THE REPUBLIC OF KENYA

CENTRAL RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY (CRVWWDA)

LAKE VICTORIA NORTH WATER WATER WORKS DEVELOPMENT AGENCY (LVNWWDA)

KENYA TOWNS SUSTAINABLE WATER SUPPLY AND SANITATION PROGRAMME (KTSWSSP)

DESIGN OF WORKS FOR REHABILITATION AND AUGMENTATION OF BUSIA SEWERAGE PROJECT

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT STUDY REPORT (ESIA)

Client / Employer:	Consultant:	
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ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT STUDY FOR REPORT FOR REHABILITATION AND AUGMENTATION OF BUSIA SEWERAGE PROJECT

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CERTIFICATION

KIRI CONSULTANTS LIMITED

Signed ……..……Date……

GODWIN LIDAHULI SAKWA
LEAD EXPERT NEMA REG NO. 2492

PROPONENT

Signed …….Date…….

NAME……..
CENTRAL RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY (CRVWWDA)
CHIEF EXECUTIVE OFFICER

E. EXECUTIVE SUMMARY

E.1 Background Information

Central Rift Valley Water Works Development Agency (the Client) commissioned Procesl in association with Kiri Consult Limited (hereafter referred to as Procesl & Kiri) to undertake the "Design of Works for Rehabilitation and Augmentation of Busia sewerage project", that is part of the "Kenya Towns Sustainable Water Supply and Sanitation Programme" (KTSWSSP) included in the first component of the programme - Water and Wastewater infrastructure development.

The objective of the consultancy is to develop the most cost-effective system to address sewage collection, treatment and disposal within Busia town and rural environ. The design output was focused on a system that is (1) capable of performing the intended functions throughout the design life; (2) environmentally acceptable, both during construction and in the long term; and (3) economical in terms of both capital and recurrent costs.

E.2 Project Information

The feasibility report prepared for Busia Sewerage Project includes both "On-site" and "Off-site" options. The proposals are organized by "Off-site" solutions, to implement in urban and peri-urban areas, and "On-site" solutions to be implemented in rural areas.

The proposed "Off-site "solutions are divided in collection systems, treatment facilities and public facilities. In respect to the collection system the selected option proposes the establishment of a sewage collection system the collects sewerage from five different catchments according to the relief, namely:

(i) Alupe, which covers the majority of future urban and peri-urban area of Alupe sub-location;
(ii) North, which covers the current and future urban and peri-urban areas of the majority of Agolot and some areas from Amerikwai and Alupe;
(iii) East, which covers the current and future urban and peri-urban areas of the majority of Amerikwai and a small part of Alupe;
(iv) Centre, which covers the current urban area in Mjini sub-location whose its network will flow to the existing WWTP;
(v) South, which covers the part of current urban areas in Mjini and parts of future peri-urban areas in Mayenje, including areas which are currently connected to the existing WWTP and will be diverted to another WWTP.

The total length of the sewerage infrastructure proposed in the feasibility report is 99,362m of various sizes 110-630mm. Regarding the treatment, the selected option proposes to maintain the existing waste stabilization ponds and define four new waste stabilization ponds, each one for the respective wastewater drainage basin within the followed project areas: Alupe, North, East and South.

For onsite solutions, the proposed solution to solve the sanitation problems at the institutional buildings and public places levels is the development of new communal toilet facilities connected to one septic tank with drainage filed or soakway.

E.3 Objectives of the ESIA Assessment

This Environmental & Social Impact Assessment (ESIA) has been conducted in compliance with the Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 2003 established under the Environmental Management and Coordination Act (EMCA) 2015 and African Development Bank (AfDB) Safeguard Standards.

The ESIA is expected to achieve the following:

(i) Identify all potential significant environmental and social impacts of the proposed Project and recommend measures for mitigation.
(ii) Assess and predict the potential impacts during site preparation, construction and operational and decommissioning phases of the Project.
(iii) Generate baseline data for monitoring and evaluating how well the mitigation measures are being implemented during the Project cycle.
(iv) Promote stakeholders and public participation.
(v) Design an Environmental and Social Management Plan to avoid, mitigate and where not possible, offset the identified impacts so as to ensure sustainability of the proposed Projects.
(vi) Recommend feasible, cost effective and culturally acceptable measures to be implemented to mitigate against the potential negative impacts while ameliorating the positive ones.

E.4 Approach and Methodology

The approach to this exercise was structured to cover the requirements under the EMCA, 2015 as well as the EIA regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003 and African Development Bank (AfDB) Safeguard Standards.

The assessment involved an understanding of the Project background, the Project designs and the implementation plan as well as Project commissioning. In addition, the baseline information was obtained through physical investigation of the site and the surrounding areas, interviews with surrounding community members through local administration and County structures, stakeholder benchmarking, photography and most importantly, discussions with the Client and the Design Team.

E.5 Legal and Policy Regulatory Instruments

The report has presented the relevant policies, legislation and institutional frameworks that guide preparation of ESIA at both National and African Development Bank (AfDB) Safeguard Standards levels. **Table E.1** on summarizes the legal and policy statutes that were reviewed during the Survey.

Table E-1: Applicable Legal and Policies Statutes

Statute Category	Specific Statute
Policy Provisions	Constitution of Kenya 2010
	Kenya Vision 2030
	National Environment Policy (NEP) 2013
	HIV and AIDS Policy 2009
	National Land Policy 2009
	Gender Policy 2011
	Kenya National Youth Policy 2006
	Sustainable Development Goals (SDGs) 2015
	National Climate Change Response Strategy 2010
Acts of parliament	EMCA 2015
	Land Act 2012
	Water Act 2016
	Physical Planning Act 1996 (286)
	The Urban Areas and Cities Act 201
	The Public Health Act (Cap.242)
	HIV and AIDS Prevention and Control Act 2011,
	Occupational Health and Safety Act (OSHA 2007),
	Sexual Offences Act 2006,
	Child Rights Act (Amendment Bill) 2014,
	Labour Relations Act 2012
	National Gender and Equality Commission Act 2011,
African Development Bank's (AfDB) Operational Safeguards (OS) Policies	OS 1: Environmental and Social Assessment
	OS 2: Involuntary Resettlement, Land Acquisition, Population Displacement and Compensation
	OS 5: Labour Conditions, Health and Safety
	OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency
	OS 3: Biodiversity and Ecosystem Services

E.6 Highlights of Stakeholder Consultations

The African Development Bank Operation Safeguard (OS 1) Environmental and Social Assessment and Kenya's Environmental Impact Assessment / Audit Regulations of 2003 require that in the process of conducting Scoping, Environmental and Social Impact Assessment (ESIA), the proponent (in this case Rift Valley Water works development agency CRVWWDA) shall in consultation with the Authority herein referred to as the National Environment Management Authority (NEMA); seek the views of persons who may be affected by the Project.

Also, in accordance with the Kenyan Constitutional requirement (Article 10) on Public Participation, it's a democratic right of every Kenyan to participate in public decisions and collaborate in public projects such as proposed Busia Sewerage Project. Therefore, to comply with the above discussed statues, consultations were done at the ESIA preparation stage. The consultations included interaction with key stakeholders in Busia Town Project area June 2019. The venues of the consultation were at Angorom Shopping Centre Busia on 20th June 2019 and Busia Social Hall On 26th June 2019.

The meetings involved ESIA experts, LVNWWDA and CCRVWWDA team, Busia Water and Sanitation Company (BUWASCO) Local Administration, Village Leaders, Busia Business

Community, Local Church Leaders and Local Residents of various sub locations within the Project area. Table E-4 on below presents a schedule of Public Participation meetings held in Busia Town Project area.

Table E-2: **Public Participation Meetings at Project Report Stage**

Meeting Date	Meeting Venue	Participants Representation	Gender Ratio
20th June 2019	Angorom Shopping Centre Busia	1. Area chief 2. Area Assistant chiefs 3. Area Member of County Assembly 4. Water Scheme Manager BUWASCO 5. Inspector of police 6. Consultant representative 7. Residents.	Total 119 Male 83 female 36
26th June 2019	Busia Social Hall	1. Area Ward administrator 2. Area Member of County Assembly 3. Water Scheme Manager BUWASCO 4. Business Community 5. Consultant representative 6. Residents.	Total 34 Male 20 female 14

The project designs and Environment and Social Impact Assessment (ESIA) in-cooperated issues discussed and resolved in the consultative meeting as summarized in **table E.3** below.

Table E-3: Issues Discussed and Response

Stakeholder Issues	Inco-operation into the Project
Timeframe of Project implementation, Scope and coverage of the project.	The project is funded by African Development Bank under the Kenya towns sustainable water supply and Sanitation programme (KTSWSSP). However, under the current scope the consultant is only undertaking Design of Works for Rehabilitation and Augmentation of Busia Sewerage Project
Project operation and maintenance and Modalities of getting sewerage connection.	The Project will be operated and maintained by Busia water and sewerage Company (BUWASCO) as provided Water Act 2016. BUWASCO will guide customers on getting a sewer connection as per the WSP regulations
Sewerage tariffs review	water tarrif to be reviewed by BUWASCO as guided by Water Act 2016 and Water Services Regulatory Authority (WASREB)
Displacement of impacts along the riparian reserves and compensation provisions**.**	Resettlement Action Plan (RAP) report done to address project impacts to private property
Employment opportunities associated with the Project	Locals will be employed both as skilled and unskilled
Benefits of the sewerage project to the residents of the town and the need for the implementation of the project since the town is growing and the use of septic tanks can be unsustainable.	Project will address health and sanitation challenges posed by the current situation of lack of sewerage infrastructure
License status of the project	After ESIA study assessment, National Environment Management Authority (NEMA) will license the Project.
Land acquisition status for the sewerage treatment plant	Land for establishment of the Waste Water Treatment Plant (WWTP) has been identified by the County Government within Alupe University. To minimize resettlement, the sewer lines will be constructed along storm water drains

	and river riparian
Quality of treatment and discharge of the effluents into Okame river	Design to treat Waste Water to allowable standards as provided by NEMA

E.7 Project Impacts

Assessment of Project Impacts was based on analysis of the proposed Project components and existing environmental and social conditions. The impacts arising during each of the phases of the proposed development namely construction, operation and decommissioning, were categorized into:

- Impacts on Biophysical Environment
- Health and safety impacts
- Social-economic impacts

Sections E.7.1 to **E.7.4** on **pages E.6 to E.12** provides a summary of the Project impacts both positive and negative discussed in this Report.

E.7.1 Positive Impacts During Construction Phase

The Project is a Socially Uplifting Project (SUP) and it's envisaged to have more positive impacts after completion of the civil works and commissioning of the Project. A summary of anticipated positive impacts of the Project include:

- Employment opportunities during construction, the design report has provided for 90% unskilled labour and 60% skilled labourers to be sourced from the local market.
- Provision of ready market for construction materials such as sand, ballast and cement that will be sourced from local market, this will lead to injection of money into the local economy
- The Project will be associated with technological and knowledge transfer to the local sector, this will be through the artisans employed and trained by the Project.

E.7.2 Positive Impacts during Operation Phase

The Project shall result in both direct and indirect benefits to the residents of Busia Project Area as summarized below:

- Reduce pollution of Okame River which provide water for irrigation and domestic use.
- Reduce cases of water borne diseases associated with pollution of water resources
- Improve Health and Sanitation status of Busia town currently being polluted by contamination associated with raw sewer flowing in storm drains
- Trigger development of modern infrastructure within Busia town due to availability of sewer infrastructure
- Reduce distances covered by exhausters to sludge discharge points eventually reducing costs.
- Residents will decommission pit latrines which are expensive to construct and unsustainable due to short fill-up duration.
- Improve aesthetic outlook of Busia Town that is currently comprised by raw sewer flowing in storm drains

E.7.3 Negative Impacts and Mitigation Measures during Project Construction Period

Activities during the Construction Phase with potential to trigger negative Environment and Social impacts due to below listed Project activities among other activities.

i) Clearing vegetation cover along the Project alignment
ii) Movement of Plant and Equipment on site which causes trampling and air pollution
iii) Excavation of sewer trenches and associated civil works
iv) Temporary stockpiling of soils, sub-soils and rock along the trenches
v) Importing material for bedding of concrete joints of the sewer lines (e.g. sand, cement, and concrete)

Table E-4 and E-4 provides a summary of potential negative impacts and proposed mitigation measures.

Table E-4: Negative Impacts and Proposed Mitigation Measures during Construction Phase

Impact	Summary of Mitigations
Bio-physical Environment	
Impacts on Vegetation Resources • The project footprint will require clearance of vegetation along sewer pipeline routes and at the site of Waste Water Treatment Plant. • This will lead to loss of ground cover and possible loss of biodiversity. • The process may also cause loss of mature indigenous species	▪ Compensatory planting of trees i.e. plants at least twice the number of trees, about 900 in total either on farmer's land or in public land within the project area. ▪ Vegetation should only be cleared along the Project corridor and where it will interfere with Project construction and/or present a hazard. ▪ The local community should be given a chance to harvest the targeted vegetation if they so wish. ▪ Areas to be cleared should be agreed and demarcated before the start of the clearing operations to minimize exposure. ▪ Also stage vegetation clearance is recommended so as not to clear the entire corridor all at once. ▪ The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc. shall be encouraged.
Water Resources • Pollution of Okame River and associated springs by construction activities which release solid and effluents waste • Major concerns will be water abstraction, soil erosion and chemical pollutants • Project construction may increase pressure on the existing limited water resources	• Isolate solid wastes disrupted from the works during excavations for safe disposal. The wastes should be collected and disposed in approved sites. • Earth moving and excavations for the construction are carried out considering safety of the river and surface drainage. Control siltation of rivers and other surface drains • Ensure spilt oil does not discharge into water sources Provide oil spill containment including concrete platform for servicing of construction equipment and holding of scrap oil drums. • Contain excavated soils so that they will not find their way into nearby water sources (of Okame River) • Spilled cement or concrete should be collected and disposed away from natural water ways or storm water drainage; • Sensitize workers and enable them to properly handle concrete spillages or waste cement;
Soil resources • Alteration of soil physical properties as well as exposure to erosion agents may result from the civil and general works within the	• The spilled oil from fuelling and servicing stations should be trapped in grit chambers for settling of suspended matter before being release into the environment • Collected oil should be properly disposed to avoid any underground water contamination • Earthworks should be controlled so that land that is not

Impact	Summary of Mitigations
Project site. • Effects of soil pollution may also result from accidental oil spills.	required for the road works is not disturbed; • Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain; • Excavated materials and excess earth should be kept at appropriate sites approved by the Supervising Engineer; • The contractor should adhere to specified cut and fill gradients and planting embankments with shrubs and grass to reduce erosion and take care of stability problems of road embankments. Areas cleared for improving sight distance should be planted with grass to reduce erosion;
Health and Safety Impact	
Air Pollution • Air quality pollution caused by emissions from construction plant and equipment which include dust and gaseous emissions. • Impacts relate to the receptors such as schools, health facilities, market centers and places of worship.	• Contractor will comply with the provisions of EMCA 2015 (Air Quality Regulations 2014). • Water sprays shall be used on all earthworks areas within 200 metres of human settlement especially during the dry season. • The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible; • Do not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds. • Water sprays shall be used on all earthworks areas. Water shall be applied when need be to reduce dust emissions caused by vehicle movements or wind • Vehicles delivering soil materials shall be covered to reduce spills and windblown dust; • Vehicle speeds shall be limited to minimize the generation of dust on site and on diversion and access roads
Noise and excessive vibration from construction equipment and vehicles	• Contractor will comply with provisions of EMCA 2015 (Noise and Excessive Vibrations Regulations of 2009). • The Contractor will keep noise level within acceptable limits (60 Decibels during the day and 35 Decibels during the night) and construction activities shall, where possible, be confined to normal working hours in the residential areas. • Sensitive receptors, for example markets such as Busia Markets and schools shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity.
Occupational health and safety risks associated with the Project	• Establish a Health and Safety Plan (HASP) for civil works areas ensuring the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay; • Provide workers with gloves, ear gears, sturdy rubber boots and overalls to protect their skin from the effects of cement; • Provide workers training on safety procedures and emergency response such as fire and sewer pipe bursts;
Solid waste generation from construction activities	• A site waste management plan should be prepared by the Contractor prior to commencement of construction works. This should include designation of appropriate waste storage areas, collection and removal schedule and identification of approved disposal site; • Ensure that the solid waste collection, segregation, and disposal system is functioning properly at all times during the construction phase; • Recycle and re-use wastes where possible such as scraps metal.
Liquid wastes during the construction phase, various liquid wastes including grey and	• Water containing pollutants such as concrete or chemicals should be directed to a conservancy tank for removal from the site where applicable

Impact	Summary of Mitigations
black water, concrete washings, runoff from camp and workshop areas.	• The contractor shall prevent runoff loaded with sediments from flowing into Okame River and other water springs within the project area. • No grey water runoff or uncontrolled discharges from the site or working areas to adjacent water sources. • The contractor shall ensure that the machines and equipment are in good condition to prevent leakages • Interceptors such as sand can be used to prevent pollutants from reaching underground water, water pans and streams • Ensure proper handling of lubricants, fuels and solvents while maintaining the equipment
Social Impacts	
Project impact to private property and sources of livelihood	• The total number of PAPs likely to be impacted by the project are 265 PAPs who include 48 female PAPs and 217 male PAPs. • The project impact on land will be triggered at the proposed site for the Waste Water Treatment Plant (WWTP) within Alupe University where 69acres will be acquired through a willing buyer willing seller agreement between the University and Busia County Government. • Also, isolated cases of Sewer Easement will be triggered along the proposed sewer alignment in areas with no government road reserve of river riparian. The total easement required for the trunk sewer is provided as cumulative of 41.42 acres for the trunks sewers discussed in the feasibility report prepared separately under this consultancy • Estimated RAP budget as presented by this RAP is Two Hundred and Sixty-Six Million Seven Hundred and Eighty-Nine Thousands and Fifty Shillings (Kshs. 266,789,050.00)
Spread of **communicable diseases and HIV/AIDS** infection	• Develop appropriate training and awareness materials for Information, Education and • Develop an intervention strategy compatible with the construction programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with other stakeholders; and • Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs
Labour Influx to the Project area.	• Effective community engagement and strong grievance mechanisms on matters related to labour. • Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx • Proper records of labour force on site while avoiding child and forced labour • Fair treatment, non-discrimination and equal opportunity of workers. • Comply to provisions of Labour Relations Act 2012 and Work Place Injuries and Benefits Act (WIBA 2007) The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct.
Violation of **Human Rights, and gender** requirement by Contractors	• Mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule and National Gender and Equality Commission Act 2011 • Protecting human risk areas associated with, disadvantaged

Impact	Summary of Mitigations
	groups, interfering with Participation Rights and Labour Rights • The contract will provide provisions that ensures that gender based violence and abuse are not triggered by the Project as provided for by Sexual Offences Act 2006
Violation of **children rights** by contractor and labour force on site.	• Develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. • All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour • Children under the age of 18 years should be hired on site as provided by Child Rights Act (Amendment Bill) 2014

E.7.4 Project Negative Impacts and mitigation Measures during Operation Phase

The Project once commissioned has the potential of triggering negative impacts associated with operation and maintenance as summarized in **Table E-5** below.

Table E-5: Negative Impacts and Mitigation Measures during Project Operation Phase

Issue	Summary of Mitigation
Pollution of Water Resources (Okame River) by raw sewage from blocked Sewer pipes and Manholes).	• Activate a community watch group for information sharing on the status of the sewer line • Awareness rising among community members not to dump solids in manholes. • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups • Design consultant to ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent build-up of solids and hydrogen sulphide generation • Regular inspection of the system to ensure performance is maintained at high levels; (BUWASCO) • Regular monitoring and sampling of the waste water at influent and effluent points as well as in the receiving water bodies; (BUWASCO) • Communities living within the river basins where the trunk sewers will be constructed should be enlightened on dangers of using raw sewerage to irrigate farmlands. • The quality of the discharging sewage into the river will be an important parameter. Continuous generation and sharing of sewage quality data on pre-scheduled monitoring programmes will be necessary
Odour Menace from Wastewater Treatment Works	• Design consultant and BUWASCO to ensure appropriate covering/ventilation of the pre-treatment unit; • Busia Water and Sewerage Company to appropriate handling and removal of grit/grease; • Design consultant to ensure proper sizing and alignment of the lagoons; • Busia Water and Sewerage Company to scum is appropriately disposed off or properly stabilized; • Busia Water and Sewerage Company to ensure that the pond series have adequate water flow and aeration to reduce the potential of odour formation; • The perimeter of the proposed site should be vegetated with trees and plants of varying heights thereby forming windbreaker and reduce dispersion of odour; • Repair the roofs of the sludge drying beds to ensure quick drying of sludge and appropriate disposal to reduce odour emanating from

Issue	Summary of Mitigation
	wet sludge.
Risks Associated with Sludge from the Waste Water Treatment Plant (WWTP)	• Busia Water and Sewerage Company during operation and maintenance of the Waste Water Treatment Plant (WWTP) will dry sludge on the drying beds before disposing off • Dried sludge could be used to make brisket used as charcoal substitute or be sold to farmers as fertilizers • Excess sludge can be disposed in a Land fill which is dedicated disposal site clearly designated landfill, the land fill shall only be for disposing dry odourless sludge. • Preparation and enforcement of operational guidelines for sludge management by Busia County Government
Solid Wastes Impacts at WWTP Screens	• Busia Water and Sewerage Company shall develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers • Busia Water and Sewerage Company shall employ personnel who will be in charge of maintaining hygiene and cleanliness of the WWTP including removal of solid wastes from screen chambers • Properly labelled and strategically placed waste disposal containers shall be provided at all places within the WWTP • Solid wastes once removed from screens shall be collected and disposed appropriately as required by waste Management Regulations of (2006) and Busia County Government by laws.
Risk of invasion of birds, rodents, mammals and associated reptiles	• Keep the Waste Water Treatment Plant (WWTP) clean to limit the attraction of birds which scavenge for insects and maggots from the ponds and sludge beds • The sewage treatment plants should be protected from wildlife encroachments by providing secure barriers to keep off the animals from interfering with the plant operations and safety. This will also ensure safety of the residents, •

E.8 Conclusion

The Environmental and Social Impact Assessment (ESIA) undertaken for the Project indicates that the Project will have the following impacts:

(i) The Project will improve health and sanitation status of Busia town that is currently being polluted by contamination associated with raw sewer flowing in storm drains due to the choked existing sewerage system
(ii) The project will not displace population along the proposed sewerage alignment. This is because the proposed sewer easement is used as farmlands and that acquisition will be partial
(iii) The project impact on land will be triggered at the proposed site for the Waste Water Treatment Plant (WWTP) within Alupe University where 69acres will be acquired through a willing buyer willing seller agreement between the University and Busia County Government or through National Lands Commission (NLC) as required by section (7) of the land Act 2020
(iv) The total number of PAPs likely to be impacted by the project are 265 PAPs who include 48 female PAPs and 217 male PAPs. These persons own cumulative of 41.42 acres' land along the proposed sewer easement route.
(v) The total budget provided for land acquisition of the new WWTP and easement acquisition is Two Hundred and Sixty-Six Million Seven Hundred and Eighty-Nine

Thousands and Fifty Shillings (Kshs. 266,789,050.00).

(vi) The cost of implementing the Environment Management Plan (EMP) is provides as Ksh 6 million.

(vii) The feasibility report provided that the Project will be constructed for a period of 18months at a cost of Ksh 2,493,905,218 including a 5% discount.

E.9 Recommendations

This assessment recommends the following provisions:

(i) The Bid documents prepared for the Project incorporate the Environment, Social Health and Safety Provisions discussed under Chapter 7 (Environment and Social Impact Assessment and Mitigation Measures).

(ii) Contractor will be required to commit to implementing the Environment, Social Health and Safety (ESHS) Provisions by developing site specific (ESHS) plans.

(iii) At Project implementation stage, the Contractor to report to the Project management team comprising of the Consultant and the Project proponent on a monthly basis on how ESHS provision detailed in this ESIA are addressed at each Project Site.

(iv) On completion of the Civil Works, Busia Water and Sewerage Company to commission an independent Consultant to undertake an initial Environment, Social, Health and Safety Audit as required by Environment Impact Assessment and Audit Regulations of 2003. The audit will identify nonconformities which the Contractor together with Busia Water and Sewerage Company will address through the defects liability period of the Project. This audit will also form basis of annual Project self-audits by Busia Water and Sewerage Company.

LIST OF ACRONYMS

AfDB	African Development Bank
BOD	Biological Oxygen Demand
BUWASCO	Busia Water and Sanitation Company
CRVWWDA	Central Rift Valley Water Works Development Agency
DOSH	Directorate of Occupational Health and Safety
GHG	Green House Gases
EA	Environmental Assessment
EHS	Environment Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMMP	Environment and Social Management & Monitoring Plan
EMSF	Environmental and Social Management Framework
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
ESHS	Environmental, Social Health and Safety Guidelines
IRR	Internal Rate of Return
KTSWSP	Kenya Towns Sustainable Water and Sanitation Project
KWS	Kenya Wildlife Services
LVNWWDA	Lake Victoria Water works development agency
MAS	Modified Activated Sludge
NLC	National Lands Commission
NEC	National Environment Council
NEP	National Environment Policy
NEMA	National Environment Management Authority
NPV	Net Present Value
PPE	Personal Protective Equipment
OS	Operation Safeguards
PPP	Private Public Participation
RAP	Resettlement Action Plan
SDG	Sustainable Development Goals
SUP	Socially Uplifting Project
WASREB	Water Services Regulatory Authority
WRA	Water Resources Authority
WWTP	Waste Water Treatment Plant
WMP	Waste Management Plan

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CHAPTER 1: BACKGROUND INFORMATION

1.1 Background Information

The Government of the Republic of Kenya (GoK) has mainstreamed its National Water Policy to envisage 100% access to safe water and sanitation facilities for the Country's population by year 2030. To achieve this target, the GoK has been implementing a far-reaching sector reform program since 2002 aimed at harmonizing the Management of Water Resources and Water Supply and Sanitation (WSS) throughout the Country. This reform has been propelled by the Water Act (2002), which aims at harmonizing the Management of Water Resources and Water Supply and Sanitation Services.

In August 2010, Kenya enacted a new Constitution. A key benchmark of the new Constitution is stipulated under Chapter IV-BILL OF RIGHTS, paragraph 43(1)(b) and (d) which stipulates: "Every person has the right to (b)..... reasonable standards of sanitation and (d) clean and safe water in adequate quantities."

