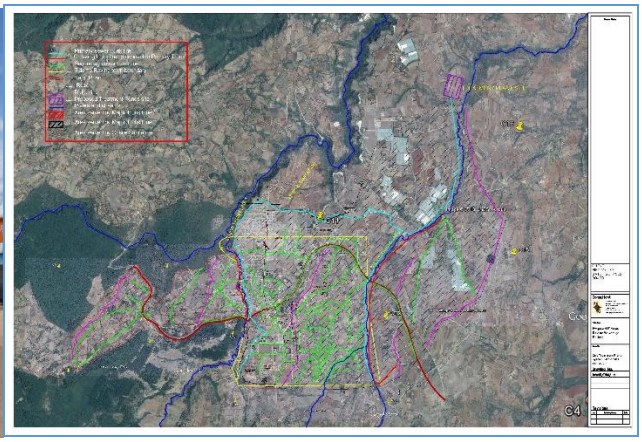
THE REPUBLIC OF KENYA

KENYA TOWNS SUSTAINABLE WATER SUPPLY AND SANITATION PROGRAMME (KTSWSSP)

CENTRAL RIFT VALLEY WATER WORKS DEVELOPMENT AGENCY (CRVWWDA)

FEASIBILITY STUDY, DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR ELDAMA RAVINE SEWERAGE PROJECT

CONTRACT No. RVWSB/KTSWSSP/C/ELDAMA RAVINE /2017 - 2018



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR ELDAMA RAVINE TOWN SEWERAGE PROJECT

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Central Rift Valley Water Works Development Agency (CRVWWDA)

CONSULTANT

Professional Consultants Ltd.

DOCUMENT TITLE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR ELDAMA RAVINE TOWN SEWERAGE PROJECT

VERSION 01

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01	16th November 2020	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR ELDAMA RAVINE TOWN SEWERAGE PROJECT	G. L SAKWA NEMA Lead Expert No 2492

CERTIFICATION

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E. EXECUTIVE SUMMARY

E.1 Background Information

Central Rift Valley Water Works Development Agency, CRVWWDA has contracted M/s KECC/PC to carry out the Consultancy Services for Feasibility Study, Detailed Design and Preparation of Tender Documents for Eldama Ravine Sewerage Town 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.

M/s KECC/PC are expected to develop the most cost-effective system to address sewage collection, treatment and disposal with design output that is capable of performing the intended functions throughout the design life, is environmentally acceptable, both during construction and in the long term and is economical in terms of both capital and recurrent costs

E.2 Project Scope

Sewer lines Scope
The Draft Final Design Report for the Project provides details of trunk and reticulation sewer sizes and associated lengths. Its Proposed to Construct 54km of both Trunk and Secondary sewer line sizes ranging from 250mm- 400mm

Sewer Treatment Scope
Its also proposed to construction a 5111m3/day new sewerage Treatment Plant, grade 9 staff houses, Waste water laboratory and fencing around the WWPT. The required size of land is 55 acres

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) 1999 Cap 387 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, 1999 cap 387 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 1999 Cap 387
	Land Act 2012
	Water Act 2016
	Physical and Land Use Development Planning Act 2019
	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

Statute Category	Specific Statute
	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 Eldama Ravine 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 Eldama Ravine Town Project area on the 21st, 22nd and 23rd October 2020. **Table E-4** on below presents a schedule of Public Participation meetings.

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

Meeting Date	Meeting Venue	Participants Representation	Gender Ratio
21st October 2020	Eldama Ravine Town Garden Square	• Lembus Central Location Chief • Ward Administrator Ravine Ward • (MD Chemususu Water and Sewerage Company) • Eldama Ravine Sub County Environment Committee Member • Eldama Ravine Sub County Public Health Officer • Residents of Eldama Ravine Town Location	Total 73 Male 44 female 29
22nd October 2020	Moringwo Primary School	• Deputy County Commissioner (DCC) Koibatek Sub County • Eldama Ravine Town Administrator • (MD Chemususu Water and Sewerage Company) • Eldama Ravine Sub County Environment Committee Member • Eldama Ravine Sub County Public Health Officer • Residents of Lembus Location	Total 27 Male 18 female 9
23rd October 2020	AT A.I.C (African Inland Church) chepsito	• Acting Chief Perkerra Location • Eldama Ravine Town Administrator • Ward Administrator Ravine Ward • Ward Administrator Ravine Ward • (MD Chemususu Water and Sewerage Company) • Eldama Ravine Sub County Environment Committee Member • Eldama Ravine Sub County Public Health	Total 62 Male 33 female 29

		Officer Residents of Lembus Location	

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

Suggestion / Question	Response
Land Acquisition Impacts The community wanted to know if land for the treatment works was available or it was to be acquired from private owners.	Members were also informed that a preliminary design has been done for a gravity sewer system and a privately owned parcel of land identified for the treatment works. Land owners will be engaged for possible acquisition.
Community perception on land acquisition The community wanted to know what will happen in the event an affected land owner refuses to allow acquisition of wayleave	Residents were informed that this project is dependent on goodwill of residents, acquisition of wayleave will be based on negotiations as opposed to compulsory acquisition. Any aggrieved party will be given an opportunity to air their grievance through grievance redress committees that will be formed for the project.
Resettlement impact along sewer wayleaves The community wanted to know the wayleave width that will be acquired for laying of pipelines. He also wanted to know if there is any activity allowed to be conducted on the wayleave	• Residents were informed that the wayleave for the secondary lines will be about three meters wide while for the trunk mains will be about six meters wide. • The design has aligned the trunks and secondary sewers within road reserves and river riparian in an effort to minimize impact on private land and property. • Residents were informed that it is best practice to leave wayleaves clear so that in the event maintenance is required, they will not experience loss of property. However they were informed that they were free to plant seasonal crops like animal fodder but not to put up structure and plant trees on the wayleave.
Water and Sewer Tarrifs The community members wanted to know if the sewer will be free or if it has any charges, they also wanted to know what is being done to improve the water situation which is not adequate at the moment	• The meeting was informed that the objective of the government is to bring services closest possible to citizens and that's what CRWWDA aims to achieve. After now the main infrastructure is put in place residents will be required to apply for the service from Chemususu Water and Sewerage Company who will give a quotation for the connection. • A monthly charge is usually added on water bill for sewer as guided by Water Services Regulatory Authority (WSRA) • On water situation residents were informed that there is an ongoing water project being done by Chemususu water and Sewerage Company. Once the works are done, the county will initiate last mile connectivity they will ensure residents are connected to the distribution network
Project Employment Opportunities Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	• Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for the job opportunities for consideration. • Those that will get these job opportunities were encouraged to work responsively to avoid termination before the project is complete.

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 Eldama Ravine as summarized below:

- Reduce pollution of Kamelilo 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 Eldama Ravine town currently being polluted by contamination associated with raw sewer flowing in storm drains
- Trigger development of modern infrastructure within Eldama Ravine 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 Eldama Ravine 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 Kamelilo 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 Kamelilo 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 1999 Cap 387 (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 Eldama Ravine 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 Kamelilo 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 Project design has ensured that the Project Trunk and Secondary Sewers will follow Road Reserves, River Riparian and existing Storm Water Channels. • However, cases of Sewer easement acquisition were recorded during RAP preparation in sections where reserves are not adequate. • The 31.53acres land for establishment of Waste Water Treatment Plant will be acquired by Baringo County Government (BCG) through willing buyer willing seller arrangement with 1 PAP (Mr Sitonik Famlity) who owns the Land the Land. • Estimated RAP budget as presented by this RAP is One Million and Forty Three, Six Hundred and Forty Thousands, Three Hundred and Ninety Seven (Kshs. 143,640,397.44) Tables 10.5 below to Table 10.8 presents' details of RAP budget for each component of the Project.
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 groups, interfering with Participation Rights and Labour Rights • The contract will provide provisions that ensures that gender

Impact	Summary of Mitigations
	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 (Kamelilo 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; (Chemususu Water and Sanitation Company) • 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 (Chemususu Water and Sanitation Company) to ensure appropriate covering/ventilation of the pre-treatment unit; • (Chemususu Water and Sanitation Company) to appropriate handling and removal of grit/grease; • Design consultant to ensure proper sizing and alignment of the lagoons; • (Chemususu Water and Sanitation Company)to scum is appropriately disposed off or properly stabilized; • (Chemususu Water and Sanitation 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 wet sludge.

Issue	Summary of Mitigation
Risks Associated with Sludge from the Waste Water Treatment Plant (WWTP)	• (Chemususu Water and Sanitation 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 Baringo County Government
Solid Wastes Impacts at WWTP Screens	• (Chemususu Water and Sanitation Company)shall develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers • (Chemususu Water and Sanitation 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 Baringo 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 Eldama Ravine 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 design has ensured that the Project Trunk and Secondary Sewers will follow Road Reserves, River Riparian and existing Storm Water Channels.
(iv) However, cases of Sewer easement acquisition were recorded during RAP preparation in sections where reserves are not adequate.
(v) The 31.53acres land for establishment of Waste Water Treatment Plant will be acquired by Baringo County Government (BCG) through willing buyer willing seller arrangement with 1 PAP (Mr Sitonik Famlity) who owns the Land the Land.
(vi) Estimated RAP budget as presented by this RAP is One Million and Forty Three, Six Hundred and Forty Thousands, Three Hundred and Ninety Seven (Kshs. 143,640,397.44) Tables 10.5 below to Table 10.8 presents' details of RAP budget for each component of the Project.

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, Chemususu 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 Chemususu 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 Chemususu Water and Sewerage Company.

LIST OF ACRONYMS

AfDB	African Development Bank
BOD	Biological Oxygen Demand
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
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 for the Country's population by year 2030 This is in line with the United Nations Sustainable Development Goals (SDG) No. 6 objective of "ensuring availability and sustainable management of water and sanitation for all".

The Government of Kenya has further initiated the "Big Four Agenda" with a goal of ensuring improved services to the public in line with the New Constitution of 2010. 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

It is in this respect that the Government of Kenya (GoK) has received financing from the African Development Fund (ADF) to support the Kenya Sustainable Towns Water Supply and Sanitation Programme (KSTWSSP). The main objective of the Programme is to improve the access, availability and sustainability of water supply and wastewater management services in multiple towns with the aim of:

- Catalyzing commercial services
- Driving economic growth
- Improving quality of life of people
- Reducing poverty levels
- Building resilience against climatic variability and change

To achieve this objective, Eldama Ravine has been prioritized as one of the Towns to benefit from the Program with the proposed design of Eldama Ravine Town Sewerage System.

