Improvement in public health	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water ▪ Sensitize communities of the dangers of using unsafe water sources
5	Achievement of universal primary education	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water
6	Promotion of gender equality and empowerment of women and the girl child	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water
7	Affordable and reliable water supply	<ul style="list-style-type: none"> ▪ Encourage and promote catchment protection by the communities so as the water sources are not depleted ▪ Set the prices for the water both connection and service fees as low as possible in tandem with income levels of the people ▪ Install reservoirs that are enough to sustain supplying the community for longer hours in times of scarcity
8	Reduction in distance moved in search for water	<ul style="list-style-type: none"> ▪ Install community water serving points in each village ▪ Ensure continuous supply of clean water to the people throughout the day ▪ The water services should be made affordable for everyone though low tariffs.
9	Improved social order	<ul style="list-style-type: none"> ▪ Install community service points closer to the people.
10	Reduction in domestic violence	<ul style="list-style-type: none"> ▪ Put at least community water point in each village to serve the people and also to prevent congestion. ▪ Ensure continuous supply of water throughout the day.

No.	IMPACT	REMARKS
		<ul style="list-style-type: none"> ▪ Encourage people to store water in preparation for scarcity

8.4.2 Mitigation Measures

The mitigation measures to avoid, reduce or minimize the identified negative impacts have been proposed, as presented in Table 8-8.

Table 8-8: Mitigation Measures

IMPACT	MITIGATION MEASURE
Pre-construction and Construction phase	
Land take	<ul style="list-style-type: none"> ▪ Compensation should be done for land and trees lost by the owners neighbouring the project infrastructure. These should be compensated based on the laws and regulations of Uganda. Compensation should be done as guided by the Government Valuer in conjunction with land/property owners.
Loss of property	<ul style="list-style-type: none"> ▪ All property should be valued and duly compensated prior to start of construction works ▪ For property like crops, where possible, owners should be informed early about the project work plan and allowed to harvest them prior to start of construction
Traffic disruption	<ul style="list-style-type: none"> ▪ Appropriate traffic management plans should be implemented with the help of local police when (partial) closure of roads is required. ▪ Liaise with the local traffic authority to manage traffic at busy crossings e.g., markets, schools, churches
Loss of vegetation and soil cover	<ul style="list-style-type: none"> ▪ Prepare a vegetation restoration plan. The plan should ensure that: <ul style="list-style-type: none"> ➢ Vegetation clearance is restricted to only areas to be constructed. ➢ Landscaping and re-vegetation are undertaken after construction especially around the water abstraction source and at the reservoir site.
Disruption of social order	<ul style="list-style-type: none"> ▪ Prioritize employment of local people where they have the required skills ▪ Sensitizing all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles ▪ Prepare a stakeholder engagement plan and ensure that stakeholder engagement is a continuous process throughout the project implementation
Faecal matter disposal	<ul style="list-style-type: none"> ▪ Prepare a waste management plan. The plan should provide temporary eco-san toilet on site during site works
Noise from construction machinery	<ul style="list-style-type: none"> ▪ Schedule noise-intensive work for the least noise-sensitive time of the day (work between 8 am and 5 pm); ▪ Provision of PPE to project workers ▪ Regular noise assessments
Solid waste generation	<ul style="list-style-type: none"> ▪ Prepare a waste management plan. The plan should ensure provide for: <ul style="list-style-type: none"> ➢ use the excavated material for backfilling. ➢ waste bins for proper waste storage. ➢ a waste collection company to manage waste generated.
Occupational health and safety issues	<ul style="list-style-type: none"> ▪ Prepare an occupational Health and safety plan. The plan should ensure: <ul style="list-style-type: none"> ➢ provision of workers with PPE and sensitise them on basic safety precautions. ➢ provision of a first aid kit; ➢ provision of adequate sanitary facilities;

IMPACT	MITIGATION MEASURE
Public health and safety issues	<ul style="list-style-type: none"> ▪ Prepare a community health and safety plan, which should ensure that: <ul style="list-style-type: none"> ➤ all dangerous areas along public roads are cordoned off ➤ speed limit of project vehicles along community roads do not exceed 40 km/h. ➤ construction works along community access roads are communicated to public at least a week prior to start of the works ▪ Prepare an HIV/AIDS management plan ▪ Prepare a traffic management plan, which should include provision for: <ul style="list-style-type: none"> ➤ speed reduction humps at crossings of many people, e.g., at a school, market; ➤ reflective signature to direct traffic to designated areas; ➤ informing of local communities and road users in advance, in case access roads have to be closed.
Increased susceptibility to soil erosion	<ul style="list-style-type: none"> ▪ Prepare an erosion control plan. The plan should provide for: ▪ Immediate disposal (where possible) of any excavated soil to avoid loose soil being washed away by storm water. ▪ Planting of bands of grass on erosion prone surfaces.
Air pollution and climate change	<ul style="list-style-type: none"> ▪ Vehicles transporting construction material along community access roads should move at lower speeds, not exceeding 40 km/hr ▪ All loose material like sand, cement, murram, soil should be covered with a tarpaulin during transportation ▪ Water should be sprinkled on dusty ground where other measures cannot appropriately minimize dust emission ▪ Repair and maintain construction equipment following the manufacturer's specifications, including on fuelling ▪ Offset emitted carbon dioxide during construction activities by planting local trees at all devastated sites
Disturbance and interruption of commercial and social activities	<ul style="list-style-type: none"> ▪ Local communities should be informed about the construction program in advance and adhere to it; ▪ Access roads in the neighbourhood should be maintained and cleaned of earth and sand on a daily basis; ▪ Temporary access ways should be provided with the approval of local authorities where access roads are closed; ▪ Works should be carried out under mild weather; avoiding strong rains or winds; ▪ Obstruction of access to and use and occupation of roads, footpaths and bridges should be reduced; ▪ Where livelihoods and property are affected, valuation and prompt compensation should be undertaken for the PAPs
Operation and Maintenance Phase	
Water and soil pollution	<ul style="list-style-type: none"> ▪ Ensuring that storage containers are checked regularly for leakage
Occupational safety and health issues	<ul style="list-style-type: none"> ▪ Prepare an occupational health and safety plan. The plan should ensure that: <ul style="list-style-type: none"> ➤ employees checking the water reservoir tanks have a harnessing equipment before any activities are carried out; ➤ workers are provided gloves and masks especially those handling chemicals; ➤ trainings on the operations of the water system are regularly conducted;

IMPACT	MITIGATION MEASURE
	<ul style="list-style-type: none"> ➤ safety signages are put at the reservoir tank points and abstraction point; ➤ firefighting equipment are installed at the abstraction point; ➤ a well-equipped first aid kit is availed to project workers.
Incapacity to operate and maintain the project components by local people	<ul style="list-style-type: none"> ▪ Train local community members in the operation and maintenance of the water supply infrastructure ▪ Prepare a quality management plan
Unaffordability of the water charges	<ul style="list-style-type: none"> ▪ Levy charges in consideration of the income levels of the area. Charges for poor people should be just enough to cover the operational costs ▪ Provide many public standard pipes where poor people can obtain water cheaply
Noise pollution	<ul style="list-style-type: none"> ▪ Same as in the construction phase
Air pollution	<ul style="list-style-type: none"> ▪ Same as in the construction phase
Reduction in water levels in the aquifers	<ul style="list-style-type: none"> ▪ The design of the water supply system should cater for changes in precipitation due to climate change. ▪ Reservoir should be installed that can store enough water to cater for the needs of the communities during times of storage. ▪ Encourage and promote catchment protection as part of corporate social responsibility through planting trees ▪ Obtain a water abstraction permit from DWRM, which will clearly specify the maximum allowable abstraction volumes from aquifers
Human waste disposal	<ul style="list-style-type: none"> ▪ The toilet facilities should be operated according to the procedures to be provided by the design team. ▪ The toilets should be emptied and waste transported by a licensed company ▪ The waste should be disposed of to a designated area
Conflicts with Karamajongs over water	<ul style="list-style-type: none"> ▪ Fence off the project infrastructure to avoid vandalism ▪ Security should be provided at key infrastructure like pumps by Police or UPDF ▪ Provisions should be put for watering of animals
Decommission Phase	
Disruption of water supply	<ul style="list-style-type: none"> ▪ Inform the communities in the affected areas well in advance about the decommissioning activities ▪ Provide alternative source of water
Traffic disruption	<ul style="list-style-type: none"> ▪ As for the construction phase
Disruption of social order	<ul style="list-style-type: none"> ▪ As for the construction phase
Faecal matter disposal	<ul style="list-style-type: none"> ▪ As for the construction phase
Noise pollution	<ul style="list-style-type: none"> ▪ As for the construction phase
Solid waste generation	<ul style="list-style-type: none"> ▪ As for the construction phase
Occupational health and safety issues	<ul style="list-style-type: none"> ▪ As for the construction phase
Public health and safety issues	<ul style="list-style-type: none"> ▪ As for the construction phase
Increased susceptibility to Soil erosion	<ul style="list-style-type: none"> ▪ As for the construction phase
Air pollution and climate change	<ul style="list-style-type: none"> ▪ As for the construction phase

8.5 Cumulative Impacts

The proposed project will be implemented in a semi-urban setting where there are other competing land uses. This has a potential of triggering cumulative environmental impacts i.e., impacts both from the project and other activities that are likely to affect the same environmental resources or receptors. The most important valued ecosystem components (VECs) within the project areas likely to be affected are:

- a. Groundwater resources,
- b. Surface water resources,
- c. Flora and fauna

Table 8-9 gives a summary of the potential cumulative impacts and recommended mitigation measures:

Table 8-9: Potential cumulative impacts

Ecosystem Component	Other “stressors” (potential sources of cumulative impact)	Potential impact	Description of mitigation measures
Groundwater resources	-Opening up land due to urban development for construction of e.g., residences, industries, access roads -Abstraction of ground water by other projects	-Increased runoff-affecting recharge of local aquifers in the catchment -Reduction of ground water yield	-Carry out community awareness and sensitization regarding environmental conservation in the catchment -All projects intending to abstract groundwater should undertake a groundwater resources assessment -All projects intending to abstract groundwater should seek guidance from respective District Local Government
Surface water (quality and quantity)	-Land use changes which may affect water flow and retention in streams and wetlands -Human wastes from un-sewered settlements, animal waste from livestock, runoff from agricultural fields	-Reduction in water volumes/quantity in surface water bodies like wetlands, which will compromise groundwater recharge -Compromised of water quality of surface and groundwater	-Carry out community awareness and sensitization regarding environmental conservation in the catchment -Restore converted/rehabilitated degraded wetlands and forests in the catchment -Regularly monitor effluent standards of existing industries and all other effluent discharging entities in the catchment
Flora and fauna	Opening up land due to urban development for construction of e.g., residences, industries, access roads	-Disturbance or loss of terrestrial species and their habitat due to increased development activities -Increased erosion and ensuing sedimentation/siltation of streams	-The MWE should participate in environmental conservation projects in the catchment or where they are non-existent, the MWE should initiate them, including restoring degraded ecosystems

9 ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLAN (ESMMP)

9.1 Introduction

The goal of the Environmental and Social Management and Monitoring Plan (ESMMP) is to ensure that environmental and socio-economic issues continue to be fully integrated into the decisions by the project proponent while promoting resource allocation efficiency throughout the lifetime of the project. This section provides a framework for managing and monitoring impacts for the life of the project. It is designed to ensure that the commitments, enhancement and mitigation measures identified, and in any subsequent assessment reports, together with any license approval or similar conditions, are implemented. In executing the project, the project proponents shall take all practicable measures to ensure that the requirements and recommendations of this report are complied with.

It also specifies monitoring actions and specific responsibilities assigned in order to check progress and the resulting effects on the environment during all project phases. Monitoring will begin immediately and will continue through both the construction and operation phases. One important aspect of monitoring will be to assess the effectiveness of the mitigation measures suggested, where they are found lacking, appropriate new actions to mitigate any adverse effects will be undertaken.

Therefore, this is a core tool that the Contractor will use to monitor project implementation and develop a standalone Environmental and Social Implementation Plan (ESIP) or Contractors Environmental and Social Management Plan (CESMP) to guide project implementation. This ESMMP is intended to guide the Contractor in the preparation, implementation, monitoring and reporting on the CESMP. The CESMP will need to be regularly reviewed and updated as the project progresses to reflect any changes in project implementation and organization as well as regulatory requirements.

9.2 Integration of Safeguards into Procurement Process (Contracts)

9.2.1 Bidding

During the bidding process, the Contractor will be expected to include a brief methodology of the implementation of the relevant environmental and social safeguards and attach a cost of implementation of these plans in his proposal bid. In addition, the Contractor should provide relevant staff for the implementation of the safeguards including a Social Specialist supported by Community Liaison Officers and an Environment Specialist supported by HSE Officers. Lastly, the Contractor must prove prior experience in adequately managing safeguards issues in the water sector.

9.2.2 Bill of Quantities (BoQs)

The BoQs must capture all relevant safeguards aspects. The indicative costs of implementing safeguards extracted from the ESMMP budget should be clearly provided

as a provisional sums or billable items in the Bills of Quantities. These should include safeguards staffing, documentation (CESMP, etc.), waste management, HIV/AIDS, grievance redress, gender awareness, site clean-up and landscaping, monthly ESMP reporting among others. Laxity in the provision and use of personal protective equipment is a risk to the safety of workers. The BoQs should provide a sum for PPE and supervision be done to ensure that all workers undertake works while in full PPE.

9.2.3 Safeguards Clauses

As a best practice, the contracts for the civil works should include clauses on management of environment and social aspects. Sometimes, the clauses are weak and cannot be used to hold the Contractors accountable. There is need to strengthen the clauses and to tailor them to the specific project safeguards aspects and management needs.

9.2.4 Procurement of the Contractor

Implementation of mitigation measures during construction is key to managing short- and long-term impacts and risks. As a best practice, the contracts for the civil works should include clauses on management of environment and social aspects. Sometimes, the clauses are weak and cannot be used to hold the contractors accountable. There is need to strengthen the clauses and to tailor them to the specific project safeguards aspects and management needs. The contractual agreement will also include clauses to enforce the implementation of the relevant mitigations. The clauses should be included in technical specifications in all contract documents related to the civil works. Safeguards clauses should be prescriptive and specify: what needs to be done, where it needs to be done, when and how the actions will take place, who is responsible, the monitoring and reporting requirements, and what sanctions or legal recourse are available for work that does not meet the required specifications.