To strive towards achieving this benchmark, the Government of Kenya has received financing from the African Development Bank to support the Kenya Towns Water Supply and Sanitation Programme (KTWSSP). The programme aims to contribute to the improvement of the quality of life and reduce poverty levels of the population of Kenya through provision of water and sanitation services on a sustainable basis. The main objective of the program is to improve the access, availability and sustainability of water supply and wastewater management services in multiple towns with a view to catalyzing commercial activities, driving economic growth, improving quality of life of people and building resilience against climate variability and change.

1.2 Project Information

The objective of the consultancy is to develop the most cost-effective system to address sewage collection, treatment and disposal within Busia sewerage Project area with design output that is focused on a system that is (1) capable of performing the intended functions throughout the design life; (2) environmentally acceptable, both during construction and in the long term; and (3) economical in terms of both capital and recurrent costs.

Rift Valley Water works development agency (the Proponent) commissioned Procesl in association with Kiri Consult Limited (hereafter referred to as Procesl & Kiri) to undertake the "Design of Works for Rehabilitation and Augmentation of Busia sewerage project", that is part of the "Kenya Towns Sustainable Water Supply and Sanitation Programme" (KTSWSSP) included in the first component of the programme - Water and Wastewater infrastructure development.

The feasibility report prepared for Busia Sewerage Project includes both "On-site" and "Off-site" options. The proposals are organized by "Off-site" solutions, to implement in urban and peri-urban areas, and "On-site" solutions to be implemented in rural areas.

The proposed "Off-site" solutions are divided in collection systems, treatment facilities and public facilities. In respect to the collection system the selected option proposes the

establishment of a sewage collection system the collects sewerage from five different catchments according to the relief, namely:

(i) Alupe, which covers the majority of future urban and peri-urban area of Alupe sub-location;
(ii) North, which covers the current and future urban and peri-urban areas of the majority of Agolot and some areas from Amerikwai and Alupe;
(iii) East, which covers the current and future urban and peri-urban areas of the majority of Amerikwai and a small part of Alupe;
(iv) Centre, which covers the current urban area in Mjini sub-location whose its network will flow to the existing WWTP;
(v) South, which covers the part of current urban areas in Mjini and parts of future peri-urban areas in Mayenje, including areas which are currently connected to the existing WWTP and will be diverted to another WWTP.

The total length of the sewerage infrastructure proposed in the feasibility report is 99,362m of various sizes 110-630mm. Regarding the treatment, the selected option proposes to maintain the existing waste stabilization ponds and define four new waste stabilization ponds, each one for the respective wastewater drainage basin within the followed project areas: Alupe, North, East and South.

For onsite solutions, the proposed solution to solve the sanitation problems at the institutional buildings and public places levels is the development of new communal toilet facilities connected to one septic tank with drainage filed or soakway.

1.3 About Busia Town and Environs

Busia town is located in Busia County, former Western Province, and covers a total area of 45 km2. It is the capital of Busia County, located about 320 km North-West of Nairobi City along the Kisumu-Busia road at the Uganda border, and its geographical coordinates are 0o27'51'' North of Equator and 34o06'08'' East of Greenwich Meridian. Busia town, like other urban centres in Kenya, is experiencing rapid population growth largely due to rural-urban migration and natural rate of increase. According to the projections of the Kenya National Bureau of Statistics (Busia Office) the current population of Busia town is 80,262. The rapid increase in population has resulted in the increase in liquid waste generation rate.

The main water supply for Busia town is the Busia – Mundika water supply scheme. Its intake and treatment works are located 12 km south of Busia town along the Busia - Kisumu road in the Sio River. The water supply relies on a two stages pumping system from the intake to treatment plant and thereafter to the town´s main storage tanks in Milimani area.

The Busia sewerage system comprises about 17 km of sewers, with diameters from 4 to 18 inches mainly in uPVC and AC, and wastewater stabilization ponds. Sewerage coverage is about 20% of the town and it is expected that the sewer design should cover 100% of the households with water supply coverage. Areas which are currently served include the town centre, Bondeni, Lukonyi, Karibuni parts of Marachi, Milimani and Mauko. However, other areas with water supply connection in the town such as Airstrip, Burumba, 48 Estate and Bulanda are still not served. The **figure 1-1** below shows project area in relation to neighboring counties,

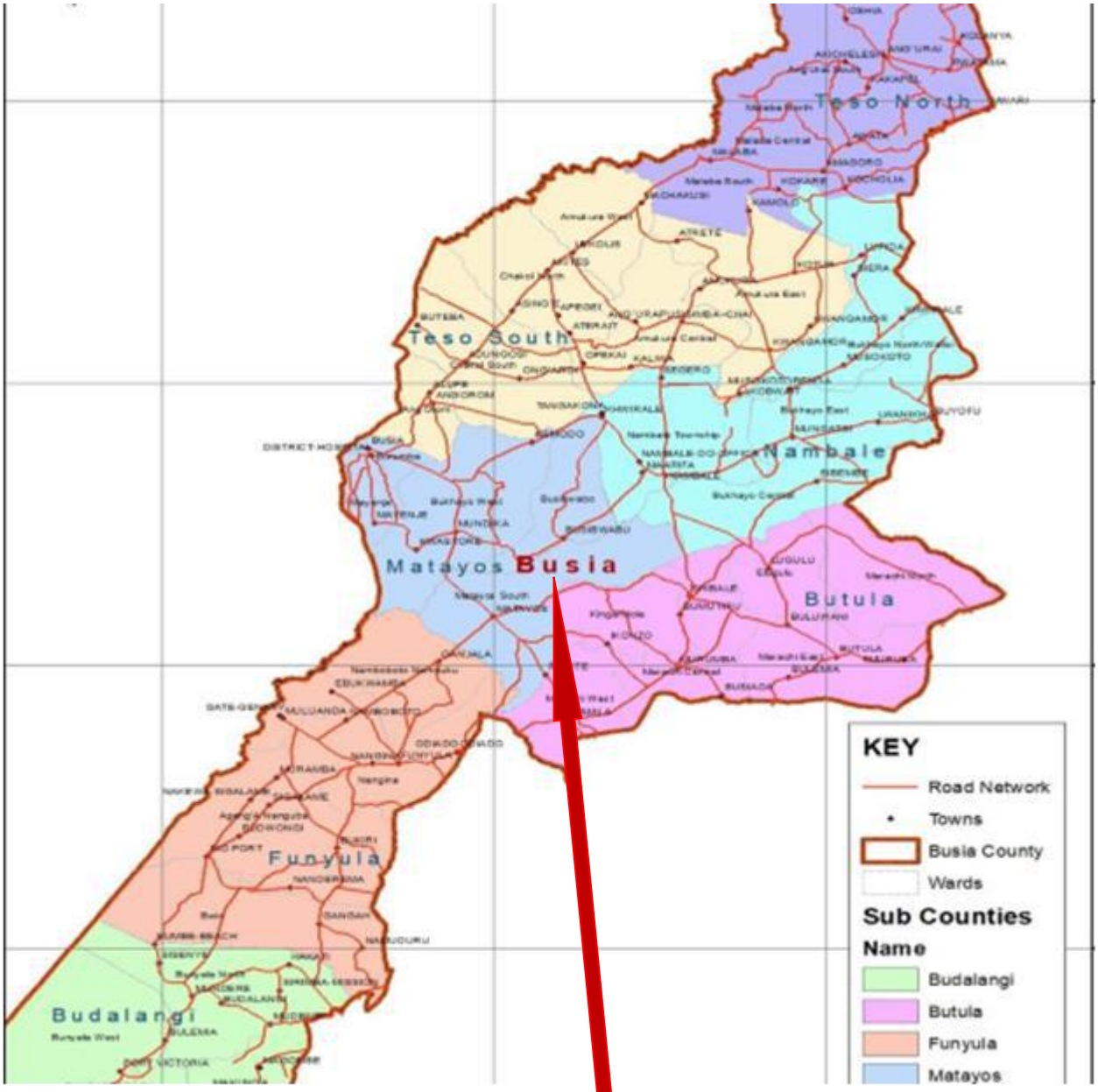


Figure 1-1: Project Location Map

CHAPTER 2: BASELINE INFORMATION

2.1 Physical Environment

2.1.1 Climate

There are two rainy seasons in Busia County, the long rains and the short rains. The long Rain season starts in March and continues into May, while the short rain season starts in late August and continues into October. The dry spells are from December through February and July. The mean annual rainfall for the district is 1500mm with most parts of the county receiving between 1270mm and 1790mm.

The rainfall is moderate throughout the year allowing the County to experience conducive conditions for cultivation of Cassava, millet, sweet potatoes, beans, and maize grown in small scale. The temperatures for the whole county are more or less homogeneous. The annual mean maximum temperatures range between 26°Celcius and 30°Celcius while the mean minimum temperature range between 14°Celcius and 22 °Celsius. **Figure 2-1** below presented rainfall map of Busia Project area.

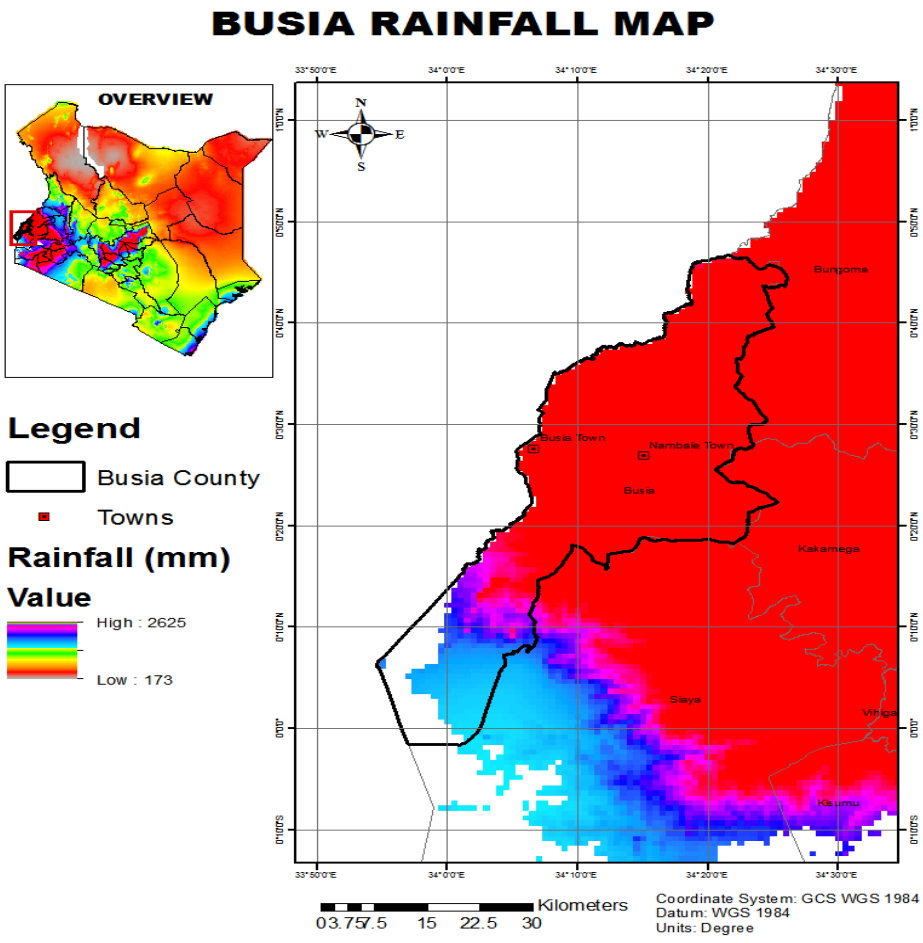


Figure 2-1: Busia Rainfall Map

2.1.2 Topography

Busia County falls within the Lake Victoria Basin. The altitude varies from 1,130m above sea level on the shores of Lake Victoria to 1,375m above sea level in the central part Butula and Nambale Divisions occupy a plain characterized by low flat divides. These are often capped by late rites and shallow incised swampy systems. The peneplain has fertile soils suitable for growing maize, robusta coffee and sugar cane. The southern part, which covers parts of Matayos Division, Funyula Division and the northern part of Budalangi Division is covered by range of hills comprising the Samia Hills, which run from northeast to southwest culminating at Port Victoria. In the extreme south of the district is found the Yala Swamp. The area forms a colony of papyrus growth broken by irregular water channels and occasional small lakes with grassy islands. **Figure 2-2** below presented topography map of Busia Project area.

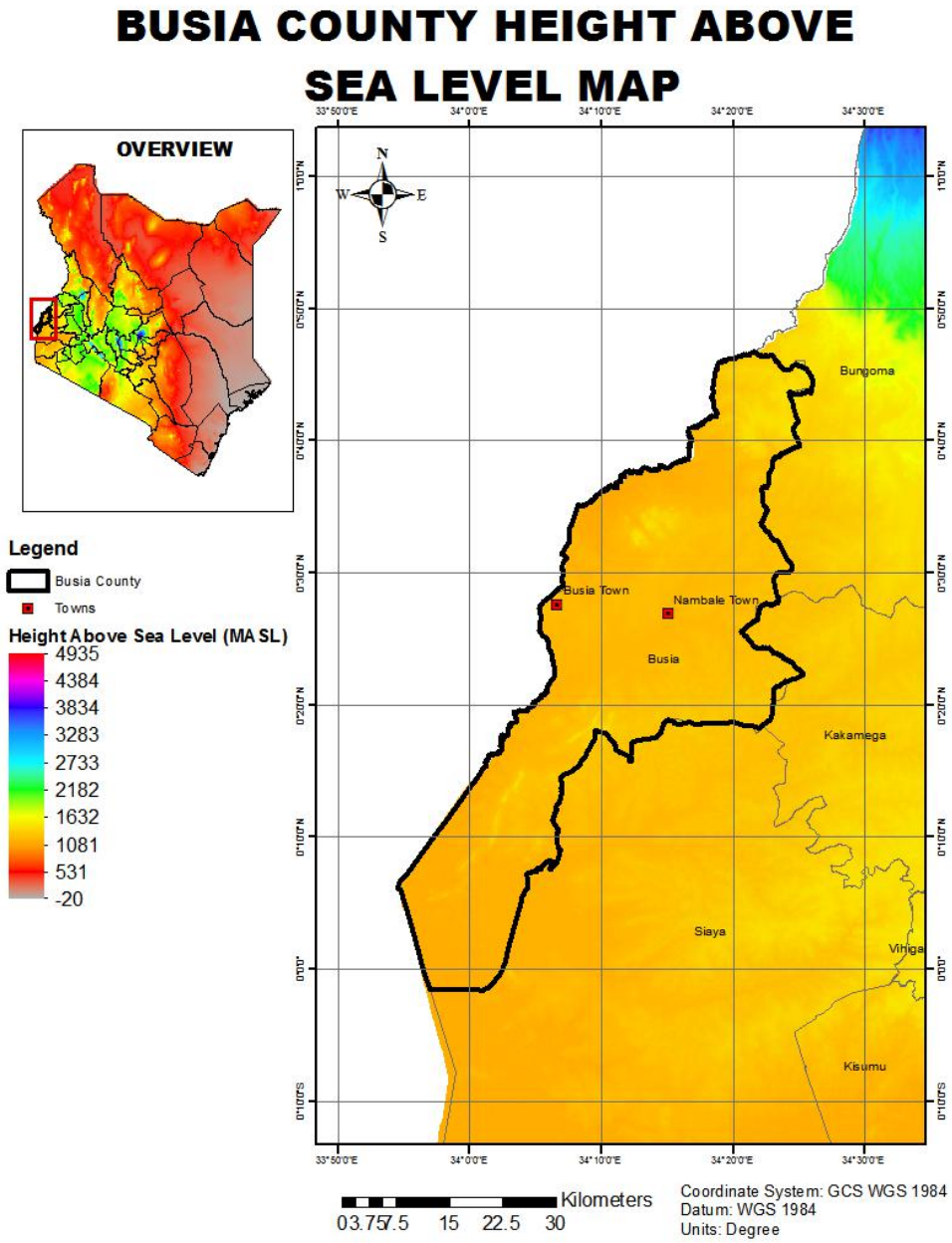


Figure 2-2: Busia Topography Map

2.1.3 Geology and Soils

Most of the soils in Busia County are moderately deep, generally rocky and stony consisting of well drained red clays which have a low natural fertility. In parts of Nambale and Butula Divisions there are soils that are well drained, deep, brownish and sandy with moderate water holding capacity. The project area has well-drained, deep, loamy soil with a bulk density of 1.1 to 1.2 g/cm3 and total porosity, with an adequate balance between pores of various sizes, is higher than 50%. The ground water table below 1.5 to 2.0m from soil surface and available water holding capacity of 15% or more is considered ideal for sugarcane cultivation.

The optimum soil Ph is about 6.5 but sugarcane can tolerate considerable degree of soil acidity and alkalinity. Hence it is found growing in soils with ph in the range of 5 to 8.5. The County has approximately 924,200 hectares of agricultural land. The relatively good soils of Nambale and Butula Divisions together with the higher rainfall, promote production of a variety of crops. **Figure 2-3** below presented soils map of Busia Project area.

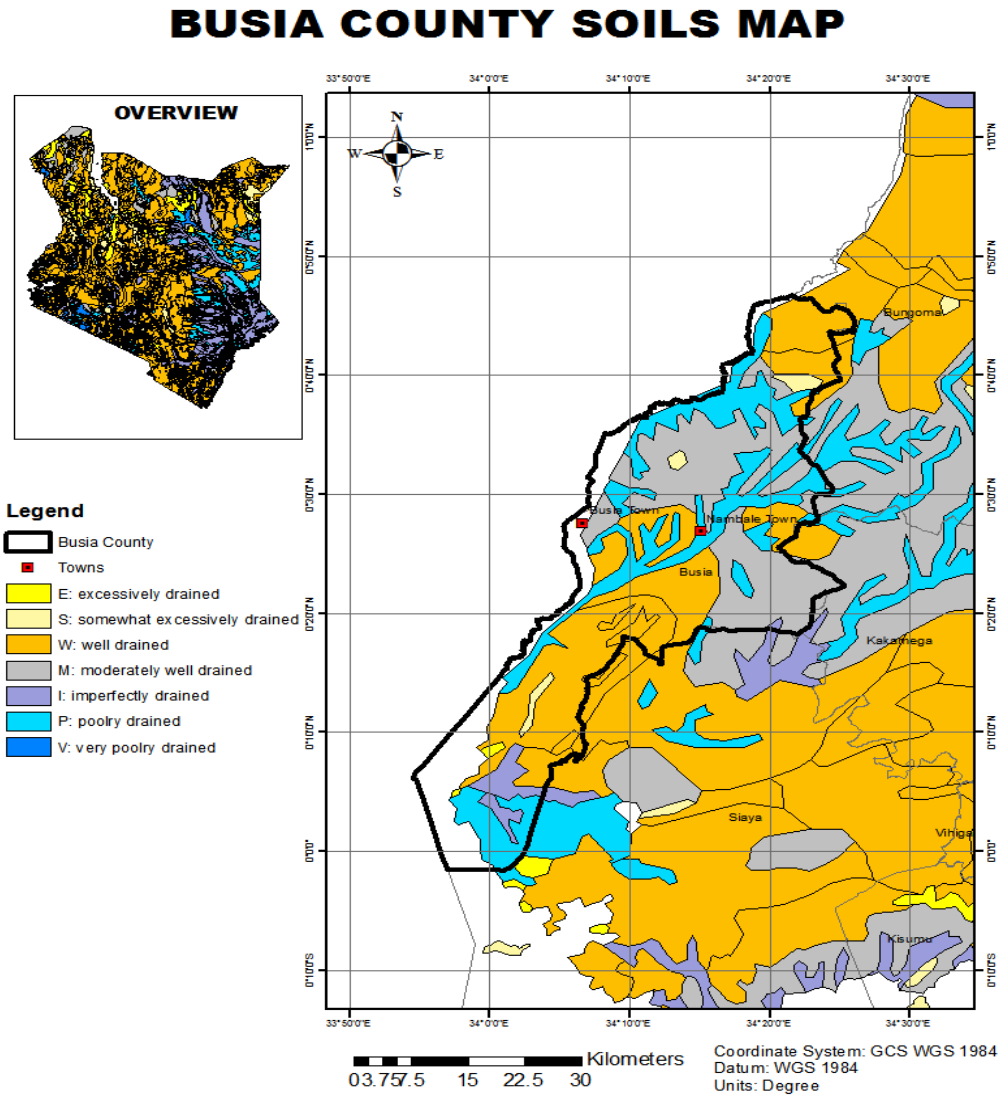


Figure 2-3: Busia Soils Map

2.1.4 Hydrology

The County has numerous sources of water. There are two main rivers, which drain into Lake Victoria. They are River Nzoia, River Sio while Okame River is the main target river where the treated effluent will be released to. There are numerous streams, springs and earth dams. The potential for ground water is good in Nambale and Matayos Divisions and moderate in Butula Division. There are a wide variety of sources of water for domestic, livestock and industrial use in the County, especially in Nambale, Butula and Matayos Divisions. **Figure 2-4** below presented hydrology map of Busia Project area.

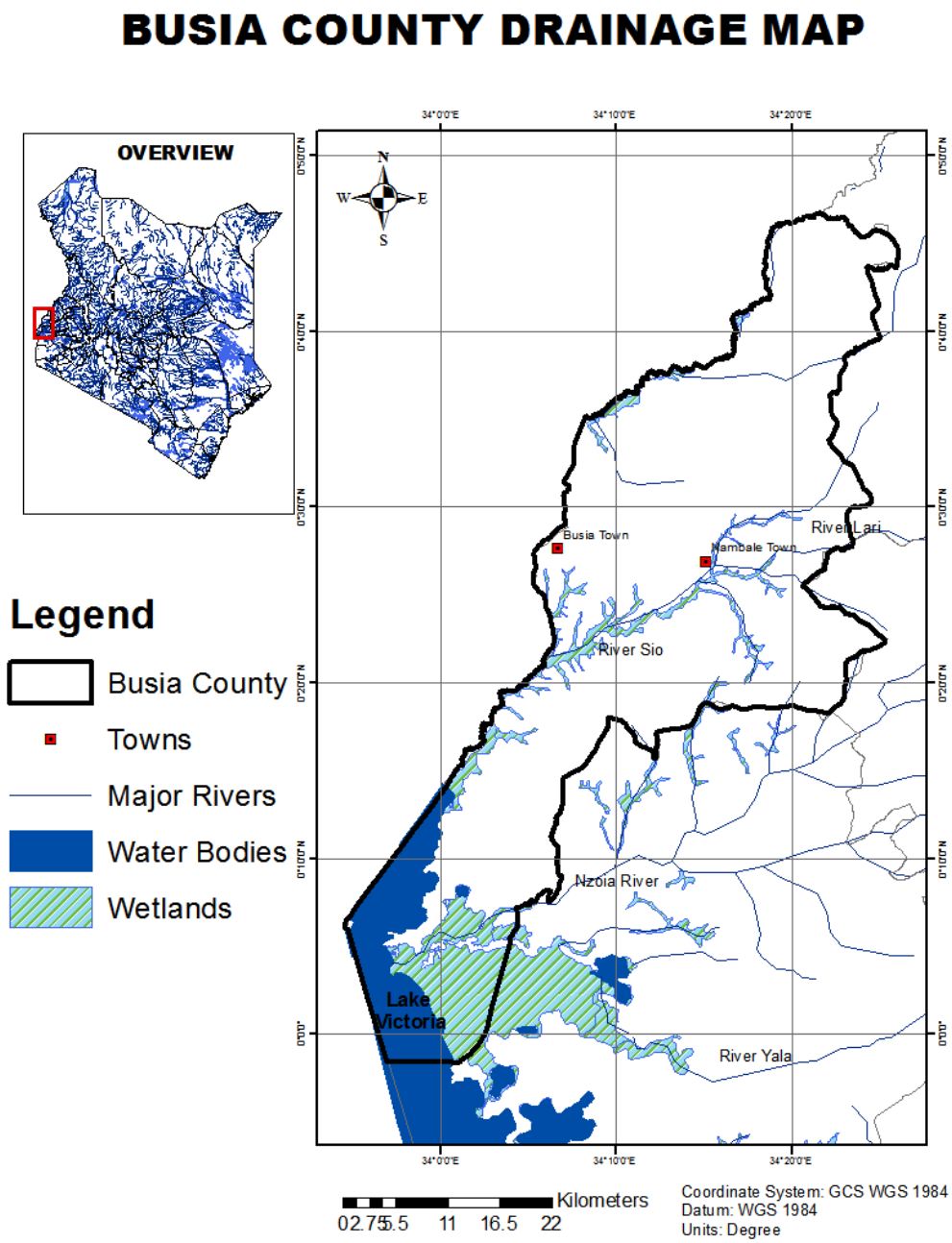


Figure 2-4: Busia Hydrology Map

2.2 Biological Environment

2.2.1 flora

The project is planned to be implemented within human settlement influenced by anthropogenic activities. Therefore, vegetation of the project area is largely domestic woodland and farmlands which include tree species such as spathodea, eucalyptus, markhamia, podocarpus, cypress, gravellie, shrubs and grasses among others. There is a wide variety of vegetation types and ecological communities including forests, rangelands, wetlands, fresh water, crop lands and a few mineral resources. These largely determine the economic growth of the Busia Vegetation types include; thickets, dry bush land, and savanna woodland community.

The vegetation in Busia has undergone considerable changes, the result being remnants of the original vegetation types. Some characteristics of the original vegetation are still in a few places. The changes are greatly attributed to continuous cultivation, vegetation burning and clearing for various purposes. Presently the following are the broad categories of vegetation types that can be identified in Busia is as listed below:

(i) Moist Combretum Savanna - This vegetation dominates the central part of the District. The remnant trees are predominantly combretacae which attain a height of 3 to 12 meters high
(ii) Wooded Savanna - This is found in the most parts of the District. The vegetation communities under this type are distinguishable on the basis of floristic composition, ranging from scattered shrubs in open grasslands to almost woodland vegetation. They have open canopy and well-developed grass cover.
(iii) Grass Savanna It is popularly known as grasslands, and forms a continuous grass cover ranging from less than half a meter (Loudetia, Eragrotis) to two meters (Hyparrhemia), trees and shrubs are generally absent.
(iv) Swamps (Wetlands) These can be divided into three categories/groups based on seasonally. The community consists of seasonal swamp grasslands dominated by Echinochloa, Sorghastrum, Hyparrhenia or Themeda. 75% of the Districts' Swamps fall under this group.
(v) Other swamps consist of permanent water logged vegetation dominated by cyperus papyrus. This accounts for 15% of the District wetland. Swamp forest is distinguishable vegetation. These are found in West Bugwe forest and may occur under seasonally water-logged conditions.