The Project Executing Agency (PEA) is Central Rift Valley Water Works Development Agency (CRVWWDA) which is a state corporations under the Ministry of Water & Sanitation and Irrigation, responsible for development, maintenance and management of Water and Sanitation Infrastructure in their areas of jurisdiction.

1.2 Project Information

Eldama Ravine town is in the Southern part of Baringo County about 51km South of Kabarnet town, the County Headquarter. The town is located approximately 193km North - West of Nairobi, the capital city of Kenya. The town can be accessed via the road A104 (Nairobi –Nakuru highway) up to Nakuru town about 156km and then by Nakuru-Eldama Ravine road 60km from Nakuru town to Eldama Ravine town. It is the administrative headquarter of Eldama Ravine Sub County in Baringo County.

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Eldama Ravine does not have any existing sewerage system. Previous Studies or Consultancy services for Design and Construction of a sewerage system in Eldama Ravine have never been carried out.

The only related Consultancy undertaken is for engineering designs and preparation of tender documents for Chemususu Water Supply Distribution project. The Project is currently being implemented.

To improve the status of sanitation in Eldama Ravine, Central Rift Valley Water Works Development Agency has prioritized the Feasibility Study, Design and preparation of Tender Documents of the Eldama Ravine Sewerage Project

A Layout Plan of the Proposed Works is shown in **Figure 1-1** on **Page 1-3**

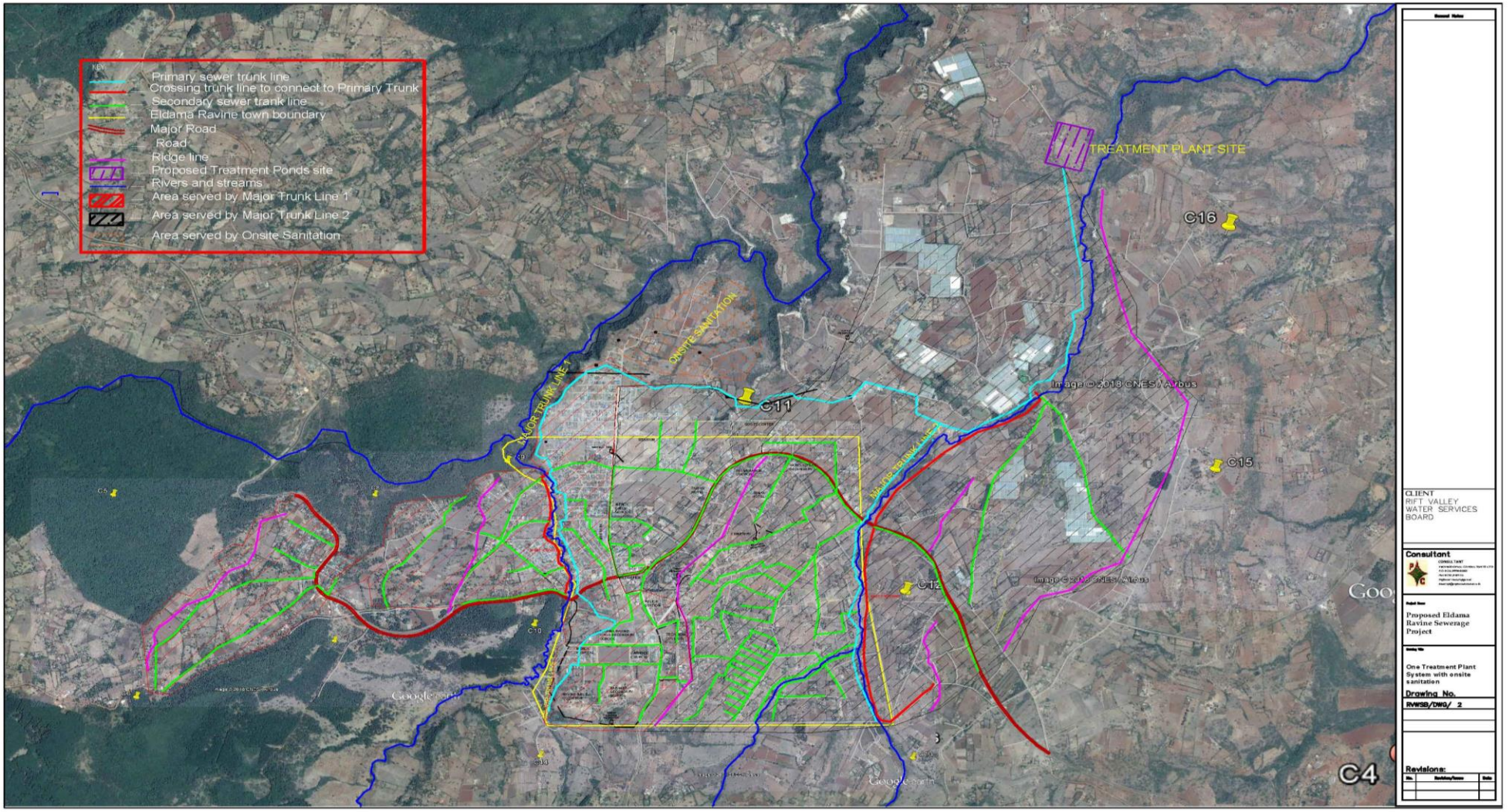


Figure 1-1:Layout Plan of the Proposed Works for Eldama Ravine Sewerage Project

CHAPTER 2: BASELINE INFORMATION

2.1 Location and Administration

Eldama Ravine is a town in Baringo County, Kenya, a few miles north of the equator, geographical coordinates 0° 30' 0" North, 35° 43' 0" East. Eldama Ravine town is in the Southern part of the County about 51km South of Kabarnet town which is the County Headquarter.

The town is located approximately 193km North -West of Nairobi, the capital city of Kenya. The town can be accessed via the road A104 (Nairobi –Nakuru highway) up to Nakuru town about 156km and then by Nakuru-Eldama Ravine road 60km from Nakuru town to Eldama Ravine town. It is the administrative headquarter of Eldama Ravine Sub County in Baringo County.

2.2 Climate

The town experiences two seasons of rainfall, the long rains start at the end of March to the beginning of July, and the short rains from the end of September to November. The rainfall is about 50% reliable. The rainfall varies from 300to 750 mm in the Rift Valley floor near Lake Bogoria to 1200 to 1237mmm the highlands near Eldama Ravine and within Kabarnet town which receives significant rainfall as it is located in the North Rift valley highlands.

Temperatures are generally influenced by altitude whereby the very high peak areas display very cold conditions, while the lower altitude zones at the base of the mountain are relatively warmer. The mean annual temperature of the Eldama Ravine Municipality varies from 16°C and 18°C. March is the hottest month of the year at an average of about 18 degrees Centigrade while July is the coldest with temperatures averaging at 16 degrees Centigrade.

2.3 Soils and Geology

2.3.1 Soils

The soil types and distribution within Eldama Ravine have been influenced by the topography. The steep slopes and rolling hills have soils developed from volcanic rocks, which are well drained varying from deep to shallow depths. Soils in these low-lying area (lowlands) have developed on volcanic rocks and alluvial. In most areas the bedrock is basaltic and some pyroclastics. This has weathered over time under dry climatic conditions to give rise to sandy loam soils in texture. They are well drained, moderately deep to very deep, brown to dark loams, sandy loams or clay loams and very erosive.

The town has soil types that are well drained and suitable for agricultural practices although the soils are highly susceptible to erosion especially on the hilly areas. The area is comprised of complex soil types with varying textures and drainage conditions that have developed alluvial deposits. Some areas are characterised of shallow stony soils with rock outcrops while others are characterised of loam soils with promising potential of agriculture in the case of irrigation practices.

Sandy Loamy Soil within Eldama Ravine

……Alluvial Deposits within River beds

Mogotio and Kisanana areas, soils are very shallow and at times extremely gravely to extremely stony. The soils vary in colour from mainly brownish to reddish brown depending on the mineral contents. Sandstones and conglomerates are common in Simotwet, Kamar and Koibos locations making them to be rich in sand. There are pockets of sedimentary rocks mainly shale and silt in depressions especially where streams enter swampy areas. Around Mugurin and Molo Sirwe, soils have low water holding capacity, very shallow and extremely gravely clayloams. At the escarpments soils have moderate water holding capacity, shallow depth, stony, gravely clay loams. Thick clay loam of alluvial origin is found around Marigat.

2.3.2 Geology

The area can be divided into the following physical units: (II the eastern edge the Uasin Gishu Plateau in the west, followed eastwards by the Kerio Valley, the Kamasian Hills and the floor of the Rift Valley. The high ground of the south—west quadrant is a continuation of both the Uasin Gishu Plateau and the Kamasian Hills around the head of the Kerio Valley.

In the present area out crop of Kabarnet trachytes and associated tails and sediments are confined to vicinity of Kabarnet though they were seen to extend many kilometres along the Kamasian Hills North of area. The tuffs and sediments associated with the Kabarnet trachytes reach their greatest extent of the outcrop at Kituro East of Kabarnet where they underlie the trachyte.

Rocks within Eldama Ravine Project Area

Erosive nature of Soils on the Escarpments

2.4 Hydrology

Most of the rivers within the region are seasonal, except for the Suguta, Kerio, Molo, Pekerra, Endau, Mukutan and Waseges which flow throughout the year. Drainage in the project area is strongly controlled by the main structural elements of the region. The crest of the eastern shoulder of the rift acts as a watershed between rivers that flow westwards through steep gorges into the inner trough, and rivers with gentler profiles that drain the high Plateau areas and flow eastwards to the Perkerra River which eventually discharges into the Lake Baringo.

The surface water resources in prospect area are scanty. The largest water body in the prospect area is Lake Bogoria which about 33 km^2 and highly saline. The main river that feeds this lake is Wasseges. It collects most of its stream flow from tributaries on Laikipi escarpment. In dry periods, the river dries up near Sandai before reaching the lake. From western side the lake is fed by some hot springs and seasonal tributaries including Emsos.