9.2.5 Staffing

It is common for contractors to recruit unqualified safeguards staff or to assign safeguards duties to site foremen or clerks with no prior safeguards experience. Staffing requirements should be spelt out in the contracts. In addition, it may be useful to include the minimum requirements in the contracts for the civil works. Therefore, the MWE, through the supervising consultants must approve the contractor's Environment Officer, Health and Safety Officer and the Sociologist.

9.2.6 ESMP Monitoring and Reporting

Laxity in implementation and reporting on safeguards issues is common amongst contractors largely because they do not take safeguards issues seriously. This can be addressed by requiring contractors to prepare monthly environment and social monitoring reports. These should either be pay items and clearly included in the BoQs or a condition for certification and payment approvals. Contractor safeguards reports are usually characterized by failure to include useful monitoring indicators such as safety

statistics (fatalities, minor injuries, near misses, etc.), number of trees cut, and number replanted amongst others. The contractors will require training on safeguards monitoring and reporting. The contractors need to undertake proper recordkeeping of all safeguard activities. The contractors should liaise with District technical offices such as the DEO and DCDO to ensure proper monitoring and timely implementation of project activities.

9.2.7 Project Reporting Commitments

The Contractor will be required to prepare regular reports (monthly, quarterly, and annual) on environmental, social, health and safety performance.

The Contractor will, under the guidance of the MWE and the District Local Governments of Kitgum, Pader and Agago, engage services of an independent Environmental and Social Compliance Auditor to undertake an Environmental and Social Audit to determine the level of the Project's environmental and social performance, in relation to the implementation of the ESMMP. The report will provide the information and data required to determine compliance with national legal requirements as well as OPs of the AfDB. The aspects to be reported on will include; grievance management, labour influx, traffic management, community health and safety and security, air quality, erosion and water pollution, waste management, emergency response, HIV/AIDS and gender management, Environmental and social restoration, among others.

9.3 Contractor Management Plans and Method Statements

The Contractor will be required to prepare some standalone safeguards management plans in addition to the Contractor's Environment and Social Management Plan (C-ESMP). Reference should always be made to the C-ESMP as the overarching document that contains general Control Statements for various impacts such as air quality, solid waste, and hazardous materials, water quality and ecosystem, noise and vibration control, erosion control, waste excavation and disposal and safety and occupational health. In addition to the Management Plans, the Contractor should prepare Method Statements for specific activities such as excavation works and submit for the Supervision Engineer's review and comments before commencement of works. If the Engineer notifies the Contractor that a specific method statement has failed to provide adequate mitigations, such a statement should be revised and resubmitted until when approved.

9.3.1 Labour Force Management Plan

The Contractor is expected to have a clear plan for recruitment of workers to promote project ownership by the communities. The Contractor should give preference to local people by recruitment of unskilled and semi-skilled labour from project villages and this should be done through local areas councils from where those seeking employment should get letters of recommendations.

9.3.2 Quality Management Plan

A quality management plan defines the quality policies and procedures relevant to the project for both project deliverables and project processes and who is charged with what responsibility to ensure compliance to set stands. Given the nature of this project, the Contractor should have a quality management plan to guide the quality control and assurance processes to achieve the intended outcomes in terms of social, design, structural and investment outcomes in line with environmental and social safeguards policies.

9.3.3 Erosion Control Plan

Soil erosion risks are expected to be mainly associated with vegetation clearance, construction of access roads and storage of excavated materials. In some cases, the project area may receive high amounts of rainfall that will be associated with soil erosion.

An erosion control plan should be overlaid on the project grading plan(s) or site plan if there is not a grading plan. The erosion control plan needs to show what Best Management Plans (BMPs) will be used and where, as well as the total area under disturbance. The plan must include measures to prevent erosion, contain sediment and control drainage. The erosion control plan must also include installation details of the BMPs as well as notes. Construction sites often have areas where soil disturbing activities such as clearing, grading, or cut/fill work has stopped for a period of time. Bare areas that are not actively under construction need some type of temporary cover to prevent or minimize erosion in the event of rainfall. Applicable areas include topsoil stockpiles, rough graded areas, sediment basin dikes, ditches, temporary earthen structures, and graded areas undergoing settlement. The following controls may be considered:

- a. Stabilization which includes a wide range of erosion prevention practices that cover exposed soil such as the use of straw, mulch, erosion control blankets, plastic sheeting or tarpaulins.
- b. Temporary seeding which is a soil stabilization practice involving the establishment of temporary vegetative cover to reduce erosion on construction sites that have disturbed areas that are temporarily idle.

9.3.4 Waste Management Plan

The Waste Management Plan (WMP) shall be prepared to address waste management aspects associated with the construction in line with legal and regulatory requirements. The Contractor, all subcontractors, and vendors involved in the project shall have to adhere to this Plan. The Contractor is responsible for ensuring that waste is managed in accordance with this Plan by providing the necessary resources and by issuing instructions and guidance during project execution. The Contractor will implement waste management measures and practices throughout the construction period to mitigate the associated risks. The WMP will contain the following information:

- Relevant legislation and guidelines for waste management of the Project;

- The procedures and initiatives proposed to address the management of waste materials;
- Safeguards, mitigation measures and monitoring to manage waste impacts during construction;
- Roles and responsibilities of those involved in the implementation of waste management controls;
- An effective monitoring, auditing and reporting framework to assess the effectiveness of the controls implemented
- Checklists and forms for day-to-day waste management activities.

The Contractor shall undertake measures to respond to all generated categories of wastes. The Contractor should be aware that large quantities of cut to spoil may be generated which will require disposal. Therefore, the Contractor is expected to identify potential sites for waste disposal before excavation works commence in order to secure the requisite approvals in a timely manner.

9.3.5 Occupational Health and Safety Plan

The Contractor will have to prepare a document that presents the framework for occupational health and safety management and monitoring measures to undertake. The OHS plan should typically cover safety programs that will be applied for promoting health and safety, preventing harm, fatality and hazards to the employees, sub-contractors, properties and the general public.

9.3.6 Community Health and Safety Plan

This Plan applies to project construction activities and the associated risks and potential impacts that these activities may have on community health and safety. The risks and potential project impacts to community health and safety can emerge from both within and outside the so-called project area of influence. Therefore, the scope of this plan focuses on the management of aspects associated with the interaction of construction activities, the workforce, and the community as well as mitigation of contagious diseases (e.g., COVID-19; etc). The Plan should include control measures designed to avoid, minimize or mitigate the adverse effects of project activities on the health and safety of the community, while at the same time, enhancing the beneficial effects and capitalize on opportunities that may contribute to improving overall community well-being.

9.3.7 HIV/AIDS and Gender Management Plan

The Contractor in pursuit of his commitment to health and safety will organize trainings, conduct awareness and education on the use of infection control measure in the workplace. The Contractor is expected to provide appropriate PPE to protect workers from the risk of exposure to HIV/AIDS and incorporate HIV/AIDS information in occupational health and safety inductions, provide guideline in preventing the spread of HIV/AIDS and other sexually transmitted infections (STIs), publicize knowledge related to HIV/AIDS and STIs to the work crews and the surrounding communities, provide

information on good HIV prevention interventions, including promotion of the correct use of condoms and ensure sufficient resources are available for HIV programs.

All the relevant stakeholders should be kept informed and up to date on issues pertaining to the project activities especially those, which affect them or where they have influence.

The Contractor should also provide a plan documenting how gender issues such as gender-based violence, employment segregation based on gender, among others will be addressed sexual violence.

9.3.8 Traffic and road safety Management plan

The major purpose of this plan is to help protect road users and workers and keep traffic delays to a minimum through proper and clear signage and controls. The Traffic Management Plan will provide actions to ensure safety of road users and construction staff during construction especially when laying water transmission pipes. It will outline traffic control and traffic management procedures to prevent potential hazards associated with road use during construction. Any road work resulting in obstruction of roads needs to be managed so that safety is not compromised and disruptions and delays to road users are kept to a minimum. The Plan shall include a road safety awareness program.

9.3.9 Cultural Heritage Management Plan

This plan will include measures to manage risks and impacts on cultural heritage during construction. There could be other unknown physical cultural resources (PCRs) within the construction areas. If any chance finds are made, measures must be taken to ensure 'conservation' in accordance with legislation and to contact the Department of Monuments.

9.3.10 Stakeholder Engagement Plan (SEP)

All stakeholders need to be kept informed during project implementation so as to accord the necessary support and advice. This consultation and public participation will be an on-going process that will continue throughout the implementation of the project. In pursuit of timely, meaningful and appropriate stakeholder engagement, the contractor is expected to have a clear strategy for stakeholder engagement to assist in managing and facilitating future engagement through the various stages of the Project's life cycle from mobilization up to handover. The SEP shall detail the key stakeholders to be engaged and the schedule of engagements throughout the various stages of construction, decommissioning and the defects liability period.

9.3.1.1 Purpose of SEP

The SEP is an instrument for mapping and prioritizing stakeholders across levels and regions; and for guiding planned consultations and disclosure of relevant project information to/with identified stakeholders.

9.3.1.2 Stakeholder Categorization

Three (3) categories of stakeholder to be mapped out (across three levels at the national, regional and community) as follows.

- a. Primary level stakeholders considered to have high influence and power in respect to the project, project area and potential impacts and project implementation. These require regular engagements and consultations throughout the project life.
- b. Secondary level stakeholder considered to have either high influence but low power or high power but low influence. These will require to be initially consulted and regularly kept informed.
- c. Tertiary stakeholders considered to have low power and low influence.

9.3.1.3 Information Needs

The following information should be made available to all stakeholders, who are likely to be affected by positive and adverse environmental or social impacts from the project:

- Purpose, nature, objectives and scale of the project.
- Schedule and duration of proposed project activities.
- Potential project risks and impacts extracted from the ESIA.
- Proposed mitigation plans.
- Available grievance mechanisms.
- Envisaged consultation process, if any, and opportunities and ways in which the public can participate (via the SEP) and
- Time and venue of any planned public meetings.

9.3.1.4 Disclosure Mechanisms

A number of strategies can be used to enhance public information disclosure and stakeholder consultations including:

- Scheduled public hearings at community level (village and parish) for initial disclosure, disclosure of draft reports and final reports including their implementation
- Dedicated and select meetings with institutional stakeholders at the central regional, district and sub-county levels at different project phases
- Dedicated meetings with select social groups like livelihoods groupings and vulnerable social groups including women, youth, PWDs and local leaders.
- Project Background Information Document (PBID) summaries will be prepared, translated and shared alongside other strategies described herein
- Non-Technical Summaries (NTS) of the ESIA will also be developed for public disclosure through print media and info-shops for the regulators, funder and project proponent.

A template of a stakeholder engagement plan is depicted in Table 9-1.

Table 9-1: Stakeholder Engagement Plan template

Project phase	Activity	Objectives	Level and type/group of stakeholders	Methods/Tasks and Materials	Schedule/Frequency

9.4 Grievance Redress Mechanism (GRM)

9.4.1 Grievance Procedure and Rationale

This section describes the procedure and mechanism through which community members and PAPs will be able to report, make, place/lodge or express a grievance against the project, its staff or contractors as part of the mitigation measures. It also describes the roles and responsibilities for different structures in resolving grievances. A grievance is any dissatisfaction or sense of injustice, or unfairness felt by a person-in this respect a community member, PAP or his/her representative in connection with his/her compensation entitlements, RAP implementation process, the project Developer, Contractor and other scenarios related to project implementation. The grievance is usually brought to the attention of the person(s) in charge, referred to here as the Grievance Officer (GO). This grievance procedure is intended to put in place and facilitate accessible, prompt and cost-effective handling of grievances at the nearest points of service to community members and the PAPs.

The aim and purpose of this system is to make the grievance handling procedures accessible, prompt and affordable to the PAPs given the generally low values of some of the properties to be affected; and also provide an alternative to the costly and time-consuming formal courts procedures for handling grievances and disputes. The objective of the grievance handling systems and procedure is to establish for the community members and PAPs mechanisms for raising complaints related to compensation for loss of land and other livelihood properties and assets and having such complaints resolved as amicably as possible through acceptable and binding corrective actions.

9.4.2 Steps of the Grievance Process

The grievance mechanism is adopted from the MWE-RPF, 2012 already disclosed. The grievance mechanism operating at each location will receive inputs from four main sources:

1. Directly from the PAPs or other members of affected community.
2. From the RAP implementation team.
3. From the Monitoring and Evaluation Officer who will forward issues/concerns identified in the field.

4. From the Local Government Offices at the Sub-county/District Levels since these are as close to the community as possible. Steps of the grievance process are described below.

Receipt of Complaint/Grievance

A verbal or written complaint from a PAP or community member will be received by the Grievance Officer (GO) (refer to Table 9-2 for the roles of the GO) or an assigned contact officer in a given administrative jurisdiction/authority near to community level and recorded in a grievance log which will be held in the Sub-county. The contact officer at the sub-county will be the Sub-county Chief.

Table 9-2: Role of a Grievance Officer

Role of a Grievance Officer
<p>A Grievance Officer (GO), who will be a member of the Project Implementation Team, will lead the grievance mechanism. Principal responsibilities of the GO will include:</p> <ol style="list-style-type: none"> 1. Recording the grievances, both written and oral, of the affected people, categorizing and prioritizing them and providing solutions within a specified time period. 2. Discussing grievances on a regular basis with the Working Group and coming up with decision/actions for issues that can be resolved at that level. 3. Informing the Steering Committee of serious cases within an appropriate time frame. 4. Reporting to the aggrieved parties about developments regarding their grievances and decisions of the Steering Committee. 5. Providing inputs into the monitoring and evaluation process <p>Source: MWE-RPF (Ministry of Water and Environment-Resettlement Policy Framework), 2012</p>

The grievance team will hold meetings at sub-county headquarters where grievances are received by a contact person who would then hand over received complaints to the GO, for entering into the grievance log using the grievance form.

The grievance log will indicate grievances, date opened/lodged, actions taken to address or reasons the grievance was not acted upon (e.g., the grievance was not related to the resettlement process); information provided to complainant and date the grievance was closed.

Grievances can be lodged at any time, either directly to the GO or the Sub-county headquarters. The process for lodging a complaint is outlined below:

- I. The GO will receive a complaint from the complainant or from the appointed contact person at the sub-county headquarters.
- II. The GO will ask the claimant questions in their local language, write the answers in English and enter them in English onto the Grievance Form.
- III. A representative of an independent local civil society organization witnesses translation of the grievance into English.
- IV. The GO reads the complaint in English and translates it into the complainant`s local language on the Grievance Form.