Figure 2-5 below presented vegetation map of Busia Project area.

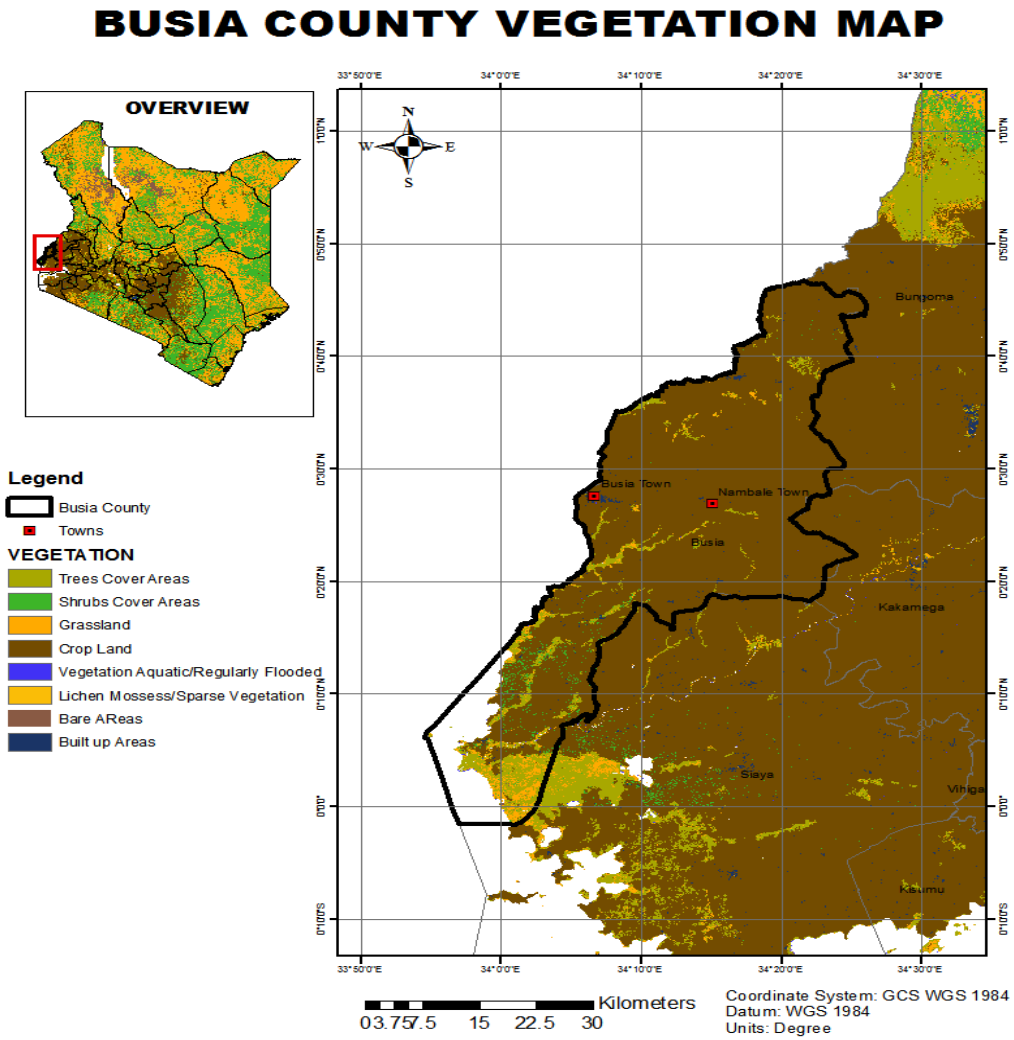


Figure 2-5: Busia Vegetation Map

2.2.2 Fauna

Fauna in the proposed project site included avifauna, small mammals, fish in the river, reptiles and different aquatic microphages. The project area is well endowed with fisheries resources both aquaculture and capture. Fishing is mainly undertaken in Lake Victoria, River Nzoia, in the Yala swamp and other areas. Fish farming is practiced in Nambale, Butula and Funyula Divisions, while capture fisheries is concentrated in Budalang'I and Funyula Divisions. Some of the major fish caught include nile perch.

Wetlands are habitats for many plants and animals that cannot be found in any other environment except wetlands. Plant species such as Phragmites, Sesbania, Afromomum, Spathodea, Cyperus and birds like Ibis, Egrets, Pelicans, herons and dugs are found in wetlands. Major fish species caught are Oreochromis niloticus (Tilapia), Lates niloticus (Nile perch) and Clarias (cat fish). Other fish caught seasonally are Labeo, Synodontis, Schilbe Mystus, Lestes and Protopterus. These are mainly caught in river Sio

2.2.3 Endangered Species

Two trees – Maesa welwitschii and Phyllanthos reticulabus and one butterfly – Belenois rubrosignate are rare, found in Busia. River Sio supports one fish species Labeo which is endemic and endangered. The Labeo (Ningu) is another rare but most priced fish species in Busia. Mellicia excelsa (Mvule) tree has been highly exploited within the District without sufficient replacement. With the slow growth rate of this tree compared to the rate of exploitation due to the demand for its quality products, the tree is at the verge of getting endangered.

2.3 Social Economic Environment

2.3.1 Land Tenure and Use

The predominant land uses in Busia are agricultural production, urbanization/commercial, residential, and gazetted land such as forested areas. Land use in the Busia is almost mixed since it is virtually impossible to separate industrial, commercial and residential areas especially in urban areas.

Land in Busia County is predominantly ancestral (91.7%) and has been demarcated with title deeds issued (71.9%). Most of the land is acquired through inheritance (84.6%) and despite the Constitution of Kenya which provides for the inheritance of both male and female children, intergenerational transfer of land is predominantly to male children, the majority of whom own family land (82.6%), while only a small percentage of females own land (8.7%). The County Government is spearheading a programme aimed at processing and giving out 100,000 title deeds, targeting institutions sitting on public land especially Government schools, health facilities, polytechnics and other public institutions and sensitize private individuals.

2.3.2 Settlement Patterns

Most urban areas have linear settlement patterns where developments are mainly concentrated along the main roads. Rural areas however exhibit nuclear settlement patterns in line with typical traditional way of living.

2.3.3 Water and Sanitation

There are two main existing water supply schemes in Busia County. The Sio River Water Supply that serves Busia Town and its environs and the Bunyala Supply Scheme that serves Port Victoria Town. The National Government has recently launched two more schemes in the county. Kocholia Irrigation Scheme on River Malakisi, which aims to supply water to 10,000 people and Ang'ololo Scheme on River Malaba that will serve residents of Kenya and part of Uganda.

Accessibility of water by citizens in the county currently standards at 42% of which 81.6% is improved water sources. The main water sources in Busia are surface water, ground water, and run0off water. There are three main rivers in the county namely; Malakisi, Nzoia and Sio. Other sources include protected springs, dug well or rural piped schemes. Lake Victoria is an

important resource for the people of Busia. The main source of drinking water in Busia County is borehole (46%) while other sources include: rivers (19.1%), springs (22.3%) and piped water (12.5%). Most of the water is not clean, therefore most people treat their water with chlorination being the most preferred method. Other methods for treating water includes boiling and decanting

Busia town has an existing sewerage system comprises about 17 km of sewers, with diameters from 4 to 18 inches mainly in uPVC and AC, and wastewater stabilization ponds as discussed in section 1.2 of this report. The rest of the households use latrines that account for 34.3% of the population. The sanitation facilities used include pit latrines which account for 25.8%, uncovered pit latrines (13.5%), covered pit latrines (12.3%), VIP (6.5%) and 0.2% flush toilets. Waste/garbage disposal is done by public garbage and heap burning which accounts for 19.7%, garbage pit (12.1%), farm garden (8.9%), public garbage heap (1.9%) and 0.4% disposed by local method. Busia has been declared an open defecation free county. Sanitation is a constitutional right in Kenya, the responsibility for which rests on the shoulders of the County Government.

2.3.4 Education and Literacy Levels

The County has 638 primary schools and 162 secondary schools with a population of over 252,057 pupils and 52,488 students respectively, 25 Vocational Training Centres and 3 university constituent colleges located in Amagoro, Nambale Market and Alupe Sub - County Hospital. According to the 2009 Kenya Population and Housing Census, 75.3% of the population, aged 15 years and above in Busia County have the ability to read and write which is 4.7 % below the national target. Adult learning and continuous education centres are being rejuvenated with at least five such facilities established in every Sub - County. There are also privately owned educational institutions at all levels that complement the public ones. There are 919 Early Childhood Development Education (ECDE) centres in the county of which 440 are public and 479 private. In addition, a number of public primary schools in the county have, with the help of the County Government, integrated a pre0primary unit in their systems. Separately, the County Government, through the Department of Education and Vocational Training, has managed to build additional 210 Early Childhood Development (ECDE) centres

2.3.5 HiV and Aids

HIV prevalence in the county was documented at 7% in 2013. In 2017, National AIDS and STI Control Programme (NASCOP) estimated the prevalence to have reduced to 6.7%. This reduction was attributed to a combination of strategies including scaling up HIV testing and treatment services in the County in tandem with the broader 90:90:90 strategy. Partner support for HIV activities, continuous health education at the health facilities, adherence to standard operating procedures, and the test and treat protocol, have all contributed to this recorded decline. The county has also ensured that HIV+ mothers receive preventive antiretroviral (ARVs)

2.4 Sensitive Receptors

The assessment identified several receptors located within close proximity of 200m to 500m to the proposed sewer lines that might be affected by Project civil activities at the time of construction.

The receptors might suffer damage associated with the Project activities, for instance, if the receptor is a school the impact could be related to Health and Safety of pupils or if the receptor is a market associated impacts could be disruption of business and demolition of structure. If the receptor is a communal water body, the associated impact could be pollution of the water resource. Likely impacts that the Project can pose to the receptors are summarized below.

- Health and Safety risks associated with accidents involving contractor's equipment and plant, open excavations and destroyed access culverts can also pose risk to students, patients, worshipers and general public.
- In case of hospitals and health centres, open trenches can restrict movement of ambulances, fire engines movement can also be restricted in times of emergencies
- Dust pollution triggered by movement of plant and equipment on dusty roads pose health risks (respiratory illness)
- Noise and excessive vibrations beyond 60 decibels during the day pose health risk (ear related illness)
- Destruction of existing public utilities especially domestic water pipeline, this situation would triggers grievances from the users or contamination of the water.

Table 2-1 presents the receptors identified in Busia Project area.

Table 2.1: Sensitive Receptors Ang'orom Location in Teso South

Type of Receptors	Number of Receptors	Name of Receptors
Schools	7	• Ang'orom Girls High school • Ang'orom Primary school • Busia airstrip Primary school • St. lukes Amoni Primary School • St. Johns Alupe secondary school • Alupe University • Alupe primary school for the deaf
Hospitals	3	• Alupe Mission Hospital • Pesi medical centre • Bukesa medical clinic
Research institutions	1	• KEMRI- Alupe Research centre
Markets	1	• Alupe Market centre

Table 2.2: Sensitive Receptors Burumba Location

Type of Receptors	Number of Receptors	Name of Receptors
Schools	4	• Busia Polytechnic • Mabale Primary School • Mabale Secondary school • Burumba Primary school
Hospitals	3	• Busia County Referral Hospital • Amane cottage hospital • Tanaka Nursing home
Markets	1	• Mabale shoping centre

Photo plate of Sensitive Receptors in Busia

	
Busia County referral Hospital	Busia Town
	
Angorom Primary school	Alupe University

CHAPTER 3: PROJECT DESCRIPTION

3.1 Feasibility Report Provisions

This chapter presents a summary of the project scope as discussed in the feasibility study report prepared for the project as a separate report under this consultancy. The report includes both “On-site” and “Off-site” sanitation feasibility study for Busia town prepared in two volumes: Volume 1: Feasibility Studies and Preliminary Report and Volume 2: Preliminary Design Drawings. Volume II contains the design drawings at preliminary level showing the improvements/designs proposed for the interventions in each sewer-shed.

3.2 Design approach

The project is planned to be developed in two phases, following the physical development of the town defined in the Busia Town Physical Plan.

- Phase I includes the interventions to be implemented immediately, based on the development of the town established in the physical plan for the period until 2028;
- Phase II includes the necessary interventions to follow the Busia urban development defined in the physical plan as of 2048.

In both phases the design populations are those that have been estimated for the project horizon year (2048). The proposed strategy to meet the objectives and targets is based on the knowledge of coverage and type of service provided by water supply network, present and future.

Majority of the town is composed of settlements of urban and peri-urban nature. The relationship between the households and water supply network shall determine the waste water service level to be implemented. It was assumed that dwellings served by house connection, yard tap or standpipes located in urban or peri-urban areas should have water-borne deposition methods with a final destination and treatment of excreta in a Waste Water Treatment Plant (WWTP) - also designated as "Off-site" systems. Areas not covered by water supply network will be served by decentralized sanitation systems i.e. dry deposition methods, such as simple pit or composting latrines, also called "On-site" systems.

3.3 Proposed options

The proposals are organized by "Off-site" solutions, to implement in urban and peri-urban areas, and "On-site" solutions to be implemented in rural areas. The “**Off-site”** collection system proposed for Busia Town will be constituted by conventional and simplified sewer networks which convey the wastewater to the Treatment Plant whose locations and quantity depends on the solution adopted. Project area is divided in five different catchments according to the relief, namely:

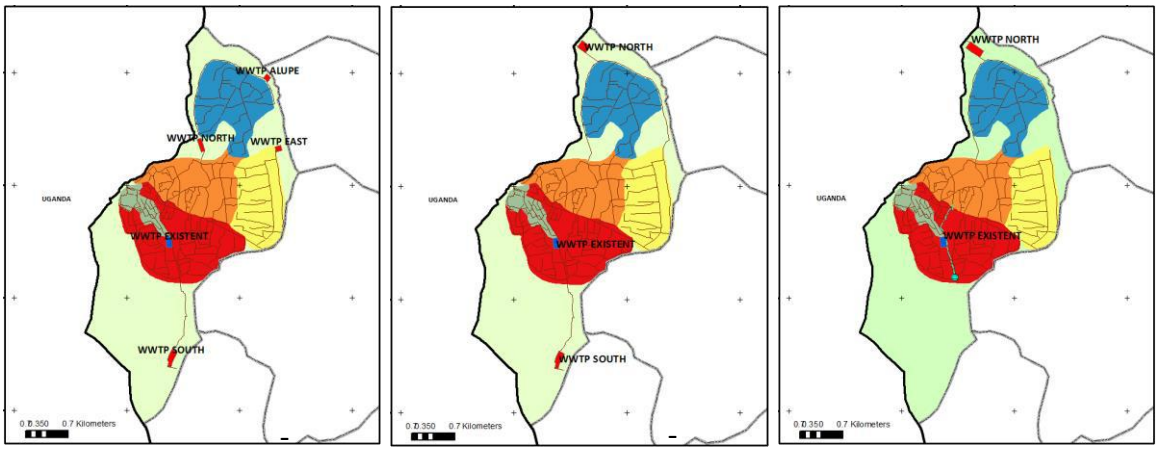
(i) Alupe, which covers the majority of future urban and peri-urban area of Alupe sub-location;
(ii) North, which covers the current and future urban and peri-urban areas of the majority of Agolot and some areas from Amerikwai and Alupe;

(iii) East, which covers the current and future urban and peri-urban areas of the majority of Amerikwai and a small part of Alupe;
(iv) Centre, which covers the current urban area in Mjini sub-location whose its network will flow to the existing WWTP;
(v) South, which covers the part of current urban areas in Mjini and parts of future peri-urban areas in Mayenje, including areas which are currently connected to the existing WWTP and will be diverted to another WWTP.

All of these sewer catchments will be connected by conventional and/or simplified gravity sewers with centralized treatment facilities. The location of the WWTP greatly determines the sewer system design. For that reason, the following sewerage system options were considered:

(i) Option A: maintain the existing WWTP (hereinafter referred to as Centre) and define four new WWTP, each one for the respective wastewater drainage basin within the defined project areas: Alupe, North, East and South;
(ii) Option B: maintain the existing WWTP Centre and construct two new WWTP - a WWTP in the northern part of the Municipality which covers Alupe, North and East zones, and a second WWTP to be located in the southern region of the intervention area;
(iii) Option C: maintain the existing WWTP Centre and construct one new WWTP - a WWTP in the northern part of the Municipality which covers Alupe, North and East zones. In the southern region of the intervention area, we have contemplated the construction of a pumping station that will receive all waste water flow produced in that zone and will direct it to the new WWTP to be built in the north zone, mentioned at option B.

Figure 3-1: Sewerage System Options.



Option A **Option B** **Option C**

"On-site" sanitation solutions were adopted in areas where there are not water supply services through a distribution network, which, in the horizon year, will be limited to the rural areas of the town. In rural areas it is recommended the development of sanitation facilities and infrastructure for management of liquid wastes and sludge at the following levels: Residential properties, Institutional buildings Public places and Commercial places.

The development of sanitation systems in residential properties and commercial places are responsibility of the owners and should be selected in accordance with the Public Health Act. I. The development of sanitation systems in institutional buildings and public places are responsibility of the Government, being, therefore, considered in the present project.

3.4 Hydraulic analysis

The following factors were taken into consideration in the analysis and design of the sewer networks: Topographical features which influence hydraulic parameters, including sewer slope and depth. The sewer depth were designed to allow for:

(i) Proper connections of service laterals from existing and probable buildings; and,
(ii) Minimum cover of 1m below existing ground level, road finish levels, creek or ditch crossing; otherwise concrete encasement of minimum thickness 150mm was provided to ensure sufficient protection against superimposed loads.

Accessibility for construction, operation and maintenance: priority was given to locating the sewers within road reserves for accessibility and ease of service connections; parts of the trunk sewerlines were, however, located within natural stream reserves where other factors including sewer slope and depth were not feasible within the road reserves.

Interference with existing and proposed surface and subsurface services were considered at feasibility level. Critical areas including low-lying buildings, invert levels of existing sewers at points of interception/connection with new sewers, etc.

Population projection was based on the assumption that the past trends will continue to operate in the future and are usually extrapolations of past and present population trends into the future. Thus, the projected population until the year 2048 was based on an average population growth of 2,63% per annum, that correspond to the growth rate verified in the last 20 years.

The **wastewater production** was calculated as 80% of the Water Average Daily Demand by consumers. The Water Average Daily Demand depends on the typology of housing, as presented in table below, according to Ministry of Water and Irrigation “Practice Manual for Water Supply Services, (2005)”.

Table 3-1: Water Average Daily Demand per capita for urban areas (l/inhab/day)

High Class Housing	Medium Class Housing	Low Class Housing
250	150	75

The distribution of each typology through the project area was established according to the current situation and the projected urban growth in Busia. For rural areas it was considered that all households belong to “low class” categories.

This distribution and the Water Average Daily Demand per capita for each typology lead to the wastewater production per capita presented in table below for the whole project area in the planning horizon year.

Table 3-2: – Adopted demand per capita

Occupation type	Demand per capita (l/inhab./day)
Urban	107.5
Peri-urban	75.0
Rural	60.0

For schools it is adopted an average demand of 25 l/student/day, which is also defined in the "Practice Manual for Water Supply Services".

3.5 Cost estimates

The cost estimates are required in order to obtain budgetary figures for each of the project components provided in the preliminary designs and to carry out financial and economic analysis to facilitate informed decisions on investment and cost recovery options. The cost components are the initial investment, also called capital costs, and the operation and maintenance costs.

For a correct cost estimates analysis, it is necessary transform the costs in a Net Present Value, applying the rate at which costs occurring in the future are converted to present worth (Discount Rate). The Net Present Value for the project, considering three different discount rates, is summarized in the following table.

Table 3-3- Net Present Value of initial and O&M cost Estimates

Discount rate	Cost	Option A	Option B	Option C
5%	Capital cost	2,493,905,218	2,648,324,703	2,539,353,276
	O&M	344,611,503	353,936,952	394,428,208
	Sum	**2,838,516,721**	**3,002,261,654**	**2,933,781,484**
10%	Capital cost	2,152,243,738	2,290,326,943	2,192,990,116
	O&M	192,097,378	196,938,288	215,384,972
	Sum	**2,344,341,116**	**2,487,265,231**	**2,408,375,089**
15%	Capital cost	1,881,100,956	2,004,538,187	1,917,045,675
	O&M	120,276,472	123,088,812	132,663,090
	Sum	**2,001,377,427**	**2,127,626,999**	**2,049,708,764**

The minimum initial investment and operation and maintenance cost occurs in the proposed Option A.

3.6 Financial and economic analysis

The objective of the financial and economic analysis is to evaluate the viability of the proposed project. The analysis includes a review of the project costs and benefits upon which viability is assessed. In carrying out the financial analysis, the following general assumptions were made:

- One-off sewerage connection fee — 5,000 Kenya Shillings
- Monthly sewerage fee of 80 Kenya Shillings per Household for Domestic customers

The financial preliminary analysis of the project was made to option A, which respects to the option with the lowest capital and operation and maintenance costs.

The results show that, financially, the project would not be viable (sustainable) because the Financial NPV is negative (-2,177,145,413 KES) and the Financial IRR is less than discount rate (-12%).

Results of financial profitability/viability do not necessarily provide reliable estimates of the value of projects such as those on sanitation from a “social” point of view.
For these types of project, cost or benefits arise as a direct consequence of a project, but these accrue to agents in economy other than those who sponsor the project or who are outside the primary market.

Economic analysis therefore requires removal of all taxes and subsidies from costs and addition of positive externalities. Most of the externalities cannot however be easily monetised. Preliminary economic analysis will therefore be carried out by use of ranges of values found in literature studies as proxies and more specific studies on economic impacts of sanitation. In order to carry out the economic analysis, the following adjustments were made in view of above.

(i) All investment costs were converted to economic costs using a conversion factor of 0.80 to eliminate all taxes and other distortions including labour market distortions;
(ii) A conversion factor of 0.80 was also used on Operation and Maintenance cost to remove excise tax and VAT that is currently applicable for energy including Electricity and fuel for vehicles;
(iii) The economic impact cost of 3,000 Kenya Shillings per capita is applied to the population in the whole of the project area;
(iv) Discount rate of 10% has been used.

Results from suggests that the project is economically viable because the NPVs are positive (508,292,601 KES), lRR are greater than 10% (12.7%) and Benefit cost ratios are greater than ’1’ (1.27).

3.7 Options comparison

The comparative analysis of the proposed options was performed concerning on five aspects: Estimated Investment Costs, Estimated Operational and Maintenance Costs, Environmental Protection, Healthiness and Welfare improvement on population and the Necessity of Resettlement and Expropriations.

It is known that there are lots of other descriptors which could be analysed (number of households covered, adequacy to Strategic Plan, Protection of superficial and underground water, etc.) but in all of these aspects the impacts are equivalent between each solution. Only descriptors on which each option had different impact were analysed.

Following table synthetises the comparative analysis performed, valued between 3 (most favourable) and 1 (the less favourable).

Table 3-4- - Comparative analysis

Descriptors	***Option A***	***Option B***	***Option C***
Investment cost	**3**	1	2
Operation and maintenance cost	**2**	3	1
Environment Protection	2	**3**	1
Healthiness and Welfare improvement	**3**	**3**	1
Necessity of Resettlement/ Expropriation	1	2	**3**
SUM	**11**	**12**	**8**

Option C is the less favourable, mainly because the necessity of use of electricity in Pumping Station. **Option B is chosen** because is slightly favourable in all technical and environmental descriptor, in particular in the resettlement and expropriations descriptor.

3.8 Proposed interventions

A summary of the works are shown below:

i. "Off-site" solutions

The proposed "Off-site" solutions are divided in collection systems, treatment facilities and public facilities. In respect to the **collection system** the selected option proposes the establishment of a sewage collection system divided in 16 different projects, according to the catchment area, phase of execution and type of infrastructure.

Figure 3-2 below shows the location of each proposed intervention and **Table 3.5** the identification and main characteristics of each one.