The surface water quality of selected streams in prospect area is good. Surface water resources have also been developed by construction of Dams and Pans to provide water for domestic use and livestock watering. The largest operational scheme is found in Marigat (Perkerra Irrigation Scheme) and the Sandai scheme, located northeast of Loboi. There are many small irrigation schemes towards Lake Bogoria. It is only in the streams, which are fed by Hot Springs, increased fluoride concentrations are found.

The Project area within Eldama Ravine town is endowed with Permanent River called Kamelilo which drain into Perkera River which flows into Lake Baringo through Marigat.

Illustration of Perkerra River

Kamelilo River.

2.5 Flora and Fauna

Eldama Ravine town with the target project area is dominated by wood lots made of *cypress, red cedar, Pine, gravellia, Nandi flame, croton and podo trees.* The trees demonstrate that the town is characterized by moderate rainfall of 1237mm at a high altitude of 1815 meters above sea level which influence vegetation.

Illustration of Red Cedar, croton and Podo trees and a cross sectional Image of Lembu Forest.

However, low lying sections where the Waste Water Treatment Scheme is to be established exhibits Arid and Semi-Arid (ASAL) characteristics and rocky. The area is mainly covered with grass, low bush, and scrub, which largely supports the pastoral lifestyle of the people. Dominant species: Acacia species *(A. tortilis, A. mearnsii, A.seyal*) *other sp: Terminalia brownii, Croton dichogamus, Balanites sp. Boscia sp. Cordia sinensis and Salverdora persica*

Endangered species: *Sandal wood and Aloe Euphorbia exploited because of medicinal value*, Threatened: *Acacia tortilis* (Charcoal burning) Alien species: *Prosopis juliflora* (Mathenge).

Threatened Sandal Wood

Acacia tortilis

2.6 Social Environment

2.7 Land Tenure

Eldama Ravine town is located on land that is characterised of freehold, leasehold and community owned land. Public land available is occupied by public installations. Land subdivisions have been rampant with subsequent transfers of land leading to regular sales following “tenant at will” arrangements especially in areas that are in close proximity to the urban core. The subdivision schemes to plots not less than ¼ acres of land are evident and coordinated undergoing necessary approval from the county department of lands and physical planning.

Historically, residents lacked land ownership documents however, over the years there has been tremendous effort deployed by the county government of Baringo to change this situation.

Large number of Residents now have documentation of proof of land ownership. Provision of land ownership documents to residents has resulted to notable changes in the form of built environment. Absolute ownership of land has made many residents result to living on permanent structures that they own themselves.

2.8 Land Use

2.8.1 Trade, Commerce and Housing

Eldama Ravine town depicts various land uses which include, Mixed use developments in the Central Business Distruct (CBD) entails commercial, educational, industrial establishments as well as public purpose institutions and public utilities.

Eldama Ravine municipality is characterized by both formal and informal commercial activities. These activities include retail shops, bookshops, commercial activities are found within the CBD. Other formal trade establishments are found at the periphery, where small market centres are found. Traces of few retail shops are located within the residential areas; away from the core market establishments. Informal commercial activities are found mainly along the main arterial roads.

Housing in Eldama Ravine is majorly by individual effort. Most residents own the houses in which they live in. Other individuals have built houses and put them up for rent. Housing schemes done by institutions include government and Kirandich Water Company Schemes for their employees.

2.8.2 Livestock and Crop Farming

Livestock farming, cash crop farming, poultry farming, fish farming, and beekeeping for the main agricultural activities within Eldama Ravine. There are pockets of crop producing area in this lowland. The main food crops are maize, millet, beans and Irish potatoes. The prospect area is a perennial food deficit. Despite the area producing a little food to feed her population, most of the food (60%) is sold for cash requirements thus occasioning frequent food shortages. The poverty level in the prospect area is more than 50% as much of the cultivated area is put under low value food crops.

Livestock keeping is one of the most important economic enterprises in the prospect area. Under the semi-arid conditions that prevail, traditional raising of indigenous livestock breeds is managed under pastoral and nomadic systems. Livestock production is depressed due to lack of adequate water and insufficient pasture as a result of prolonged droughts, epidemic disease outbreaks and lack of breeding systems for better productivity.

The land is used for animal grazing and furrow irrigation agriculture. Pockets of rain-fed and irrigated crop production can be found especially along the river course and lowland.

Crop failure prevails in both rain-fed agricultural and irrigation areas because water is limited in this lowland. There are small-scale irrigation schemes in the area that are served by both permanent and seasonal rivers, streams and swamps. Reliable sources of rivers and streams include *Perkerra River, Molo River, Wasseges and Loboi. Swamps include Loboi and Kapkuikui*. Soil erosion in the area is also widespread. This has been aggravated by reduction

in vegetation cover and by overstocking of livestock leading to land denudation and formation of large gullies

Livestock Rearing in Eldama Ravine

Farming Activities in Eldama Ravine

2.9 Health Facilities

Eldama Ravine is served by a number of health facilities including Level IV Hospital, health centres and dispensaries, these are Mercy Mission Hospital and Eldama Ravine Sub County Hospital. Further, there are chemists and pharmaceutical establishments which supplement the health sector.

Baringo County Referral Hospital is the only Level IV hospital and is well equipped with personnel, equipment, and drugs. The facility serves the entire county especially people from Marigat, Tiaty, Chemolingot etc

Photographs of Mercy Mission Hospital Eldama Ravine and Baringo County Referral hospital within Kabarnet Town

2.10 Education Facilities

The different institution categories in Eldama Ravine town are pre-primary, primary, secondary and tertiary institutions as summarized below in **Table 2-1** below.

Table 2.1: Educational Institutions within Eldama Ravine

School	GPS Location
Mercy Girls High School	36 N 0803313 UTM 0006216
Karen Roses JB Primary School	36 N 0803419 UTM 0005829
Kamelilo Day Primary School	36 N 0804971 UTM 0006059
Kamelilo Ploytechnic	36 N 0804980 UTM 0004669

The photographs below illustrated some of the institutions.

Photographs of Miringo Primary School.

Kamelilo Polytechnic

2.11 Receptors within the Proposed Water Lines Alignment

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

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. **Table 2-2** below presents list of sensitive receptors identified in Eldama Ravine Project area.

Table 2.2: Educational Institutions within Eldama Ravine

Category	Name of Receptor	GPS Coordinate
Schools	Mercy Girls High School	36 N 0803313 UTM 0006216
	Karen Roses JB Primary School	36 N 0803419 UTM 0005829
	Kamelilo Day Primary School	36 N 0804971 UTM 0006059
	Kamelilo Ploytechnic	36 N 0804980 UTM 0004669
	Moringwo Primary School	36N 0801218 UTM 0005085
Health facilities	Mercy Mission Hospital	36 N 0803293 UTM 0005976
	Eldama Ravine Sub County Hospital	36 N 0803253 UTM 0005347
Markets	Eldama Ravine Market	36 N 0803051

		UTM 0005259
Forests	Lembus Forest	
Rivers	Perkera River	
	Kamelilo River	
Abattoirs	Eldama Ravine Slaughter house	36 N 0803084 UTM 0006460

CHAPTER 3: PROJECT DESCRIPTION

3.1 Introduction

The proposed measures for Eldama Ravine Town Sewerage System Includes investment in wastewater collection, conveyance and treatment. The proposed measures have been developed based on the following salient points:

- ✓ The anticipated development of Eldama Ravine will be gradual up to the ultimate design horizon (2045) and in future. Therefore, construction of some of the system components can be phased to be at per with the development and to avoid redundant sewerage system components.
- ✓ The sewers have been designed for ultimate condition to avoid sewer duplication which might prove more expensive than laying one sewer. There is also limited wayleave for laying duplicate sewers. Though economical for long design period, duplication of sewers is uneconomical for short design period as is the case for this study *(Ministry of Water and Irrigation Manual for Sewerage and Sanitation Services)*
- ✓ At any time, it is prudent to have two (2) or more wastewater treatment streams in a Wastewater Treatment Plant (WWTP). This is to avoid total lockdown in case repair/ maintenance of the WWTP is required.

3.2 Project Components

The project will involve construction of primary and secondary sewer network within Eldama Ravine town and construction of Waste Water Treatment works. The proposed investment entails construction of a 2Nr streams of Wastewater Stabilization Ponds with capacity to treat 5111 m3/d comprising of the following components:

- ✓ Inlet Works and Exhauster Discharge Bay
- ✓ 2Nr. Anaerobic Ponds
- ✓ 2Nr. Facultative Ponds
- ✓ 8Nr Maturation Ponds
- ✓ 10Nr.Sludge Drying Beds
- ✓ Grade 9 Staff Houses
- ✓ Waste water Laboratory

3.3 Project Cost

The estimated cost for the investment is Kshs 1,341,756,632.26 which translates to Dollar 146146,050,209,422. **Table 3-1 on Page 3-2** shows a cost breakdown of the investment.

Table 3.1: Project Cost

Item	Description	Amount (Ksh)	Amount (USD)
1	Sewer lines	243,936,000.00	26,552,433,600
2	Anaerobic Ponds	2125500	231,360,675
3	Facultative Ponds	389,154,816.00	42,359,501,722
4	Maturation Ponds	143,754,647.04	15,647,693,330
5	Capacity Building	47,365,000	5,155,680,250
6	Grade 9 Houses and Laboratory	4,500,0000	4,898,250,000
7	Landscaping	4,000,000	435,400,000
			-
	Other costs	12,000,000	1,306,200,000
	Sub-Total 1: Construction Works	**834,835,963.04**	90,871,894,577
	Preliminary & General Items 10%	**83,483,596.30**	9,087,189,457
	Contingencies 20%	**166,967,192.61**	18,174,378,916
	Compensation costs	71,400,000	7,771,890,000
	Sub-Total 2	**1,156,686,751.95**	125,905,352,950
	Add 16% VAT	185069880.3	20,144,856,471
	Grand Total	**1,341,756,632.26**	146,050,209,422