- V. The local leader (representative of an independent local civil society organization) and the complainant both sign the Grievance Form after they have both confirmed the accuracy of the grievance.
- VI. The GO lodges the complaint in the Grievance Log.

Determination of Corrective Action

If in their judgment, the grievance can be solved at this stage, the GO and a representative of a local independent civil society/organization will determine a corrective action in consultation with the aggrieved person. A description of the action; the time frame in which the action is to take place; and the party responsible for implementing the action will be recorded in the grievance data base.

Grievances will be resolved and status reported back to complainants within 30 days. If more time is required, this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, detailed investigations will be undertaken and results discussed in the monthly meetings with affected persons. In some instances, it may be appropriate to appoint independent third parties to undertake the investigations.

Meeting with the Complainant

The proposed corrective action and the timeframe in which the grievance is to be implemented will be discussed with the complainant within 30 days of receipt of the grievance. Written agreement to proceed with the corrective action will be sought from the complainant (e.g., by use of an appropriate consent form). If no agreement is reached, Step 2 will be re-visited.

Implementation of Corrective Action

Agreed corrective actions will be undertaken by the project developer or its contractors within the agreed timeframe. The date of the completed action will be recorded in the grievance database.

Verification of Corrective Action

To verify satisfaction, the aggrieved person will be approached by the GO to verify that the corrective action has been implemented. A signature of the complainant will be obtained and recorded in the log and/or on the consent form (see Step 3). If the complainant is not satisfied with the outcome of the corrective action additional steps may be undertaken to reach agreement between the parties. If additional corrective action is not possible alternative avenues maybe pursued.

Action by the Local Leaders and Project Contractors

If the GO and independent observer cannot solve the grievance, it will be referred to relevant parties such as local leaders, District Officers, Construction Contractor, Valuer and MWE, for consultation and relevant feedback provided.

Action by the Grievance Committee

If the complainant remains dissatisfied and a satisfactory resolution cannot be reached, the complaint will be handled by the Grievance Committee. A dedicated Grievance Committee will be established to assess grievances that arise from disputes in each district (Agago, Kitgum, Pader). This will include the following members:

1. District Land Office Surveyor;
2. Representative of the valuer;
3. Grievance Officer
4. SC LC III Council Representative where it applies.

This committee must have a quorum of at least three persons. Decisions will be reached by simple majority. The Grievance Committee should be constituted for as long as grievances are being lodged.

Once the Grievance Committee has determined its approach to the lodged grievance, this will be communicated to the GO, who will communicate this to the complainant. If satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied however, the complainant notes the outstanding issues, which may be re-lodged with the Grievance Committee or the complainant may proceed with judicial proceedings.

Action by Developer (MWE)

If no satisfactory solution is reached by the Grievance Committee, the complainant can be advised to lodge the complaint with the management of the developer at their regional head/offices to make the process easily accessible to the complainants. If no satisfactory solution is reached by developer's management, the complainant has the option to seek redress via judicial processes.

Alternative Action by Chief Government Valuer (CGV)

Some grievances may be beyond the capacity of the GO or the Grievance Committee to handle expeditiously without the technical support of other professionals like the CGV. Some of the grievances may be specifically related to the valuation process, valuation rates and awards. Therefore, the GO will determine whether a complaint can be resolved by the Grievance Committee or, if not, should be referred to the CGV for technical and administrative advice.

The CGV will make necessary consultations with offices he/she deems fit to consult in his/her capacity as CGV. If satisfactory solution is not achieved or provided by the CGV, the aggrieved person can resort to the judicial process.

9.4.3 Capacity Building for the Grievance Officer and Grievance Committee

It will be important for the appointed GO to be appointed based on his/her experience and training in conflict resolution through mediation and reconciliation. It will also be important for the GO to have sufficient skills in data management including data entry, data analysis and storage. This notwithstanding, it will be important that steps are taken to orient and build the capacity of the GO as part of the project implementation team in conflict resolution procedures such as mediation and reconciliation and other management areas such as record keeping and report writing and ICT equipment management.

The Grievance Committee members will also need to be oriented about the grievance management system. The capacities of the grievance committee members will also need to be built around issues of conflict identification, conflict information analysis and resolution based on issues in the land legislation through reconciliation and mediation.

9.4.4 Other alternatives

The other alternative recourse suggested as a last resort is for the complainant to seek redress from formal courts of law. The Land Act, Cap 227 establishes Land Tribunals at regional/district level. It empowers the Land Tribunals to determine disputes relating to amount of compensation to be paid for land acquired compulsorily for public interest. The affected person may appeal to a higher ordinary court. The Land Acquisition Act allows for any person to appeal to the High Court within 60 days of the award being made. The Land Act, Cap 227 also states that traditional authority mediators can play a role in settling land disputes.

9.5 Capacity Building and Trainings

The Capacity building and trainings will be conducted using the AfDB's and the National social and environmental (E&S) safeguards, as required by the AfDB for its projects to ensure early identification of possible risks and propose management measures so that the project is able to address the risks while maximizing positive outcomes.

Training will be conducted with the following primary objectives:

- Train the project beneficiaries and other government staff interested in the general safeguard requirements built into the E&S safeguards.
- Introduce the participants to the safeguard requirements of the AfDB and of the country.
- Examine the specific safeguard requirements of the AfDB funded projects.

The following outcomes are expected as the result of training.

- Improved knowledge and understanding on the E&S concepts and standards.
- Improved knowledge and understanding on the ESIA concepts and methodology.
- Improved knowledge and understanding on the ESMMP preparation.
- Improved knowledge and understanding on the ESMMP monitoring and reporting.

9.6 Required Approvals, Permits and Licenses

Several approvals and licenses will be required before commencement of certain construction activities. Securing of approvals requires preparation of the relevant documentation and payment of fees. This needs to be done during mobilization to ensure that all approvals are secured in a timely manner to avoid construction delays. It is important to ensure that all materials (sand and aggregates) are sourced from quarries, borrow pits and sand mines approved by NEMA and compliant with environmental laws. For all new materials sites to be opened up, NEMA approval must be secured while all existing sites should undertake/provide proof of having undertaken environmental compliance audits. For the success of the Orom gravity flow WSSP, the following permits and licenses may be required by the project as presented in Table 9-3.

Table 9-3: Approvals, permits and licenses that may be required by the project

Approvals, Permits and Licenses Required	Issuing Authority	Party responsible for acquiring permit/license	Legal Framework
Water Abstraction Permit	DWRM	MWE Contractor	Water Act, cap 152
Wastewater Discharge permit	DWRM	MWE Contractor	Water Act, cap 152
Waste Disposal Permit	NEMA	MWE Contractor	National Environment Act Cap 153; National Environment (Waste Management) Regulation
Waste Transportation License	NEMA	Contractor	National Environment Act Cap 153; National Environment (Waste Management) Regulation
Storage of Hazardous/ Non-Hazardous Waste	NEMA	Contractor	National Environment Act Cap 153; National Environment (Waste Management) Regulation
License to emit noise in excess of permissible noise levels	NEMA	Contractor	National Environment Act Cap 153
Blasting, importation, storage and transportation of explosives	Ministry of Internal Affairs	Contractor	Explosive Act, Cap 298
Mining Permit, Extraction of minerals, opening up of quarries and sand pits	MEMD/ NEMA approval	Contractor	Mining Act, Cap 148
Permit for Storage of Petroleum Products and dispensing license	MEMD	Contractor	Petroleum Act, Cap 2003
Work Permits	Ministry of Internal Affairs	Contractor MWE	Immigrations Act, Cap 66

Permit if the water transmission line is to cross the UNRA road (Road Permits)	UNRA	MWE	The Uganda National Roads Authority (General) Regulations 2017
Traffic Diversions consent	Uganda Police	Contractor	Traffic and Road Safety Act 1998
RAP approval conditions for this project	CGV	MWE Contractor	The Land Act Cap 227

9.7 Environmental and Social Monitoring Plan

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

A monitoring plan has been prepared considering the chronology of potential project activities. The recommendations in this report would provide a basis for tracking progress of the proposed project activities with regard to sound environmental practice and mitigation measures.

9.8 Roles and Responsibilities

In order to enhance the potential for integrating sustainability concerns in this proposed Piped Water Supply and Sanitation System, it is important to assign clear roles and responsibilities to dominant professionals, contractors and/or sub-contractors so as to ensure that environmental plans are implemented effectively.

Project Developer (MWE)

The MWE will be responsible for the implementation of the Project through contractors. The MWE will be responsible for contract management and will ensure that the contractors adhere to their contractual obligations and that they are compliant with the environmental and social standards as spelt out in their contracts.

The Project Developer will:

- Have overall responsibility for environmental and social compliance;
- Ensure that appropriate resources are allocated to facilitate environmental and social management of the Project, including financial and human resources;
- Review for quality and approve the CESMP for project implementation;
- Ensure that adequate supervision for implementation of the ESMMP is provided at all times;
- Check that penalties for non-compliances with contractual environmental commitments are actioned; and e.g., Supervising Engineer is required to have an Environmental & Social Management Specialist by contractual obligation. The Contractor's Environmental Specialist, Social Development

Specialist and Health & Safety Specialist will ensure that the provisions in this ESMMP are implemented within the sites under their supervision and to collect and transmit relevant information to the Supervising Engineer.

- Undertake regular compliance audits, including the mandatory Annual Environmental Compliance Audit in accordance with the National Environment Act.

Project Development Partner (AfDB)

The AfDB will be financing the project. Like other financing entities, the AfDB is expected to offer implementation support supervision to the project's environmental and social performance through reviews, approvals, meetings, training field inspections and missions. The AfDB is expected to have a safeguards team that can participate in safeguards missions.

Therefore; the AfDB will;

- Provide appropriate guidance towards compliance with the Operational Safeguards;
- Allow for quick feedback on any safeguards documentation of the project;
- Provide no-objection on environmental and social matters whenever required; and
- Play an oversight role in implementing the Safeguards Requirements.

NEMA and Lead Agencies

NEMA will, in consultation with the District Local Governments of Kitgum, Agago and Pader (represented by the District Environment Officers), monitor all environmental phenomena with a view of assessing any possible changes in the environment and their possible impacts; the operation of the water supply facility with a view of determining its immediate and long-term effects on the environment.

Project Contractor

During sites preparation and construction, the Contractor will be responsible for ensuring compliance with all relevant legislation as well as adherence to all environmental and socio-economic mitigation measures specified in the Environment and Social Management Plan. The Contractor is also responsible for managing the potential environmental, socio-economic, safety and health impacts of all contract activities whether these are undertaken by themselves or by their subcontractors. Other responsibilities of the Contractor include: preparation of a Contractors Environmental and Social Management Plan (CESMP), workers' Code-of-Conduct that all workers will have to read and abide with through signing.

Kitgum, Pader and Agago District Local Governments

Although the Contractor will have the primary role in delivering on the measures set out in the ESMMP, Kitgum, Pader and Agago District Local Governments will have the ultimate responsibility for ensuring that the measures are delivered. In this respect,

Kitgum, Pader and Agago District Local Governments will review and approve contractor plans for delivery of the actions contained in the ESMP and subsequently during project operation, review contractor performance through monitoring, audits and inspection to ensure that all proposed mitigation measures are implemented as well as ensuring regulatory compliance.

9.9 The Monitoring Team

It is recommended that a core team of individuals preferably headed by the District Environment Officers (DEOs) and the Water Officers (DWO) for Kitgum, Pader and Agago District Local Governments. Other important players to take part in monitoring include the Community Development Officer (CDO) at the district or sub-county levels and the local leaders at sub-county, parish and village levels.

The monitoring team will start its work during the site preparation and construction process and continue throughout the operation phase and should ensure that the proposed mitigation measures are implemented as suggested in this report. The monitoring team will most particularly check for the following issues among others:

- Collaboration of the Project Proponents with NEMA and other relevant authorities to ensure that operations of the water scheme meet regulatory requirements.
- Efficient and functional water and sanitation system at the premises.
- Proper storage, handling and final disposal of any solid waste produced at the premises.
- General cleanliness and good housekeeping in and around the facilities.
- Emergency preparedness especially in cases of fire outbreak.
- Constant acquisition of appropriate permits and/or licenses from respective institutions and compliance with the regulatory framework.
- Supervise implementation of all the proposed mitigation measures.
- Compile a monitoring report indicating all non-conformances to mitigation measures.

9.10 Enforcement of Compliance

Laxity in implementation and reporting on safeguards issues is common amongst contractors during project implementation largely because they do not take safeguards issues seriously. This can be addressed by requiring the Contractor to prepare monthly environmental and social monitoring reports. These should either be pay items and clearly included in the BoQs or a condition for certification and payment approvals. The contractor must be required to undertake proper recordkeeping of all safeguards' activities. Slackness in the provision and use of PPE is a risk to the safety of workers. The BoQs should provide a sum for PPE and supervision be done to ensure that all workers undertake works while in full PPE.

The Supervising Engineer must strictly supervise implementation of the ESMMP and where there are breaches, the supervising engineer should issue written instructions, cautions and warnings as applicable. Where the contractor fails to comply, contractual

clauses should be invoked, and penalties or fines effected. If necessary, the civil works can be suspended if the Contractor repeatedly fails to adhere to instructions. The MWE should penalize the supervising consultant if he fails to supervise and enforce ESMP implementation by the Contractor.

9.11 Environmental and Social Management and Monitoring Plan (ESMMP) Matrix

The ESMMP matrix (Table 9-4) provides a detailed guidance for managing impacts, monitoring indicators, indicative costs for impact mitigation, responsibility for implementing the mitigation measures, the monitoring institution and the monitoring frequency. The total cost of implementing the ESMMP is estimated at Uganda Shillings Three hundred twenty million three hundred thousand only (UGX 320,300,000), as broken down in Table 9-4. The Contractor and Developer/Operator must ensure that the ESMMP is implemented, and should allow the monitoring institution to carry out the monitoring duties without any obstruction.