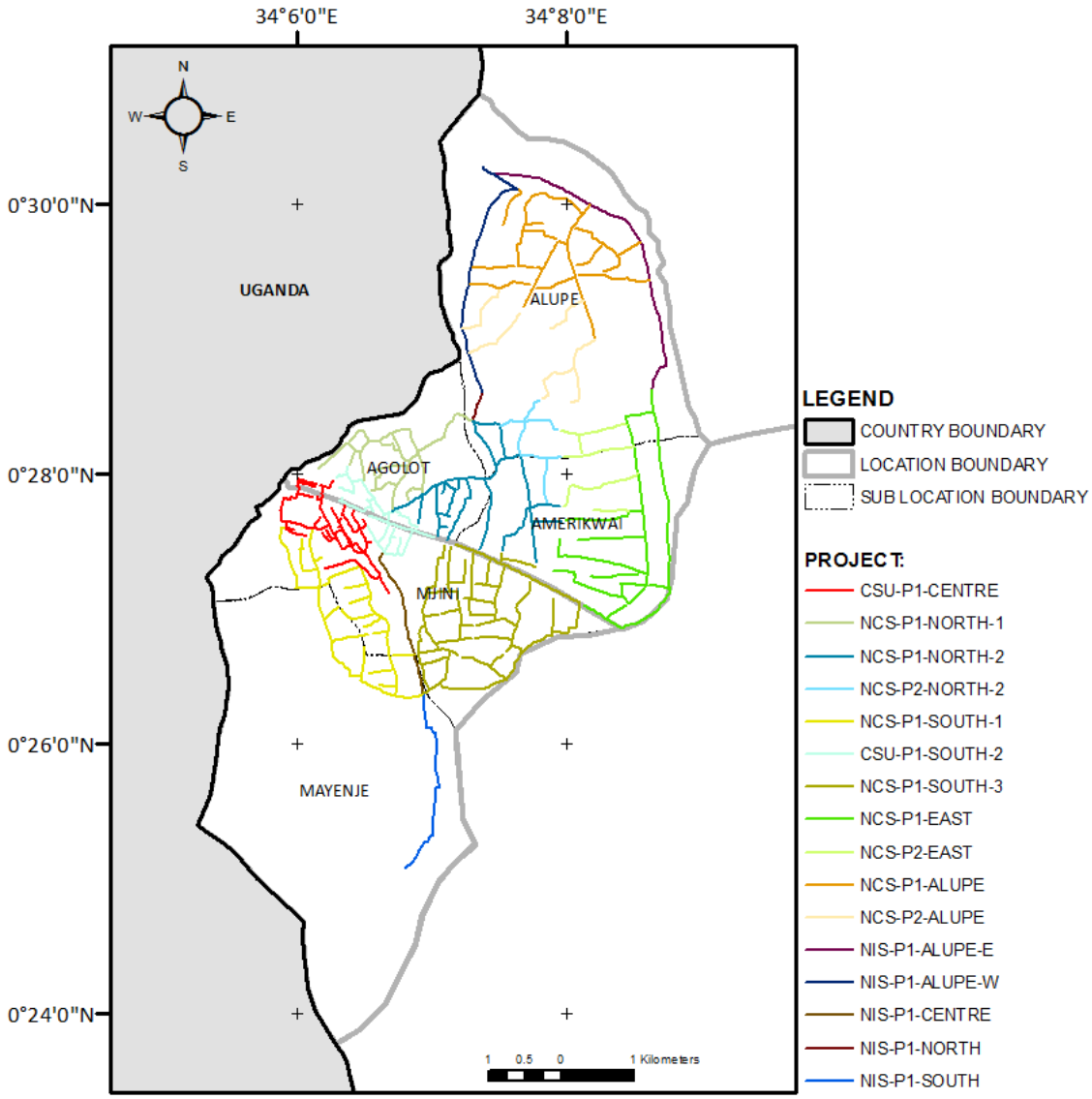


Figure 3-2: Location of Proposed Sewerage Interventions

Table 3-5- – Proposed interventions for the collection system

Project		Length (m)	Diameters (mm)
ID	Name		
NCS-P1-AL	Execution of sewage network in Alupe catchment – Phase I	11,960	110 -315
NCS-P2-AL	Execution of sewage network in Alupe catchment – Phase II	5,401	110-200
NCS-P1-E	Execution of sewage network in East Catchment – Phase I	14,115	110-355
NCS-P2-E	Execution of sewage network in East Catchment – Phase II	4,013	110-200
NCS-P1-N1	Execution of sewage network in North catchment – Zone 1	7,848	110-355
NCS-P1-N2	Execution of sewage network in North catchment – Zone 2 – Phase I	10,535	110-400
NCS-P2-N2	Execution of sewage network in North catchment – Zone 2–Phase II	3,344	200
CSU-P1-C	Interventions of Rehabilitation and Expansion in Centre catchment	1,286	200
NCS-P1-S1	Execution of sewage network in South catchment – Zone 1	10,598	110-355
CSU-P1-S2	Interventions of Rehabilitation and Expansion in South catchment– Zone 2	1,262	200-315
NCS-P1-S3	Execution of sewage network in South catchment – Zone 3	19,872	110-560
NIS-P1-AL-	Execution of Alupe East Interceptor	868	200
NIS-P1-AL-	Execution of Alupe West Interceptor	3,064	200-315
NIS-P1-N	Execution of North Interceptor	414	500

Project		Length (m)	Diameters (mm)
ID	Name		
NIS-P1-C	Execution of Centre Interceptor	2,086	355
NIS-P1-S	Execution of South Interceptor	2,696	630
Sum		**99,362**	**110-630**

Regarding the **treatment**, the selected option proposes to maintain the existing waste stabilization ponds and define four new waste stabilization ponds, each one for the respective wastewater drainage basin within the followed project areas: Alupe, North, East and South.

The general locations of the proposed WSP are shown in **Figure 3-3:** below and its main characteristics in table 3.6.

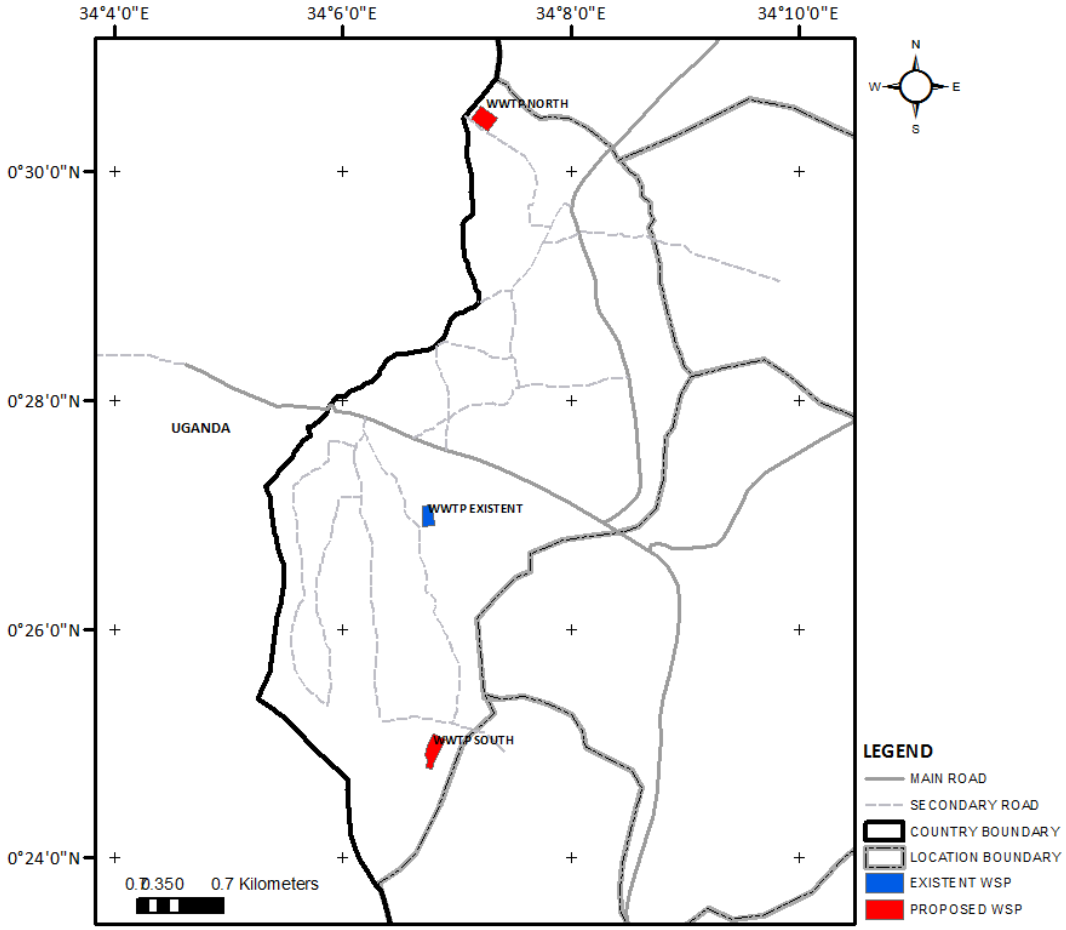


Figure 3-3: Location of Proposed WWTP

Table 3-6– Proposed interventions for the treatment facilities

Project		Pond type	Width x Length (m)	Number of units
ID	Name			
NSP-01-AL I	Execution of WSP Alupe – Phase I	Anaerobic	10 x 21	1+1 (parallel)
NSP-01-AL II	Execution of WSP Alupe – Phase II	Facultative	27 x 80	2+2 (in series)
		Maturation	40 x 60	1+1 (parallel)
NSP-02-NO I	Execution of WSP North – Phase I	Anaerobic	17 x 40	1+1 (parallel)
		Facultative	55 x 156	1+1 (parallel)
NSP-02-NO II	Execution of WSP North – Phase II	Maturation	40 x 60	2+2 (in series)
NSP-03-EA I	Execution of WSP East – Phase I	Anaerobic	12 x 24	1+1 (parallel)
NSP-03-EA II	Execution of WSP East – Phase II	Facultative	34,5x100	1+1 (parallel)
		Maturation	26 x 40	2+2 (in series)
NSP-04-SO I	Execution of WSP South – Phase I	Anaerobic	25 x 50	1+1 (parallel)
NSP-04-SO II	Execution of WSP South – Phase II	Facultative	54 x 158	2+2 (in series)
		Maturation	54 x 158	2+2 (in series)
SPU-01-EX	Maintenance and Cleansing Works	-	-	-

Finally, in the "Off-site" solutions it is proposed also the construction of **public toilets** connected to the proposed collection system. Table 3-7 shows the proposed projects in this category.

Table 3-7– Proposed interventions for public facilities connected to the "Off-site "systems

ID	Name
SPP-01-AL	Execution of Public facilities connected to sewage network in Alupe sub-location
SPP-02-AG	Execution of Public facilities connected to sewage network in Agolot sub-location
SPP-03-AM	Execution of Public facilities connected to sewage network in Amerikwai sub-location
SPP-04-MJ	Execution of Public facilities connected to sewage network in Mjini sub-location
SPP-05-MA	Execution of Public facilities connected to sewage network in Mayenje sub-location

ii. "On-site" solutions

The proposed solution to solve the sanitation problems at the institutional buildings and public places levels is the development of new communal toilet facilities connected to one septic tank with drainage filed or soakway. The proposed projects are presented in Tables 3-8 and 3-9.

Table 3-8– Proposed interventions for Institutional buildings with "On-site" technologies

ID	Name
SIB-01-AL	Execution of toilets in Institutional buildings with "on-site" technologies in Alupe sub-location
SIB-02-AG	Execution of toilets in Institutional buildings with "on-site" technologies in Agolot sub-location
SIB-03-AM	Execution of toilets in Institutional buildings with "on-site" technologies Amerikwai sub-location
SIB-04-MJ	Execution of toilets in Institutional buildings with "on-site" technologies in Mjini sub-location
SIB-05-MA	Execution of toilets in Institutional buildings with "on-site" technologies in Mayenje sub-location

Table 3-9– Proposed interventions for public facilities with "On-site" technologies

ID	Name
SPP-06-AL	Execution of Public facilities with "on-site" technologies in Alupe sub-location
SPP-07-AG	Execution of Public facilities with "on-site" technologies in Agolot sub-location
SPP-08-AM	Execution of Public facilities with "on-site" technologies in Amerikwai sub-location
SPP-09-MJ	Execution of Public facilities with "on-site" technologies in Mjini sub-location

SPP-10-MA	Execution of Public facilities with “on-site” technologies in Mayenje sub-location

iii. Promotion and awareness

The promotion and awareness for sanitation and hygiene is performed by running a series of actions/projects over the horizon of the study, which together allow achieving the objectives and contribute to the significant improvement of the population's quality of life in Busia town. The proposed projects for the development of a program to promote awareness and the level of sanitation and hygiene are presented in Table 3-10

Table 3-10– Proposed interventions for promotion and awareness

ID	Name
PAP-01-COD	Implementation of programmes to eradicate the open defecation at community level
PAP-02-SOD	Implementation of programmes to eradicate the open defecation at school level
PAP-03-CSH	Implementation of programmes to promote safe hygiene at community level
PAP-04-SSH	Implementation of programmes to promote safe hygiene at school level

CHAPTER 4: PROJECT ALTERNATIVES

4.1 Project Design Consideration

This chapter analyses the design process used to arrive at the proposed project capacity, technology used and location of project components. The 'No Project' alternative was also considered. The design considerations analyzed were as follows;

- Location of Sewerage Network and Waste Water Treatment Plant
- Waste Water Treatment Methods
- Land Acquisitions and Resettlement Impacts
- Material sourcing sites and disposal of spoil
- Proposed Project Option
- No Project Alternative.

4.2 Sewerage Network System

The entire sewerage system for Busia is based on gravity conveyance up to the Inlet Works at Alupe WWTP site to the North and to the existing WWTP to the South. Sewers of diameters ranging from 200mm to 525mm have been designed for the collection and conveyance of sewage from the households and properties to Sewage Treatment Works.

The Sewer alignments adopted in the Design were found to be suitable since they allow for gravity flow of sewage to the Treatment Works Sites. However, sections of the Trunk Sewers aligned in the Drifts within the project area present construction challenge as well as risk of flooding. Preferred / suitable sewer alignments are those that lie along road reserves and river valleys where adequate space for construction can be obtained with ease and where minimum interference with existing services such as water mains, permanent structures, powerlines, etc. is expected. These locations also permit ease of access for future connections and maintenance. The adopted alignment has minimal road crossings at only necessary locations and preferably on roads without bitumen surfaces. At the road crossing, additional ground cover to the minimum requirement and concrete surrounds have been provided for pipe protection.

Where encroachment or illegal structures have been identified along the proposed sewer alignments and within the road reserves, provision for demolishing of such structures and associated reinstatement works have been included in the Bills of Quantities.

Road reserves and river wayleaves are shared with other public utilities such as telephone and electricity lines, communication cables, etc. Provisional Sums for statutory payments and reinstatement works of the existing utilities have been itemized and included in the Bills of Quantities. It is important to note that liaison with the relevant utility providers is necessary at the commencement of the project to help in identification and relocation of affected utilities

4.3 Project Location for Proposed Waste Water Treatment Plant

Several factors have been considered in the Design Review of the Sewage Treatment Works site selected in the Detailed Design (69 acres of land within Alupe University):

- Available area, topography, and soil conditions of the site should be suitable for the construction of the type of plant proposed
- Area not be susceptible to flooding
- It should not be too far from the main contributing areas
- The wastewater flows should preferably drain to the site by gravity
- It should be close to the ultimate point of effluent disposal (preferably river)
- It should be close to water supply and electricity services
- It should not require the construction of a long length of access road

The proposed site for Sewage Treatment Works, some of the key factors that confirm suitability of the Site include;

- It is sparsely populated
- It is far away from town and thus not a hindrance to the Town's future growth
- It has gently slopes suitable for hydraulics within Sewage Treatment Works
- It is adjacent to Okame river, which is a permanent river and thus a suitable effluent discharge point
- Sewage from town can be conveyed by gravity to the Site.

4.3.1 Waste Water Treatment Method

The choice of Waste Water Treatment Technology depends on factors which include; standards of treatment and effluent quality, process complexity and process reliability, ease of operation, land requirements, civil construction requirements, mechanical and electrical plant, sludge production and environmental consideration. The technologies below were considered by the design team before a choice of waste water treatment technology was identified for the Town:

(i) Waste Water Stabilization Ponds

Where climatic conditions are favourable and land is readily available, stabilization ponds are generally the most suitable method of waste water treatment. The units are open, shallow, flow-through lagoons. They require relatively large areas of land to provide the necessary long retention periods needed to stabilize the organic material in the waste. They operate without mechanical plant and with limited supervision. Maintenance requirements are minimal. Waste stabilization ponds are generally subdivided into the following types: anaerobic ponds, facultative ponds and maturation ponds:

(ii) Aerated Lagoons

This is a more intensive system of treatment results in greater removal of organics per unit volume of treated waste water than is achieved in stabilization ponds. However, machinery and energy to drive it are necessary. Oxygen is supplied to the waste water by mechanical surface aerators immersed in the liquor, supported either by floating pontoons or by fixed

structures in the lagoon.

Aerated lagoons are normally considered where there is shortage of land for the development of a straightforward system of Waste Water Stabilization Ponds. The construction requirements of the lagoons are very simple and so capital costs are low. Operation and maintenance procedures are simple, although power costs can be high. The process is not particularly efficient in the reduction of faecal bacteria and subsequent maturation ponds are needed.

(iii) Biological Filters

These comprise a permeable bed of media, of either graded natural stone or inert synthetic material, usually plastic, around which sewage flows. The filter is generally 2.0m deep and circular in plan. Sewage is evenly distributed on the surface and effluent is collected through under drains in the base, while allowing circulation of air upwards around the material. The units are preceded by primary settlement tanks followed by secondary (humus) settlement tanks to collect the settleable organic solids delivered from the filters. Percolating filters are able to withstand shock loads and provide a reliable means of treating wastewater with relatively little maintenance or skilled supervision. Subsequent maturation ponds or effluent disinfection would be needed for bacterial reduction.

(iv) Conventional Activated Sludge Process

The process basically involves the aeration of settled sewage mixed with return sludge within an aeration tank, the air being introduced by either surface aerators or by diffused system into the liquid. The settled incoming sewage is aerated for several hours, during which the micro-organisms in the sewage multiply through assimilation of the organics in the influent wastewater. Part of this reaction synthesizes new cells and the subsequent separation of the biological mass and oxidation reaction are the principle components of BOD removal in the process.

(v) Extended Aeration using Oxidation Ditches

Extended aeration using oxidation ditches has the advantage of simple construction, relatively simple operation, no preliminary settling is required, and the sludge produced tend to be stable. An oxidation pond system would normally comprise an oxidation ditch with final clarifiers and recirculation pumps to re-circulate return sludge to the inlet of the ditch. Because of the length of the aeration period (around 24 hours), power costs can be significant. Subsequent maturation ponds or effluent disinfection would be needed for bacterial reduction.

Table 4-1 on **Page 4-4** provides a comparison of the waste water treatment technologies discussed above.

Table 4-1: Description Comparison of Alternative Wastewater Treatment Methods

Treatment Process	Standard of Treatment	Process Reliability	Process Complexity	Operation & Maintenance Requirements	Land Requirements	Civil Construction Requirements	M & E Equipment	Sludge Production	Environmental Considerations
Waste Stabilization Ponds	Good, except for nutrient removal	Very Good, but climate dependent	Extremely simple. No skills needed	Very limited and simple	large areas of land needed	very simple	Almost none. except possibly at the inlet works	Limited sludge production. Sludge is stable and requires no further treatment	High environmental acceptance
Aerated Lagoons	Good., except for nutrient and bacterial removal	Good, but partly subject to power outages and mechanical failure	Very simple. No skills needed	Limited and straight forward	High land requirements, but not as large as WSPs	Very simple	Apart from the inlet works, only the surface aerators	Limited sludge production. Sludge is stable and requires no further treatment	Moderate environmental acceptance
Biological Filters	Very Good., except for nutrient and bacterial removal	Good, subject to power outages and mechanical failure	Simple. Limited skills needed	Moderate, but straight forward	Moderate land requirements	Complicated RC structural requirements	Moderate degree of M&E plant needed	Sludge from primary & secondary settlement needs treatment	Some aspects need further environmental consideration
Activated Sludge	Very Good., except for nutrient & bacterial removal	Good, subject to power outages & mechanical failure	Complex Highly skilled manpower needed	High requirement for O&M and skilled staff	Moderate land requirements	Very Complicated RC structural requirements	High input of M&E equipment needed	Sludge from primary & secondary settlement needs treatment	Many aspects need further environmental consideration
Oxidation Ditch	Very Good., except for nutrient & bacterial removal	Good, but subject to power outages & mechanical failure	Simple Limited skills required	Moderate requirement for skilled O&M staff	Moderate land requirements	Moderate construction requirements	Moderate degree of M&E plant needed	Limited sludge production. Sludge stable & requires no further treatment	Some aspects need further environmental consideration

Notes:

1. All treatment processes except waste stabilization ponds require additional treatment such as and filtration and disinfection or maturation to achieve bacteriological reduction

2. All treatment processes considered will require additional process units to achieve nutrient removal

3. The activated sludge process and the oxidation ditch most easily lend themselves to nutrient reduction using Modified Activated Sludge (MAS) process

4.4 Preferred Waste Water Treatment Method

During feasibility study, the consultant considered all the available wastewater treatment technologies for the project and subjected waste stabilization ponds, trickling filters and hybrid system to detailed financial and economic analysis. waste stabilization ponds was recommended for adoption as it presented best cost to benefit ratios.
The design will address treatment of wastewater effluents, primarily of domestic nature with limited industrial component. It is assumed that more toxic constituents found in specific wastewater such as from factories will be dealt by its own pre-treatment before such waste are allowed to enter Municipal sewer.

A treatment process including WSP is more effective and affordable where land is available. The warm climate in the country is also a favourable aspect for this kind of treatment.

4.5 Options Comparison – Feasibility Report

The comparative analysis of the proposed options was performed concerning on five aspects: Estimated Investment Costs, Estimated Operational and Maintenance Costs, Environmental Protection, Healthiness and Welfare improvement on population and the Necessity of Resettlement and Expropriations.

It is known that there are lots of other descriptors which could be analysed (number of households covered, adequacy to Strategic Plan, Protection of superficial and underground water, etc.) but in all of these aspects the impacts are equivalent between each solution. Only descriptors on which each option had different impact were analysed.

Following table synthetises the comparative analysis performed, valued between 3 (most favourable) and 1 (the less favourable).

Table 4-2- - Comparative analysis

Descriptors	***Option A***	***Option B***	***Option C***
Investment cost	**3**	1	2
Operation and maintenance cost	**2**	3	1
Environment Protection	2	**3**	1
Healthiness and Welfare improvement	**3**	**3**	1
Necessity of Resettlement/ Expropriation	1	2	**3**
SUM	**11**	**12**	**8**

Option C is the less favourable, mainly because the necessity of use of electricity in Pumping Station. **Option B is chosen** because is slightly favourable in all technical and environmental descriptor, in particular in the resettlement and expropriations descriptor.

4.6 No Project Alternative

The No Project Option in respect to the proposed Project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. Therefore, if the Project is not implemented, the following issues are most likely to continue affecting residents of Busia residents:

- Increased pollution of the local rivers from untreated waste water.
- No improved Health and Sanitation within the target beneficiaries
- No improved living standards, employment and local economy to the target

beneficiaries
- Limited opportunities for future growth of the town.
- No creation of employment during construction and operation phases of the projects

The expected environmental impacts are not extreme and can be managed to reduce negative impacts on the environment. Therefore, the 'No Project' option is not a suitable alternative for the community.

CHAPTER 5: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Introduction

Development of infrastructure projects is dealt with under several laws, by-laws, regulations, Acts of Parliament as well as policy documents and it is not possible to bring all those statutes under one heading. This section is therefore aimed at assessing the existing policies and legislative framework, economic tools and enforcement mechanisms for the management of infrastructure projects at different stages. In so doing, the discussion will be based on the following legislations and policy provision

5.2 Policy Provision

The proposed investments will be implemented within provisions of various government policies as summarized in **Table 5-1** below:

Table 5-1: Policy Framework

No	Policy	Applicability
1	Constitution of Kenya 2010	The CoK at Article 43 (1) provides that every person has the right – (b) to accessible and adequate housing, to reasonable standards or sanitation; and, (d) to clean and safe water in adequate quantities. These provisions cover oblige state organs and bind them to provide not just high quality or clean and safe water but also adequate quantities to all people that they will serve. Also, the Constitution of Kenya provides for sound management and sustainable development of all of Kenya's Projects, both public and private investments. It also calls for the duty given to the Project proponent to cooperate with State organs and other persons to protect and conserve the environment as mentioned in Part II.
2	Kenya Vision 2030	This is the current national development blueprint for period 2008 to 2030. The vision has three pillars – economic, social and political. It is recognized that Kenya is a water scarce Country but stated (Kenya, 2007: 115) that the Vision for the water and sanitation sector is "to ensure water and improved sanitation services availability. The Project will directly contribute towards achievement of objectives of vision under the environment and social pillar through provision of the planned sanitation investments under the Master Plan.
3	National Climate Change Response Strategy, 2010	The strategy paper recognizes that Kenya is a water scarce Country and offers a variety of strategies for ensuring that the resource is utilized in ways that recognize that it is a finite resource. The paper also argues that interventions in the water sector should take a participatory approach involving different water users including gender groups, socioeconomic groups, planners and policy makers in water resource management (Kenya, 2010: 53). These principles will also apply to the sanitation initiatives discussed in this ESIA, Importantly the ESIA has proposed operation measures to be complied with during Project operation by BUWASCO in order to reduce emission of Methane and Hydrogen Sulphide gases which are considered green house gases.
4	National Environment Policy (NEP)	The revised draft of the National Environmental Policy, dated April 2012, sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources.