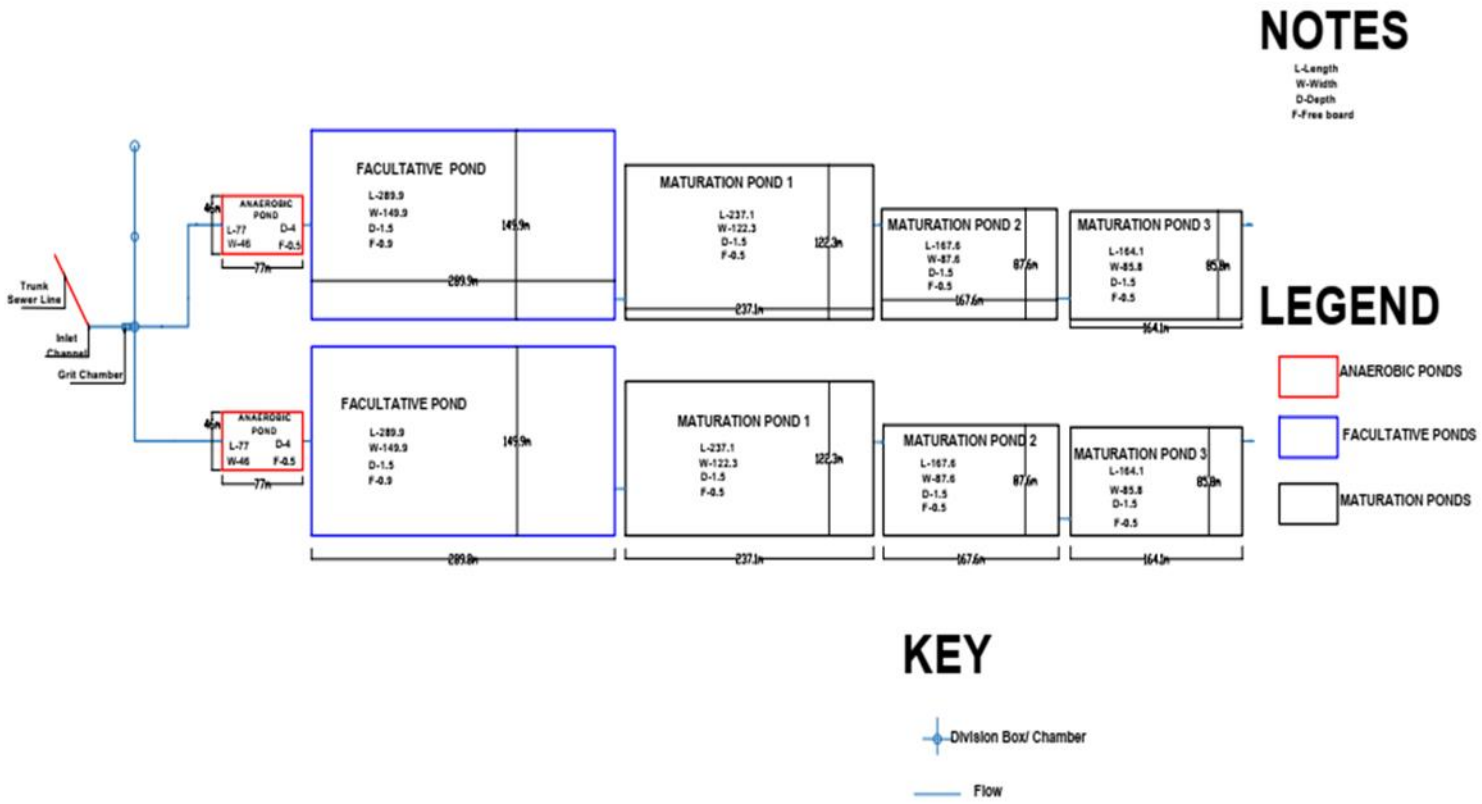


Figure 3-1: Layout Plan of the Proposed Sewerage Treatment Plant

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 Eldama Ravine is based on gravity conveyance up to the Inlet Works of the WWTP. 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 including.

- 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 Kamelilo 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 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 Eldama Ravine 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 Chemususu Water and Sanitation Company in order to reduce emission of Methane and Hydrogen Sulphide gases which are considered greenhouse 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 Chemususu 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 Eldama Ravine 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 Kamelilo 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 Eldama Ravine for Central Rift Valley Water works development agency CRVWWDA) and operations to Baringo County Government. The Design and ESIA Teams have adequately involved Chemususu Water and Sewerage Company in the preparation the Project.
10	County Government Act No. 17 of 2012	The proposed Project will be implemented within Eldama Ravine 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 Baringo 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 Baringo 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 Baringo 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

No	Policy	Applicability
16	Sexual Offences Act 2006	An Act of Parliament that makes provision about sexual offences 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 Eldama Ravine 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. Chemususu Water and Sanitation Company 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 Chemususu Water and Sanitation Company 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, Eldama Ravine 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 Kamelilo 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 Project design has ensured that the Project Trunk and Secondary Sewers will follow Road Reserves, River Riparian and existing Storm Water Channels. However, cases of Sewer easement acquisition were recorded during RAP preparation in sections where reserves are not adequate. The 31.53acres land for establishment of Waste Water Treatment Plant will be acquired by Baringo County Government (BCG) through willing buyer willing seller arrangement with 1 PAP (Mr Sitonik Famlity) who owns the Land the Land. Estimated RAP budget as presented by this RAP is One Million and Forty Three, Six Hundred and Forty Thousands, Three Hundred and Ninety Seven (Kshs. 143,640,397.44) Tables 10.5 below to Table 10.8 presents' details of RAP budget for each component of the Project.
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 Eldama Ravine Sewerage Project, the focus will be on the quality of effluent that will be released into river Kamelilo, 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 Kamelilo river from literature indicate that water flowing through Kamelilo 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 greenhouse 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 Eldama Ravine 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	Baringo County Government	• Baringo County Executive Committee Member for Environment • Baringo County Executive Committee Member for Lands and Urban Planning • Baringo County Secretary • Baringo County Statistics Officer • Managing Director Chemususu Water and Sanitation Company • Eldama Ravine Town Administrator • County Public Health Officer
2	National Government	• Deputy County Commissioner ELdama Ravine Sub County • Local Administration (Chiefs and Village Elders) • Baringo Sub Region Manager Water Resources Authority (WRA) • National Environment Management Authority (NEMA)
3	Institutions	• Mercy Girls High School • Karen Roses JB Primary School • Kamelilo Day Primary School • Kamelilo Ploytechnic • Moringwo Primary School

		• Mercy Mission Hospital • Eldama Ravine Sub County Hospital • Eldama Ravine Market
4	Other Interested Parties	• Water Resource Users Association for Kamelilo River • Project Affected Persons (PAPs) including Land owners along the trunk and secondary Sewers • Landlords and tenants of Eldama Ravine Town • Business Community Eldama Ravine Town • Traders within Eldama Ravine • Hotel owners within Eldama Ravine • Non-Governmental Organizations and Community Based Organization

6.3 Stakeholder Consultation Process

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 Eldama Ravine 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 Eldama Ravine Town Project area on the 21st, 22nd and 23rd October 2020. **Table 6-4** below presents a schedule of Public Participation meetings.

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

Meeting Date	Meeting Venue	Participants Representation	Gender Ratio
21st October 2020	Eldama Ravine Town Garden Square	• Lembus Central Location Chief • Ward Administrator Ravine Ward • (MD Chemususu Water and Sewerage Company) • Eldama Ravine Sub County Environment Committee Member • Eldama Ravine Sub County Public Health Officer • Residents of Eldama Ravine Town Location	Total 73 Male 44 female 29
22nd October 2020	Moringwo Primary School	• Deputy County Commissioner (DCC) Koibatek Sub County • Eldama Ravine Town Administrator • (MD Chemususu Water and Sewerage Company) • Eldama Ravine Sub County Environment Committee Member • Eldama Ravine Sub County Public Health Officer • Residents of Lembus Location	Total 27 Male 18 female 9

23rd October 2020	AT A.I.C (African Inland Church) chepsito	• Acting Chief Perkerra Location • Eldama Ravine Town Administrator • Ward Administrator Ravine Ward • Ward Administrator Ravine Ward • (MD Chemususu Water and Sewerage Company) • Eldama Ravine Sub County Environment Committee Member • Eldama Ravine Sub County Public Health Officer Residents of Lembus Location	Total 62 Male 33 female 29

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

Suggestion / Question	Response
Land Acquisition Impacts The community wanted to know if land for the treatment works was available or it was to be acquired from private owners.	Members were also informed that a preliminary design has been done for a gravity sewer system and a privately owned parcel of land identified for the treatment works. Land owners will be engaged for possible acquisition.
Community perception on land acquisition The community wanted to know what will happen in the event an affected land owner refuses to allow acquisition of wayleave	Residents were informed that this project is dependent on goodwill of residents, acquisition of wayleave will be based on negotiations as opposed to compulsory acquisition. Any aggrieved party will be given an opportunity to air their grievance through grievance redress committees that will be formed for the project.
Resettlement impact along sewer wayleaves The community wanted to know the wayleave width that will be acquired for laying of pipelines. He also wanted to know if there is any activity allowed to be conducted on the wayleave	• Residents were informed that the wayleave for the secondary lines will be about three meters wide while for the trunk mains will be about six meters wide. • The design has aligned the trunks and secondary sewers within road reserves and river riparian in an effort to minimize impact on private land and property. • Residents were informed that it is best practice to leave wayleaves clear so that in the event maintenance is required, they will not experience loss of property. However they were informed that they were free to plant seasonal crops like animal fodder but not to put up structure and plant trees on the wayleave.
Water and Sewer Tarrifs The community members wanted to know if the sewer will be free or if it has any charges, they also wanted to know what is being done to improve the water situation which is not adequate at the moment	• The meeting was informed that the objective of the government is to bring services closest possible to citizens and that's what CRWWDA aims to achieve. After now the main infrastructure is put in place residents will be required to apply for the service from Chemususu Water and Sewerage Company who will give a quotation for the connection. • A monthly charge is usually added on water bill for sewer as guided by Water Services Regulatory Authority (WSRA) • On water situation residents were informed that there is an ongoing water project being done by Chemususu water and Sewerage Company. Once the works are done, the county will initiate last mile connectivity they will ensure residents are connected to the distribution network
Project Employment Opportunities Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	• Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for the job opportunities for consideration.

	• Those that will get these job opportunities were encouraged to work responsively to avoid termination before the project is complete.

	
MD Chemususu Water and Sanitation Company addressing public participation meeting at Eldama Ravine Town Garden Square	The consultant's representative giving a project overview and scope of works for Perkera Location at A.I.C Chepsito Church

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 1999) Cap 387 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 Kamelilo **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 Kamelilo 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 Kamelilo 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 Kamelilo 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 Kamelilo that does not meet the requires BOD levels (Water quality regulation 2006). • Could lead destruction of aquatic ecosystem downstream river Kamelilo after effluent discharge Point. • Pollution of River Kamelilo 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 Eldama Ravine Sewerage Project, the focus will be on the quality of effluent that will be released into Kamelilo 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 Kamelilo River.