Table 9-4: The Environmental and social management and monitoring plan for Orom water supply and sanitation system

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Positive Impacts						
Employment opportunities and income	<ul style="list-style-type: none"> ▪ Prepare a labour force management plan ▪ Preference for employment opportunities should be given to the local people where they have the required skills (for skilled labour activities). Otherwise, all activities which do not require skills such as casual activities should be given to the locals ▪ The use of appropriate labour-intensive methods for some of the construction activities (for example excavation for pipelines) should be undertaken to enable as many local people (including women) as possible get jobs ▪ Priority for sourcing materials for construction and other services such as food and accommodation should be given to local suppliers ▪ Ensure that children are not employed on the project 	<ul style="list-style-type: none"> -Labour force management plan in place -Details of the project staff, including origin, age 	5 million (for the labour farce management plan)	Contractor MWE	CDO	Monthly
Acquisition/imp rovement of skills	<ul style="list-style-type: none"> ▪ Foreign companies (if contracted) should be required to have a joint venture with local companies to build their capacity. ▪ Contracts terms for construction works for the project's construction and O&M phase should emphasize knowledge transfer and the project developer should monitor and ensure that the objectives are met. ▪ O&M manual and standard operating procedures must be handed over to the operator 	<ul style="list-style-type: none"> -Details of the Contractor, including country of registration -Details of the Contracts agreement -Presence of the O&M manual 	0	Contractor MWE	CDO DWO	Once, before start of construction works

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Reduction of poverty and improved livelihoods of the local people	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes 	Part of the contract	MWE	DWO CDO	Quarterly
Improvement in public health	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water ▪ Sensitize communities of the dangers of using unsafe water sources 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes -Minutes of community sensitization 	1 million (for community sensitization)	MWE	DWO CDO	Quarterly
Achievement universal primary education	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes 	Part of the contract	MWE	DWO CDO	Quarterly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Promotion of gender equality and empowerment of women and the girl child	<ul style="list-style-type: none"> ▪ Ensure consistent supply of water of adequate quality and quantity ▪ Extend water to as many users as possible in the project area ▪ Provide as many public stand pipes as possible where poor people can obtain water 	<ul style="list-style-type: none"> -Records of water abstraction and supply -Records of water quality assessment -Number of households connected, and number public stand pipes 	Part of the contract	MWE	DWO CDO	Quarterly
Affordable and reliable water supply	<ul style="list-style-type: none"> ▪ Encourage and promote catchment protection by the communities so as the water sources are not depleted 	<ul style="list-style-type: none"> -Number of trees planted -record of number campaigns done 	10 million	Operator MWE	DEO's CDO's	Yearly
	<ul style="list-style-type: none"> ▪ Set the prices for the water both connection and service fees as low as possible in tandem with income levels of the people 	<ul style="list-style-type: none"> -Cost of water per m³ 	0	Operator MWE	LCI's DWO	Yearly
	<ul style="list-style-type: none"> ▪ Install reservoirs that are enough to sustain supplying the community for longer hours in times of scarcity 	<ul style="list-style-type: none"> -Capacity of reservoirs installed 	0	MWE	DWO LCI's	At start of the operation
Reduction in distance moved in search for water	<ul style="list-style-type: none"> ▪ Install community water serving points in each village 	<ul style="list-style-type: none"> -Number of serving points in the community 	0	MWE Operator	DWO LCI's	Start of operation
	<ul style="list-style-type: none"> ▪ Ensure continuous supply of clean water to the people throughout the day 	<ul style="list-style-type: none"> -Number of hours water is supplied in a day 	0	Operator	DWO's LCI's CDO's	Monthly
	<ul style="list-style-type: none"> ▪ The water services should be made affordable for everyone though low tariffs. 	<ul style="list-style-type: none"> -Cost of water per m³ 	0	Operator MWE	LCI's DWO	Yearly
Improved social order	<ul style="list-style-type: none"> ▪ Install community service points closer to the people. 	<ul style="list-style-type: none"> -Number of serving points in the community 	0	MWE Operator	DWO LCI's	Start of operation

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Reduced domestic violence	<ul style="list-style-type: none"> Ensure continuous supply of water throughout the day. 	-Number of hours water is supplied in a day	0	Operator	DWO's LCI's CDO's	Monthly
	<ul style="list-style-type: none"> Put at least community water point in each village to serve the people and also to prevent congestion. 	-Number of serving points in the community	0	MWE Operator	DWO LCI's	Start of operation
	<ul style="list-style-type: none"> Encourage people to store water in preparation for scarcity 	-Number of people with tanks	0	Operator	DWO's CDO's LCI's	Yearly
Negative Impacts						
Pre-construction phase and Construction Phases						
Land take	<ul style="list-style-type: none"> Prepare and implement a RAP All privately owned land to host project components should be duly compensated prior start of construction activities 	<ul style="list-style-type: none"> RAP in place Agreements of land sale 	-50 million for a RAP -Cost of land to dependent on its actual value of land	Developer	CDO	Once, to be cleared before start of construction
Loss of property	<ul style="list-style-type: none"> Prepare and implement a RAP All property should be valued and duly compensated prior to start of construction works 	<ul style="list-style-type: none"> Compensation agreement 	Dependent on the value of property, as per the RAP findings	Developer	CDO	Once, to be cleared before start of construction
	<ul style="list-style-type: none"> For property like crops, where possible, owners should be informed early about the project work plan and allowed to harvest them prior to start of construction 	<ul style="list-style-type: none"> Compensation agreement 	Dependent on the value of crops	Developer	CDO	Once, to be cleared before start of construction
Traffic disruption	<ul style="list-style-type: none"> Prepare and implement traffic management plan 	<ul style="list-style-type: none"> Traffic management plan in place 	5 Million	Contractor	CDO	Weekly
	<ul style="list-style-type: none"> Liaise with the local traffic authority to manage traffic at busy crossings e.g., markets, schools, churches 	<ul style="list-style-type: none"> Records of agreed work plans with traffic police 	2 Million	Contractor	CDO Traffic police Department, Kitgum, Agago and Pader	Weekly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Loss of vegetation and soil cover	<ul style="list-style-type: none"> ▪ Prepare a vegetation restoration plan 	<ul style="list-style-type: none"> ▪ A vegetation restoration plan in place 	10 Million	Contractor	DEO	Once, before start of construction activities
	<ul style="list-style-type: none"> ▪ Restrict clearance to only areas to be constructed. 	<ul style="list-style-type: none"> ▪ Presence of bare soils 	Part of the Contract	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> ▪ Landscaping and re-vegetation after construction especially around the water source and reservoir 	<ul style="list-style-type: none"> ▪ Presence of gullies due to soil erosion. 	2 million	Contractor	DEO	Weekly
	<ul style="list-style-type: none"> ▪ Restrict alignment of the transmission route along road reserves 	<ul style="list-style-type: none"> ▪ Layout of the transmission line 	Part of the Contract	Contractor	DWO /DEO	Monthly
Disruption of social order	<ul style="list-style-type: none"> ▪ Prioritize employment of local people where they have the required skills 	<ul style="list-style-type: none"> ▪ Record of project staff and their area of origin 	Part of the Contract	Contractor	CDO	Weekly
	<ul style="list-style-type: none"> ▪ Sensitizing all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles ▪ Prepare a stakeholder engagement plan and ensure that stakeholder engagement is a continuous process throughout the project implementation 	<ul style="list-style-type: none"> ▪ Record of sensitization sessions ▪ Stakeholder engagement plan in place ▪ Records of stakeholder engagement 	1 million	Contractor	CDO	Monthly
Faecal matter disposal	<ul style="list-style-type: none"> • Prepare a waste management plan 	<ul style="list-style-type: none"> • A waste management plan in place 	15 million	Contractor	DEO	Once, before the start of construction works
	<ul style="list-style-type: none"> • Provide temporary eco-san toilet on site during site works 	<ul style="list-style-type: none"> • Disease outbreak • Bad odour and nuisance of flies 	Part of the construction contract	Contractor	DEO	Monthly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Noise from construction machinery	▪ Schedule noise-intensive work for the least noise-sensitive time of the day (work between 8 am and 5 pm)	▪ Work schedule ▪ Complaints about noise;	0	Contractor	DEO	Weekly
	▪ Provision of PPE to project workers	▪ PPE in use	Part of the Contract	Contractor	DEO	Weekly
	▪ Regular noise assessments	▪ Noise assessment reports	1 million	Contractor	DEO	Monthly
	▪ Sprinkle water to dusty grounds during the dry seasons	▪ Records of air water sprinkling	2 Million	Contractor	DEO	Weekly
	▪ Cover earth materials with tarpaulin during transportation to minimise their falling off trucks;	▪ Presence of tarpaulins for covering loose material	0.5 million	Contractor	DEO	Weekly
	▪ Provision of PPE to project workers;	▪ PPE in use	Part of the Contract	Contractor	DEO	Weekly
Solid waste generation	▪ Use the excavated material for backfilling.	▪ Heaps of waste & excavated material on site	Part of the Contract	Contractor	DEO	Monthly
	▪ Provide waste bins for proper storage.	▪ Waste bins within the project area.	0.2 million	Contractor	DEO	Monthly
	▪ Contract a waste management company where waste volumes are large	▪ Contract agreement with a waste management company	2 million	Contractor	DEO	Monthly
Occupational health and safety issues	▪ Prepare an occupational Health and safety plan	▪ An occupational health and safety plan in place	10 million	Contractor	CDO DEO DHI	Once, before start of construction works
	▪ Provide workers with PPE and sensitise them on basic safety precautions.	▪ PPE in use	Part of the Contract	Contractor	DEO	Weekly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> ▪ Provision of a first aid kit 	<ul style="list-style-type: none"> ▪ First aid kit 	3 Million	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> ▪ An occupational safety and health policy should be drafted and implemented 	<ul style="list-style-type: none"> ▪ A health and Safety Policy in place and being implemented 	2 Million	Contractor	DEO	Monthly
Public health and safety issues	<ul style="list-style-type: none"> ▪ Prepare a community health and safety plan 	<ul style="list-style-type: none"> ▪ A community health and safety plan in place 	10 Million	Contractor	CDO DEO DHI	Once, before start of construction works
	<ul style="list-style-type: none"> ▪ Cordon off all dangerous areas along public roads 	<ul style="list-style-type: none"> ▪ Marks of dangerous places 	2 Million	Contractor	CDO DEO	Weekly
	<ul style="list-style-type: none"> ▪ Project vehicles transport material along community roads should not exceed 40 km/h. 	<ul style="list-style-type: none"> ▪ Records of sensitization of project drivers on speed limits ▪ Speed limit signs on roads 	1 Million	Contractor	DEO	Monthly
	<ul style="list-style-type: none"> ▪ Schedule of construction works along community access roads should be communicated to public at least a week prior to start of construction works 	<ul style="list-style-type: none"> ▪ Proof of communication of work schedule with communities ▪ Number accidents recorded 	0.5 Million	Contractor	DEO	Bi-monthly
	<ul style="list-style-type: none"> ▪ Prepare and implement an HIV/AIDS management plan 	<ul style="list-style-type: none"> ▪ An HIV/AIDS management plan 	10 Million	Contractor	DCDO	Quarterly
Increased susceptibility to soil erosion	<ul style="list-style-type: none"> ▪ Prepare an erosion control plan 	<ul style="list-style-type: none"> ▪ An erosion control plan in place 	10 Million	Contractor	DEO NEMA	Once, prior to start of construction activities
	<ul style="list-style-type: none"> ▪ Immediately dispose of any excavated soil to avoid loose soil being washed away by storm water. 	<ul style="list-style-type: none"> ▪ Presence of erosion gullies within the site premises 	2 Million	Contractor	DEO NEMA	Weekly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> Planting of bands of grass on erosion prone surfaces. 	<ul style="list-style-type: none"> Presence of bare soils on site 	2 Million	Contractor	DEO NEMA	Quarterly
Air pollution and climate change	<ul style="list-style-type: none"> Vehicles transporting construction material along community access roads should move at lower speeds, not exceeding 40 km/hr 	<ul style="list-style-type: none"> Speed signs on the roads 	10 million	Contractor	DEO NEMA LCI's	Monthly
	<ul style="list-style-type: none"> All loose material like sand, cement, murrum, soil should be covered with a tarpaulin during transportation 	<ul style="list-style-type: none"> Number of transport truck cover with tarpaulins 	4 million	Contractor	DEO Project engineer	Daily
	<ul style="list-style-type: none"> Water should be sprinkled on dusty ground where other measures cannot appropriately minimize dust emission 	<ul style="list-style-type: none"> Number of water bowsers Number of times roads are sprinkled with water 	5 million	Contractor	Project engineer LCI's	Weekly
	<ul style="list-style-type: none"> Repair and maintain construction equipment following the manufacturer's specifications, including on fuelling 	<ul style="list-style-type: none"> Logs for repairing the different equipment and vehicles 	0	Contractor	Project engineer Site engineer	Monthly
	<ul style="list-style-type: none"> Offset emitted carbon dioxide during construction activities by planting local trees at all devastated sites 	<ul style="list-style-type: none"> Number of trees planted 	5 million	MWE	DEO	Yearly
Disturbance and interruption of commercial and social activities	<ul style="list-style-type: none"> Local communities should be informed about the construction program in advance and adhere to it 	<ul style="list-style-type: none"> Copy of the communication made to the community 	10 million	Contractor MWE	DWO LCI's	Quarterly
	<ul style="list-style-type: none"> Access roads in the neighbourhood should be maintained and cleaned of earth and sand on a daily basis 	<ul style="list-style-type: none"> Number of roads maintained 	0	Contractor	District Engineers	Quarterly
	<ul style="list-style-type: none"> Temporary access ways should be provided with the approval of local authorities where access roads are closed 	<ul style="list-style-type: none"> Number of temporary access road provided 	0	Contractor	District Engineers	Quarterly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> Works should be carried out under mild weather; avoiding strong rains or winds 	<ul style="list-style-type: none"> Copy of the schedule for the civil works 	0	Contractor	Site Engineer Project Engineer	Monthly
	<ul style="list-style-type: none"> Obstruction of access to and use and occupation of roads, footpaths and bridges should be reduced 	<ul style="list-style-type: none"> Number of roads abstracted/closed 	0	Contractor	Site Engineer Project Engineer	Monthly
	<ul style="list-style-type: none"> Where livelihoods and property are affected, valuation and prompt compensation should be undertaken for the PAPs 	<ul style="list-style-type: none"> Number of people compensated Copies of compensation agreements 	To be determined based on number of affected	MWE	District Labour Officers LCI's	Monthly
Theft of construction materials	<ul style="list-style-type: none"> -Verification of project employees should be done by the local authorities. 	<ul style="list-style-type: none"> -Records of employee verification exercise 	1 Million	CDO	CDO	Prior to the start of construction activities -Any time staff are required
	<ul style="list-style-type: none"> Security guards should be hired to provide security at the construction sites. 	<ul style="list-style-type: none"> -Presence of security guards 	6 Million	CDO	CDO	-Weekly
Operation and maintenance phase						
Water Pollution	<ul style="list-style-type: none"> Ensuring that storage containers are checked regularly for leakage 	<ul style="list-style-type: none"> Records of chemical leakage/spillage Complaints from water users. 	0.3 Million	Developer / Operator	DEO	Monthly
Occupational Health and Safety	<ul style="list-style-type: none"> Prepare an occupational health and safety plan 	<ul style="list-style-type: none"> Same as in the construction phase 	Same as in the construction phase	Same as in the construction phase	Same as in the construction phase	Same as in the construction phase
	<ul style="list-style-type: none"> Workers should be given appropriate PPE when handling chemical 	<ul style="list-style-type: none"> Workers using PPE 	Part of the Contract	Developer / Operator	DEO	Quarterly
	<ul style="list-style-type: none"> Regular trainings on the operations of the water system 	<ul style="list-style-type: none"> Records of training on operation systems 	2 Million	Developer / Operator	DWO	Quarterly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> ▪ Installation of firefighting equipment at the abstraction point 	<ul style="list-style-type: none"> ▪ Presence of firefighting equipment 	2 Million	Developer / Operator	DEO	Quarterly
	<ul style="list-style-type: none"> ▪ A well-equipped first aid kit should be availed to project workers. 	<ul style="list-style-type: none"> ▪ Presence of a first aid kit. ▪ Records of injuries 	Part of the Contract	Developer / Operator	DEO	Quarterly
Generation of hazardous wastes	<ul style="list-style-type: none"> ▪ Maintenance of the solar power system should be undertaken by a licensed firm 	<ul style="list-style-type: none"> ▪ -License certificate of the hired maintenance firm 	5 Million	Developer / Operator	DEO DWO	Prior to start of operation, and annually thereafter
	<ul style="list-style-type: none"> ▪ Waste batteries and solar panels should be taken back to the supplier, who should handle it appropriately as hazardous waste. This should be agreed in the solar power supply contract 	<ul style="list-style-type: none"> -Solar power supply contract ▪ -Records of delivery of waste solar batteries and panels to the supplier 	As per the supply contract	Developer / Operator	DEO DWO	Annually
	<ul style="list-style-type: none"> ▪ Where such agreement is not reached, the Developer (MWE) should hire a licensed firm for handling hazardous waste 	<ul style="list-style-type: none"> -Contract agreement with the waste handling firm ▪ -Records of waste solar batteries and panels handled 	5 Million	Developer / Operator	DEO DWO	Prior to start of operation, and annually thereafter
Incapacity to operate and maintain the project components by local people	<ul style="list-style-type: none"> ▪ Train local community members in the operation and maintenance of the water supply infrastructure 	<ul style="list-style-type: none"> ▪ Number of trained community members in operation and maintenance of the piped water supply system 	3 Million	Developer/ Operator	DWO	Quarterly
	<ul style="list-style-type: none"> ▪ Prepare a quality management plan 	<ul style="list-style-type: none"> ▪ A quality Management plan in place 	15 Million	Contractor Operator	DWO CDO DEO	Quarterly