No	Policy	Applicability
		The Project area is ecological zone V and VI. Ecosystems under these zones are sensitive to any activity out of character with the ecosystem. Therefore, during construction and operation phases of the Project the ESMMP provided in chapter 8 of this assessment should be implemented in order to ensure that the ecosystems are not destabilized by the subsequent Project activities especially effluent pollution of Okame River thereby raising the Biological and Chemical Oxygen Demand of the river water.
5	HIV and AIDS Policy 2009	The HIV Policy therefore will be complied with during implementation of the Project; the Contract will incorporate in Bid Document and implement HIV awareness initiatives during construction of the Project.
6	Gender Policy 2011	This Policy will be referred to during Project implementation especially during hiring of staff to be involved in the Project, procuring of suppliers, sub consultants and sub-contractors to the Project
7	The Sustainable Development Goals (SDGs)	The concept of the SDGs was born at the United Nations Conference on Sustainable Development, Rio+20, in 2012. The objective was to produce a set of universally applicable goals that balances the three dimensions of sustainable development: environmental, social and economic. The Investments will therefore contribute towards achieving this goal through the proposed sanitation Project.
8	Kenya National Youth Policy 2006	This Policy aims at ensuring that the youth play their role alongside adults in the development of the Country. The National Youth Policy visualizes a society where youth have an equal opportunity as other citizens to realize their fullest potential. Proposed Sanitation Project will provide direct employment to the youth as required by the Policy.
9	The National Environmental Sanitation and Hygiene Policy-July 2007	The Policy is devoted to environmental sanitation and hygiene in Kenya as a major contribution to the dignity, health, welfare, social well-being and prosperity of all Kenyan residents. The Policy recognizes that healthy and hygienic behaviour and practices begin with the individual. The implementation of the Policy will greatly increase the demand for sanitation, hygiene, food safety, improved housing, use of safe drinking water, waste management, vector control at the household level and encourage communities to take responsibility for improving the sanitary conditions of their immediate environment. Implementing the Project will directly contribute to achievement of the Policy

5.3 Kenyan Legislations

The proposed investment will be implemented within provisions of various Acts of Parliament and Local Legislations as summarized in **Table 5-2** below:

Table 5-2: Acts of Parliament

No	Policy	Applicability
1	EMCA 2015	The Act provides for the establishment of a legal and institutional framework for the management of the environment. This is achieved through various regulations. For Sanitation Projects proposed in Busia the following EMCA Regulations will be applicable: (i) EMCA (Waste Management) Regulations, 2006 Legal Notice No. 121; (ii) EMCA (Water Quality) Regulations, 2006 Legal Notice No. 120; (iii) EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Legal Notice No. 61; (iv) EMCA (Air Quality Regulations 2014)
2	The Environmental (Impact Assessment and Audit) Regulations, 2003	The regulation provides a framework under which Environment and Social Impact Assessment for the Project will be prepared, Regulation 4(1) further states that: (a)''…no Proponent shall implement a project: likely to have a negative environmental impact. (b) for which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…''
3	Environmental Management and Coordination (Water Quality) Regulations, 2006	Regulation 9 of these regulations provides for water quality monitoring. It states that the "Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations". At ESIA stage, baseline water quality analysis of water quality flowing through Okame River was determined, the results revealed that the organic load in the river was not significant to trigger Biological Oxygen Demand (BoD).
4	(Waste Management Regulations, 2006	Regulation 4 (1) states that "no person shall dispose of any waste on a public highway, street, road, recreational area or in any place except in a designated receptacle". Regulation 4 (2) further states that "a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations". The proponent will use provisions of this regulation to ensure that waste is handled, stored, transported and disposed as per this regulation.
5	Noise and Excessive Vibration Pollution (Control) Regulations, 2009	The Contractor will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the Construction Phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting by vehicles. The regulations provides for a maximum of 60 dcl during the day and 35 dcl during the night for a construction site.
6	The Environmental Management and	These regulations provide a framework for management of plant and equipment emissions of hydrocarbons on site. The regulations require that all plant and equipment on site should be well serviced to manufacturers specifications to avoid air pollution, the regulation also

No	Policy	Applicability
	Coordination (Air Quality Regulations 2014)	require monitoring of baseline air quality within construction site and implementation of correction action where the standards are not complied to. Water spray will be used at all times when working in dry areas to avoid risks associated with dust menace.
8	Land Act, 2012	It is the substantive law governing land in Kenya and provides legal regime over administration of public and private lands. It also provides for the acquisition of land for public benefit. The government has the powers under this Act to acquire land for projects, which are intended to benefit the general public. The Project proposed will be implemented within government land and along road reserves. However, sites for WWTP will be acquired through willing buyer willing seller arrangement.
9	Water Act, 2016	The Water Act, 2002 was amended in the year 2016 to align to the Kenyan Constitution 2010. The Act vests the responsibility of developing water and sanitation infrastructure (sewerage and water supply) in Busia for Lake Victoria Water works development agency (LVNWWDA) and operations to Busia County Government. The Design and ESIA Teams have adequately involved Busia Water and Sewerage Company (BUWASCO) in the preparation the Project.
10	County Government Act No. 17 of 2012	The proposed Project will be implemented within Busia Project area. Part II of the Act empowers the County Government to be in charge of function described in Article 186 of the Constitution, (county roads, water and sanitation, health). The Project once complete will be handed to BUWASCO which is owned by Busia County Government for operation and maintenance.
11	Physical Planning Act 1996 (286)	Section 29 of the said Act empowers the Local Authorities (now county governments) to reserve and maintain all land planned for open spaces, parks, urban forests and green belts as well as land assigned for public social amenities. The Project identified will be implemented as provided by Busia County Land Use Plan.
12	The Urban Areas and Cities Act 2011	This Law passed in 2011 provides legal basis for classification of urban areas (City) when the population exceeds 500,000; a municipality when it exceeds 250,000; and a town when it exceeds 10,000) and requires the city and municipality to formulate County Integrated Development Plan (Article 36 of the Act). The Project described in this assessment is within Busia County CIDP 2013-2017.
13	Occupational Health and Safety Act (OSHA 2007)	The Act provides Environment Health and Safety (EHS) Guidelines which shall be followed by both the Contractor and Supervising Consultant during implementation of the Project to avoid injuries and even loss of life to workers and neighbouring community.
14	The Public Health Act (Cap.242)	The Act provides Guidelines to the Contractor on how he shall manage all wastes (Liquid and Solid Wastes) emanating from the Project in a way not to cause nuisance to the community. This Act, during construction shall be read alongside the Waste Management Regulations of EMCA 2015 for utmost compliance.
15	HIV and AIDS Prevention and Control Act 2011	The object and purpose of this Act is to (a) promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS; (b) extend to every person suspected or known to be infected with HIV and AIDS full protection of his human rights and civil liberties. The Act provisions will be applied during Project implementation phase where the contractor will be required to create awareness among workers and community at large
16	Sexual	An Act of Parliament that makes provision about sexual offences

No	Policy	Applicability
	Offences Act 2006	aims at prevention and the protection of all persons from harm from unlawful sexual acts and for connected purposes. Section 15, 17 and 18 focuses mainly on sexual offenses on minor (children).
17	Child Rights Act (Amendment Bill) 2014	This Act of Parliament makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children. It also makes provision for the administration of children's institutions, gives effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child. The contractor under this Project will be required to comply to provisions of the Act during Project implementation
18	Labour Relations Act 2012	An Act of Parliament to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations or federations, to promote sound labour relations through the protection and promotion of freedom of association. This act will be applied by labour force on site in addressing disputes related to working conditions.
19	National Gender and Equality Commission Act 2011	The over-arching goal for NGEC is to contribute to the reduction of gender inequalities and the discrimination against all; women, men, persons with disabilities, the youth, children, the elderly, minorities and marginalized communities. This Act will be applied during hiring of workforce on site
20	Public Participation Bill of 2016	The Bill is an Act of Parliament that provides a general framework for effective public participation and to give effect for the constitutional principles of democracy. The purpose of the act includes promotion of democracy and public participation of the people according to Article 10 of the Constitution, promote community ownership for public decisions and promote public participation and collaboration in governance processes. Therefore adequate consultations were held within Busia Project area as discussed in Chapter (6) of this report.
20	Permits and Licenses	The Proponent should demonstrate compliance to the legislation through acquisition of the appropriate licenses and permits. Furthermore, all contractors and consultants who will be engaged during the planning and design, construction, operation and maintenance and decommissioning should demonstrate compliance to the necessary pieces of legislation. These includes: NEMA registration certificates, collection of waste by a NEMA licensed handler. BUWASCO will before Project operation apply for license to discharge treated effluent into the environment from Water Resource Authority (WRA). The permit will be issued after BUWASCO dully fills and submits an Effluent Discharge Control Plan (EDCP) to WRA as required by the Water Rules of 2007.

5.4 African Development Bank Policy Provisions

The Project is being financed by AfDB, it was therefore checked against the listed Operation Safeguards (OS) in **table 5-3** and appropriate mitigation measures likely to be triggered under each Policy are also provided.

Table 5-3: Project Activities Triggering AfDB Operational Safeguards

Policy	Discussions
OS 1: Environmental and Social Assessment.	The Project components will trigger OS 1, the assessment identified that According to OS 1 screening provisions, Busia Sewerage Project is a **Category 1**, the project is likely to have detrimental site-specific environmental and/or social impacts that are more adverse and but can be reversible, and minimized by applying appropriate management and mitigation measures. Mitigation measures for impacts identified are detailed in chapter 7 of this report. Significant impact identified to be triggered during operation is likely pollution of Okame River by blocked sewer manholes or release of effluent into the river which does not meet the required standards as provided by Water Quality Regulation of 2006
OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation.	The policy aims to avoid involuntary resettlement where feasible, or minimize resettlement impacts where involuntary resettlement is deemed unavoidable after all alternative Project designs have been explored. For Busia Sewerage Project, displacement of population is not triggered as pipelines are designed to follow River Riparian- However, the Project will impact crops/trees / structures/fences. The total number of PAPs likely to be impacted by the project are 265 PAPs who include 48 female PAPs and 217 male PAPs. The project impact on land will be triggered at the proposed site for the Waste Water Treatment Plant (WWTP) within Alupe University where 69acres will be acquired through a willing buyer willing seller agreement between the University and Busia County Government. Also, isolated cases of Sewer Easement will be triggered along the proposed sewer alignment in areas with no government road reserve of river riparian. The total easement required for the trunk sewer is provided as cumulative of 41.42 acres for the trunks sewers discussed in the feasibility report prepared separately under this consultancy

OS 3: Biodiversity, Renewable Resources and Ecosystem Services.	The safeguard aims to conserve biological diversity and ecosystem integrity by avoiding or, if avoidance is not possible, reducing and mitigating any adverse environment and social risks. , For Proposed Busia Sewerage Project, the focus will be on the quality of effluent that will be released into river Okame, Water Quality Regulations of 2001 provide that Biological Oxygen Demand (BOD) for treated effluent should be less that 30mg/litre. At ESIA stage, water quality analysis of Okame river from literature indicate that water flowing through Okame River has adequate oxygen and therefore sustains aquatic ecosystem. This should be maintained during both phases of the Project in order to ensure sustainability of the river ecology. The treatment method proposed "Waste Water Stabilization Ponds" will ensure the effluent is treated to the required BOD levels; the measure will be adhered to so that the quality of water is guaranteed for downstream users and aquatic ecosystem.
OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency.	The Project shall utilize raw materials both during construction and operation phase that could result to pollution of biophysical environment if not handled appropriately. Appropriate mitigation measures for likely waste to be generated by the Project are detailed in chapter 7 of this report. Project activities shall not result to significant amount of greenhouse gases, **Sub Chapter 7.6.2 on page 7.19** provides measures for management of odour emanating from Hydrogen Sulphide and Methane Gases which are associated with green house gases. Also, the Project design has ensured that sewer flows through by gravity hence reducing the need for pumping.
OS 5: Labour Conditions, Health and Safety.	The Project shall involve workers both during construction and operation phases of the project. This policy read together with OSHA 2007 shall form integral instruments to be used in ensuring that health, safety and working conditions of both works and community is safeguards. The Labour Relations Act 201 will be applied by labour force on site in addressing disputes related to working conditions.

CHAPTER 6: STAKEHOLDER CONSULTATION

6.1 Stakeholder Consultations

Stakeholder consultation in the Environment and Social Impact Assessment (ESIA) process is undertaken during the design, implementation and initial operation stages of the Project. The aim is to disseminate information to interested and affected parties (stakeholders), solicit their views and consult on sensitive issues.

The specific aims of the consultation process during the ESIA at the design stage were;

- To inform the local people, leaders and other stakeholders about the proposed Sewerage Project and its objectives
- Obtain the main concerns and perception of the community and their representatives regarding the project
- To promote project ownership by the beneficiaries and minimize conflicts
- Obtain opinions and suggestions from the directly affected persons on the project impacts and best suited measures to mitigate them.
- Obtain opinions and suggestions on the project designs and therefore minimize conflicts and delays in implementation
- To facilitate the development of appropriate and acceptable entitlements options
- To increase long term project sustainability and ownership
- To reduce problems of institutional coordination, especially at the different governments levels.

6.1.1 Legal and Policy Provisions for Public Consultation

Stakeholder and public consultations are guided by various legal and policy framework documents. For proposed Busia Sewerage Project, public consultation activities conform to both National and International Legal Instruments as described in **Table 6.1** below.

Table 6-1: Legal and Policy Provisions for Public Consultations

Level	Statutes
National (Kenya)	Kenya Constitution 2010 Articles 10(2), 35, 69(1), 118, 174(c), 184(1)(c), 196, 201(a), 232(1)d
	Public Participation Bill 2016
	The Environmental Management and Coordination Act (EMCA), 2015 and subsequent regulations of Environment Impact Assessment and Audit Regulation of 2003

Table 6.2 below provides in detail, Sections of the Kenya Constitution which require public participation in governance.

(a) Kenyan Constitution 2010

Table 6-2: Kenya Constitution Provision for Public Participation

Article	Public Participation Provision
Article 10(2)	Article 10(2) of the Constitution Provides **national values and principles of governance** in this Article bind all State organs, State officers, public officers and all persons whenever any of them whenever they (c) makes or implements public policy decisions. The national values and principles of governance as provided in the constitution include; patriotism, national unity, sharing and devolution of power, the rule of law, democracy and **participation of the people** and **sustainable development**.
Article (35)	Article (35) of the same constitution provides for **Access to information**, the articles indicates that every citizen has the right of access to information held by the State; an information held by another person and required for the exercise or protection of any right or fundamental freedom. The same article provides that the State shall **publish and publicize** any important information affecting the nation.
Articles 174(c)	Articles 174(c) state objectives of devolutions, among them is that devolution gives powers of self-governance to the people and enhance the participation of the people in the exercise of the powers of the State and in making decisions affecting them and to recognize the right of communities to manage their own affairs and to further their development
Article 184	Article 184 is exclusive on **urban areas and Cities**, the article provides that National legislation shall provide for the governance and management of urban areas and cities and shall, among other provisions provide for **participation by residents in the governance** of urban areas and cities.
Article 201(a)	Article 201(a) provides Principles of public finance which require openness and accountability, including public participation in financial matters;
Article 232(1)	Article 232(1) provides values and principles of public service include among others involvement of the people in the process of policy making;

(b) The Public Participation Bill 2016

The Bill, when enacted by parliament, will be referred to as “Public Participation Act”. The Bill provides general guidelines of ensuring public participation in nation governance. The Bill will give effect to Articles of the Constitution referred to above namely Articles 10(2), 35, 69(1), 118, 174(c), 184(1)(c), 196, 201(a), 232(1)d.

The Bill provides that public participation shall be guided by the following:

- The public, communities and organizations to be affected by a decision shall have a right to be consulted and involved in the decision making process
- Provision of effective mechanisms for the involvement of the public, communities,

organizations and citizens that would be affected by or that would be interested in a decision;

- Participants' equitable access to the information they need to participate in a meaningful manner
- That public views shall be taken into consideration in decision making
- Development of appropriate feedback mechanisms
- Adherence to the national values under Article 10 of the Constitution
- Adherence to the principles of leadership and integrity set out in Chapter Six of the Constitution
- Adherence to the principles of public participation as may be prescribed by any written law
- Promotion of sustainable decisions recognizing the needs and interests of all participants, including decision makers

6.2 Stakeholder Mapping

This was done to ensure that all the stakeholders likely to be affected or influenced by the Project were identified and involved in ESIA detailed study. The consultations were through a key informant interviews for institutional stakeholders identified in table 6.3 below rows (1) and (2) while stakeholders listed in (3) to (5) had representatives attending public meeting listed in table (6.4). More stakeholder consultations will be undertaken at sectorial review of the ESIA prior to issuance of the environment license as well as during project implementations phases of the Project.

Table 6.3 below presents stakeholders are necessary and who were engaged in the ESIA process;-

Table 6-3: Stakeholder Inventory

N/o	Institution	STAKEHOLDER
1	Busia County Government	• Busia County Executive Committee Member for Environment • Busia County Executive Committee Member for Lands and Urban Planning • Busia County Secretary • Busia County Statistics Officer • MD BUWASCO • Busia Town Administrator • County Public Health Officer
2	National Government	• Deputy County Commissioner Busia Sub County • Local Administration (Chiefs and Village Elders) • Busia Sub Region Manager Water Resources Authority (WRA) • National Environment Management Authority (NEMA)
3	Institutions	• Alupe Mission Hospital • Pesi medical centre • Bukesa medical clinic • Busia Polytechnic • Mabale Primary School

		• Mabale Secondary school • Burumba Primary school
4	Other Interested Parties	• Water Resource Users Association for Okame River • Project Affected Persons (PAPs) including Land owners along the trunk and secondary Sewers • Landlords and tenants of Busia Town • Business Community Busia Town • Traders within Busia • Hotel owners within Busia • Non-Governmental Organizations and Community Based Organization

6.3 Stakeholder Consultation Process

Therefore, to comply with the above discussed statues, consultations were done at the ESIA preparation stage. The consultations included interaction with key stakeholders in Busia Town Project area June 2019. The venues of the consultation were at Angorom Shopping Centre Busia on 20th June 2019 and Busia Social Hall On 26th June 2019.

The meetings involved ESIA experts, LVNWWDA and CRVWWDA team, Busia Water and Sanitation Company (BUWASCO) Local Administration, Village Leaders, Busia Business Community, Local Church Leaders and Local Residents of various sub locations within the Project area. **Table 6-4** on below presents a schedule of Public Participation meetings held in Busia Town Project area.

Table 6-4: **Public Participation Meetings at Project Report Stage**

Meeting Date	Meeting Venue	Participants Representation	Gender Ratio
20th June 2019	Angorom Shopping Centre Busia	1. Area chief 2. Area Assistant chiefs 3. Area Member of County Assembly 4. Water Scheme Manager BUWASCO 5. Inspector of police 6. Consultant representative 7. Residents.	Total 119 Male 83 female 36
26th June 2019	Busia Social Hall	1. Area Ward administrator 2. Area Member of County Assembly 3. Water Scheme Manager BUWASCO 4. Business Community 5. Consultant representative 6. Residents.	Total 34 Male 20 female 14

The project designs and Environment and Social Impact Assessment (ESIA) in cooperated issues discussed and resolved in the consultative meeting as summarized in **table 6.5** below.

Table 6-5: Issues Discussed and Response

Stakeholder Issues	In cooperation into the Project
Timeframe of Project implementation, Scope and coverage of the project.	The project is funded by African Development Bank under the Kenya towns sustainable water supply and Sanitation programme (KTSWSSP). However, under the current scope the consultant is only undertaking Design of Works for Rehabilitation and Augmentation of Busia Sewerage Project
Project operation and maintenance and Modalities of getting sewerage connection.	The Project will be operated and maintained by Busia water and sewerage Company (BUWASCO) as provided Water Act 2016. BUWASCO will guide customers on getting a sewer connection as per the WSP regulations
Sewerage tariffs review	water tarrif to be reviewed by BUWASCO as guided by Water Act 2016 and Water Services Regulatory Authority (WASREB)
Displacement of impacts along the riparian reserves and compensation provisions**.**	Resettlement Action Plan (RAP) report done to address project impacts to private property
Employment opportunities associated with the Project	Locals will be employed both as skilled and unskilled
Benefits of the sewerage project to the residents of the town and the need for the implementation of the project since the town is growing and the use of septic tanks can be unsustainable.	Project will address health and sanitation challenges posed by the current situation of lack of sewerage infrastructure
License status of the project	After ESIA study assessment, National Environment Management Authority (NEMA) will license the Project.
Land acquisition status for the sewerage treatment plant	Land for establishment of the Waste Water treatment Plant (WWTP) has been identified by the County Government within Alupe University. To minimize resettlement, the sewer lines will be constructed along storm water drains and river riparian
Quality of treatment and discharge of the effluents into Okame river	Design to treat Waste Water to allowable standards as provided by NEMA

Busia Town location chief addressing residents

Busia Town MCA responding to resident's

during 20th June 2019 at Angorom Shopping Centre Busia	concerns during the 26th June 2019 Busia Town Meeting at Busia Social Hall.

CHAPTER 7: ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT & MITIGATION

7.1 Introduction

This ESIA assessment has been systematically conducted to determine whether the proposed Project will have a diverse impact on the environment. The Environmental Management and Co-ordination Act (EMCA) No.8 of 2015 provide the legal and statutory guideline for the Environment and Social Impact Assessment process in Kenya.

The impacts in this Chapter have been generated based on the analysis of the proposed environment in relation to the proposed project. The impacts arising during each of the phases of the proposed development namely construction, operation and decommissioning, can be categorized into:

- Impacts on biophysical environment;
- Health and safety impacts
- Social-economic impacts

7.2 Definition and Classification of Environment Impact

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- ✓ Positive (beneficial) or negative (adverse);
- ✓ Direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect.

Impacts are termed cumulative when they add incrementally to existing impacts. In the case of the project, potential environmental impacts would arise during the construction and the operations phases of the Project and at both stages positive and negative impacts would occur.

7.2.1 Impact Assessment and Scoring

The impact analysis were done using the leopold matrix which is a grid that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis. For the identification of impacts, a breakdown of the environment into elements or factors that may be affected and a breakdown of the various actions or activities of the project under study were done.

The potential impacts associated with the proposed development have been assessed as presented in **Table 7-1** on **Page 7-2.** Precautionary principle was used to establish the significance of impacts and their management and mitigation i.e. information, the Environmentalist erred on the side of caution.

Table 7-1: Impact Rating Criteria for Environment and Social Risks

Extent		Duration		Intensity		Probability		Weighting Factor (WF)		Significance Rating (SR)		Mitigation efficiency		Significance following Mitigation (SFM)	
Foot print	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19	High	0,2	High	0-19
Site (1km radius)	2	Short to medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39	Medium to High	0,4	Medium to High	20-39
Location	3	Medium term	3	Medium	3	Likely	3	medium	3	medium	40-59	medium	0,6	medium	40-59
Sub County	4	Long term	4			Highly likely	4	Medium to high	4	Medium to high	60-79	Low to medium	0,8	Low to medium	60-79
County	5	Permanent	5	High	5	High	5	High	5	High	80-100	low	1,0	low	80-100

Definition of Terms

Extent: An area of influence covered by the impact. In this sense, if the action produces a much localized effect within the space, it is considered that the impact is low (1). If, however, the effect does not support a precise location within the project environment, having a pervasive influence beyond the project footprint, the impact will be at location level (3) or could be County (5)

Timing: Refers to the moment of occurrence, the time lag between the onset of action and effect on the appearance of the corresponding factor. We consider five categories according to this time period is zero, up to 1 year (short term), or more than two years, which are called respectively medium term (3), long-term (4), and permanent (5).

Intensity: refers to the degree of impact on the factor, in the specific area in which it operates, ranked from low (1) to high (5).

Probability: Refers to the likelihood of the impact occurring during the project implementation, this is also ranked as Probable (1) to highly probable

7.3 Positive Impacts during Construction Phase

Construction Phase normally includes Pre-Construction Phase and Construction Phase. Construction period depends on the nature of the project activities and normally vary from one year to three years.

The positive impacts are summarized below:

- Employment opportunities during construction, the design report has provided for 90% unskilled labour and 60% skilled labourers to be sourced from the local market.
- Provision of ready market for construction materials such as sand, ballast and cement that will be sourced from local market, this will lead to injection of money into the local economy
- The Project will be associated with technological and knowledge transfer to the local sector, this will be through the artisan who will be employed and trained by the Project.

7.4 Negative Impacts during Construction Phase

The following negative impacts are associated with the Construction Phase of the Project:

7.4.1 Impacts on Vegetation Resources

The Project impacts on vegetation is summarized in sub chapters below. The assessment identified that construction activities could lead to clearance of vegetation and consequently disruption of soil structure within the sewer easement. The lose soils eventually are washed down into the lower areas into river Okame **Table 7-2** illustrates assessment Impacts on vegetation Cover.

Table 7-2: Project Impacts on Vegetation Cover

Impact Sources	**Clearing of vegetation cover along the Sewer pipeline identified for the Project**		**Mitigation Efficiency**
Nature of impact	• Clearing of vegetation cover exposes soils to agents of soil erosion such as wind and runoff, this could lead to soil degradation. • Triggers sedimentation in nearby river Okame this increases river turbidity, could also lead to flooding.		**High**
Reversibility of impact	Permanent vegetation clearance along the Project corridor footprint and replanting of vegetation that is not within the Pipeline corridor		
Affected areas	**Flora and fauna along the proposed sewer pipeline**		
Magnitude	***Extent*** Site – 2	The entire Project corridor has vegetation that has grown due to availability of water from Okame River.	
	Intensity Medium-3	The project area is mostly semi-arid with sparse vegetation cover in most parts	
	Duration	Short to medium-2	
	Probability	Likely-3	
Significance	**Weighting**	(Extent+ Intensity +Duration + Probability) x WF (2+3+2+3) x3= 30 (Low-Medium)	Low to Medium

Mitigation Measures

The following is proposed to mitigate against soil erosion and its effects and enhance vegetation cover:

- Compensatory planting of trees i.e. plant at least twice the number of trees, about 900 in total either on farmers land or in public land within the project area.
- Vegetation should only be cleared along the Project corridor and where it will interfere with Project construction and/or present a hazards.
- The local community should be given a chance to harvest the targeted vegetation if they so wish.
- Areas to be cleared should be agreed and demarcated before the start of the clearing operations to minimize exposure.
- Also stage vegetation clearance is recommended so as not to clear the entire corridor all at once.
- The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc. shall be encouraged.

7.4.2 Impacts of Water Resources

The Project excavation activities will trigger limited discharge of silt into rivers and other local drainage systems from earth moving during construction, potential discharge of oil residuals into the same rivers and open drains from the construction equipment and disruption of accumulated solid wastes from work areas washed down into River Okame and other stream along the Project Corridor as indicated in Table 7-3 below.

Table 7-3: Water Pollution Impacts Rating

Impact Sources	• **Discharge of silt and oils into rivers and water bodies leading to pollution** • **Erosion of soils that are washed off into water sources** • **Discharge of oil spills into water bodies** • **Washing off of solid wastes from project sites into drains and water sources**		**Mitigation Efficiency**
Nature of impact	• Could lead to contamination of aquifers and underground water sources • Release of effluent into river Okame that does not meet the requires BOD levels (Water quality regulation 2006). • Could lead destruction of aquatic ecosystem downstream river Okame after effluent discharge Point. • Pollution of River Okame downstream effluent discharge point posing health sanitation risk to people downstream.		**Medium**
Reversibility of impact	Yes		
Affected stakeholders /areas	Fauna and flora, rivers and streams		
Magnitude	*Extent*	location– 3	
	Intensity	Medium-3	
	Duration	Medium-3	
	Probability	Likely-3	

Significance	**Weighting**	(Extent+ Intensity +Duration + Probability) x WF (3+3+3+3) x3= 36(Low to Medium)	Low to Medium

7.4.2.1 Water Resources Pollution

For proposed Busia Sewerage Project, the focus will be on the quality of effluent that will be released into Okame River and streams along the Sewer alignment. EMCA 2015 water Quality Regulations of (2006) provide that BOD for treated effluent should be less that 30mg/litre. The treatment method proposed "Waste Water Stabilization Ponds" will ensure the effluent is treated to the required BOD levels, the measure will be adhered to so that the quality of water is guaranteed for downstream users and aquatic ecosystem.

The mitigation measures summarized below will be adhered during Project construction in order to minimize and eliminate pollution of Okame River.

Mitigation Measures

- No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent River Okame shall be permitted;
- Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site where applicable
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to River Okame.
- Works that are likely to generate silt-laden runoff (e.g. earthworks and excavations) will be undertaken preferentially during the drier months of the year; November to April;
- Site compounds and stockpiles will be located away from Okame River; The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and streams without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances;
- Where possible an 8m buffer strip of existing vegetation will be maintained alongside River Okame
- Earth stockpiles will be seeded as soon as possible, covered with geotextile mats or surrounded by a bund to minimise the risk of sediment-rich runoff;
- Tools and plant to be washed out and cleaned in designated areas within the site compound where runoff can be isolated for treatment before discharge to Okame river;
- Debris and other material will be prevented from entering watercourses; Construction sites (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants); and
- Discharges to watercourses and water bodies will only be carried out under consent of the relevant governing bodies such as WRMA.