Mitigation Measures

- No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent River Kamelilo 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 Kamelilo.
- 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 Kamelilo 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 Kamelilo
- 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 Kamelilo 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 Kamelilo 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 domestic needs

Mitigation Measure

- Any work along River Kamelilo will be isolated to prevent silt propagating downstream;
- Debris and other material will be prevented from entering River Kamelilo; 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 Kamelilo.
- Site compounds and stockpiles will be located away from Kamelilo 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 Kamelilo River, 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.

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 /areas	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+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 Kamelilo 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 Kamelilo 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 and haulage activities.

Already there is significant dust was observed along the murrum road along River Kamelilo that will be adopted as the access road to the sewer treatment plant. 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
(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

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

Safety Principle	Management Measure
	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 - 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 Project design has ensured that the Project Trunk and Secondary Sewers will follow Road Reserves, River Riparian and existing Storm Water Channels. However, cases of Sewer easement acquisition were recorded during RAP preparation in sections where reserves are not adequate. The 31.53acres land for establishment of Waste Water Treatment Plant will be acquired by Baringo County Government (BCG) through willing buyer willing seller arrangement with 1 PAP (Mr Sitonik Famlity) who owns the Land the Land.

Estimated RAP budget as presented by this RAP is One Million and Forty Three, Six Hundred and Forty Thousands, Three Hundred and Ninety Seven (Kshs. 143,640,397.44) Tables 10.5 below to Table 10.8 presents' details of RAP budget for each component of 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 Eldama Ravine 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 Eldama Ravine 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 Eldama Ravine town.
- Reduced pollution of natural river systems which include Kamelilo River and numerous springs within the Project area which are main watering resources to the residents.
- Trigger development of modern infrastructure within Eldama Ravine 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 Eldama Ravine 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 Kamelilo 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

- Chemususu 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 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 Baringo 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 Chemususu Water and Sanitation Company during Project operation in order to solid wastes collected at screening chambers.

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

- Chemususu Water and Sewerage Company shall develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers
- Chemususu 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 Baringo 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, Chemususu Water and Sewerage Company 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

Central Rift Water works development agency (CRWWDA) 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:

- Chemususu Water and Sewerage Company
- Contractor
- Design Consultant;
- County Government of Baringo.

8.3.1 Central Rift Valley Water Works Development agency (CRVWWDA) / Chemususu Water and Sewerage Company

CRVWWDA in conjunction with Chemususu Water and Sewerage Company 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 Baringo.

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 Eldama Ravine 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 Baringo County Government Physical Planning Department** of any structures on site ▪ **Permits from Public Health Department (Baringo 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 <u>Responsibility</u> 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 <u>Responsibility</u> 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 <u>Responsibility</u> ▪ 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 <u>Responsibility</u> ▪ 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 Project design has ensured that the Project Trunk and Secondary Sewers will follow Road Reserves, River Riparian and existing Storm Water Channels. However, cases of Sewer easement acquisition were recorded during RAP preparation in sections where reserves are not adequate. The 31.53acres land for establishment of Waste Water Treatment Plant will be acquired by Baringo County Government (BCG) through willing buyer willing seller arrangement with 1 PAP (Mr Sitonik Famlity) who owns the Land the Land. Estimated RAP budget as presented by this RAP is One Million and Forty Three, Six Hundred and Forty Thousands, Three Hundred and Ninety Seven (Kshs. 143,640,397.44) Tables 10.5 below to Table 10.8 presents' details of RAP budget for each component of the Project.	Responsibility CRVWWDA and Baringo County Government	RAP prepared and implemented	Kshs. 143,640,397.44
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 Kamelilo 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 Kamelilo 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.	• Chemususu Water and Sewerage Company • Baringo 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 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	• Chemususu Water and Sewerage Company • Baringo 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**	• Chemususu Water and Sewerage 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 Baringo County Government	• Chemususu Water and Sewerage Company • Baringo County Government	To be established at Operation Phase and included in the operation of the Project
4.	**Solid Wastes Impacts at WWTP Screens**	• Chemususu Water and Sewerage shall develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers • Chemususu Water and Sewerage 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 Baringo County Government by laws.	• Chemususu Water and Sewerage Company • Baringo 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, Chemususu Water and Sewerage 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	• Chemususu Water and Sewerage Company • Baringo 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 Eldama Ravine 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 design has ensured that the Project Trunk and Secondary Sewers will follow Road Reserves, River Riparian and existing Storm Water Channels.
(iv) However, cases of Sewer easement acquisition were recorded during RAP preparation in sections where reserves are not adequate.
(v) The 31.53acres land for establishment of Waste Water Treatment Plant will be acquired by Baringo County Government (BCG) through willing buyer willing seller arrangement with 1 PAP (Mr Sitonik Famlity) who owns the Land the Land.
(vi) Estimated RAP budget as presented by this RAP is One Million and Forty Three, Six Hundred and Forty Thousands, Three Hundred and Ninety Seven (Kshs. 143,640,397.44) Tables 10.5 below to Table 10.8 presents' details of RAP budget for each component of the Project.

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, Chemususu 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 Chemususu 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 Chemususu Water and Sewerage Company.

ANNEXES

Annex 1 Public Participation Minutes and List of Participants
Annex 2 Chance Find Procedures
Annex 3 Lead Expert License 2020

Annex 1

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) REPORT FOR ELDAMA RAVINE SEWERAGE PROJECT

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 21ST OCTOBER 2020 AT ELDAMA RAVINE TOWN GARDEN SQUARE.

1.0 MIN-01- Introduction

The meeting was called to order by the Ward administrator for Ravine *Mr Tallam* at 12pm, he called upon a village elder to start off the forum with a word of prayer. In his opening remarks, the area ward administrator gave the apologies of the Area chief who was absent due to an abrupt meeting with the Deputy County Commissioner (DCC) Koibatek Sub County. He added that the project was very timely as Ravine Town was really growing and a process to elevate it to a Municipality was already ongoing with a consultant given the work to design the amenities. In addition, the town was really growing in population and developments hence a sewerage project would benefit the town. The Ward admin reminded the people in the meeting how costly it is to exhaust the waste from the septic tanks and even getting a place to dump the waste from the town into neighboring counties is a huge problem. He affirmed that such development will create direct and indirect job opportunities to youths and women ultimately contributing to improvement of living conditions of the people of Eldama Ravine Ward. He welcomed the Managing Director Chemususu Water and Sewerage Company Mr Koech and requested him to give his introductory remarks.

Mr Koech (MD Chemususu Water and Sewerage Company) thanked the public for availing time to come and participate in the ESIA public participation forum. The *MD* emphasized that residents should use the forum to openly share their views and opinion with regards to the proposed sewer project. He also reminded the gathering of the ongoing Chemususu Water Project that was going to add a lot of water to the area and it was almost complete. With that in mind, almost 80% of the water will turn into waste water and that would necessitate the need for a sewer system in the town.

He gave a brief about where the project would cover stating that lateral sewer lines and secondary lines will mostly be laid within the road reserve, the trunk main lines would ran along the river riparian (kamelilo river) and (perkera river). The MD added that some residents had encroached into the road reserve, he discouraged this habit as the reserves were meant for services like water, sewer, and electricity. Lastly he welcomed the consultant team from Professional Consultants to the town and invited *Mr Obra M'Maitsi- an environmentalist* to take the floor and to give an overview of the Project with regards to the funding, importance of the sewer system, the reports they were required to write and associated impacts to social and natural environment.

2.0 MIN -02- Project Funding

Mr Obra thanked everyone for attending the forum and informed them that the project was being funded by the African Development Bank who had given the funds to the Ministry of Water and Sanitation who in turn allocated it to the Rift Valley Water Works Development Agency (RVWWDA) for a project called *Kenya Towns Sustainable Water Supply and Sanitation Program(KTSWSSP)* and this is where Eldama Ravine town was identified to be among the towns that needed its sanitation improved. He added that since the town was growing at a first rate the project would help improve sanitation issues.

3.0 MIN -03- Importance of the Sewer

He noted that input from stakeholders during ESIA process is important and is required during finalization of Project designs and also help in development of impacts mitigation measures. He informed the gathering that they were among the stakeholders selected to be consulted with regards to the above described project.

Mr Obra gave a brief of the scope of works that will be entailed in the project with regards to benefits and reminded them that the main importance is better handling of liquid waste from their houses and business establishments. Others are summarized below.

Sewer benefits.

a) The sewer will contribute directly towards improvement of land value within Eldama Ravine town and also attract investors to the area
b) Improved sanitation in households and business premises hence clean environment
c) During the project implementation phase, it will provide direct employments and generate indirect employment for the people around during construction and operation stage. This will ultimately translate into economic growth of the town.
d) Reduction of water borne diseases resulting from waste water
e) Materials like environmentally friendly charcoal (briquettes) can be made from the dried sludge in the sewer treatment ponds, this will create more employment to youth groups or any other empowerment group around Ravine.

4.0 MIN-03- The reports required (ESIA and RAP)

The environmentalist informed the meeting that they were going to prepare two reports that would eventually help with the final preparation of the final design and tender documents of the project. The reports are *Environmental and Social Impact Assessment Report* (ESIA) and *Resettlement Action Plan* (RAP)

He added that the ESIA would capture all the environmental and social concerns of the people and give mitigation measures that should be put in place to address any issues that would come

up. They were assured that all their opinions and objections would be put in the report so as to ensure that the project would be widely acceptable. Some of the environmental issues likely to occur were mentioned below;

Likely Sewer Impacts to Environment (Natural and Social)

- Effects to Air Quality- This would result around the treatment ponds as a bad odour could be felt if proper measures aren't put in place like setting up buffer zone from the nearest homes, planting of trees to act as wind breakers around the ponds, and ensure the ponds are operating optimally at all times
- Reduced water quality- since the treated waste water would eventually be released into the nearest stream or river around, proper analysis has to be done to ensure that the water doesn't have any heavy metals and is of the recommended BOD levels as it gets in the water bodies.
- Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the project.

He further added that all these impacts would be addressed comprehensively by the ESIA report.