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Unaffordability of the water charges	<ul style="list-style-type: none"> Levy charges in consideration of the income levels of the area. Charges for poor people should be just enough to cover the operational costs 	<ul style="list-style-type: none"> Records of water charges Complaints from the public 	0	Developer / Operator	DWO	Quarterly
	<ul style="list-style-type: none"> Provide many public standard pipes where poor people can obtain water cheaply 	<ul style="list-style-type: none"> Number of public stand pipes 	Part of the Contract	Developer / Operator	DWO	Twice a year
Noise pollution	<ul style="list-style-type: none"> Schedule noise-intensive work for the least noise-sensitive time of the day (work between 8 am and 5 pm) 	<ul style="list-style-type: none"> Copy of the schedule for works 	0	Operator	LCI's	Weekly
	<ul style="list-style-type: none"> Provision of PPE to project workers 	<ul style="list-style-type: none"> Number of workers with PPE's 	Part of operational costs	Operator	District Labour Officers CDO's	Monthly
	<ul style="list-style-type: none"> Regular noise assessments 	<ul style="list-style-type: none"> Copy of reports for noise assessment 	5 million	Operator	NEMA DEO	Quarterly
Air pollution	<ul style="list-style-type: none"> Vehicles transporting construction material along community access roads should move at lower speeds, not exceeding 40 km/hr 	<ul style="list-style-type: none"> Speed signs with speed limits along routes 	4.5 million	Operator MWE	Uganda Police	Quarterly
	<ul style="list-style-type: none"> Repair and maintain construction equipment following the manufacturer's specifications, including on fuelling 	<ul style="list-style-type: none"> Number of equipment repaired 	Part of operational costs	Operator	Project Engineer DWO	Quarterly
	<ul style="list-style-type: none"> Offset emitted carbon dioxide during construction activities by planting local trees at all devastated sites 	<ul style="list-style-type: none"> Number of trees planted 	5 million	MWE	DEO	Yearly
Reduction of water levels in aquifers	<ul style="list-style-type: none"> The design of the water supply system should cater for changes in precipitation due to climate change. 	<ul style="list-style-type: none"> Copy of the design report 	0	MWE	DEO DWO	Before start of operation of the system
	<ul style="list-style-type: none"> Reservoir should be installed that can store enough water to cater for the needs of the communities during times of storage. 	<ul style="list-style-type: none"> Number of reservoirs with the right capacity 	0	MWE Operator	DWO	Before start of operation of the system

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
	<ul style="list-style-type: none"> ▪ Encourage and promote catchment protection as part of corporate social responsibility through planting trees ▪ Obtain a water abstraction permit from DWRM, which will clearly specify the maximum allowable abstraction volumes from aquifers 	<ul style="list-style-type: none"> ▪ Report on CSR activities done ▪ Copy of the abstraction permit 	1 million	MWE Operator	DWO NEMA	<p>Before start of operation of the system</p> <p>Yearly for the permits</p>
Human waste disposal	<ul style="list-style-type: none"> ▪ The toilet facilities should be operated according to the procedures to be provided by the design team. 	<ul style="list-style-type: none"> ▪ Number of properly maintained toilet facilities 	0	Community (Markets, schools and other institutions)	MWE NEMA DEO District Health Officers	Monthly
	<ul style="list-style-type: none"> ▪ The toilets should be emptied and waste transported by a licensed company 	<ul style="list-style-type: none"> ▪ Number of toilets emptied ▪ Copies of receipts and licenses from the company 	10 million	Operator	MWE NEMA DEO District Health Officers	Every six months
	<ul style="list-style-type: none"> ▪ The waste should be disposed off to a designated area 	<ul style="list-style-type: none"> ▪ Copies of receipts for disposing off waste 	10 million	Community (Markets, schools and other institutions)	MWE	Monthly
Conflicts with Karamajongs over water	<ul style="list-style-type: none"> ▪ Fence off the project infrastructure to avoid vandalism 	<ul style="list-style-type: none"> ▪ Fence around the project facilities 	Part of operational costs	MWE Operator	LCI's DWO	At the start of the project
	<ul style="list-style-type: none"> ▪ Security should be provided at key infrastructure like pumps by Police or UPDF 	<ul style="list-style-type: none"> ▪ Number of security personnel at the sites 	20 million	Operator	MWE	Monthly
	<ul style="list-style-type: none"> ▪ Provisions should be put for watering of animals 	<ul style="list-style-type: none"> ▪ Number of animal watering point 	0	MWE	DWO District Engineers District Agricultural officers	At the beginning of operations

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Spread of sanitation and water borne diseases	<ul style="list-style-type: none"> Ensure regular supply of sufficient water for flushing and washing hands by providing a reservoir tank at the toilet 	<ul style="list-style-type: none"> Presence of a reservoir tank at the toilet 	Part of the Contract	Developer / Operator	DWO CDO DEO	Quarterly
Vandalization / theft project equipment	<ul style="list-style-type: none"> Sensitize community members about the importance of the project 	<ul style="list-style-type: none"> Records of community sensitization 	2 Million	Developer / Operator	DWO CDO DEO	Once, prior to, and once after construction
	<ul style="list-style-type: none"> Hire a security guard to provide 24-hour security at sensitive components such as the abstraction/pumping station 	<ul style="list-style-type: none"> Presence of security guards 	To depend on the local security labour cost	Developer / Operator	DWO CDO DEO	Quarterly
	<ul style="list-style-type: none"> Fence off major project components such as abstraction and reservoir sites 	<ul style="list-style-type: none"> Fenced project site 	Part of the construction Contract	Developer / Operator	DWO CDO DEO	Twice a year
Decommissioning Phase						
Disruption of water supply	<ul style="list-style-type: none"> Inform the communities in the affected areas well in advance about the decommissioning activities Provide alternative source of water 	<ul style="list-style-type: none"> Records of sensitization meeting about project decommissioning Presence alternative water sources 	3 Million for sensitization meetings	Operator Decommissioning Contractor	DWO CDO DEO	Quarterly, within the last two years of decommissioning
Traffic disruption	<ul style="list-style-type: none"> Same as for the construction phase 	<ul style="list-style-type: none"> Same as for the construction phase 	2 Million	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Disruption of social order	<ul style="list-style-type: none"> Same as for the construction phase 	<ul style="list-style-type: none"> Same as for the construction phase 	1Million	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Faecal matter disposal	<ul style="list-style-type: none"> Same as for the construction phase 	<ul style="list-style-type: none"> Same as for the construction phase 	Part of the decommissioning contract	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase

IMPACT	ENHANCEMENT/MITIGATION MEASURE	INDICATOR	ESTIMATED COST OF MITIGATION (UGX)	RESPONSIBLE PARTY	MONITORING INSTITUTION	MONITORING FREQUENCY
Noise pollution	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	3500000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Solid waste generation	<ul style="list-style-type: none"> ▪ Same as for the construction phase ▪ Further, hazardous wastes associated with solar batteries and panels should be handled and disposed of by a licensed firm for handling such wastes 	<ul style="list-style-type: none"> ▪ Same as for the construction phase ▪ Agreement with a licensed hazardous waste management firm 	2200000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Occupational health and safety issues	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	3000000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Public health and safety issues	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	3500000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Increased susceptibility to Soil erosion	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	4000000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Air pollution and climate change	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	<ul style="list-style-type: none"> ▪ Same as for the construction phase 	14000000	Same as for the construction phase	Same as for the construction phase	Same as for the construction phase
Total Cost for ESMP implementation			320,300,000			

Further, the following other costs (Table 9-5) should be clear in the BoQs during the bidding process. Additional details on the main activities are presented in Annex VI.

Table 9-5: Other cost items to be included in the BoQs during the bidding process

Item	Indicative Costs
Grievance Redress Mechanism	30,000,000
Stakeholder Engagement	30,000,000
Environment and Social Audit	35,000,000
Capacity Building and Trainings	20,000,000
Sub-total	115,000,000
Grand Total, including ESMMP (UGX 320,300,000)	435,300,000

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Introduction

This report presents a comprehensive (full) environmental and social impact assessment for the proposed Orom Gravity Flow Water Supply and Sanitation Project, and proposed measures for mitigating the adverse impacts while enhancing the positive ones during the different phases of the project (construction, operation and maintenance). An evaluation of the possible alternatives for the project activities was also performed.

10.2 Conclusions

The anticipated benefits of the construction, operation and maintenance of the Orom Gravity Flow Water Supply and Sanitation Project are immense. The project will provide a reliable supply of portable water and sanitation services to the residents of the project area, which come along with many benefits. For example, the proposed water supply project will result into an improvement of public health conditions, spur socio-economic development, provide employment to local residents and bring the water closer to the residents thereby reducing community violence and sexual harassment that may occur when children, especially the girl children and women go to fetch water over long distances during evening/night times.

However, just like most developments, the immense benefits of this proposed project do not necessarily insulate this project from negative impacts. In order to evaluate the project so that its impacts on the environment and socio-economic set up are minimized, an evaluation of the possible project alternatives was also conducted.

For all project components, an evaluation of the positive and negative impacts was performed, and an Environmental and Social Management and Monitoring Plan (ESMMP) drawn. All negative impacts can be mitigated following the ESMMP proposed in this report. Suggestions were also proposed on the enhancement of the positive impacts. The project should be developed in conformity with all legal requirements. The Developer should ensure that the wastes and chemicals are handled and disposed of in accordance with the ESMMP, and following the established regulations and policies. If the proposed project is developed following the suggestions given in the ESMMP of this ESIA, it is our contention that there will be no negative impacts that can deter the development of the proposed Orom Gravity Flow Water Supply and sanitation Project.

10.3 Recommendations

Based on the benefits expected to accrue from the proposed Orom Gravity Flow Water Supply and Sanitation Project, which have been stated above, and the fact that the identified negative impacts can be mitigated following the proposed ESMMP, we strongly recommend to NEMA to review and approve this ESIA to enable further development of the project.

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The Occupational Safety and Health Act, 2006, Uganda.

The Public Health Act 2000.

The Uganda Wildlife Act Cap 200.

The Water (waste discharge) Regulations, S. I. 32/1998.

The Water Act, Cap 152.

The Workers' Compensation Act (Act 8), 2000.