7.4.2.2 Siltation and Sedimentation

The Project activities associated with excavation of sewer trenches will significantly disturb the soil structure along the sewer easement and eventually trigger soil erosion which leads to siltation and sedimentation of River Okame and streams along the sewer easement. This impact will be significant during the dry season when water levels in the river are low

The streams are an important resource for the communities along the proposed project road as most of them are farmers and depend on these resources to meet their their domestic needs

Mitigation Measure

- Any work along River Okame will be isolated to prevent silt propagating downstream;
- Debris and other material will be prevented from entering River Okame; Construction Sustainable drainage system (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants);
- Sand/silt traps should be used so as to prevent silt and any other sediments from getting into River Okame.
- Site compounds and stockpiles will be located away from Okame River. The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and water pans without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances.

7.4.2.3 Pressure on Water Resources

There is a possibility of overexploitation of the water resources along the Project alignment during construction if they are used as the major source to meet construction water demand.

Mitigation Measures

- Adequate meaningful consultations with the communities shall be required before commencement of water abstraction in Okame, the assessment established that the river basin has a functional Water Resource Users Association (WRUA).
- Water permits for the abstraction of water shall be obtained from Water Resources Authority (WRA) to ensure that existing water rights and uses will not be affected by the Project for its diverse water needs
- Water within existing shallow wells and streams should not be used to meet Project construction water needs.

7.4.3 Impacts on Soil Resources

The county experiences high riverine erosion due to its hilly landscape. The major soil found in the county are deep and well drained categorized as Dystric acrisols and slightly acidic covered with humic top soils from both volcanic and basement complex with yellowish red loams derived from sediments and basements.

The impacts therefore likely to be triggered by the Project activities on soil resource include;

(i) Destruction of soil structure due to top soil excavation.
(ii) Soil contamination caused by oils and fuel leaks from construction equipment
(iii) Soil erosion due to clearing of vegetation cover and trenching activities.

The soil are loose and susceptible to agents of erosion as indicated in the photographs below.


Photographs of loose soils susceptible to agents of erosions

Removal of vegetation cover during site clearance will further expose soil to water and wind which are agents of erosion. Excavation and ground clearance works will also have the direct effect of loosening the soils making them easier to be washed away by water and wind. Soil erosion will be more pronounced if earth works coincide with the rainy season since runoff will enhance soil erosion.

The assessment also identified that less significance impacts are anticipated on Soil resource as discussed in **Table 7-4** below.

Table 7-4: Impacts on Soil Resources

Impact Sources	**Project activities which could lead to soil compacting and interference with soil structure hence making top soils loose and susceptible to agents of erosion.**		**Mitigation Efficiency**	**High**
Nature of impact	• Destruction of Soil Structure due to top soil breaking leading to soil erosion • Movement of plant and equipment could result to soil compacting which inhibits soil aeration leading to death of soil microorganisms. • Soil contamination caused by oils and fuel leaks from construction equipment leading to Oil Acidity increase • Soil Erosion due to clearing of vegetation cover and trenching activities which results to death of soil microorganism and reduced soil productivity			
Reversibility of impact	Yes			
Mitigation	As discussed below			
Affected stakeholders /areas	Terrestrial ecosystems			
Magnitude	*Extent*	Site – 2		
	Intensity	Medium-3		
	Duration	Medium term-3		
	Probability	Likely – 3		
Significance	**Weighting**	(Extent+ Intensity +Duration + Probability)x WF(2+3+3+3) x1=11 (Low)		Low

Mitigation Measures to Project Impacts to Soils

(a) Soil Erosion due to Clearing of Vegetation Cover

- Earthworks should be controlled so that land that is not required for the Project works is not disturbed;
- Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain.
- Excavated materials and excess earth should be kept at appropriate sites approved by the Supervising Engineer.
- The contractor should adhere to specified cut and fill gradients and planting embankments with shrubs and grass to reduce erosion and take care of stability problems of Project trenches once reinstated. Areas cleared for improving sight distance should be planted with grass to reduce erosion;
- Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion, these include: areas stripped of topsoil, Soil stockpiles, Spoil sites, Borrow pits, Sites for bridges and drainage structures.
- Monitoring should also be done during the operation phase to prevent road degradation by erosion caused by flash floods.
- In sections where the risk of erosion is evident as identified above, special measures may be necessary to stabilise the areas and prevent further erosion. These may include, but not be limited to: confining construction activities, using cut off drains, using mechanical cover or packing structures such as geo-fabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls, constructing anti-erosion berms and planting of appropriate vegetation
- Any work along watercourses will be isolated to prevent silt propagating downstream;
- Debris and other material will be prevented from entering streams and shallow wells; Construction settlement lagoons or other temporary attenuation to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants);
- Where possible, sieves should be placed next to water bodies so as to prevent silt and any other sediments from getting into the resources

(b) Civil Works Resulting to Soil Compaction

- Split compacted area to reduce runoff & re-vegetate where necessary
- Vehicles to be kept in designated access roads.
- Minimize compaction during stockpiling by working the soil in dry state.

(c) Civil Works Resulting to Soil Pollution

- The contractor should develop an emergency response plan that includes spill response strategy.
- Spills should be immediately addressed per the appropriate spill management plan and initiate soil clean up and soil removal if needed. Spill kits should be availed to aid this
- Spill prevention practices and response actions should be applied in refuelling and vehicle use areas to minimize accidental contamination
- Containment around the garage, fuel store and fuelling station should be ensured so that these potentially polluting substances can be properly handled and any intended escape

of material from that area can be contained until such time as remedial action can be taken
- Proper handling of material through use of dip trays, directing spills to an oil sump which should be emptied into a designated disposal site
- Refuel in designated refuelling areas that include a temporary berm to limit the spread of any spill.
- Proper maintenance of machinery and equipment to avoid or minimize leakages from machines

7.4.4 Workers, Community Health and Safety Risks

Workers, Community Health and Safety risks are often triggered by Project activities during Project Construction Phase. These risks often affect both workers on site as well as general community in close proximity to the work site.

Management of these risks is required to be as provided for by the Occupational Health and Safety Act (OSHA 2007), Waste Management Regulation 2006, noise and excessive vibration regulations of 2009 and .air quality regulations of 2014.

This assessment identified potential Environment, Health and Safety in the following context and analysis in **Table 7-5**

(i) Wastes Management (Liquid and Solids)
(ii) Excessive noise and vibrations
(iii) Air Pollution and Dust Generation.
(iv) Risk of Accidents at Work Sites

Table 7-5: Impacts on Workers, Community Health and Safety

Impact Sources	Adverse Impact associated with Health and Safety	Mitigation Efficiency	Low to Medium
Nature of impact	**Solid and liquid Wastes** - Impact involves pollution of the environment caused by construction generated solid and liquid waste which include waste water, fuels, oils, hazardous substances and other liquid pollutants. **Noise and excessive vibrations** - noise and excessive vibrations due to un-serviced plant and equipment and Activities associated with blasting and rock breaking - Hearing impairment and respiratory related illness **Health and Safety risks** - Open trenches within the settlement which pose health hazards to workers and community. - Failure to use required correct signage and safety marshal on site - Un-serviced plant and equipment which emit hydro carbons through equipment exhaust system. - Poor workmanship & failure to use water sprays during dry season could also result to air pollution. - Failure to observe safe work environment requirements like use of PPEs, Warning Taps, site labelling. **Air pollution** - Anticipated impact may originate from vehicle and machinery fumes and dust		
Reversibility of impact	Yes		
Affected stakeholders	Workers and Community		

/areas			
Magnitude	*Extent*	Site – 2	
	Intensity	Medium-5	
	Duration	Medium term-4	
	Probability	Likely – 4	
Significance	**Weighting**	(Extent+ Intensity +Duration + Probability)x WF(2+5+4+4) x4=60 (Medium to High)	Medium to high

7.4.4.1 Solid Wastes

During construction, solid waste will be generated from a wide range of project activities. Some of the waste includes earth spoils, wrapping materials discarded by the workers on site, food waste from kitchens, waste from the workshops and offices consisting of waste papers, toners and cartridges, broken equipment and containers, steel, timber, etc.

To minimize pollution and visual intrusion, waste will to be managed appropriately as provided in this sub section. Solid and liquid wastes often increase organic load of the river eventually rising the Biological Oxygen Demand (BoD). Food waste may also attract primates and birds to the construction camps with the potential of being a nuisance to the construction workers.

Solid Wastes Impacts Mitigation Measures

(i) The contractor shall develop a comprehensive Waste Management Plan (WMP) prior to commencement of works
(ii) Properly labelled and strategically placed waste disposal containers shall be provided at all places of work
(iii) Litter bins should have secured lids to prevent animals and birds from scavenging
(iv) All personnel shall be instructed to dispose of all waste in a proper manner
(v) Recycling of construction material shall be practiced where feasible e.g. containers and cartons
(vi) Earth spoils shall be disposed of in pre identified sites
(vii) The construction camps should be situated away from the primate reserve and wildlife corridors to prevent wildlife from scavenging polluted waste.

7.4.4.2 Liquid Wastes

During construction various types of liquid waste will be produced such as concrete washings, runoff from workshops and grey water from contractor's camp. Just as with solid waste, liquid waste can attract rodents and birds especially for meeting their drinking water needs. This can affect pose health hazards to both workers and community.

Liquids Wastes Impacts Mitigation Measures

(i) Water containing pollutants such as concrete or chemicals should be directed to a conservancy tank for removal from the site where applicable
(ii) Potential pollutants of any kind and form shall be kept, stored and used in such a manner that any escape can be contained
(iii) In case of any form of pollution the contractor should notify the Resident Engineer (RE)
(iv) Wash areas shall be placed and constructed in such a manner so as to ensure that the

surrounding areas including groundwater are not polluted
(v) No grey water runoff or uncontrolled discharges from the site or working areas to any adjacent Okame River.

7.4.4.3 Fuels, oils, Hazardous Ssubstances

The construction phase will involve use of stationary and mobile plant and equipment which will require fuelling and lubrication. There are chances of accidental spillage of used engine oils, grease and diesel which may lead to soil contamination. Should this spillage occur during the rainy season, the contaminants may be washed off by surface runoff and find their way into the water bodies especially Okame River and the Shallow wells and streams along the Project easement.

Hazardous wastes Impacts Mitigation Measures

(i) The contractor shall ensure that the machines and equipment are in good condition when on site.
(ii) Ensure proper handling of lubricants, fuels and solvents while maintaining the plant and equipment.
(iii) Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal.
(iv) A safety and emergency response plan will need to be developed for all operations with emphasis on the protection of the environment prior to start up.
(v) Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal;
(vi) Storm water shall be diverted away from the fuel handling and storage areas. An oil water interceptor shall be provided to treat any rainwater from fuel storage and handling areas;
(vii) Measures should be taken to ensure proper storage of fuel, oil and bitumen. Oil-water interceptors or sumps should be constructed to capture discharge of oils, fats and other polluting liquids from maintenance workshops, vehicle and equipment washing bays and kitchen drains;
(viii) At the work sites the contractor will be expected to maintain strict surveillance particularly when working within the vicinity of water supply points and the rivers within the project area;
(ix) Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment or provided with own containment

7.4.4.4 Excessive Noise and Vibrations

The risk often affects both workers on site and community at large. Common sources noise and excessive vibrations are as a result of use of un-serviced plant and equipment as well as activities associated with blasting and rock breaking.

Noise generating activities such as equipment operations and the workers themselves could be a public nuisance to nearby settlements and commercial centres, health centres and schools especially those within 200m of the road reserve. As required, OSHA 2007 and EMCA 2015 Noise and Excessive Vibration 2009 as well as World Bank EHS Guidelines should be adhered to. **Table 7-6 below** provides permissible noise levels for a residential and construction sites

Table 7-6:

	Facility	Maximum Noise Levels (Leg) in dB (A)	
		Day	Night
i	Health Facilities, educational institutions, homes for disabled	60	35
ii	Residential	60	35
iii	Areas other than those prescribed in (1) and (ii) above	75	65

Mitigation Measure to Excessive Noise and Vibration

(i) Contractor will comply with provisions of EMCA 2015 (Noise and Excessive Vibrations Regulations of 2009)
(ii) The Contractor will keep noise level within acceptable limits (60 Decibels during the day and 35 Decibels during the night) and construction activities shall, where possible, be confined to normal working hours in the residential areas
(iii) Hospitals, schools and other sensitive receptors as identified in **sub section 2.4 of this report** shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity

7.4.4.5 Air Pollution and Dust Generation

Significant air pollution will most likely be attributable to particulate matter (PM), especially dust. Particulate matter is a common air quality problem at road construction works. PM mainly originates from excavations, from the movement of heavy machinery on earth roads especially along unpaved diversions, haulage activities and concrete mixing and batching.

Already there is significant dust was observed along the murrum road along River Okame that will be adopted as the access road to the sewer treatment plant to be located within Alupe University Land. The particulate matter generated could affect the learning institutions and health facilities that are within 200m to 500m as detailed in **table 7.7** on **page 7-13.**

As required by OSHA 2007 and EMCA 2015 (Air Quality Regulations 2014) as well as World Bank, EHS Guidelines should be adhered to.

Mitigation Measure to Project Related Dust and Air Pollution

(i) The contractor will comply to the provisions of EMCA 2015 (Air Quality Regulations 2014)
(ii) Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications
(iii) Water sprays shall be used on all earthworks areas within 200 metres of human settlement especially during the dry season
(iv) The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible;
(v) Do not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds
(vi) Vehicles delivering soil materials shall be covered to reduce spills and windblown dust;

(vii) Vehicle speeds shall be limited to minimise the generation of dust on site and on diversion and access

7.4.4.6 Risk of Accidents at Work Sites

The risk of accidents at worksites often affects both workers on site and community at large. These risks at times can be fatal as they could lead to death or permanent disability of victims. The risks are commonly caused by failure to observe safety requirements as provided for by as required by OSHA 2007 and the World Bank EHS Guidelines.

Mitigation Measure to Risks of Accidents on Site

(i) Contractor to provide a Healthy and Safety Plan (HSP) prior to the commencement of works to be approved by the Supervising Engineer.
(ii) Provide Personal Protective Equipment including gloves, gum boots, overalls and helmets to workers. Use of PPE to be enforced by the Supervising Engineer.
(iii) Fully stocked First Aid Kits to be provided within the Sites, Camps and in all Project Vehicles
(iv) Strict use of warning signage and tapes where the trenches are open and at other active construction sites
(v) Contractor to Employ and train Road Safety Marshalls who will be responsible for management of traffic on site
(vi) Contractor to provide a Traffic Management Plan during construction to be approved by the Supervising Engineer

7.4.4.7 Risks Associated with Traffic on Site

The term 'vehicles' includes: cars, vans, lorries, low-loaders and mobile plant such as excavators, lift trucks and site dumpers etc. Construction site vehicle incidents can and should be prevented by the effective management of transport operations throughout the construction process.

On average, each year, about 7 workers die as a result of accidents involving vehicles or mobile plant on construction sites. A further 93 are seriously injured[1]. Occupational Health and Safety Act (OSHA 2007) provides for site traffic organization so that vehicles and pedestrians using site routes can move around safety. The routes need to be suitable for the persons or vehicles using them, in suitable positions and sufficient in number and size.

This assessment provides for key management principles that will guide the Contractor when dealing with traffic on Site during the construction of the Sewerage Project. in order to reduce risks of accident on site, the contractor should ensure the below listed measure are assessed in detail.

(i) Keeping Pedestrians and Vehicles Apart
(ii) Minimizing vehicles movement
(iii) People on Site
(iv) Turing of Vehicles

[1] http://www.hse.gov.uk/construction/safetytopics/vehiclestrafficmanagement.htm

(v) Visibility
(vi) Signs and Instructions.

Table 7.7 below provides details on how traffic will be managed on site under the above discussed principles.

Table 7-7: Traffic Management Plan on Site

Safety Principle	Management Measure
Keeping Pedestrians and Vehicles Apart on Site	- **Entrances and exits-** provide separate entry and exit gateways for pedestrians and vehicles; - **Walkways-** provide firm, level, well-drained pedestrian walkways that take a direct route where possible; - **Crossings**- where walkways cross roadways, provide a clearly signed and lit crossing point where drivers and pedestrians can see each other clearly; - **Visibility-** make sure drivers driving out onto public roads can see both ways along the footway before they move on to it; - **Obstructions**– do not block walkways so that pedestrians have to step onto the vehicle route; d - **Barriers**- think about installing a barrier between the roadway and walkway
Minimizing vehicles movement	- Limit the number of vehicles on site - Provide car and van parking for the workforce and visitors away from the work area; - Control entry to the work area; and - Plan storage areas so that delivery vehicles do not have to cross the site.

People on Site	- Contractor will take steps to make sure that all workers are fit and competent to operate the vehicles, machines and attachments they use on site by, for example:
	  - checks when recruiting drivers/operators or hiring contractors;
	  - training drivers and operators;
	  - managing the activities of visiting drivers
	- Accidents can also occur when untrained or inexperienced workers drive construction vehicles without authority.
	- Access to vehicles will be managed and people alerted to the risk

Turning of Vehicles	The need for vehicles to reverse will be avoided where possible as reversing is a major cause of fatal accidents. - One-way systems will be adopted by the contractor as this can reduce the risk, especially in storage areas. - A turning circle could be installed so that vehicles can turn without reversing
Visibility	If vehicles reverse in areas where pedestrians cannot be excluded the risk is elevated and visibility becomes a vital consideration. This ESIA provides for: - **Aids for drivers-** mirrors, CCTV cameras or reversing alarms that can help drivers can see movement all round the vehicle; - **Signallers**- who can be appointed to control manoeuvres and who are trained in the task; - **Lighting**- so that drivers and pedestrians on shared routes can see each other easily. Lighting may be needed after sunset or in bad weather; - **Clothing**- pedestrians on site should wear high-visibility clothing.
Signs and Instructions	- Make sure that all drivers and pedestrians know and understand the routes and traffic rules on site. Use standard road signs where appropriate including the Heavy Vehicles turning sign

Safety Principle	Management Measure
	- Provide induction training for drivers, workers and visitors and send instructions out to visitors before their visit

7.4.5 Social Impacts

7.4.5.1 Resettlement Impacts

The total number of PAPs likely to be impacted by the project are 265 PAPs who include 48 female PAPs and 217 male PAPs. The project impact on land will be triggered at the proposed site for the Waste Water Treatment Plant (WWTP) within Alupe University where 69acres will be acquired through a willing buyer willing seller agreement between the University and Busia County Government.

Also, isolated cases of Sewer Easement will be triggered along the proposed sewer alignment in areas with no government road reserve of river riparian. The total easement required for the trunk sewer is provided as cumulative of 41.42 acres for the trunks sewers discussed in the feasibility report prepared separately under this consultancy. A separate RAP report for the project is prepared for the Project.

7.4.5.2 Other Social Risks

The Project activities as described in the report have the potential of triggering various social risks both at Project Construction Phase and Operation Phase. These risks are likely to be significant within Busia town and less significant along sewer line through villages.

This assessment has identified potential social risks associated with the Project as listed below and analyzed in **Table 7-8** below.

(i) Labour Influx Impacts
(ii) Human Rights and gender inclusivity
(iii) Children Protection
(iv) Increased Transmission of communicable diseases including HIV/AIDS

Table 7-8: Impacts on Social Setting

Impact Sources	Project Impacts to social setting of the Project area		Mitigation Efficiency	High
Nature of impact	(i) Labour Influx Impacts (ii) Human Rights and gender inclusivity (iii) Child protection (iv) Increased Transmission of communicable diseases including HIV/AIDS			
Reversibility of impact	Yes			
Mitigation Measures	As detailed below			
Affected stakeholders	Workers and Community			
Magnitude	*Extent*	Site – 2		
	Intensity	Medium-5		

	Duration	Medium term-4	
	Probability	Likely – 4	
Significance	**Weighting**	(Extent+ Intensity +Duration + Probability)x WF(2+3+3+3) x1=11 (Low)	Low

(a) Labour Influx Effects

This impact is triggered during Project Construction Phase due to the Project attracting various categories of workers from local, national and international markets. This therefore leads to concentration of people in one area drawn from diverse social and cultural backgrounds often resulting to a number of issues as listed below;

(i) Strain on various resources especially water resources for road works
(ii) Grievances from local community members over job opportunities.
(iii) Sexual Offences
(iv) Teenage Pregnancies

Mitigation Measures to Labour Influx Impacts

- The contractor awarded the Project will develop a labour Management Plan (LMP) in consultation with local leaders.
- The contractor will ensure effective community engagement and strong grievance mechanisms on matters related to labour
- Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx, the contractor should engage a local community liaison person.
- The contractor will ensure proper records of labour force on site while avoiding child and forced labour
- The contractor will ensure compliance with provisions of Work Place Injuries and Benefits Act (WIBA) 2007
- The contractor will develop and implement a children Protection Strategy, this strategy will ensure that no child under the legal age of 18years in employed to the Project.

(b) Human Right and Gender Inclusivity

This impact is triggered during Project Construction Phase due to the potential of the Contractor's failure to comply with the following provisions;

(i) Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule.
(ii) failure to protect Human Risk Areas Associated with, Disadvantaged Groups, interfering with Participation Rights, and interfering with Labour Rights

Mitigation Measures of Human Rights and Gender Requirements

- The contractor will mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule.
- The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability and VMGs
- Protecting Human Risk Areas Associated with, Disadvantaged Groups, interfering with Participation Rights and interfering with Labour Rights

(c) Child Protection

The possibility of contractor children abuse is through hiring of child labour, also labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV and AIDS. The contractor will undertake the below listed mitigation measures.

Mitigation Measures to child protection

- The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project.
- All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour
- Children under the age of 18years should not be hired on site as provided by Child Rights Act (Amendment Bill) 2014

(d) Increase in Prevalence of Communicable Diseases

This impact is triggered during Project Construction Phase due to the Project attracting various categories of workers from local, national and international markets. This therefore leads to concentration of people in one area drawn from diverse social and cultural backgrounds often resulting to people engaging in risky sexual activities.

Mitigation Measures to Risk of Communicable Diseases

- HIV/AIDS and other communicable diseases like Hepatitis B Awareness Program and other communicable diseases to be instituted and implemented as part of the Contractor's Health and Safety Management Plan to be enforced by the Supervising Engineer.
- This will involve periodic HIV/AIDS and other communicable diseases Awareness Workshops for Contractor's Staff
- Access to Contractor's Workforce Camps by outsiders to be controlled
- Contractor to provide standard quality condoms to personnel on site

7.5 Positive Impacts during Operational Phase

The Project main objective is to improve the quality of life of people within Busia town through provision of improved Sewerage Services. The positive impacts associated with the Project operation phase are summarized below.

- Reduced cases of water borne diseases associated with pollution of water resources
- Improved Health and Sanitation status of Busia town.
- Reduced pollution of natural river systems which include Okame River and numerous springs within the Project area which are main watering resources to the residents.
- Trigger development of modern infrastructure within Busia town due to availability of sewer infrastructure
- Reduce distances covered by exhausters to sludge discharge points eventually reducing costs.
- Residents will decommission pit latrines which are expensive to construct and

unsustainable due to short fill-up duration.
- Improve aesthetic outlook of Busia towns that is currently comprised by raw sewer flowing in storm drains

7.6 Negative Impacts during Operation Phase

The project operation phase will have potential negative impacts which are less significant and can easily be mitigated as described in **sub-sections 7.6.1 to 7.6.5**.

7.6.1 Pollution of Water Resources by raw sewage from blocked Sewer pipes and Manholes.

The main river at a risk of pollution is the Okame River along which the sewer pipeline will be laid. Also, poorly maintained and designed sewers can lead to dispersal of raw sewage particularly at manholes and burst areas into the environment. These can cause outbreaks of water borne related diseases like cholera and typhoid from contamination of water sources by raw sewage.

Mitigation Measures water pollution by raw sewerage

- Ensure proper and periodic maintenance of sewer lines and treatment plant;
- Activate a community watch group for information sharing on the status of the sewer line
- Regular check, repair and maintenance of the sewer line
- Awareness rising among community members not to dump solids in manholes.
- Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups
- Development of an inventory of system components, with information including age, construction materials, and drainage areas served elevations.
- Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replaced if broken to minimize entry of garbage and silt into the system
- Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent build-up of solids and hydrogen sulphide generation
- Regular inspection of the system to ensure performance is maintained at high levels;
- Blockages should be detected and promptly replaced;
- Regular monitoring and sampling of the waste water at influent and effluent points as well as in the receiving water bodies;
- Communities living within the river basins where the trunk sewers will be constructed should be enlightened on dangers of using raw sewerage to irrigate farmlands.

7.6.2 Odour Menace from Wastewater Treatment Works

The process of wastewater collection, conveying or treatment has the potential to generate and release odours to the surrounding area. Most odour problems occur in the collection system, in primary treatment facilities and in solid handling facilities as well as the sludge drying beds.

The most frequently reported symptoms attributed to odours from treatment plants include headache, nausea, hoarseness, cough, nasal congestion, palpitations shortness of breath, stress, drowsiness, alterations in mood, and eye, nose, and throat irritation. Hydrogen Sulphide (H2S) is the most prevalent gas associated with domestic wastewater collection and treatment.

The conditions leading to Hydrogen Sulphide formation usually favour the production of other odorous gases such as ammonia which may have considerably higher detectable odour thresholds, and consequently H_2S may be an indicator of their presence. Exposure of receptors to levels of hydrogen sulphide above 5ppb can lead to odour nuisance.

Mitigation to odour menace from WWTP

- Ensure appropriate covering/ventilation of the pre-treatment unit;
- Ensure appropriate handling and removal of grit/grease;
- Ensure proper sizing and alignment of the lagoons;
- Ensure scum is appropriately disposed off or properly stabilized;
- Ensure that the pond series have adequate water flow and aeration to reduce the potential of odour formation;
- The perimeter of the proposed site should be vegetated with trees and plants of varying heights thereby forming windbreaker and reduce dispersion of odour;
- Repair the roofs of the sludge drying beds to ensure quick drying of sludge and appropriate disposal to reduce odour emanating from wet sludge.

7.6.3 Risks Associated with Sludge from the WWTP

Waste Water Treatment Plants often require sludge removal overtime in order to guarantee efficient operation of the plant. However, if sludge is not management properly it can pose significant health hazards to workers, community and water quality from the de-sludging exercise.

Also, if sludge on site is not properly managed, it leads to significant land and soil contamination at the disposal site and eventually pollution water resources when leachate from the sludge flows into water resources. Therefore, mitigation measures for sludge associated risks are presented below.