The second report he talked is the RAP report. He explained to the meeting that this would capture all those likely to be affected by the project in any way or another. The consultant's sociologist together with the RAP expert would go to the ground and take details of the affected land, structure and tree owners, then at an advanced stage a meeting will be held with them to discuss compensation methods.
He added that government land rates would be used in the process of compensation in land, while gazetted Kenya Forest rates would be used to pay those whose trees will be affected.

He assured all in attendance that this process would be fair so as not to exclude anyone who genuinely is affected by the project. He concluded by thanking them for listening to his agendas, and gave the floor back to the ward administrator who opened the plenary session.

5.0 MIN-04- Plenary Session

After discussion summarized in minutes 2,3 and 4 above, the community were invited to a question and answer session under the guidance of *Mr Tallam,* the Ward administrator. Detailed questions and suggestion of the plenary session are presented in **Table 1** on **Page 5**.

Table 1: Plenary Discussion

Suggestion / Question	Response
Eldama Ravine chamber of commerce representative welcomed the proposed project and called for inclusive consultations so that all stakeholders within the town are given an opportunity to air their concerns. He wanted to know when the project is likely to start since exhausting services were expensive and they were eating up into investors profit margins. He also wanted to know if land for treatment works has already been identified.	Members were informed that at this stage, the consultant was only doing design for the sewer system, the designs are supposed to be ready by end of the year 2020 and submitted to the client (RVWWDA). The client will then look for funding and determine when project implementation starts. Members were also informed that a preliminary design has been done for a gravity sewer system and a privately owned parcel of land identified for the treatment works. Land owners will be engaged for possible acquisition.
Mr. Mwaura wanted to know if more public participation forums will be organized so that to sensitize the community.	Members were informed that this was the initial forum and more public participation will be organized with residents of Eldama Ravine.
Members wanted to know how services like water mains and electricity lines will be relocated without causing disruption to the public.	Residents were informed that during sewer design such services will be identified and the pipelines aligned to avoid disruption of services to residents.
A member I attendance wanted to be informed on how compensation will be done and if residents living on land without ownership documents will be compensated.	Residents were informed compensation is normally done on three items land, Crops and trees and Structures that are likely to be affected by the project. The rates used are current land value within the locality, for trees a rate recommended by KFS will be used, for crops a rate recommended the ministry of agriculture will be used and finally for structures current market value for full replacement will be used. Residents were informed that those affected will be allowed to salvage any of their affected property. For those living on land without ownership documents, they were informed that a process of adjudication will be done to determine ownership status before any engagement.
Mr. Sigilai wanted to know how deep the pipeline will be laid and if they will be allowed to conduct any activities on the acquired wayleave section.	Residents were informed that pipeline depth will be determined by contour levels provided by survey data. Those in attendance were further informed that they will be free to plant seasonal crops on the wayleave like maize and beans however, they will not be allowed to plant trees and put up structures on the wayleave

6.0 MIN-05- Adjournment

The meeting was adjourned at 4pm by a vote of thanks from Ravine Town Youth Leader who added that the youth needed to be involved more in upcoming projects as they had lots of inputs to give but lack opportunities. He then gave a word of prayer.

SAMPLE MEETING PHOTOS

The ward admin opening the meeting

MD Chemususu Water Company addressing the meeting

The Environmentalist Mr. Obra going through his agendas

A village elder asking a question

Mr Greg Chemususu Water Co. Operations Technical Manager answering a question

A member of the disabled community in Ravine Town giving his opinions about the project

ATTENDANCE LIST ELDAMA RAVINE TOWN GARDEN SQUARE

CONSULTANCY SERVICES FOR FEASIBILITY STUDY, DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR ELDAMA RAVINE SEWERAGE PROJECT

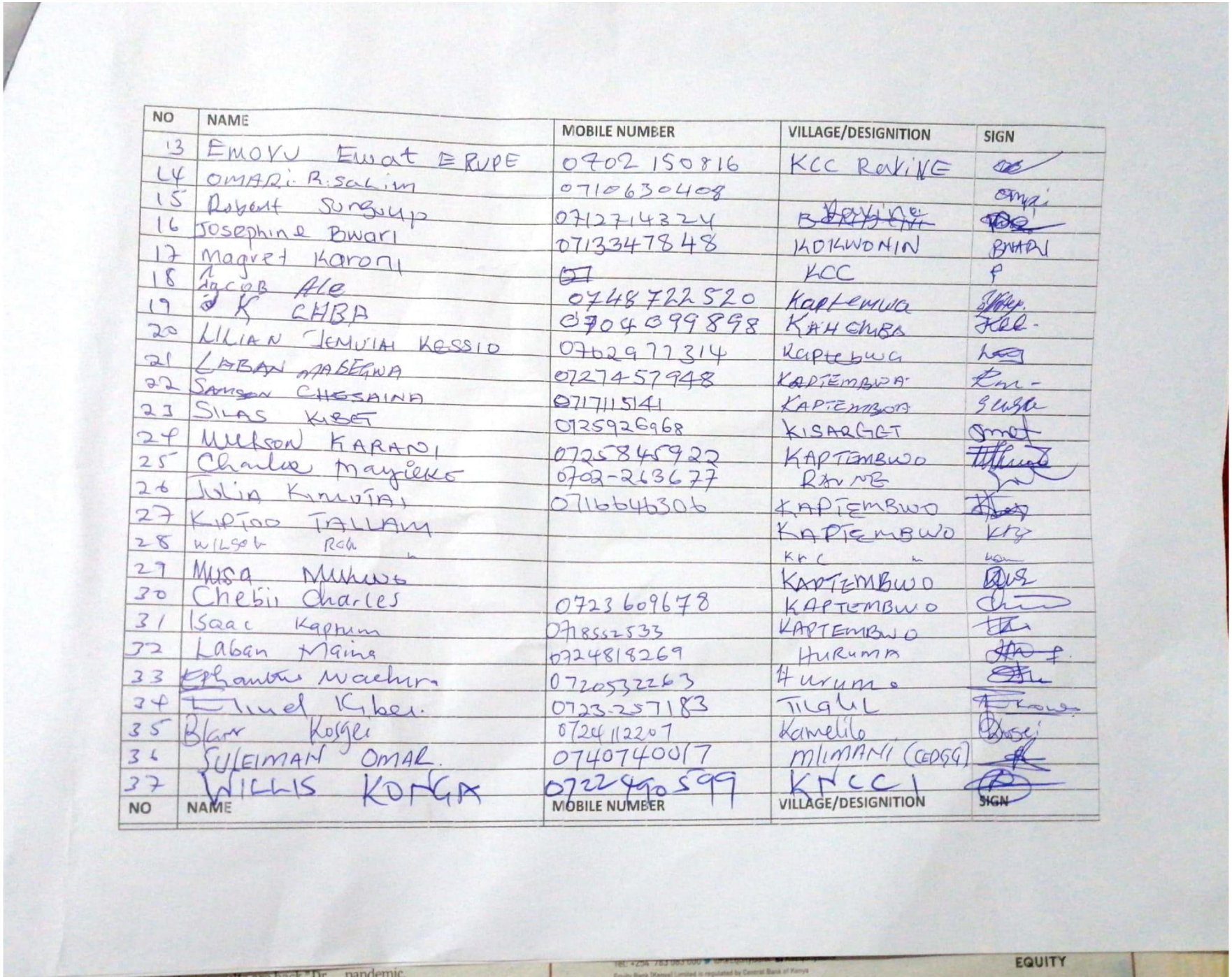
CONTRACT NO. RVWSB/KTSWSSP/C/ELDAMA RAVINE /2017 – 2018

Public Participation Attendance ESIA/RAP

DATE 21/10/2020 **Venue** Garden Square Ravine Town

NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
1	Collins Juma	0711806553	Socialogist	
2	Kiprotich Kimetto	0720-258962	Kisarget	
3	TECLA CHUMBA	0722398342	Chemususu County Environmental Committe	
4	JOWAU K BIRGEN	0721635230	Kamelilo/Kasarwai	
5	DAUDI DOKA	0718231476	SHABAB	
6	AYUB .K. CHERUIYOT	0713003272	KAMELILO	
7	WILSON K. SIGILAI	0722456106	KAMELILO	
8	Langston Songol	0723671926	Public Health officer	
9	Haron C. CHEBET	0712998826	Kaptembwo	
10	John Mumosi	0728249640	KAREN ROSES	
11	Benjamin K. Tallam	0714388912	Kaptumbo	
12	MUSA LOMORU	0727165562	KCC RAVINE	

NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
13	EMOYU Ewat ERUPE	0702 150816	KCC RAVINE	
14	OMARI Risalim	0710630408		
15	Robert Songulp	0712714324	RAVINE	
16	Josephine Bwari	0713347848	KOKWONIN	BWARI
17	Magret Karoni		KCC	
18	Jacob Ale	0748722520	KAPLEMWA	
19	K CHBA	0704099898	KAH CHBA	
20	LILIAN JEMUIAH KESSIO	0702977314	Kaptebwa	
21	LABAN MASEGWA	0727457948	KAPTEMBWA	
22	SAMSON CHESAINA	0717115141	KAPTEMBWA	
23	SILAS KIBET	0725926968	KISARGET	
24	MULSON KARANJ	0725845922	KAPTEMBWO	
25	Charles Mayieko	0702-263677	RAVINE	
26	Julia Kanuria	0716646306	KAPTEMBWO	
27	KIPTOO TALLAM		KAPTEMBWO	
28	WILSON RCA		KAPTEMBWO	
29	Musa Mukwo		KAPTEMBWO	
30	Chebii Charles	0723609678	KAPTEMBWO	
31	Isaac Kaptum	0718552533	KAPTEMBWO	
32	Laban Maina	0724818269	HURUMA	
33	Ephantus Waehura	0720532263	Hurumo	
34	Ismael Kiber.	0723-257183	TILALIL	
35	Blair Kosgei	0724112207	Kamelilo	
36	SULEIMAN OMAR.	0740740017	MLIMANI (CEDSG)	
37	WILLIS KONGA	0722990599	KRCC	
NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN



NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
38	JUSTUS K. KOECH	0728 045 623	KISARGET	
39	JACKSON K. BOSWONY	0721 607491	KAMELILO	
40	Josphat K. Ruga	0711327503	Kamelilo	
41	ISSA RAMADHAN	0725 030173	BONDENI	
42	VIVIAN JEMGAT Komen	0745275 615	KAPLEBWO	
43	MARY AKENO	0722312603	KCC	
44	Magdaline Chenuyot	0700123997	KapTembwo	
45	LEAH KIPRO	0725959927	KAPTEMBWO	
46	Julius Muendo	0720978686	KAPTEMBWO	
47	Carolyne Soget	0725880367	Kaptembwo	
48	Carolyne Chelimo	0721452768	kaptembwo	
49	RAJAB KARSALA	0705385268	Milimani	
50	SILVANUS KIRUINKAMAR ROTICH	0714378629	Ravine nursing home	
51	PETER K. MBUGUA	0757157816	KISLANGET –	
52	ROSE MAIYO	07179811 95	KISARGET	
53	Paul Kangogo	0723137819	TOWN	
54	HUSSEIN ISMAIL MFAY	0796098632	MLIMANI	
55	ELIJAH GICHOHI MUCHIRI	0729215457	KISARGET	
56	Peter Wachira Konyi	0726558357	Kisarget	
57	David. Kipkemoi	0724704018	Kisinjoki	
58	KIPRUTO Bartenge	0726 329 753	Kokoronin	
59	John Njoroge Kinihu	0720368755	Kislangelik	
60	DANIEL MUCHIRI			
61	BRENDAH TANUI	0727780534	KAPTEMBWO	
62	SEMIFFER MOROGO	0726616365	KAMELILO	

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NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
63	MARY WANGUI		SHAURI	Mary
64	Mwangi Andrew	0728-864157	Shauri	
65	Benson K. Wanu	0716-311599	Shauri	
66	Pst. Samuel Muchiri	0724556468	Kapdenung	
67	David Ngetich	0720070063	K.C.C	
68	Nicolas Kiptoo	0708841605	Benonin	
69	Geofrey Munyesia	0719122842	Kokoronin	
70	Kadija Ali	0711340942	Bondeni	
80	John ngetich	0768805313	Ravine	
81	Samusoi Koech	0722579237	MD- Chemususu Water	
82	Grey Kiptanui	072375185	TM-Chemususu Water	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) REPORT FOR ELDAMA RAVINE SEWERAGE PROJECT

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 22ND OCTOBER 2020 AT MORINGWO PRIMARY SCHOOL.

7.0 MIN-01- Introduction

The meeting was called to order by the area chief for Lembus Central Location *Mr John Ruto* at 11am, he called upon the spiritual leader *Mr Koech* to start off the forum with a word of prayer. In his opening remarks, the area chief appreciated the those who had turned up for the forum even though it was a market day in the town and explained the need for public participation to the people. The chief thanked the consultant's team present in the meeting and Chemususu Water Company Technical Manager *Mr. Greig* for calling up the meeting to enlighten the people about the project. That the sewer project would help solve their sanitation issues as exhausting the liquid waste was too costly. He also explained that since the water table in the area was too high, the septic pits dug only lasted for a few years, and a comprehensive sewer system would be a huge remedy. Lastly he invited the town administrator *Mr Kosgei* to make his opening remarks.

Mr Kosgei started by saying that the project was very timely as Ravine Town was growing and a process to elevate it to a Municipality was already ongoing with a consultant given the work to design the amenities. The total area to be covered in the new town plan was approximately a radius of 7km from the center of the town. In addition, the town was growing in population and developments hence a sewerage project would benefit the town and its outskirts where Lembus Central Location lies. The Town admin reminded the people in the meeting how costly it is to exhaust the waste from the septic tanks and even getting a place to dump the waste from the town into neighboring counties is a huge problem. He affirmed that such development will create direct and indirect job opportunities to youths and women ultimately contributing to improvement of living conditions of the people of Lembus. He welcomed the Technical Manager for Chemususu Water and Sewerage Company *Mr Greig* and requested him to give his introductory remarks.

Mr Greig (TM Chemususu Water and Sewerage Company) thanked the public for availing time to come and participate in the ESIA public participation forum. The *TM* emphasized that residents should use the forum to openly share their views and opinion with regards to the proposed sewer project. He also reminded the gathering of the ongoing Chemususu Water Project that was going to add a lot of water to the area and it was almost complete. With that in mind, almost 80% of the water is expected to become waste water necessitating the need to have a comprehensive sewer system.

He gave a brief about where the project would cover and the road reserves or private land likely to be used for laying of the secondary laterals, the main trunk would ran along the river riparian of (kamelilo river) and (perkera river). The TM added that some members had encroached the riparian area and made temporary structures on it, he discouraged this habit as the land was meant to be left free of encroachment. Lastly he welcomed the consultant team from Professional Consultants to the town and invited *Mr Obra M'Maitsi- an environmentalist* to take the floor and to give an overview of the Project with regards to the funding, importance of the sewer system, the reports they were required to write and associated impacts to social and natural environment.

8.0 MIN -02- Project Funding

Mr Obra thanked everyone for attending the forum and informed them that the project was being funded by the African Development Bank who had given the funds to the Ministry of Water and Sanitation who in turn allocated it to the Rift Valley Water Works Development Agency (RVWWDA) for a project called *Kenya Towns Sustainable Water Supply and Sanitation Program(KTSWSSP)* and this is where Eldama Ravine town was identified to be among the towns that needed its sanitation improved. He added that since the town was growing at a first rate the project would help with the expansion.

9.0 MIN -03- Importance of the Sewer

He noted that input from stakeholders during ESIA process is important and is required during finalization of Project designs and also help in development of impacts mitigation measures. He informed the gathering that they were among the stakeholders selected to be consulted with the regards to the above described project.

Mr Obra gave a brief of the scope of works that will be entailed in the project with regards to benefits and reminded them that the main importance is better handling of liquid waste from their houses and business establishments. Others are summarized below.

Sewer benefits.

f) The sewer will contribute directly towards improvement of land value in the area with will attract investors like real estate developers
g) Improved sanitation in households and business premises hence clean environment
h) During the project implementation phase, it will provide direct employments and generate indirect employment for the people around during construction and operation stage. This will ultimately translate into economic growth of the town.
i) Reduction of water borne diseases resulting from waste water
j) Materials like environmentally friendly charcoal (briquettes) can be made from the dried sludge from the sewer treatment ponds, this will create more employment to youth groups or any other empowerment group around Ravine.

10.0 MIN-03- The reports required (ESIA and RAP)

The environmentalist informed the meeting that they were going to prepare two reports that would eventually help with the final preparation of the final design and tender documents of the project. The reports are *Environmental and Social Impact Assessment Report* (ESIA) and *Resettlement Action Plan* (RAP)

He added that the ESIA would capture all the anticipated environmental and social impacts of the project and give mitigation measures that should be put in place to address any issues that would come up. They were assured that all their opinions and concerns would be incorporated into the report so as to ensure that the project would run smoothly. Some of the environmental issues likely to occur were mentioned below;

Likely Sewer Impacts to Environment (Natural and Social)

- Effects to Air Quality- This would result around the treatment ponds as bad odour could be felt if proper measures aren't put in place like setting up buffer zone from the nearest homes, planting of trees to act as wind breakers around the ponds, ensuring that the treatment works is operating optimally.
- Effects to water quality- since the treated waste water would eventually be released into River Kamelilo, proper analysis has to be done to ensure that the water doesn't have heavy metals as it gets in the water body. This can be achieved through planting of bamboo trees or papyrus reeds to clean the effluent further. The trees absorb any harmful metals in the treated waste water.
- Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the project.

He further added that all these impacts would be addressed comprehensively by the ESIA report.

The second report he talked about is a Resettlement Action Plan (RAP). He explained to the meeting that this would capture all those likely to be affected by the project in one way or the other. The consultant's sociologist together with the RAP expert would go to the ground and take details of the affected land, structure and tree owners, then at an advanced stage a meeting will be held with them to discuss compensation methods. That those who had structures on riparian land wouldn't be compensated for land, but given notice to vacate. He added that government land rates would be used in the process of compensation in land, while gazetted Kenya Forest rates would be used to pay those whose trees will be affected.

He assured all in attendance that this process would be fair so as not to exclude anyone who genuinely is affected by the project. He concluded by thanking them for listening to his agendas, and gave the floor back to the area Chief who opened the plenary session.

11.0 MIN-04- Plenary Session

After discussion summarized in minutes 2,3 and 4 above, the community were invited to a question and answer session under the guidance of the area chief. Detailed questions and suggestion of the plenary session are presented in **Table 1** on **Page 5**.

Table 1: Plenary Discussion

Suggestion / Question	Response
A Resident in attendance welcomed the proposed project and called for inclusive consultations so that all stakeholders within the area are given an opportunity to air their concerns. He wanted to know when the project is likely to start since The water table in the area was high which leads to fast filling up of pit latrines and septic tanks The resident also wanted to know if land for the treatment works was available or it was to be acquired from private owners.	Members were informed that at this stage, the consultant was only doing design for the sewer system, the designs are supposed to be ready by end of the year 2020 and submitted to the client (RVWWDA). The client will then look for funding and determine when project implementation starts. Members were also informed that a preliminary design has been done for a gravity sewer system and a privately owned parcel of land identified for the treatment works. Land owners will be engaged for possible acquisition.
A resident in attendance wanted to know what will happen in the event an affected land owner refuses to allow acquisition of wayleave	Residents were informed that this project is dependent on goodwill of residents, acquisition of wayleave will be based on negotiations as opposed to compulsory acquisition. Any aggrieved party will be given an opportunity to air there grievance through grievance redress committees that will be formed for the project.
A resident wanted to know the wayleave width that will be acquired for laying of pipelines. He also wanted to know if there is any activity allowed to be conducted on the wayleave	Residents were informed that the wayleave for the secondary lines will be about three metres wide while for the trunk mains will be about six metres wide. Residents were informed that it is best practice to leave wayleaves clear so that in the event maintenance is required, they will not experience loss of property. However they were informed that they were free to plant seasonal crops like animal fodder but not to put up structure and plant trees on the wayleave.
A community member wanted to know if the sewer will be free or if it has any charges He also wanted to know what is being done to improve the water situation which is not adequate at the moment	The meeting was informed that the objective of the government is to bring services closest possible to citizens and that's what CRWWDA aims to achieve. After now the main infrastructure is put in place residents will be required to apply for the service from Chemususu Water and Sewerage Company who will give a quotation for the connection. A monthly charge is usually added on water bill for sewer. On water situation residents were informed that there is an ongoing water project being done by Chemususu water and sewerage company. Once the works are done, the county will initiate last mile connectivity they will ensure residents are

	connected to the distribution network
Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for the job opportunities for consideration. Those that will get these job opportunities were encouraged to work responsively to avoid termination before the project is complete.