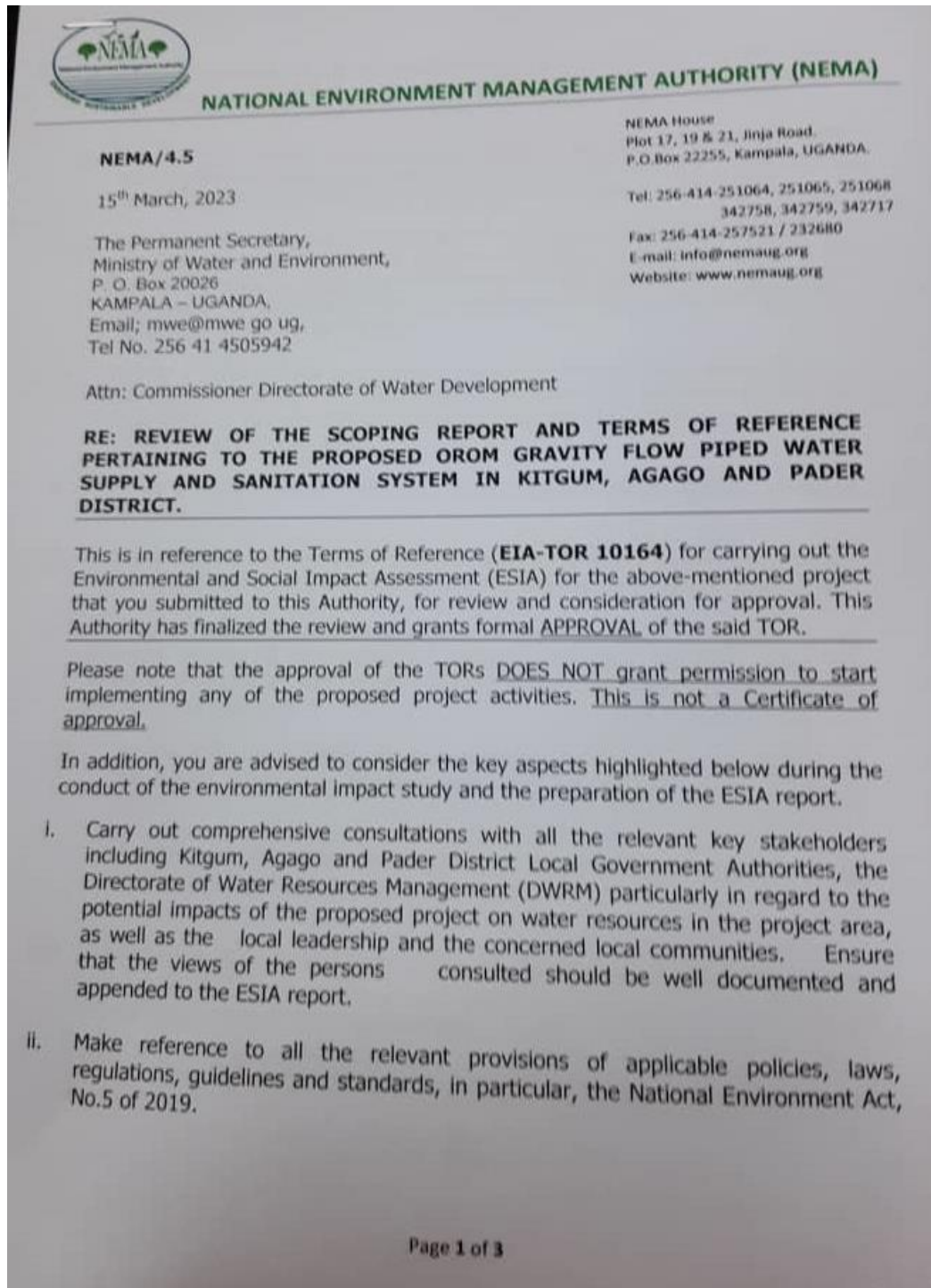
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ANNEXES

Annex I: Terms of Reference for the ESIA study



- iii. Include in the report other relevant baseline information that is project site-specific, on the soils, water, and air quality; as well as, clear-colored photographs depicting the current status of the project area and the neighboring environs.
- iv. Provide clear, colored and well-labelled location maps/images (preferably *each covering A-3 size paper*) and accurate sets of GPS coordinates clearly indicating the site boundaries. Ensure that all GPS coordinates are provided in UTM format.
- v. In addition to the above, provide details of the geographical boundaries of the project including total area to be covered – preferably in tabulated format – by **names of villages, parishes, sub-counties and county, as well as the corresponding GPS coordinates** (*in UTM format*) marking the location of the key components of the WSS system.
- vi. Provide a comprehensive description of the proposed Piped Water Supply System, the specific components and associated infrastructure, and the activities that will be undertaken during both the construction and operational phases of the project and the size of the work force.
- vii. Provide a comprehensive description of the proposed **WSS design, installed capacity**.
- viii. Clearly indicate the chemicals that will be used in the water supply and treatment systems and how these will be stored, handled and associated waste disposed of.
- ix. Include in the ESIA, a hydrogeological investigative report in regard to the potential impacts of the project on underground water resources within the proposed project area, and incorporate into the ESIS mitigation actions to address the identified impacts.
 - (i) Include in the ESIA report, detailed description of the **water source(s) and the water sources protection plan** that will support the Water Supply System.
 - (ii) Provide a clear description of the proposed **water storage facility(ies)**, and the associated water reservoirs.
 - (iii) Provide a detailed **description of the waste streams** that will be generated during the and the measures and equipment that will be put in place to handle the different kinds of waste, respectively.
- Provide a clear and legible copy of the site layout plan (*preferably on A-3 sized paper*).

Be mindful of any other critical environmental aspects/concerns which may have not been initially foreseen during the preparation of the TOR, and **include evaluations of such concerns in the ESIA reports.**

- xii. Include in the ESIA report, comprehensive analysis of alternatives/options to the selected project location, alignment of the infrastructure, design and technology, among other aspects.
- xiii. Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities.
- xiv. Provide detailed evaluation of the potential environmental impacts and risks (e.g., in case of breakdown of the system) associated with the proposed project components and activities.
- xv. Include in the ESIA report **comprehensive mitigation and environmental management and monitoring plans**, respectively (*preferably in table matrix format*), that related to the identified potential environmental impacts and risks.
- xvi. Append to the ESIA report authentic copies of land ownership and acquisition documents.
- xvii. Indicate the project (investment) cost and append to the ESIA report **a copy of the certificate of valuation** issued by a qualified and registered valuer in accordance with the provisions of Schedule 5, 3(f) of the National Environment (Environmental and Social Assessment) Regulations, 2020.

In line with Regulation 49 (2) of the National Environment (Environmental and Social Assessment) Regulations S.I. No. 143/2020, pay a non-refundable administration fee of thirty percent (30%) of the total fees payable on submission of the Environmental and Social Impact Statement

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

This is, therefore, to recommend that you proceed with carrying out the ESIA for the Piped Water Supply System. We look forward to your cooperation and receipt of a comprehensive copy of the ESIA report, for our further action.



Waiswa-Ayazika Arnold
FOR: EXECUTIVE DIRECTOR

Annex II: Project Investment Cost

MINISTRY OF WATER AND ENVIRONMENT
 OROM WATER SUPPLY AND SANITATION SYSTEM - PHASE II
 GRAND SUMMARY

Bill No. OROM	Description	Amount (UGX)
	GENERAL	
1.1	General Items	366,160,000
1.2	Dayworks	27,513,250
TE	Tools and Equipment	40,126,323
1.3	Method Related Charges	11,675,900
	WORK ITEMS (PumpHouses, Pipe Networks, Reservoir Tanks, Sanitation Facilities)	
PA	Paimol Sub-system - Agago	1,611,527,027
AL	Akilok Sub-system - Kitgum	1,701,943,483
LA	Lapene Sub-system - Kitgum	2,008,328,790
LC	Lacomo Sub-system- Kitgum	2,027,859,985
PA	Pawidi Sub-system- Kitgum	1,406,119,770
LL	Labongo Layamo - Sub-system Kitgum	1,626,217,809
OA	Omia - Anyima Sub-system- Kitgum	1,613,229,064
LT	Latanya Sub-system - Pader	2,084,734,991
	Subtotal 1	14,525,436,392
	Allow for 10% contingency	1,452,543,639
	Subtotal 2	15,977,980,031
	Add 18% VAT	2,876,036,406
	GRAND TOTAL	18,854,016,438



Annex III: Water quality Results

MAKERERE

P.O. Box 7062 Kampala, Uganda

Fax: 256-041-531061



UNIVERSITY

: 256-041-540992

E-mail: chemistry@chemistry.mak.ac.ug

DEPARTMENT OF CHEMISTRY

CLIENT: ALLIANCE CONSULTANTS

MATRIX: GROUNDWATER (Boreholes)

PROJECT: WATER QUALITY ASSESSMENT: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR OROM WATER SUPPLY AND SANITATION SYSTEMS

Date Received: 1/4/2023

Date of Report: 4/4/2023

ANALYSIS RESULTS

PARAMETER	Units	Sample ID 1	Sample ID 2	Sample ID 3	Sample ID 4	Sample ID 5	Sample ID 6	Sample ID 7	Sample ID 8	National Standards for Potable Water
pH	-	7.2	7.1	7.0	6.8	6.8	6.9	7.0	6.9	6.8-8.5
Electrical Conductivity	µS/cm	383	321	277	421	273	249	250	676	1000
Colour apparent	Co-Pt	35	0	0	0	0	0	0	0	15
Turbidity	NTU	2	0	0	0	0	0	0	0	5.0
TDS	mg/l	191	160	138	210	136	124	125	338	700
TSS	mg/l	0	0	0	0	0	0	0	0	0.0
Total Alkalinity as CaCO ₃	mg/l	233	150	113	119	201	88	103	121	500
Total Hardness as CaCO ₃	mg/l	346	252	196	202	160	126	152	168	500
Magnesium	mg/l	26	20.8	20	20.8	12.4	13.6	16.4	21.2	50
Sodium	mg/l	11.5	10.4	9.2	11.5	7.6	9.5	9.8	18.6	200
Chloride	mg/l	23	23	47	70	47	37	21	58	250
Fluoride	mg/l	1.15	1.10	1.0	1.12	0.28	0.14	0.27	1.14	1.0
Total Iron	mg/l	0.03	0.03	0.02	0.04	0.00	0.02	0.00	0.05	<0.3
Sulphate	mg/l	8	0	34	23	3	25	22	150	200
TP	mg/l	1.03	1.08	1.12	1.18	1.93	1.12	1.08	1.56	-
TN	mg/l	1.85	1.54	1.63	2.05	2.14	1.14	1.36	2.57	-

KEY TO SAMPLE ID AND SAMPLING SITES

SAMPLE ID	SAMPLE SOURCE
Sample-1	PADER, ACHOLI BUR S/C, LAGENG VILLAGE
Sample-2	KITGUM, LAGORO S/C, ALEL EAST VILLAGE
Sample-3	KITGUM, OMIYA ANYIMA S/C PALEMENE VILLAGE
Sample-4	KITGUM, NAMOKORA S/C, KAKOO VILLAGE
Sample-5	KITGUM, OROM S/C AGROMIN CITY VILLAGE
Sample-6	AGAGO, OMIYA PACHWA S/C LONGOR VILLAGE
Sample-7	AGAGO, PALMOL S/C LAI CENTRAL
Sample-8	PADER, POROGALI S/C LOCKEN VILLAGE

Analysis by:
Ruharara Budigi
rbudigi@gmail.com

Ruharara



Annex IV: List of Stakeholders Consulted

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: Daba - AGAGO DISTRICT H/A			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 13/03/2023			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
OROMA EMMAWUDE	AWD	0715232499	
Olaj David Alwechil	BNRO	0782453184	
Odohanyso Francis Oryem	BMT-ADLG	0775914247	
KUKAMWE WAN	S. Manager, Agago	0788806294	





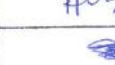

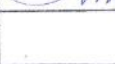
STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: <i>District H/O Ketemni</i>			
Purpose of consultation (tick appropriate box):	Scoping:	<input checked="" type="checkbox"/>	ESIA:
	Sensitization:	<input type="checkbox"/>	RAP:
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: <i>16/03/2023</i>			
PROJECT NAME:			
PROPOSER:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
<i>Picho Willy</i>	<i>D/ENGINEER</i>	<i>01179273224</i>	<i>[Signature]</i>
<i>Wany Oyok David</i>	<i>Senior Environment Officer</i>	<i>0772978783</i>	<i>[Signature]</i>
<i>Okello James P'Okid</i>	<i>DEDO</i>	<i>0772890583</i>	<i>[Signature]</i>
<i>Omwoy Lakwonyo</i>	<i>PAS</i>	<i>077264609</i>	<i>[Signature]</i>

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: KOKIL WEST PAMULSIC, AGAGO			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 13/03/2023			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT (TEL/EMAIL)	SIGN / INITIAL
1- Ongom Edwong Anty	Elder	0779047440	<i>[Signature]</i>
2- Angom Sittela	member	—	<i>[Signature]</i>
3- Abodo Elder	do -	—	<i>[Signature]</i>
4- Akuly Komila	WOMEN LEAD	0787450793	<i>[Signature]</i>
5- Akelo Christine	member	—	<i>[Signature]</i>
6- Akelo Rose	-do -	077906467	<i>[Signature]</i>
7- Oceng Eirea	C/PERSON	0779945384	<i>[Signature]</i>
8- Devese Selstina Adogo	VHF	0774821090	<i>[Signature]</i>
9- KIDREGA CHARLES	KOKIL VILLAGE	0782723021	<i>[Signature]</i>
10- APORO JULIA	member	—	<i>[Signature]</i>
11- ATIM BETTY	member		<i>[Signature]</i>
12- ALENO CHRISTINE	member		<i>[Signature]</i>
13- Onyng Sabina	member	—	<i>[Signature]</i>
14- OUCHI ROBERT	Sec. security	0777761910	<i>[Signature]</i>
15- ALFREDO KOMARSEN	<i>[Signature]</i>	07899735702	<i>[Signature]</i>

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: LAGORO S/C - LABRO B			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 16/03/2023			
PROJECT NAME: OROM GRAVITY FLOW WSS			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
JOJO MILTON	security	-	
Okanyo patrick	-	0771456375	
Atod hucy	-	-	
Anywar patrick	-	-	
Amemo pamela	-	-	
Aelong Hellen	-	-	
Akello Gloria	-	-	

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: LABONGO-LAYAMO S/C			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 16/03/2023			
PROJECT NAME: Orom GRAVITY FLOW WATER SCHEME			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
AUNA GRACIA	FARMER	-	AUNA
LALAM SUSAN	FARMER	-	LALAM
ACIRO FLORENCE	FARMER	0776373695	ACIRO
AYAA FRANCA	F.	0781957862 0776373695	AYAA
LAMUNU FLORENCE	F	-	LAMUNU
AMONY BEATRICE	F	-	AMONY
Okwera David	F	0773729377	Okwera
ODHA MOTIS	F	0772601425	ODHA
Olum Albino	F	-	Olum
Oryem mansio	F	-	Oryem
Obaya Doria	F	-	Obaya
Okettay + Riaz	M	077640502	Okettay
Lampys Ape	M	0777758545	Lampys
Orio Coras	M	0776082011	Orio
QAK KASINO	M	-	KOQOK