Mitigation Measures for risks associated with sludge

- Busia Water and Sanitation Company (BUWASCO) during operation and maintenance of the WWTP will dry sludge on the drying beds before disposing off
- Dried sludge could be used to make brisket used as charcoal substitute or be sold to farmers as fertilizers
- Excess sludge can be disposed in a Land fill which is dedicated disposal site clearly designated landfill, the land fill shall only be for disposing dry odorless sludge.
- Preparation and enforcement of operational guidelines for sludge management by Busia County Government

7.6.4 Solid Wastes Impacts at WWTP Screens

Waste water trunk and secondary sewers are often used illegally as dumping sites at open manholes. Therefore, solid wastes which include plastic bottles, wood, cloths and debris are often screened and disposed off at screening chambers at inlet works of the Waste Water Treatment Plant (WWTP).

Therefore, such solid wastes should be handles and disposed off appropriately as provided by the waste Management Regulations of (2006). This ESIA provides for the below listed measure that will be enforced by Water and Sanitation Company (BUWASCO) during Project operation in order to solid wastes collected at screening chambers.

Mitigation Measures for risks associated with Solid Wastes collected at Screen Chambers

- Busia Water and Sewerage Company (BUWASCO) shall develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers
- BUWASCO shall employ personnel who will be in charge of maintaining hygiene and cleanliness of the WWTP including removal of solid wastes from screen chambers
- Properly labelled and strategically placed waste disposal containers shall be provided at all places within the WWTP
- Solid wastes once removed from screens shall be collected and disposed appropriately as required by waste Management Regulations of (2006) and BUWASCO County Government by laws.

7.6.5 Inversion of Birds and Reptiles to the WWTP

There is a possibility of birds' attraction to the sewage treatment plants arising from proliferation of insects and aquatic flora suitable for birds' food. Certain species and population of birds at Sewage treatment plant could become a safety risk to aviation sector; however, no flight corridor was identified within the vicinity. Certain animals including crocodiles and hippos may encroach the sewage treatment plants and other areas arising from overgrown vegetation. This will not only be a nuisance to the plants' operations but also pose safety threats to the immediate residents and commercial premises.

The sewage discharging from the treatment plants (as well as other discharges from sources) are a determinant of the macro and micro flora and fauna in rivers. Excessive nutrients will lead into increased eutrophication of the river waters while chemical and organic loading will reduce

the capacity for the river waters to support life (low oxygen levels and toxic conditions).

Mitigation Measures for risks of invasion of the WWTP by birds and wildlife

- The sewage treatment plants should be protected from wildlife encroachments by providing secure barriers to keep off the animals from interfering with the plant operations and safety. This will also ensure safety of the residents,
- In the event of larger wildlife e.g. hippos and crocodiles, Lake Victoria Water works development agency (LVNWWDA) and BUWASCO will ensure appropriate consultations with the Kenya Wildlife Services (KWS) on appropriate management actions,
- The quality of the discharging sewage into the river will be an important parameter on the regional control of the river eutrophication. Continuous generation and sharing of sewage quality data on pre-scheduled monitoring programmes will be necessary.

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Purpose and Objectives of ESMMP

The specific objectives of the ESMMP are to:

- Serve as a commitment and reference for the contractor to implement the ESMMP including conditions of approval from NEMA.
- Serve as a guiding document for the environmental and social monitoring activities for the supervising consultant, contractor and the client management including requisite progress reports.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment.
- Provide instructions to relevant Project personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the Project goal of minimal or zero incidents.
- Document environmental concerns and appropriate protection measures; while ensuring that corrective actions are completed in a timely manner.

8.2 Auditing of ESMMP

Lake Victoria Water works development agency (LNWWDA) and the Contractor shall conduct regular audits to the ESMMP to ensure that the system for implementation of the ESMMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The ESMMP being used is the up to date version;
- Variations to the ESMMP and non-compliance and corrective action are documented;
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (spills, injuries, complaints) is in place and other documentation related to the ESMMP.
- Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued

8.3 Management Responsibility of ESMMP

In order to ensure the sound development and effective implementation of the ESMMP, it will be necessary to identify and define the responsibilities and authority of the various persons and Organizations that will be involved in the project. The following entities should be involved in the implementation of this ESMMP:

- LNWSB/BUWASCO
- NEMA Busia County
- Contractor
- Design Consultant;
- County Government of Busia.

8.3.1 Lake Victoria Water works development agency (LNWWDA) / Busia Water and Sewerage Company (BUWASCO)

LNWSB in conjunction with BUWASCO the project proponent, will be charged with the responsibility of ensuring that the proposed development has been put up in an environmentally sound manner. This can be achieved by inclusion of environmental specifications in the tender documents, selection of renowned environmentally conscious contractors and supervision to ensure that the objectives of this ESMMP are met.

8.3.2 National Environment Management Authority (NEMA)

The responsibility of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government of Kenya in the implementation of all policies relating to the environment.

8.3.3 The Contractor

The persons/firms contracted to put up the proposed water and sanitation projects plant will be required to comply with the requirements of the ESMMP within this report. To ensure strict compliance environmental specifications of this ESMMP should form part of the contract documents.

8.3.4 Consultant

The sourced consultant will have to ensure that the proposed ESMMP is up to date and is being used by the contractor. Periodic audits of the ESMMP will have to be done to ensure that its performance is as expected.

8.3.5 County Government of Busia.

The relevant departmental officers in the above local authorities should be called upon where necessary during Project implementation to provide the necessary permits and advisory services to the Project implementers.

Tables 8-1 and 8-2 on **page 8.3 to page 8.15** present the ESMMP for the proposed Busia Sewerage Project during construction, operation and decommissioning phases respectively.

Table 8-1: Permits and Approval Compliance Management Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
Permits and Licenses	Delay in implementation of the Project due to objections and stop orders	Low	▪ The Contractor shall ensure that all pertinent permits, certificates and licenses have been obtained prior to any activities commencing on site and are strictly enforced/ adhered to; ▪ The license in Department of **Occupational Health and Safety Registration (DOSH).** ▪ Environment Licenses for camp sites, burrow pits, cement batching plants, quarries from **NEMA** ▪ Water Resources Authority **(WRA) approvals to construct works** ▪ Approval of **Plans by Busia County Government Physical Planning Department** of any structures on site ▪ **Permits from Public Health Department (Busia County) of sanitation facilities** installed on site ▪ The Contractor shall maintain a database of all pertinent permits and licenses required for the contract as a whole and for pertinent activities for the duration of the contract	All the Project components Responsibility LVNWWDA & Contractor	Approvals / permits issued	~KShs.1million
Total						**~KShs.1million**

Table 8-2: Campsites and Access Roads Establishment Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
construction campsites	Environmental degradation risks	Medium	▪ Isolate through fencing the camp sites from access by the public for their safety ▪ Preferably to be located on land already cleared land wherever possible ▪ The Contractor's Camp layout shall take into account availability of access for deliveries and services and any future works ▪ Ensure all approvals as discussed above are complied with ▪ Prepare specific ESIA for identified sites for establishment of campsites	Campsites Responsibility Contractor	Status of campsite	~KShs. 1million
Access to campsites and construction sites	Environmental degradation risks	Medium	▪ Utilize to the extent possible the existing public roads to avoid social and economic disruption ▪ Engage local Community and sign land lease agreements with community where private land is required for access roads ▪ Ensure road safety measures for the construction vehicles to the extent possible by observing all traffic regulations	Access Roads Responsibility Contractor	• Cases of private land required • Accidents occurrence incidences	
Total						**~KShs. 1million**

Table 8-3: Training and Awareness Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
Environmental and Social Training and Awareness	Risks of Environmental and Social degradation risks and occupational health and safety related accidents	Medium	▪ The Contractor and sub-contractors shall be aware of the environmental requirements and constraints on construction activities contained in the provisions of the ESMMP ▪ The Contractor will be required to provide for the appropriate Environmental Training and Awareness as described in this ESMMP in his costs and programming ▪ An initial environmental awareness training session shall be held prior to any work commencing on site, with the target audience being all project	All Workers Responsibility Contractor	• Number of Trainings Held • Availability of Training reports • Attendance list of participants	KShs. 0.5million
HIV/AIDS awareness and prevention campaign	Risks of Increased HIV and Aids transmission in the area	Medium	▪ The Contractor shall institute HIV/AIDS awareness and prevention campaign amongst his workers for the duration of the contract, contracting an implementing organization, with preference for an organization already working on this issue in the Project area; ▪ Awareness Workshops for Contractor's Staff ▪ Access to Contractor's Workforce Camps by outsiders to be controlled ▪ Contractor to provide standard quality condoms to personnel on site ▪ The campaign shall include the training of facilitators within the workers, information posters in more frequented areas in the campsite and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), coordination with GBV prevention messages and theatre groups	All Workers Responsibility Contractor	• Number of Trainings Held • Availability of Training reports • Attendance list of participants during the training sessions	KShs. 0.5million
Total						**Ksh 1million**

Table 8-4: Labour Force Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
Local Labour / Employment	Delay in Project implementation due to opposition from aggrieved community members	Medium	▪ Wherever possible, the Contractor shall use local labour, and women must be encouraged to be involved in construction work ▪ The contractor shall ensure compliance to the gender balance as required by the 2/3 gender rule ▪ The contractor awarded the Project will develop a labour Management/influx Plan (LMP) in consultation with local leaders. ▪ The contractor will ensure effective community engagement and strong grievance mechanisms on matters related to labour ▪ Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx, the contractor should engage a local community liaison person. ▪ The contractor will ensure proper records of labour force on site while avoiding child and forced labour ▪ The contractor will develop and implement a children Protection Strategy, this strategy will ensure that no child under the legal age of 18years is employed to the Project. ▪ The contractor shall comply with the International Labour Organization Standards ratified in Kenya which include but not limited to: Prohibition of forced labour (ILO No 29) and Abolition of forced labour (ILO No 159).	All the Project components Responsibility Contractor	• Number of workforce employed from the local community • Number of female employed • Number of grievances recorded and resolved	KShs. 1million
Total						**Ksh 1million**

Table 8-5: Gender Based Violence and Sexual Harassment and Child protection Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	• Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
	Gender Based violence and Sexual Harassment	Low	• The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability and VMGs • Protecting Human Risk Areas Associated with, Disadvantaged Groups, interfering with Participation Rights and interfering with Labour Rights • The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability • Protecting Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights and interfering with Labour Rights	Project Corridor Responsibility ▪ Contractor ▪ Supervision Engineer	women and Men employed by the Project	KShs0.5 million
	Children abuse impacts	Low	• The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. • All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour • Children under the age of 18years should be hired on site as provided by Child Rights Act (Amendment Bill) 2014	Project Corridor Responsibility ▪ Contractor ▪ Supervision Engineer	Number of cases reported involving abuse of children	KShs0.5 million
Total						**Kshs 1 million**

Table 8-6: Resettlement and Land Acquisition Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
Land Acquisition and Resettlement of Populations	Acquisition of Land for WWTP and sewer easement for the Project	High	• The total number of PAPs likely to be impacted by the project are 265 PAPs who include 48 female PAPs and 217 male PAPs. • The project impact on land will be triggered at the proposed site for the Waste Water Treatment Plant (WWTP) within Alupe University where 69acres will be acquired through a willing buyer willing seller agreement between the University and Busia County Government. • Also, isolated cases of Sewer Easement will be triggered along the proposed sewer alignment in areas with no government road reserve of river riparian. The total easement required for the trunk sewer is provided as cumulative of 41.42 acres for the trunks sewers discussed in the feasibility report prepared separately under this consultancy • Estimated RAP budget as presented by this RAP is Two Hundred and Sixty-Six Million Seven Hundred and Eighty-Nine Thousands and Fifty Shillings (Kshs. 266,789,050.00)	Responsibility LVNWWDA and Busia County Government	RAP prepared and implemented	Kshs. 266,789,050.00
Kshs						

Table 8-7: Construction Impacts Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
Sewer Infrastructure Construction	Sedimentation Impacts	Medium to High	▪ Construction activities should take place during the dry conditions. Topsoil removed will need to be transported away from the site to a location not accessible to storm water. ▪ Provide a soil trap downstream the site to intercept excessive silt during the construction. This may be in form of a pan, ▪ Debris and other material will be prevented from entering storm water channels Construction Sustainable drainage system (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants); ▪ Sand/silt traps should be used so as to prevent silt and any other sediments from getting into Water channels ▪ Site compounds and stockpiles will be located away from shallow wells and water channels. ▪ The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and water pans without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances.	All work areas <u>Responsibility</u> Contractor	• Soil erosion extend and intensity on site • Sediment load in Okame river	Kshs, 1.5million
	Water Quality Impacts	Medium to high	▪ No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent storm water shall be permitted; ▪ Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site where applicable	All work areas <u>Responsibility</u> Contractor	Water quality of Okame river	Kshs, 0.5 million

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			▪ The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to storm water channels ▪ All vegetation materials (live and dead) at the project site shall be cleared and removed before the area is excavated and inundated. This will ensure controlled release of organic matter into the river water. Proliferation of aquatic macro-flora could be encouraged along the periphery of the project site to ensure natural aeration and purification of the water,			
Site Activities	Risk of Accidents at Work Sites	High	▪ Contractor to provide a Healthy and Safety Plan (HSP) prior to the commencement of works to be approved by the Supervising Engineer. ▪ Provide Personal Protective Equipment (PPE) including gloves, gum boots, overalls and helmets to workers. Use of PPE to be enforced by the Supervising Engineer. ▪ Fully stocked First Aid Kits to be provided within the Sites, Camps and in all Project Vehicles ▪ Strict use of warning signage and tapes where the trenches are open and at other active construction sites ▪ Contractor to Employ and train Road Safety Marshalls who will be responsible for management of traffic on site	civil works areas Responsibility Contractor Supervision	Number of fatalities and accidents recorded in the incidence book	KShs.1 million
	Solid Wastes impacts	Low to Medium	▪ The contractor shall develop a comprehensive Waste Management Plan (WMP) prior to commencement of works ▪ Properly labelled and strategically placed waste disposal containers shall be provided at all places of work ▪ Litter bins should have secured lids to prevent animals and birds from scavenging	civil works areas Responsibility Contractor Supervision	Quantity of solid Wastes Generated and appropriately disposed	KShs.0.5 million

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			▪ All personnel shall be instructed to dispose of all waste in a proper manner ▪ Recycling of construction material shall be practiced where feasible e.g. containers and cartons ▪ Earth spoils shall be disposed of in pre identified sites			
	Liquid Wastes Impacts	Low to Medium	▪ Water containing pollutants such as concrete or chemicals should be directed to a conservancy tank for removal from the site where applicable ▪ Potential pollutants of any kind and form shall be kept, stored and used in such a manner that any escape can be contained ▪ In case of any form of pollution the contractor should notify the Resident Engineer (RE) ▪ Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas including groundwater are not polluted ▪ No grey water runoff or uncontrolled discharges from the site or working areas to any adjacent Storm water channels.	civil works areas <u>Responsibility</u> Contractor Supervision	Quantity of liquid Wastes Generated and appropriately disposed	KShs.0.5 million
	Sanitation issues resulting from both solid and liquid wastes on site Risks associated with water born diseases exposed to community and workforce	Low to Medium	▪ The Contractor shall -laws relating to public health and sanitation ▪ All temporary/ portable toilets or pit latrines shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over ▪ A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimise the spread of possible disease	All work areas <u>Responsibility</u> ▪ Contractor ▪ Engineer	Incidence of reported cases of water related diseases among the workforce and neighbor community	KShs.500,000
	Fuels, Oils and other hydro-carbons	high	▪ The contractor shall ensure that the machines and equipment are in good condition when on site.	civil works areas	Quantity of waste fuels and oils	KShs.0.5 Million

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			▪ Ensure proper handling of lubricants, fuels and solvents while maintaining the plant and equipment. ▪ Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal.	Responsibility ▪ Contractor ▪ Engineer	appropriately disposed	
	Storage of fuel oils, lubricants, chemicals and flammable materials Hazards of fire outbreak, oil and chemical spills.	High	▪ Follow specifications of the Occupational Health and Safety Act 2007, EMCA 2015 and others in the development and operation of stores.	All work areas Responsibility ▪ Contractor ▪ Supervision Engineer	Incidence of reported cases of fuel leaks and fire incidences	
	Noise and Vibration control from plant and equipment Risk to health and safety of community and workers	Low to Medium	▪ The Contractor shall keep noise level within acceptable limits and construction activities shall, where possible, be confined to normal working hours in the residential areas ▪ hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity ▪ Any complaints received by the Contractor regarding noise will be recorded and communicated to the RE ▪ The Contractor must adhere to Noise Prevention and Control Rules of April 2005	civil works areas and access roads Responsibility ▪ Contractor ▪ Supervision Engineer	Reported complaints from neighbor community and institutions	
	Air Quality Control Air pollution causing respiratory disorders to human	Low to Medium	▪ Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications ▪ The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible	All work areas Responsibility ▪ Contractor ▪ Supervision Engineer	Cases of respiratory complication at nearby health centre	KShs. 200,000

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			▪ The contractor shall not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds ▪ Vehicles delivering soil materials shall be covered to reduce spills and windblown dust ▪ Water sprays shall be used on all earthworks areas within 200metres of human settlement.			
Contractor de-mobilization and site reinstatement	Associated risks of environmental degradation	Low	▪ The site is to be cleared of all construction materials, including litter prior to hand over ▪ Fences, barriers and demarcations associated with the construction phase must be removed from the site ▪ Fences, barriers and demarcations associated with the construction phase must be removed from the site ▪ Rehabilitation Activities of Environmental Cases identified must continue throughout the defect liability period ▪ Undertake a completion Environment, Health and Safety Audit	All work areas <u>Responsibility</u> ▪ Contractor ▪ Supervision Engineer	Closeout audit report findings	KShs.0.5 million
Total Estimated Cost for ESMMP					**EMP**	**Khs 6 million**

Table 8-8: Operational Phase: Environmental and Social Management and Monitoring Plan

No.	Issue	Action required	Responsibility	Provisional Budget
1.	**Pollution of Water Resources by raw sewage from blocked Sewer pipes and Manholes.**	• Ensure proper and periodic maintenance of sewer lines and treatment plant; • Activate a community watch group for information sharing on the status of the sewer line • Regular check, repair and maintenance of the sewer line • Awareness rising among community members not to dump solids in manholes. • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups • Development of an inventory of system components, with information including age, construction materials, and drainage areas served elevations. • Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replaced if broken to minimize entry of garbage and silt into the system • Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent build-up of solids and hydrogen sulphide generation • Regular inspection of the system to ensure performance is maintained at high levels; • Blockages should be detected and promptly replaced; • Regular monitoring and sampling of the waste water at influent and effluent points as well as in the receiving water bodies; • Communities living within the river basins where the trunk sewers will be constructed should be enlightened on dangers of using raw sewerage to irrigate farmlands.	BUWASCO Busia County Government	To be established at Operation Phase and included in the operation of the Project
2.	**Odour Menace from Wastewater Treatment Works**	• Ensure appropriate covering/ventilation of the pre-treatment unit; • Ensure appropriate handling and removal of grit/grease; • Ensure proper sizing and alignment of the lagoons; • Ensure scum is appropriately disposed off or properly stabilized; • Ensure that the pond series have adequate water flow and aeration to reduce the potential of odour formation; • The perimeter of the proposed site should be vegetated with trees (*Bamboo trees*) and plants of varying heights thereby forming windbreaker and reduce dispersion of odour; • Repair the roofs of the sludge drying beds to ensure quick drying of sludge and appropriate disposal to reduce odour emanating from	BUWASCO Busia County Government	To be established at Operation Phase and included in the operation of the Project

No.	Issue	Action required	Responsibility	Provisional Budget
		wet sludge.		
3.	**Risks Associated with Sludge from the WWTP**	• Busia Water and Sanitation Company during operation and maintenance of the WWTP will dry sludge on the drying beds before disposing off • Dried sludge could be used to make briquette used as charcoal substitute or be sold to farmers as fertilizers • Excess sludge can be disposed in a Land fill which is dedicated disposal site clearly designated landfill, the land fill shall only be for disposing dry odorless sludge. • Preparation and enforcement of operational guidelines for sludge management by Busia County Government	BUWASCO Busia County Government	To be established at Operation Phase and included in the operation of the Project
4.	**Solid Wastes Impacts at WWTP Screens**	• Busia Water and Sewerage Company (BUWASCO) shall develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers • BUWASCO shall employ personnel who will be in charge of maintaining hygiene and cleanliness of the WWTP including removal of solid wastes from screen chambers • Properly labelled and strategically placed waste disposal containers shall be provided at all places within the WWTP • Solid wastes once removed from screens shall be collected and disposed appropriately as required by waste Management Regulations of (2006) and Busia County Government by laws.	BUWASCO Busia County Government	To be established at Operation Phase and included in the operation of the Project
5.	**Inversion of Birds and Reptiles to the WWTP**	• The sewage treatment plants should be protected from wildlife encroachments by providing secure barriers to keep off the animals from interfering with the plant operations and safety. This will also ensure safety of the residents, • In the event of larger wildlife e.g. hippos and crocodiles, Lake Victoria Water works development agency (LNWWDA) and BUWASCO will ensure appropriate consultations with the Kenya Wildlife Services (KWS) on appropriate management actions, • The quality of the discharging sewage into the river will be an important parameter on the regional control of the river eutrophication. Continuous generation and sharing of sewage quality data on pre-scheduled monitoring programmes will be necessary	BUWASCO Busia County Government	To be established at Operation Phase and included in the operation of the Project

8.4 Decommissioning Flow Chart

The Project has been designed to operate effectively for over 20 years. In the event that the infrastructure will be required to be overhauled, then steps should be considered in order to undertake the procedure in a structured manner with minimum impact to both human and natural environment as illustrated in **Table 8-3** below.

Table 8-9: Decommissioning Flow Chart

Stage	Action	Actor
Step 1	**Initiation** Development of an Objective Worksheet and checklist incorporating references, legal and policies Undertake decommissioning audit	**Proponent then**
Step 2	**Prepare Road Map for Decommissioning Design** Conduct design review to validate elements of the design and ensure design features are incorporated in the decommissioning design. Public consultations	**Proponent then**
Step 3	**Prepare and Award Contract** Prepare a contract that incorporates validated Project information and award to a contractor as per the Procurement rules.	**Proponent then**
Step 4	**Execute Decommission Works** Implement design elements and criteria on the Project in accordance with specifications and drawings. Inspect during decommissioning and at Project completion to ensure that all design elements are implemented according to design specifications.	**Contractor**
Step 5	**Commissioning Environmental Management Plan**	**Contractor**
Step 6	**Non-Conformance, Corrective/Preventive Action** Determine root cause Propose corrective measures Propose future preventive measures.	**Contractor**

CHAPTER 9: CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

The Environmental and Social Impact Assessment (ESIA) undertaken for the Project indicates that the Project will have the following impacts:

(i) The Project will improve health and sanitation status of Busia town that is currently being polluted by contamination associated with raw sewer flowing in storm drains due to the choked existing sewerage system
(ii) The project will not displace population along the proposed sewerage alignment. This is because the proposed sewer easement is used as farmlands and that acquisition will be partial
(iii) The project impact on land will be triggered at the proposed site for the Waste Water Treatment Plant (WWTP) within Alupe University where 69acres will be acquired through a willing buyer willing seller agreement between the University and Busia County Government or through National Lands Commission (NLC) as required by section (7) of the land Act 2020
(iv) The total number of PAPs likely to be impacted by the project are 265 PAPs who include 48 female PAPs and 217 male PAPs. These persons own cumulative of 41.42 acres land along the proposed sewer easement route.
(v) The total budget provided for land acquisition of the new WWTP and easement acquisition is Two Hundred and Sixty-Six Million Seven Hundred and Eighty-Nine Thousands and Fifty Shillings (Kshs. 266,789,050.00).
(vi) The cost of implementing the Environment Management Plan (EMP) is provides as Ksh 6 million.
(vii) The feasibility report provided that the Project will be constructed for a period of 18months at a cost of Ksh 2,493,905,218 including a 5% discount.

9.2 Recommendations

This assessment recommends the following provisions:

(i) The Bid documents prepared for the Project incorporate the Environment, Social Health and Safety Provisions discussed under Chapter 7 (Environment and Social Impact Assessment and Mitigation Measures).
(ii) Contractor will be required to commit to implementing the Environment, Social Health and Safety (ESHS) Provisions by developing site specific (ESHS) plans.
(iii) At Project implementation stage, the Contractor to report to the Project management team comprising of the Consultant and the Project proponent on a monthly basis on how ESHS provision detailed in this ESIA are addressed at each Project Site.
(iv) On completion of the Civil Works, BUWASCO to commission an independent Consultant to undertake an initial Environment, Social, Health and Safety Audit as required by Environment Impact Assessment and Audit Regulations of 2003. The audit will identify nonconformities which the Contractor together with BUWASCO will address through the defects liability period of the Project. This audit will also form basis of annual Project self-audits by BUWASCO.

ANNEXES

Annex 1 Public Participation Minutes and List of Participants
Annex 2 Chance Find Procedures
Annex 3 Lead Expert License 2018

Annex 1

KENYA TOWNS SUSTAINABLE WATER SUPPLY AND SANITATION PROGRAMME.
DESIGN OF WORKS FOR REHABILITATION AND AUGMENTATION OF KAPSABET, BUSIA, NAMBALE & WEBUYE SEWERAGE PROJECTS

PUBLIC CONSULTATIVE MEETING FOR ESIA AND RAP HELD AT ANGOROM SHOPPING CENTRE BUSIA ON 20TH JUNE 2019

MEMBERS PRESENT

1. Area chief
2. Area Assistant chiefs
3. Area Member of County Assembly
4. Water Scheme Manager BUWASCO
5. Inspector of police
6. Consultant representative
7. Residents.

AGENDA

1. legal and policy provisions with regard to ESIA and RAP
2. Identified RAP impacts in the settlement after census and applicable entitlement
3. Community preferred mode compensation
4. Gender inclusivity in the RAP process
5. Support to vulnerable groups
6. Plenary discussion

MIN 1/6/2019: Introduction

The area Chief called the meeting to order at 11:00 Am and asked one resident to pray before the meeting begun. He thanked members present for coming, Further he explained the aim of the meeting was for the consultant to share project information with residents and also gather their concerns over the same issue. Residents were request to remain attentive and ask any questions they might be having concerning the project because the meeting was a participatory forum.