STAKEHOLDER CONSULTATIONS

Patrol Sta

Name of Agency/stakeholder/community: <i>LA Central, Patrol Lunit/Comms</i>			
Purpose of consultation (tick appropriate box):	Scoping:	<input type="checkbox"/>	ESIA: <input checked="" type="checkbox"/>
	Sensitization:	<input type="checkbox"/>	RAP: <input type="checkbox"/>
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: <i>13/03/2023</i>			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TELE/EMAIL)	SIGN / INITIAL
<i>OGEN THOMAS LAKIDI</i>	<i>CULTURAL LEADER</i>	<i>0761382859</i>	<i>[Signature]</i>
<i>AYAA HELLEN</i>	<i>P/FARMER</i>		<i>AL</i>
<i>AKUT JOHNS OGWANG</i>	<i>LC:1</i>	<i>0772588455</i>	<i>[Signature]</i>
<i>BLAL ALI MARSHAL</i>	<i>POWER OFFICER</i>	<i>0778529369</i>	<i>[Signature]</i>
<i>OGAL PETER</i>	<i>P/FARMER</i>		<i>[Signature]</i>
<i>OSOR CELESTINO</i>	<i>P/FARMER</i>		<i>[Signature]</i>
<i>OTINO BOSCO EMEN</i>	<i>P/FARMER</i>		<i>[Signature]</i>
<i>OPIRA JILLO</i>	<i>P/FARMER</i>		<i>[Signature]</i>
<i>ALAL CHARLINE</i>	<i>P/FARMER</i>	<i>0778565342</i>	<i>[Signature]</i>
<i>OBURA NORBERT SWAY</i>	<i>LC:1</i>	<i>0786107763</i>	<i>[Signature]</i>
<i>OKOT JAMES</i>	<i>P/FARMER</i>		<i>[Signature]</i>
<i>DAHA JULIUS</i>	<i>STUDENT</i>	<i>0784817472</i>	<i>[Signature]</i>
<i>OPIO RICHARD</i>	<i>CP/LCII</i>	<i>0755245672</i>	<i>[Signature]</i>
<i>OTIM JOHN ACATE</i>	<i>P/FARMER</i>	<i>0788013317</i>	<i>[Signature]</i>

STAKEHOLDER CONSULTATIONS

PADER

Name of Agency/stakeholder/community: <u>EDGE LOSKEN VILLAG PADER</u>			
Purpose of consultation (tick appropriate box):	Scoping:	<input type="checkbox"/>	ESIA: <input checked="" type="checkbox"/>
	Sensitization:	<input type="checkbox"/>	RAP: <input type="checkbox"/>
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: <u>18/03/2023</u>			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
<u>ABEN RWOT GABRIEL</u>	<u>P. Farmer</u>	<u>0782469477</u>	<u>[Signature]</u>
<u>LANKOL OWUL</u>	<u>P. farmer</u>		<u>[Signature]</u>
<u>ATERO DORINE</u>	<u>P. Farmer</u>		<u>[Signature]</u>
<u>OTOD RICHARD</u>	<u>P. farmer</u>		<u>[Signature]</u>
<u>PIDO RICHARD</u>	<u>P. farmer</u>		<u>[Signature]</u>
<u>ABWOL SABINA</u>	<u>P. Farmer</u>		<u>[Signature]</u>
<u>DJOK KENIA ELLY</u>	<u>P. farmer</u>		<u>[Signature]</u>
<u>OKWERA PATRICT.</u>	<u>P. farmer</u>		<u>[Signature]</u>
<u>OJWYA JAMES</u>	<u>P. Farmer</u>	<u>0783948873</u>	<u>[Signature]</u>

STAKEHOLDER CONSULTATIONS

PADER














Name of Agency/stakeholder/community: LAGWENOLIM, CENTRAL CELL

Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):

DATE: 18/03/2023

PROJECT NAME:

PROPOSER:

NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
<u>DIAL CHARLES LATO</u>	<u>Le1 CIP</u>	<u>0763422515 0775300018</u>	
<u>OKELLO RICHARD</u>	<u>Security Guard Water and climate</u>	<u>0786869917</u>	
<u>AKELLO MARIAM</u>	<u>P/F</u>		
<u>LAJARA CHRISTINE</u>	<u>P/F</u>	<u>0787646564 078787</u>	
<u>LATO XLICE</u>	<u>P/F</u>	<u>0770311462 077011462</u>	
<u>XTOO YUDIJA</u>	<u>P/F</u>	-	
<u>LAKO GLORIA OLOYA</u>			
<u>LATO MOLINA</u>			
<u>ADYERD JANE</u>		<u>0779071279</u>	
<u>ARINYO SUSAN</u>			
<u>QJARA MICHELL</u>		<u>0760631335</u>	
<u>OKOT GEOFFREY</u>		<u>0778637111</u>	
<u>OKOI JANARO</u>		-	

STAKEHOLDER CONSULTATIONS

KITGUM

Name of Agency/stakeholder/community: MUCWIMI C/C			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA:
	Sensitization:		RAP:
	Environmental Audit		Other (specify):
DATE: 16/03/2023			
PROJECT NAME: OROM GRAVITY FLOW W.S.S			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
ORUKHA PETER	AKARA	0778836475 0751406296	
Orum Simon PETER	AKARA	0781969685	
AKARA GEORGE CORNIA	AKARA	0773633773	
USAWO JOHN	AKARA	077812114	
LADO JOSEPHINE	AKARA		Lado
ANIYAGO PASK	AKARA		Away
ANIEK FILDER	AKARA	0770553503	
OROMA INNOCENT	AKARA	0783441349	
LABDI ESTHER	AKARA	-	Labdi
KIDEGA SIMON PETER	AKARA	0779990851	
Canotenge Sebastian A.	AKARA	0778453992	
OSULLO OWONA	ORIMA(B)	0788909799	
ACAJE GEORGE	AKARA	0778238502	
OBITA LEONARD	AKARA	-	
OKEMO TITO	Bidial	0778585541	

STAKEHOLDER CONSULTATIONS

KITGUM

Name of Agency/stakeholder/community: MUCWINI S/C			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 16/03/2023			
PROJECT NAME: OROM GRAVITY FLOW WSS			
PROPOSER:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
Nyamahuge Violet	CEO	0743441723	
ACIRO GRACE		—	ACIRO
ABALO GRACE		0775178915	
Atto JACKLINE DIKERA	WOMAN COUNCILOR III AKARA PARISH	074526501	
Kinyera John	WOMAN COUNCILOR	—	
Acela paska	M.	—	AC
Adiyo Vichy	M.	—	Adiyo
Auma MONICA	M.	—	Auma
Auma JOSEPHINE	M.	—	AUM
DAT GEORGEY	MEMBER	0767466681	
UTHURU DAN DENIS	MEMBER 2	0782002391	
Oloungo Samson II	II	0788236012	
Kilanta Daniel Lambert	II	0780679929	
Okot Richards Rocky	II	—	
KAKA KEBO JAMES	II	—	
LAWGOTA SISTO	II	07802262767	

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: NAMOKORA TOWN COUNCIL			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 14/03/2023			
PROJECT NAME: OROM (LOT1) WATER SUPPLY PROJECT			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
KOMAKEGA RICHARD	TOWN AGENT	0789167282	
KIDAGA ROBIN GULLS	TOWN CLERK	0772566225	

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: KAKO EAST, NAMOKORA T/C <i>Kitum</i>			
Purpose of consultation (tick appropriate box):	Scoping:		ESIA: <input checked="" type="checkbox"/>
	Sensitization:		RAP: <input type="checkbox"/>
	Environmental Audit		Other (specify):
DATE: 15/03/2023			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
ALUTA ALFRED	LCI KAKO EAST	0701956626	KAKO EAST
OTEI ROBERI	LCI	0774775282	KIELENG

STAKEHOLDER CONSULTATIONS

Kitgum

Name of Agency/stakeholder/community: <i>Namwora North S/C</i>			
Purpose of consultation (tick appropriate box):	Scoping:	<input type="checkbox"/>	ESIA: <input checked="" type="checkbox"/>
	Sensitization:	<input type="checkbox"/>	RAP: <input type="checkbox"/>
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: <i>15/03/2023</i>			
PROJECT NAME:			
PROPOSER:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
<i>Hon @chale wolfrad</i>	<i>Namwora Council</i>	<i>0777285843</i> <i>0782239481</i>	<i>[Signature]</i>
<i>Oromba Daind</i>	<i>SAS</i>	<i>0170815708</i>	<i>[Signature]</i>
<i>HON KOMAREKA HENRY</i>	<i>C/P L.C. III</i>	<i>0782490575</i>	<i>[Signature]</i>
<i>Hon Ojjo Charles</i>	<i>SEC/GP Council</i>	<i>0782899322</i>	<i>[Signature]</i>
<i>Hon ADJUL COLLINS</i>	<i>VICE/ III</i>	<i>017604990</i>	<i>[Signature]</i>

STAKEHOLDER CONSULTATIONS

KITGUM



Name of Agency/stakeholder/community: OROM S/C			
Purpose of consultation (tick appropriate box):	Scoping:	<input type="checkbox"/>	ESIA: <input checked="" type="checkbox"/>
	Sensitization:	<input type="checkbox"/>	RAP: <input type="checkbox"/>
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: 17/03/2023			
PROJECT NAME: OROM GRAVITY FLOW WSS			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
TOODERA JOHNSON AKELLAM	LC3 OROM	0774378030	
TOODERA DANIEL COMBENI	PARISH CLERK	0777789552	
OPIO JUSTO	community member	—	
OKOT DAVID	MEMBER	—	
OPIRTA DANIEL	MEMBER	076079008	
ACAYIO SCOVIA	MEMBER	—	
LAKOT BRADA	MEMBER	—	

STAKEHOLDER CONSULTATIONS

Name of Agency/stakeholder/community: PADER DISTRICT HQS			
Purpose of consultation (tick appropriate box):	Scoping:	<input type="checkbox"/>	ESIA: <input checked="" type="checkbox"/>
	Sensitization:	<input type="checkbox"/>	RAP: <input type="checkbox"/>
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: 16/03/2023			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
OLANYA PATRIUC	DWO	072983095	

STAKEHOLDER CONSULTATIONS

Oromi Leji WSP

Name of Agency/stakeholder/community: Pamlo S/C			
Purpose of consultation (tick appropriate box):	Scoping:	<input type="checkbox"/>	ESIA: <input checked="" type="checkbox"/>
	Sensitization:	<input type="checkbox"/>	RAP: <input type="checkbox"/>
	Environmental Audit	<input type="checkbox"/>	Other (specify):
DATE: 13/03/2023			
PROJECT NAME:			
PROPONENT:			
NAME OF PERSON/OFFICIAL MET:	DESIGNATION	CONTACT(TEL/EMAIL)	SIGN / INITIAL
NDABA TRAWAS	SAS	0775000928	
NGOMKURADICTARY	C/P LCII	0772329405	

Annex V: Flora identified in the project area

SITE	SITE CHARACTERISTICS	SPECIES	FORM	IUCN STATUS
Kabete Pumping Station - DWD 60772 N03.395302 E032.986001	Already developed, savannah grassland with patches of woody plant species resistant to fire.	<i>Paspalum scrobiculatum</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Digitaria velutina</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
Proposed Akilok Reservoir	Modified area.	<i>Imperata cylindrica</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Biden pilosa</i>	Herb	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
Pudo Reservoir	Modified site, Reservoir existing	<i>Panicum maximum</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
		<i>Vitellaria paradoxa</i>	Tree	VU
		<i>Acacia sieberiana</i>	Herb	LC
DWD 60593 - Mogila pump station	Already developed, grassland with patches of woody plant species resistant to fire.	<i>Panicum maximum</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
DWD - 61454 Labilo B	A garden formerly comprising of savannah grassland with patches of	<i>Panicum maximum</i>	Grass	NE
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Cenchrus setaceus</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	NE

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	woody plant species resistant to fire.	<i>Tridax procumbens</i>	Herb	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
		<i>Acacia sieberiana</i>	Herb	LC
		<i>Flueggea virosa</i>	Shrub	LC
		<i>Gossypium hirsutum</i>	Shrub	VU
DWD - 61455 Alel East	A garden formerly comprising of savannah grassland with patches of woody plant species resistant to fire.	<i>Gossypium hirsutum</i>	Shrub	VU
		<i>Balanite aegyptiaca</i>	Tree	DD
		<i>Combretum molle</i>	Tree	NE
		<i>Sorghum bicolor</i>	Food crop	LC
		<i>Panicum maximum</i>	Grass	NE
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
DWD 61458 - Agoromin City	Already developed, grassland with patches of woody plant species.	<i>Tamarindus indica</i>	Tree	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Biden pilosa</i>	Herb	LC
		<i>Combretum molle</i>	Tree	NE
		<i>Sorghum bicolor</i>	Food crop	LC
		<i>Panicum maximum</i>	Grass	NE
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
Agoromin Reservoir	Already developed: grassland with patches of regenerating woody plant species within the fence of the reservoir	<i>Vitellaria paradoxa</i>	Tree	VU
		<i>Acacia sieberiana</i>	Tree	LC
		<i>Sida acuta</i>	Tree	NE
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Biden pilosa</i>	Herb	LC
		<i>Combretum molle</i>	Tree	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
<i>Sorghum bicolor</i>	Food crop	LC		
Lapeitak II - DWD 61461	A garden cleared and comprising of	<i>Manhot esculenta</i>	Food crop	DD
		<i>Cajanus cajan</i>	Food crop	NT

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	savannah grassland with patches of woody plant species resistant to fire.	<i>Sorghum bicolor</i>	Food crop	LC
		<i>Carica papaya</i>	Food crop	DD
		<i>Fluegea virosa</i>	Shrub	LC
		<i>Combretum mole</i>	Tree	LC
		<i>Milicia exclesa</i>	Tree	NT
		<i>Solanum incanum</i>	Herb	LC
		<i>Commelina benghalensis</i>	Herb	LC
		<i>Sida acuta</i>	Herb	VU
		<i>Biden pilosa</i>	Herb	LC
		<i>Cissus sp</i>	Lianas	LC
		<i>Aristolochia gigantean</i>	Lianas	LC
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
Lapeitak I – DWD 61460	A garden cleared and comprising of savannah grassland with patches of woody plant species resistant to fire.	<i>Sorghum bicolor</i>	Food crop	LC
		<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Biden pilosa</i>	Herb	LC
		<i>Flueggea virosa</i>	Shrub	LC
		<i>Combretum molle</i>	Tree	NE
		<i>Solanum incanum</i>	Herb	LC
		<i>Commelina benghalensis</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	NE
		<i>Emilia fosbergii</i>	Herb	LC
		<i>Vitis arizonica</i>	Herb	LC
		<i>Acacia dealbata</i>	Tree	LC
DWD 60639 – Loluko Pumping Station	Already developed, grassland with patches of woody plant species within the fence of the pump.	<i>Paspalum scrobiculatum</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	NE
		<i>Digitaria velutina</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	NE
		<i>Cyperus rotoundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	NE
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
DWD 60642 – Lobiro Pumping Station	Already developed, grassland with patches of woody plant species within the fence of the pump	<i>Paspalum scrobiculatum</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	NE
		<i>Digitaria velutina</i>	Grass	LC
		<i>Cyperus rotoundus</i>	Grass	LC
		<i>Acacia sieberiana</i>	Tree	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
		<i>Sorghum bicolor</i>	Food crop	LC