The consultant representative thanked everyone for attending the forum since public participation was a very critical part of conducting ESIA and RAP for any proposed project. He further informed residents that the sewer project was important to improve sanitation in the area considering that is expected to have an influx of people due to the establishment of Alupe University.

MIN 2/6/2019: LEGAL AND POLICY PROVISIONS WITH REGARDS TO ESIA

Residents were guided on legal provisions for ESIA stating that EMCA 1999 amended in 2015to align to the Kenyan constitution 2010 and EIA/EA 2013 require that during preparation of ESIA for such projects all relevant stakeholders are identified and consulted in regards to the proposed project. Inputs from stakeholders help in development of mitigation measures and finalization of engineering designs.

MIN 3/6/2019: LEGAL AND POLICY PROVISIONS WITH REGARDS TO RAP

The consultant guided residents present on legal and policy provision with regards to RAP. They were informed that Kenya – Land Act 2012 and World Bank OP 4.12 on Involuntary Resettlement were the main statutes which protect PAPs against impacts caused to them by development projects

MIN 4/6/2019: IDENTIFICATION OF PAPS AND APPLICABLE ENTITLEMENT

Residents were informed that a census will be conducted along the proposed pipeline route to identify Project Affected Persons, they will be recorded and their assets valued. All affected PAPs will be legible for below listed entitlement.

(i) Loss of land will be compensated as per the current market value for Land in the area.
(ii) Loss of Structures will be replaced at full replacement cost, the owners will also be given three months' notice to remove the affected asset and the right to salvage materials.
(iii) Loss of Business: Affected businesses will be given two months cash grants equivalent to average income as a means of facilitation.
(iv) Vulnerability: PAPs will be facilitated over and above compensation for impacts on their structures, livelihoods and loss of shelter. They will also receive preferential/ specialized assistance throughout the RAP process and priority in disbursement of compensation funds

MIN 5/6/2019: COMMUNITY PREFERRED MODE COMPENSATION

The meeting discussed with the residents available options for compensation, they were informed that the options are:

(i) Cash compensation for lost Land, crops, structures and livelihoods – this option is where the PAPs are given the compensation money and given freedom to reconstruct their structures away from the pipeline route.
(ii) In kind compensation for lost land and structures – this option is where land will be bought and structures constructed for PAPs. The land and structures should be of similar value with the ones affected.

MIN 6/6/2019: GENDER INCLUSIVITY IN THE RAP PROCESS

The meeting discussed provisions of gender inclusivity as provided by World Bank Operation Policy (OP 4.20) Gender and Development and OP 4.12 on Involuntary Resettlement and provisions of the National Gender and Equality Commission Act 2011.

MIN 7/6/2019: SUPPORT TO VULNERABLE GROUPS

The PAPS were informed that vulnerable PAPs are a distinct groups of people who might suffer disproportionately or face the risk of being marginalized as a result of resettlement and specifically include: (i) female-and child-headed households, (ii) disabled household heads, (iv) Households headed by elderly persons with no means of support.

Vulnerable PAPs will be entitled to additional financial support for the first 2 months, specialized assistance during relocation and priority in disbursement of compensation funds. The elderly will also be enlisted to government social programme such as the "Inua Jamii cash transfer programme for aged persons.

MIN 8/6/2019: PLENARY DISCUSSION

The below listed issued in table 2 below were discussed with the residents at the plenary session.

Table 2: Plenary Discussion during the Meeting

Issues	Discussion	Way forward
Payment for sewer	• Residents wanted to know what the procedure will be for connection to the sewer line • They wanted to know factors that will be considered to arrive at the connection fee • They also wanted to know the modalities that will be used to charge monthly or periodic fee for use of the sewer facility.	• Residents were informed that they will be required to make an application to BUWASCO who will access the distance of applicant's homestead from the nearest sewer line and give an appropriate quotation. • The sewer levy will charged as a percentage of the cost of water consumed by the household per month.
Who will be eligible go get a sewer connection	• Residents wanted to know if the sewer connection will be available for them too or only for town dwellers.	• The meeting was informed that sewer was a public facility and anyone was eligible to get a connection • It was also established that the sewer is a gravity system so connections will only be possible were the levels allow.
Compensation of PAPs	• Residents wanted valuation and compensation to be done on all their affected properties separately. • They suggested certified valuer be contracted to do the valuation of their properties. • Some residents suggested the RAP team to work with respective village elders during enumeration of PAPs. This will help reduce occurrences of ghost PAPs.	• It was agreed that valuation of assets will be done in three categories namely; Land, Structures and crops separately • A certified valuer will be engaged and village elders will be part of the enumeration team
Employment opportunities	• Residents wanted to know if they will get any employment opportunities associated with the project • They also wanted to know if the opportunities will only be of unskilled labour.	• Residents were informed that the project will create employment opportunities both at implementation and operation phase. Residents will be given first priority • Both employment opportunities will be available unskilled and skilled like plumbers and truck drivers.

MIN 9/6/2019: AOB

The area Member of County Assembly urged members of public to be vigilant and volunteer information about suspected criminals. These criminals he said mostly steal cattle at night have been causing havoc in the area and should be stopped before it is too late. On the other hand he urged police to us the right methods of arresting suspects especially *Bodaboda* riders.

There being no business the forum adjourned at 1:00 Pm with a word of prayer from a resident.

PHOTO PLATE

	
Area chief addressing residents	BUWASCO representative addressing the meeting
	
Area MCA responding to resident's concerns	A resident asking questions

RIFT VALLEY WATER SERVICES BOARD

In Financial Cooperation with AFRICAN DEVELOPMENT BANK

LAKE VICTORIA NORTH WATER SERVICES BOARD

KENYA TOWNS SUSTAINABLE WATER SUPPLY AND SANITATION PROGRAMME

DESIGN OF WORKS FOR REHABILITATION AND AUGMENTATION OF KAPSABET, BUSIA, NAMBALE & WEBUYE SEWERAGE PROJECTS

PUBLIC PARTICIPATION CONSULTATION LIST

TOWN: BUSIA LOCATION: ANGOROM VENUE: Angorom mkt DATE: 20/06/19

NAME	DESIGNATION / Village	CONTACT	SIGN
PHYLIS NANDERA EGESA	AMONI	0719245909	[illegible]
RASMO WAFULA	LIGURU/AMERIKWAI	0729332897	[illegible]
ATTANS MOUREEN	AGET VILLAGE	0712636842	[illegible]
PATRICK IKAGALA	R/BLOCK VILLAGE	0719128988	
AUGUSTINE SAMUNYU	V/ELDER AMONI	0729806168	[illegible]
AGGREY ABELLU OMERI	ASOPOTOT	0725773839	[illegible]
PETER OKOOO G	MALIMANI	0703314554	[illegible]
PATRICK WABWIRE	ANGOROM A	0705999597	[illegible]
RASMOS E. OMUVISI	ANGOROM B	0728056466	[illegible]
Wycliffe O. Makanda	OJAMII	0770196138	[illegible]
JAMES M. MBUTHIA	ALUPE	0102757	[illegible]
OMANYO SILAS	ANGOROM	0707342567	[illegible]
OMUSE ALLOYS	ALUPE	0726625130	[illegible]
BERNARD EMOKOL	ANGORO	0725374515	[illegible]
MARGRET NGEGSA	ANGOROM	0703762267	Margy
MICHAEL ONGARIA	ANGOROM	0717484403	[illegible]
CHARLES OKANDA	"		[illegible]
Onyango Michael	Angorom	0701101900	[illegible]

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KENYA TOWNS SUSTAINABLE WATER SUPPLY AND SANITATION PROGRAMME
DESIGN OF WORKS FOR REHABILITATION AND AUGMENTATION OF KAPSABET, BUSIA, NAMBALE & WEBUYE SEWERAGE PROJECTS
PUBLIC PARTICIPATION CONSULTATION LIST

TOWN: Busia LOCATION: Angorom VENUE: Angorom Market DATE: 20/06/2019

NAME	DESIGNATION/VILLAGE	CONTACT	SIGN
Philip Owaga	Angorom	-	[illegible]
Philip Ongura	Angorom	0715738228	[illegible]
Erneo Emojel	Angorom	–	[illegible]
Margaret P. Makand	Shraka	072447699	[illegible]
GABRIEL EMONGAISE	ASOPOTOIT	0786107247	[illegible]
JAMES OSIGWARI	AMAGORO B	0712304294	[illegible]
ROBERT OILE	Alupe B	0715626612	[illegible]
Daniel Otimo Were	Alupe B	0710 929 052	[illegible]
John Ikapel Mogolo	Asopotoit	0726945465	[illegible]
Ann Egesa	Angorom	0764620568	[illegible]
SIMON OMUKAGA	ANGOROM	0721587451	[illegible]
Edward Emuto	Angorom	0711390851	[illegible]
JAMES ODERO	ALUPE	0717299980	[illegible]
PAUL OMUGE OPORIA	ANGOROM	0707467694	[illegible]
GASPER ADUNGOSI	ANGOROM	0702280426	[illegible]
ROBERT NYOGESA ABUYA	ANGOROM	0787500562	[illegible]
RONALD NYOGESA	ANGOROM	0704898537	[illegible]
OSAMIAT BERNARD	ANGOROM	0705622510	[illegible]

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TOWN: Busia LOCATION: Angorom VENUE: Angorom market DATE: 20/06/2019

NAME	DESIGNATION	CONTACT	SIGN
PATRICK ONGARIA	ANGOROM	0702099542	[signature]
GODFREY OLUKENDO	"	0723444879	[signature]
Ferdnand. A. ILUKOL.	Angorom	[illegible]	[signature]
ONGARIA O. ROBERT	ANGOROM	0712659982	[signature]
JAMES O. JUMA	ANGOROM	0729391796	[signature]
PETER AGOLA	ANGOROM	[illegible]	[signature]
Wesonga W. Peter	ANGOROM	0721709478	[signature]
Daniel Osabai	ANGOROM	0718692319	[signature]
Catherine Kalalu	ANGOROM	0727293305	Kalalu
Anjeline wandera	Angorom	0710403236	[signature]
PHENUS ANTANGO	ANGOROM	0724787571	[signature]
Magaret Lageri	Angorom	07	[signature]
AGNES ODUNGA	ANGOROM	0725878684	[signature]
JANEROSE ACHOM	ANGOROM	0710795425	[signature]
GODFREY [illegible]	ALUPE	0713941986	[signature]
Bonface omukulot	ALUPE	0790213185	[signature]
DAVID ABILA EGESA	ANGOROM	0725213572	[signature]
PETER ASOBO	ANGOROM	0703110567	[signature]

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TOWN Busia LOCATION Angorom VENUE Angorom market DATE 20/06/2019

NAME	DESIGNATION/Village	CONTACT	SIGN
Okodoi Jafanas	A Sopodoit	0718-971148	[signature]
Vitalis Obara	Angrom B	0726017988	[signature]
MAURICE EMODO	ALUPE B	0719799885	[signature]
DUNCAN BARASA	ANGOROM	0708367682	[signature]
Isaac Abwaja Okwach	Angoromo	0790928166	[signature]
VINCENT WAMBUA	Angoromo	0799630234	[signature]
Pascal Eawagat	Angoromo	0729886341	[signature]
David Emojan	Makoro	0711861581	[signature]
Margret Omeri	Angorom	0713296540	[signature]
Juhas Omsee	Angorom	0733326866	[signature]
Clement Omweng	Mogoro	0724482088	[signature]
Charles Odinyo	Angorom	0712202959	[signature]
BONFACE OTEBA	ALUPE	0708953053	[signature]
CHRISTOPHER Omusidi	ANGOROM	9956229	[signature]
Kevin Aketch	Angorom	0729464422	[signature]
JAPHETH BARASA	AGET	0710851848	[signature]
ERICK OTIENO	ANGOROM	0705606424	[signature]
DANIEL WAFULA	ANGOROM	0723022429	[signature]

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TOWN Busia LOCATION Angorom VENUE Angorom Market DATE 20/06/2019

NAME	DESIGNATION Village	CONTACT	SIGN
Isaac Ochieng	ANGOROM	0740863486	
CHARLES OMINI	AGIET	0729379615	
Augustine Okomol	Alup	0710280359	
WAFULA OTIBINE	ANGOROM	0719096898	
GODFREY ADONG'OSI	ANGOROM	0768087443	
Charles Muruga	ANGOROM	0748044896	
JESSY OMOLLO	ANGOROM	0701386604	
DANIEL ODANGA	ANGOROM	0701553850	
Jerald Otoba	Angorom	0714415320	Jaro
Patrick Oiminga	Angorom	0729713136	
Robert OMOKOL	ALUPE A	07	
Isaac Cheleba	ALUPE A	0706456467	
PATRIK EMOKE	ALUPE A	0715063035	
ENG. SAMSON MANGO	ALUPE	0727945465	
James ISIEPAI	Alupe	0792960057	
Mathew Okwane	Alupe	0728563083	
Francis Omango	Alupe	0727170460	
ELISHA EJAKAIT	ALUPE	0792449711	

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PUBLIC PARTICIPATION CONSULTATION LIST

TOWN: Busia LOCATION: Angorom VENUE: Angorom market DATE: 20/6/2019

NAME	DESIGNATION / VILLAGE	CONTACT	SIGN
OTEMA JORAM EMASET	ALUPE	0743939277	[signature]
OWIRE LINUS . E.	ALUPE	0721 711144	[signature]
JOSEPH OTWANI	ALUPE	"	[signature]
PATRICK OPILIT	ANGOROM	0721878261	[signature]
STEPHEN PAMBA	V. ADMIN. ALUPE	0721937148	[signature]
STEPHEN EKISA	WARD MANAGER	0724946398	[signature]
ANNET OKITWI	V. ADMIN - OJAMII	0719303262	[signature]
ANTONY. O. EJAKAIT	CHIEF ANGOROM	0723305751	[signature]
FLORENCE A. OWIRO	ANGORIKWAS ASS. ASS/CHIEF	0707615078	[signature]
TERESA W. KAMAU	WAO ANGOROM	0726259271	[signature]
DOUGLAS MEGIRI	POLICE OFFICER	0710228679	[signature]
JUVENALIS O. EMAASE	ASS. CHIEF - ALUPE	0710123119	[signature]
HON ONG'OLE JAMES	M.C.A.	0721757070	[signature]

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PUBLIC PARTICIPATION CONSULTATION LIST

TOWN Busia LOCATION Angorom VENUE Angorom market DATE 20/06/2019

NAME	DESIGNATION Village	CONTACT	SIGN
Margaret Akondo	Alupe B	0700243064	
Wekesa Tendea	Alupe*		
David Atwani	Alupe *	0729236028	
pascal Sifuta	Alupe	0742462098	
Juma Obabai	Alupe		
Gidion odongo	Alupe	0746679727	
Francis ongaria	Alupe	0717830145	
MARY Adhiambo	Alupe	0725455112	
CATHRINE Amunyelet	Alupe	0704640235	
CHRISPINUS Emoikol	Angorom A	0724704256	
FREDRICK OTIENO	Angorom	0715970641	
RAPHAEL O-AMUTOLA	CHAIRMAN	0722940019	
ANTHONY ILUKOLI	ALUPE	0714287238	

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DESIGN OF WORKS FOR REHABILITATION AND AUGMENTATION OF KAPSABET, BUSIA, NAMBALE & WEBUYE SEWERAGE PROJECTS

PUBLIC CONSULTATIVE MEETING FOR ESIA AND RAP HELD AT BUSIA SOCIAL HALL ON 26TH JUNE 2019

MEMBERS PRESENT

1. Area Ward administrator
2. Area Member of County Assembly
3. Water Scheme Manager BUWASCO
4. Business Community
5. Consultant representative
6. Residents.

AGENDA

7. legal and policy provisions with regard to ESIA and RAP
8. Identified RAP impacts in the settlement after census and applicable entitlement
9. Community preferred mode compensation
10. Gender inclusivity in the RAP process
11. Support to vulnerable groups
12. Plenary discussion

MIN 1/6/2019: Introduction

The area ward administrator called the meeting to order at 11:00 Am and asked one resident to pray before the meeting begun. He thanked members present for coming, Further he explained the aim of the meeting was for the consultant to share project information with residents and also gather their concerns over the same issue. Residents were request to remain attentive and ask any questions they might be having concerning the project because the meeting was a participatory forum.

The consultant representative thanked everyone for attending the forum since public participation was a very critical part of conducting ESIA and RAP for any proposed project. He further informed residents that the sewer project was important to improve sanitation in the area considering that the existing sewer infrastructure was built long time ago and is overstretched. Busia is also a border town with a lot of hotels which necessitates improvement of sewer.

MIN 2/6/2019: LEGAL AND POLICY PROVISIONS WITH REGARDS TO ESIA

Residents were guided on legal provisions for ESIA stating that EMCA 1999 amended in 2015to align to the Kenyan constitution 2010 and EIA/EA 2013 require that during preparation of ESIA for such projects all relevant stakeholders are identified and consulted in regards to the proposed project. Inputs from stakeholders help in development of mitigation measures and finalization of engineering designs.

MIN 3/6/2019: LEGAL AND POLICY PROVISIONS WITH REGARDS TO RAP

The consultant guided residents present on legal and policy provision with regards to RAP. They were informed that Kenya – Land Act 2012 and World Bank OP 4.12 on Involuntary Resettlement were the main statutes which protect PAPs against impacts caused to them by development projects

MIN 4/6/2019: IDENTIFICATION OF PAPS AND APPLICABLE ENTITLEMENT

Residents were informed that a census will be conducted along the proposed pipeline route to identify Project Affected Persons, they will be recorded and their assets valued. All affected PAPs will be legible for below listed entitlement.

(v) Loss of land will be compensated as per the current market value for Land in the area.
(vi) Loss of Structures will be replaced at full replacement cost, the owners will also be given three months' notice to remove the affected asset and the right to salvage materials.
(vii) Loss of Business: Affected businesses will be given two months cash grants equivalent to average income as a means of facilitation.
(viii) Vulnerability: PAPs will be facilitated over and above compensation for impacts on their structures, livelihoods and loss of shelter. They will also receive preferential/ specialized assistance throughout the RAP process and priority in disbursement of compensation funds

MIN 5/6/2019: COMMUNITY PREFERRED MODE COMPENSATION

The meeting discussed with the residents available options for compensation, they were informed that the options are:

(iii) Cash compensation for lost Land, crops, structures and livelihoods – this option is where the PAPs are given the compensation money and given freedom to reconstruct their structures away from the pipeline route.
(iv) In kind compensation for lost land and structures – this option is where land will be bought and structures constructed for PAPs. The land and structures should be of similar value with the ones affected.

MIN 6/6/2019: GENDER INCLUSIVITY IN THE RAP PROCESS

The meeting discussed provisions of gender inclusivity as provided by World Bank Operation Policy (OP 4.20) Gender and Development and OP 4.12 on Involuntary Resettlement and provisions of the National Gender and Equality Commission Act 2011.

MIN 7/6/2019: SUPPORT TO VULNERABLE GROUPS

The PAPS were informed that vulnerable PAPs are a distinct groups of people who might suffer disproportionately or face the risk of being marginalized as a result of resettlement and specifically include: (i) female-and child-headed households, (ii) disabled household heads, (iv) Households headed by elderly persons with no means of support.

Vulnerable PAPs will be entitled to additional financial support for the first 2 months, specialized assistance during relocation and priority in disbursement of compensation funds. The elderly will also be enlisted to government social programme such as the "Inua Jamii cash transfer programme for aged persons.

MIN 8/6/2019: PLENARY DISCUSSION

The below listed issued in table 2 below were discussed with the residents at the plenary session.

Table 2: Plenary Discussion during the Meeting

Issues	Discussion	Way forward
Commencement date for the project	• Residents wanted to know when project will be implemented. • They also wanted to know who was financing the project whether it was National government county or donor funded	• Residents were informed that this process was only design for Rehabilitation and augmentation of the sewer project. Implementation will commence after finalization of all the design and when funds are available. • They were further informed that the design is funded by African Development Bank and Government of Kenya through CRVWWDA
Inconsistencies in water supply	• Residents wanted to know what was being done by BUWASCO to solve the issue of irregular water supply • They were concerned that improved sanitation might not be achieved if water supply is not up to date.	• The meeting was informed that there is power supply interruption at the pumping station that supply's Busia town but BUWASCO is working to resolve the issue. • Further residents were informed that there are plans to install solar pumps that will be used to pump water during the day and electricity used at night. This will increase pumping hours and at the same time reduce costs.
Illegal connections	• Residents wanted to know what will be done to reduce issues of illegal connections that weaken the sewer system due to poor workmanship. • Residents accused some members of staff of BUWASCO to be involved in the irregularity	• Residents were encouraged to report such incidences to the office because the management of BUWASCO does not tolerate such behaviour • The area MCA also requested the case to be reported to his office for further action.
Compensation of PAPs	• Residents wanted valuation and compensation to be done on all their affected properties separately. • They suggested certified valuer be contracted to do the valuation of their properties. • Some residents suggested the RAP team to work with respective village elders during enumeration of PAPs. This will help reduce occurrences of ghost PAPs.	• It was agreed that valuation of assets will be done in three categories namely; Land, Structures and crops separately • A certified valuer will be engaged and village elders will be part of the enumeration team
Employment opportunities	• Residents wanted to know if they will get any employment opportunities associated with the project • They also wanted to know if the opportunities will only be of unskilled labour.	• Residents were informed that the project will create employment opportunities both at implementation and operation phase. Residents will be given first priority • Both employment opportunities will be available unskilled and

Issues	Discussion	Way forward
		skilled like plumbers and truck drivers.

MIN 9/6/2019: AOB

The area Member of County Assembly thanked CRVWWDA for considering Busia town for the sewer upgrade project he urged residents to support the project until it is complete.

The ward administrator also asked residents to cooperate with the consultant and air any issues that might arise in an orderly manner for amicable solutions.

There being no business the forum adjourned at 1:00 Pm with a word of prayer from a resident.

PHOTO PLATE

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Area Ward administrator addressing residents</td><td>BUWASCO representative addressing the meeting</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Area MCA responding to resident’s concerns</td><td>A resident asking questions</td></tr>
</table>

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PUBLIC PARTICIPATION ATTENDANCE LIST

TOWN: Busia LOCATION: Busia Town VENUE: Busia Township Social Hall DATE: 26/06/2019

NAME	DESIGNATION/VILLAGE	CONTACT	SIGN
Fredrick Aububstine Okello	Residence	0723652251	[signature]
Alex Ottomu Zachariah	Residence	0720282076	[signature]
Haron Kutwa	Residence	0701479136	[signature]
Gabriel Odaga Okoth	Maduwa	0726052734	[signature]
Jonathan Odhiambo	Maduwa	0714002874	[signature]
Peter Ojanji	Maduwa	0725437107	[signature]
Francis Wesonga	Maduwa	0721209392	[signature]
Okoiti Ndubi Leonard	St. Mathias Sec.	0725331841	[signature]
Meshack Nderema	Village Admin Burumba	0721795394	[signature]
Patrick O. Odanga	Village Area Mawero B1	0717249016	[signature]
Raer Mutira	Participant	0700 188111	[signature]
David Asava	Burumba 'D'	6291657	[signature]
B. E. Owuor	BCRH	0722446523	[signature]
Edwin Odunga	Ward Manager	0721296748	[signature]
John Naliali	Residence	0721386247	[signature]
Cornel Siongo	Maduwa	0798049447	[signature]
Barnabas Wesonga	Ward Admin	0725-785591	[signature]
Boniface Ntongeta	Participant	0721246856	[signature]

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PUBLIC PARTICIPATION ATTENDANCE LIST

TOWN: Busia LOCATION: Busia Town VENUE: Busia Social Hall DATE: 26/06/2019

NAME	DESIGNATION/VILLAGE	CONTACT	SIGN
Akrias Philemon	Com. Developer - Kiri	0727943566	[signature]
Dickson Omondi	CS/Manager	0706201620	[signature]
Hon. Moses Ochieng	M.C.A	0722994087	[signature]
Maxwell Oluoch Ongey	V. Administrator Mjini	0729984638	[signature]
Samatan Ali Abdi	V. Admin Lukonyi	0708964000	[signature]
Lilian Imeje	A. Amane Hosp	0702140578	[signature]
Stella Wanjala	Eleganza Burma	0719384913	[signature]
Sebastian O. Wandera	Tesia Supervisor	0704054140	[signature]
Vincent Namulundu	New Millennium Hotel	0729508235	[signature]
Tobias Asuma	Blue	0707038784	[signature]
Silvester Oduor	Sister St Joseph	0726788877	[signature]
Martha Njoroge	Bliss Healthcare	0780622634	[signature]
Joel Maina	Hillcrest G.H	0721685568	[signature]
Samson Abisai Nobisa	Dimz Hotel	0790629952	[signature]
Joyce Adala	Clerical	0727021639	[signature]
Adeya Benard	Farmer/Member	0711516913	[signature]
Jatrus Omondi	Driver	0797408864	[signature]
Samuel Njoroge	Manager	0707029936	[signature]

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Annex 2:

Chance Find Procedures

CHANCE FIND PROCEDURES

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT

BUSIA SEWERAGE PROJECT

Policy and Legal Provision

National Museums and Heritage Act 2006 laws of Kenya provides for; *'if you believe that you may have encountered any archaeological materials or any material national importance stop work in the area and follow the procedure box below'*

Chance Find Procedures

(i) All construction activity in the vicinity of the remains is to cease immediately.
(ii) The Supervising engineer or Environment Officer shall contact Kenya National Museums Immediately

Public relations:
E-mail: publicrelations@museums.or.ke
Director General:-
Email: dg@museums.or.ke
Fax: +254 -20-3741424
Tel:+254-20-8164134/35/36

(iii) The find location will be recorded and all remains will be left in place.
(iv) Potential significance of the remains will be assessed and mitigative options will be identified.
(v) If the significance of the remains is judged to be sufficient to warrant further action and they cannot be avoided, then the Director of Kenya National Museums will determine the appropriate course of action
(vi) In the case of human remains, if the remains are assessed to be archaeological, then Director of Kenya National Museums will determine how to handle them.
(vii) Options could include avoidance or respectful removal and reburial.
(viii) If human remains are encountered and they are not archaeological, then Busia County Government will be contacted immediately for appropriate reburial.

Annex 3:

Lead Expert License 2020

FORM 7 (r.15(2))

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/12319

Application Reference No: NEMA/EIA/EL/16460

M/S **GODWIN LIDAHULI SAKWA**
(individual or firm) of address

P.O. Box 18075-00500, NAIROBI

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **2492**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **3/10/2020** Expiry Date: **12/31/2020**

Signature…..

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2008 Certified