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DWD 60622 - Locken	A garden cleared and comprising of grassland and patches of woody plant species resistant to fire.	<i>Panicum maximum</i>	Grass	NE
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	NE
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
		<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Acacia sieberiana</i>	Tree	LC
		<i>Combretum molle</i>	Tree	LC
		<i>Gossypium hirsutum</i>	Shrub	VU
		<i>Golden bamboo</i>	Shrub	CR
DWD 60596 - Lugede Pumping Station	Already developed, grassland with patches of woody plant species within the fence of the pump.	<i>Paspalum scrobiculatum</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Digitaria velutina</i>	Grass	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
Proposed Paimol Sub County Reservoir	Bare rock comprising of a few scattered trees	<i>Combretum mole</i>	Tree	LC
		<i>Acacia sieberiana</i>	Tree	NE
		<i>Terminalia brownii</i>	Tree	LC
DWD 60627 - Lai Central	Generally the vegetation has been dry due to drought, and so most of the vegetation was regenerating, the vegetation composed both grass and woody plants species.	<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Chloris gayana</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	NE
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Cenchrus setaceus</i>	Grass	LC
		<i>Amaranthus sp</i>	Herb	LC
		<i>Indigofera sp</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Conyza sp</i>	Herb	LC
		<i>Achyranthes asepera</i>	Herb	NE
		<i>Tridax procumbens</i>	Herb	LC
		<i>Combretum molle</i>	Herb	LC
		<i>Triumfetta sp</i>	Herb	LC
		<i>Ocimum basilicum</i>	Herb	LC
<i>Solanum incanum</i>	Herb	LC		
<i>Guizotia abyssinica</i>	Herb	NE		
<i>Bridelia tomentosa</i>	Herb (medicinal)	LC		
<i>Flueggea virosa</i>	Shrub	LC		

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		<i>Bauhinia variegata</i>	Tree	LC
		<i>Vitellaria paradoxa</i>	Shrub	VU
DWD 60608 - Pawel	Farmland	<i>Hyparrhenia rufa</i>	Grass	NE
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Chloris gayana</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	NE
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	NE
		<i>Sorghum bicolor</i>	Food crop	LC
		DWD 60626 - Wipolo Central	A garden cleared and comprising of grassland and patches of woody.	<i>Bouteloria dactyloides</i>
<i>Hyparrhenia rufa</i>	Grass			NE
<i>Cynodon dactylon</i>	Grass			LC
<i>Chloris gayana</i>	Grass			LC
<i>Panicum maximum</i>	Grass			NE
<i>Imperata cylindrica</i>	Grass			LC
<i>Indigofera sp</i>	Herb			LC
<i>Euphorbia bicolor</i>	Herb			LC
<i>Sida acuta</i>	Herb			LC
<i>Conyza sp</i>	Herb			LC
<i>Achyranthes aspera</i>	Herb			LC
<i>Solanum incanum</i>	Herb			LC
Coodong Reservoir (N03.236635, E033.447533)	Existing reservoir. Site is modified			<i>Panicum maximum</i>
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	NE
		<i>Sida acuta</i>	Herb	NE
		<i>Solanum incanum</i>	Herb	LC
		<i>Hyparrhenia rufa</i>	Grass	LC
DWD 61453 - Alok Ki Winyo	A garden cleared and comprising of grassland, trees and herbaceous plants	<i>Cyperus rotundus</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	DD
		<i>Tridax procumbens</i>	Herb	NE
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
		<i>Rucus communis</i>	Herb	LC
		<i>Mangifera indica</i>	Tree	LC
		<i>Kigelia africana</i>	Tree	LC
		<i>Acacia whiteii</i>	Tree	LC
		<i>Pseudocedrella odorata</i>	Tree	VU
		<i>Milicia exclesa</i>	Tree	NT

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DWD 61463 - Kakoo	Already developed: grassland with patches of regenerating woody plant species within the fence of the reservoir	<i>Paspalum scrobiculatum</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Digitaria velutina</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	NE
		<i>Acacia sieberiana</i>	Tree	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
Kalabong Reservoir	The reservoir is already developed. The vegetation cover, regenerating and comprise of;	<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Conyza sp</i>	Herb	LC
		<i>Achyranthes aspera</i>	Herb	LC
		<i>Tridax procumbens</i>	Herb	LC
DWD 61462 - Giligil	The reservoir is already developed. The vegetation cover, regenerating grasses and shrubs	<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Conyza sp</i>	Herb	LC
		<i>Achyranthes aspera</i>	Herb	LC
		<i>Tridax procumbens</i>	Herb	LC
		<i>Euphorbia hirta</i>	Herb	LC
		<i>Carica papaya</i>	Tree	DD
		<i>Paspalum scrobiculatum</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Digitaria velutina</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
Wang Kenya II - DWD 60632	Savannah woodland	<i>Tridax procumbens</i>	Herb	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Chloris gayana</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Indigofera sp</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
Wang Kenya I - DWD 60631	Savannah woodland	<i>Albizia coriaria</i>	Tree	LC
		<i>Albizia zygia</i>	Tree	LC
		<i>Bouteloria dactyloides</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Chloris gayana</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Imperata cylindrica</i>	Grass	LC

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		<i>Indigofera sp</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Conyza sp</i>	Herb	LC
		<i>Achyranthes aspera</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
		<i>Albizia coriaria</i>	Tree	LC
		<i>Albizia zygia</i>	Tree	LC
		<i>Combretum molle</i>	Tree	LC
DWD 60588 - Lamugo	Savannah woodland	<i>Balanite aegyptiaca</i>	Tree	DD
		<i>Combretum molle</i>	Tree	LC
		<i>Acacia hockii</i>	Tree	LC
		<i>Albizia coriaria</i>	Tree	LC
		<i>Albizia zygia</i>	Tree	LC
		<i>Sorghum bicolor</i>	Food crop	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Hyparrhenia rufa</i>	Grass	LC
		<i>Cyperus rotundus</i>	Grass	LC
		<i>Tridax procumbens</i>	Herb	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
<i>Chromolaena odorata</i>	Herb	DD		
Lakongera II - DWD 60637	Savannah woodland	<i>Cyperus cyperoides</i>	Grass	LC
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Brachiaria mutica</i>	Grass	LC
		<i>Persicaria senegalensis</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC
		<i>Chloris gayana</i>	Grass	LC
		<i>Persicaria punctata</i>	Herb	LC
		<i>Ageratum conyzoides</i>	Herb	LC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	NE
		<i>Chromoleana odorata</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
Obem Reservoir	The area is situated along settlement (School and homes). The vegetation regenerating.	<i>Ageratum conyzoides</i>	Herb	ILC
		<i>Euphorbia bicolor</i>	Herb	LC
		<i>Sida acuta</i>	Herb	LC
		<i>Solanum incanum</i>	Herb	LC
		<i>Hyparrhenia rufa</i>	Grass	LC
		<i>Bouteloua dactyloides</i>	Grass	LC
		<i>Cynodon dactylon</i>	Grass	LC

		<i>Chloris gayana</i>	Grass	LC
		<i>Panicum maximum</i>	Grass	LC
		<i>Imperata cylindrica</i>	Grass	LC
		<i>Acacia hockii</i>	Tree	LC
		<i>Albizia coriaria</i>	Tree	LC
		<i>Albizia zygia</i>	Tree	LC

Annex VI: Other items to be considered during preparation of the BoQs

Grievance Redress Mechanism Main Activities

S/N	ACTIVITY	Indicative COST (UGX)
1.	Preparations for and attending monthly meetings for project workers and the contractor's representatives.	1000000
2.	Gender sensitisations for project contractor about employment considerations for both men and women	4000000
3.	Gender mainstreaming on the project including gender inspections and monitoring	2000000
4.	Establishment of grievance mechanism structures and committees in the project	2000000
5.	Establishment of grievance office and orientation of office personnel	1000000
6.	Rent for GRM office	1000000
7.	Remuneration and facilitation for the grievance officer	6000000
8.	Stakeholder sensitization on the grievance procedure	3000000
9.	Stipends and refreshments for GRM committee members	1000000
10.	Community sensitisations and engagements about grievance mechanism redress	2000000
11.	Office facilities, stationery and other secretarial services for GRM offices and committees	6000000
12.	Monitoring and Evaluation by the project staff and the district team	1000000
13.	GRAND TOTAL	30,000,000

Stakeholder Engagement Plan Main Activities

Activity	Objectives	Level and type/group of stakeholders	Indicative Cost (UGX)
Pre-construction Phase			10,000,000
HIV and AIDS Awareness	Increase levels of HIV/AIDS awareness in terms of transmission, ways of living a healthy life including taking safe water, living positively with HIV/AIDS	Most vulnerable groups e.g., multiple sexual partners Water user committees/associations, water users, local government authorities e.g., LCs	
GBV prevention campaigns	Prevention of GBV at water sources	Water source users Water user committees/associations, local government authorities	
Community awareness of environmental and social risks and impacts	Making awareness of environmental and social risks and impacts of water projects and mitigation measures	Water source users Water user committees/associations District and local authorities Civil society	
Feasibility study	Establish the existing population and settlement patterns; assess and determine the water demands; conduct a detailed baseline to assess the socio-economic status of the beneficiaries	District authorities, sub-county authorities, Communities Local authorities	

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ESIA	Assess environmental and social impacts of the project	District authorities, sub-county authorities, Communities Local authorities	
Socio-economic survey	Assess socio-economic activities; collect data on institutions, commerce and local administration	Interest groups; - women's representatives Water point committees traders	
Engineers' survey	Access data on water and sanitation activities, institutional and commercial activities	DWOs, district authorities, Subcounty authorities	
Training in operation and maintenance of water project	Acquiring skills and expertise in operation and maintenance of the project	Water source users Water user committees/associations District and local authorities Civil society	
Water resources surveys	Assessment of the ground water resources in the project area, collect data	DWOs, Directorate of Water Resources Management	
Grievance Management	Address grievances and conflicts in the project area as a result of the project	- grievance mechanism committees - GRM office - district authorities - water offices - district, MWE - local government authorities - Communities; water users - water user committees	
Construction Phase			10,000,000
HIV and AIDS Awareness			
Public health education at water sources	Health education about maintaining hygiene and sanitation around water sources	Water source users Water user committees/associations	
Community awareness of environmental and social risks and impacts	Making awareness of environmental and social risks and impacts of water projects and mitigation measures	Water source users Water user committees/associations District and local authorities Civil society	
GBV prevention campaigns	Prevention of GBV at water sources	Water source users Water user committees/associations	
Grievance Management	Address grievances and conflicts in the project area as a result of the project	- grievance mechanisms committees - GRM office - district authorities - water offices - district, MWE - local government authorities - Communities; water users - water user committees	

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Operation and Maintenance Phase			10,000,000
HIV and AIDS Awareness	Increase levels of HIV/AIDS awareness in terms of transmission, ways of living a healthy life including taking safe water, living positively with HIV/AIDS	Most vulnerable groups e.g. multiple sexual partners Water user committees/associations	
Training stakeholders in operation and maintenance of water sources	Maintenance of water sources	Water users Local government authorities Water user committees/associations, communities, district and local government authorities	
Public health education at water sources	Health education about maintaining hygiene and sanitation around water sources	Water source users Water user committees/associations	
GBV prevention campaigns	Prevention of GBV at water sources	Water source users Water user committees/associations	
Grievance Management	Address grievances and conflicts in the project area as a result of the project	- Grievance mechanisms committees - GRM office - district authorities - water offices - district, MWE - local government authorities - Communities; water users - water user committees	
Community awareness of environmental and social risks and impacts	Making awareness of environmental and social risks and impacts of water projects and mitigation measures	Water source users Water user committees/associations District and local authorities Civil society	
Decommissioning Phase			
HIV and AIDS Awareness	Increase levels of HIV/AIDS awareness in terms of transmission, ways of living a healthy life including taking safe water, living positively with HIV/AIDS	Most vulnerable groups e.g. multiple sexual partners Water user committees/associations	
Public health education at water sources	Health education about maintaining hygiene and sanitation around water sources	Water users	
GBV prevention campaigns	Prevention of GBV at water sources	Water source users Water user committees/associations	

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Grievance Management	Address grievances and conflicts in the project area as a result of the project	- grievance mechanisms committees - GRM office - district authorities - water offices - district, MWE - local government authorities - Communities; water users - water user committees	
Community awareness of environmental and social risks and impacts	Making awareness of environmental and social risks and impacts of water projects and mitigation measures	Water source users Water user committees/associations District and local authorities Civil society	
Total			30,000,000

Environmental and Social Audit

The Environmental and Social Audit should be conducted during and at the end of the construction phase to understand the compliance of the Contractor in relation to the implementation of the ESMMP.

The Environmental and Social Audit should include the following activities:

S/N	Activity	Indicative cost (UGX)
1.	Review of the ESMMP	2000000
2.	Interviewing the Contractor about the implementation of the ESMMP	2000000
3.	Interviewing the workers about the implementation of the ESMMP	4000000
4.	Interviewing community members about the implementation of the ESMMP	15000000
5.	Carrying out measurements and observations on the biophysical	4000000
6.	Assessing the compliance of the Contractor to ESMMP	4000000
7.	Identifying issues that require correction	2000000
Total		35,000,000

Capacity Building and Trainings

S/N	Description of training	Target participants	Timeframe	Cost (UGX)
1	Labour conditions, GRM health and safety	District Local Government	During construction and operation	10,000,000
2	Water rights issue, Community disagreements, GRM	Project Beneficiaries/ Farmers	During Operation	10,000,000
Total				20,000,000