12.0 MIN-05- Adjournment

The meeting was adjourned at 3pm by a word from the Ward Admin for Lembus Central, who appreciated the people present and added that the County Government was all aware of the project and would give it maximum support when the implementation stage came. She urged the people to be more open to receive projects as the main objective was to improve their living conditions and that her office was ready to serve any of them. Finally, she called the chief who invited the spiritual leader to close the meeting with a word of prayer.

SAMPLE PHOTOS OF THE MEETING

The area chief giving his opening remarks.

One of the elders asking about the sewer project to the consultant

The consultant's representative Mr Obra addressing some of the issues raised.

Mr Greg TM Chemususu Water Co. giving a project brief with the locations likely to be served

The town admin enlightening the people about the benefits of the municipality

Part of the people in attendance

MORINGWO PRIMARY SCHOOL MEETING ATTENDANCE LIST

CONSULTANCY SERVICES FOR FEASIBILITY STUDY, DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR ELDAMA RAVINE SEWERAGE PROJECT

CONTRACT NO. RVWSB/KTSWSSP/C/ELDAMA RAVINE /2017 – 2018

Public Participation Attendance ESIA/RAP

DATE 22/01/2020 Venue MORINGWO PRIMARY SCHOOL

NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
1	John K. Ruto	0725509645	Area chief Location	
2	Julius K. Sameen'	0721654477	Elder	
3	RAYMOND K. TANUI	0707611356	VILLAGER	
4	KENNETH KOSKEI	0723635296	VILLAGER	
5	JENNIFER TAKLAM	0723841847	VILLAGER	
6	Reggie yegon	0700828890	Villager	
7	NANCY CHUMBA	0727079475	VILLAGER	
8	PURITY ROTICH	0725968422	WARD ADMINISTRATOR	
9	EDWIN CHUMBA	0728006406	VILLAGER	
10	Dominic Sang	0720767066	" "	
11	SIMON BIRIR	0711327801	VILLAGER	
12	JULIUS KOSKEI	0728551594	" "	

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NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
13	JOHN KIPKOECHEM	0798 132 710	Villager	[signature]
14	RODGERS CHERUTICH	0710284634	"	[signature]
15	Collins Juma	0711806553	Socialogist	[signature]
16	REV GIDEON KOECH	0721430656	Spiritual leader	[signature]
17	EVANS K. Bomett	0728043924	Resident	[signature]
18	James K. Milei	0717114540	Resident	[signature]
19	RICHARD KOROS MAITO	0720 885862	Resident	[signature]
20	Gilbert Chumba	0720430077	Resident	[signature]
21	Stanley K. Lagat	0724 037 905	Resident (MORINGWO	[signature]
22	Philip K. Ngetich	0721-605792	Resident	[signature]
23	SAMUEL K. CHEBIMO	0701654802	Resident	[signature]
24	GREIG KIPYATICH	0723751815	Chemususu company	[signature]
25	Bismarck K. Kosgei	0728723294	Bca. Town Admin E/Ravine	[signature]
26	Omar Mmaitsi	0729766000	Environmentalist	[signature]
27	EMMILY TALLAM	0724717476	[illegible]	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) REPORT FOR ELDAMA RAVINE SEWERAGE PROJECT

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 23RD OCTOBER 2020 AT A.I.C CHEPSITO

13.0 MIN-01- Introduction

The meeting was called to order by the acting chief Perkera Location at 11am, he invited the church pastor to start off the forum with a word of prayer. In his opening remarks, the area chief gave the apologies to the people for the late start of the meeting as the County leadership had a small meeting with the Chemususu Water Company management. He welcomed all that had taken their time to attend the meeting as the discussions about sanitation would be of great importance to the location in future. The chief added that the project would have both negative and positive effects to the people and both needed to be addressed before commencing. He then invited the Perkera location chief *Mr Gideon* to give a few remarks.

The chief started by welcoming the consultant's team and the Sub-County leadership which was in attendance to the meeting, and also appreciated all the people in attendance. He talked about the need to be responsive and positive towards all government projects that were coming their way as it would eventually improve their lives. He reminded them about the importance of education as he was very surprised that some parents had decided not to take their children back to school even though the Government had given a nod for the resumption. Those in attendance were urged to tell the chief of any family whose grade 4, grade 8 and form 4 child wasn't in school. He finished by telling the community about the need to open up the roads as the county government had advised them. The space created would be used to implement government projects such as drainage, fiber optics, sewer system and many more. He returned the program to the acting chief who invited a representative from Karen Roses *Mr Kabogo* to say a few remarks.

The flower farm representative appreciated the invite from the chief and acknowledged there good working relationships with the area leadership and the community around them. He also added that the sewer project would really help open up the area and bring many investors around. They would support the consultant's team in any way possible as part of the secondary laterals were passing in their land. He gave the program back to the acting chief who then invited the Chairman *Skyline Sacco* an elder to say a few words.

The elder put weight in the need for the community to come together and support projects given to them by the national and county governments. He added that a sewer system would increase the value of their land and give them many benefits especially to the coming generations. He finished by welcoming all the visitors to their area and gave the floor to the chief who invited the ward administrator *Mr Tallam* to talk to the people.

The ward admin started by saying that the sewer project was very timely as Ravine Town was really growing and a process to elevate it to a Municipality was already ongoing with a consultant given the work to design the amenities required. In addition, the town was really growing in population since the last census and lots of investments in terms of development were coming up hence a sewerage project would really benefit the town. The Ward admin reminded the people in the meeting how costly it is to exhaust the waste from the septic tanks and even getting a place to dump the waste from the town into neighboring counties is a huge problem. He affirmed that such development will create direct and indirect job opportunities to youths and women ultimately contributing to improvement of living conditions of the people of Perkera Ward. He welcomed the Managing Director for Chemususu Water and Sewerage Company Mr Koech and requested him to give his introductory remarks.

Mr Koech (MD Chemususu Water and Sewerage Company) thanked the public for availing time to come and participate in the ESIA/RAP public participation forum. The *MD* emphasized that residents should use the forum to openly share their views and opinion with regards to the proposed sewer project. He also reminded the gathering of the ongoing Chemususu Water Project that was going to add a lot of water to the area and it was almost complete. With that in mind, almost 80% of the water is expected to become waste water necessitating the need to have a comprehensive sewer system. He added that a project of this nature within their town is an opportunity brings employment opportunities to qualified persons, additional investments especially in the real estate and all these would improve the economy of Ravine.

He gave a brief about where the project would cover and the road reserves or private land likely to be used in laying of the secondary laterals as the main trunk would ran along the river riparian (kamelilo river) and (perkera river). The MD added that some members had encroached the riparian area and made temporary structures on it, he discouraged this habit as the land was meant to be left free. Lastly he welcomed the consultant team from Professional Consultants to the town and invited *Mr Obra M'Maitsi- an environmentalist* to take the floor and to give an overview of the Project with regards to the funding, importance of the sewer system, the reports they were required to write and associated impacts to social and natural environment.

14.0 MIN -02- Project Funding

Mr Obra thanked everyone for attending the forum and informed them that the project was being funded by the African Development Bank who had given the funds to the Ministry of Water and Sanitation who in turn allocated it to the Rift Valley Water Works Development Agency (CRVWWDA) for a project called *Kenya Towns Sustainable Water Supply and Sanitation Program(KTSWSSP)* and this is where Eldama Ravine town was identified to be among the towns that needed its sanitation improved. He added that since the town was growing at a first rate the project would really help with the expansion.

15.0 MIN -03- Importance of the Sewer

He noted that input from stakeholders during ESIA process is important and is required during finalization of Project designs and also help in development of impacts mitigation measures. He informed the gathering that they were among the stakeholders selected to be consulted with the regards to the above described project.

Mr Obra gave a brief of the scope of works that will be entailed in the project with regards to benefits and reminded them that the main importance is better handling of liquid waste from their houses and business establishments. Others are summarized below.

Sewer benefits.

k) Improve the value of land around the area, as investors would take note of the extra sanitation solutions offered.
l) Improved sanitation in households and business premises hence clean environment
m) During the project implementation phase, it will provide direct employments and generate indirect employment for the people around during construction and operation stage. This will ultimately translate into economic growth of the town.
n) Reduction of water borne diseases resulting from waste water
o) Materials like environmentally friendly charcoal can be made from the dried sludge in the sewer treatment ponds, this will create more employment to youth groups or any other empowerment group around Ravine.

16.0 MIN-03- The reports required (ESIA and RAP)

The environmentalist informed the meeting that they were going to prepare two reports that would eventually help with the final preparation of the final design and tender documents of the project. The reports are *Environmental and Social Impact Assessment Report* (ESIA) and *Resettlement Action Plan* (RAP)

He added that the ESIA would capture all the environmental and social concerns of the people and give mitigation measures that should be put in place to address any issues that would come up. They were assured that all their opinions and objections would be put in the report so as to ensure that the project would run smoothly. Some of the environmental issues likely to occur were mentioned below;

Likely Sewer Impacts to Environment (Natural and Social)

- Effects to Air Quality- This would result around the treatment ponds as bad odour could be felt if proper measures aren't put in place like setting up buffer zone from the nearest homes, planting of trees to act as wind breakers around the ponds, ensuring that the treatment works is operating optimally.
- Effects to water quality- since the treated waste water would eventually be released into River Kamelilo, proper analysis has to be done to ensure that the water doesn't

have heavy metals as it gets in the water body. This can be achieved through planting of bamboo trees or papyrus reeds to clean the effluent further. The trees absorb any harmful metals in the treated waste water.

- Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the project.

He further added that all these impacts would be addressed comprehensively by the ESIA report.

The second report he talked is the RAP report. He explained to the meeting that this would capture all those likely to be affected by the project in any way or another. The consultant's sociologist together with the RAP expert would go to the ground and take details of the affected land, structure and tree owners, then at an advanced stage a meeting will be held with them to discuss compensation methods. That those who had structures on riparian land wouldn't be compensated for land, but given notice to vacate. He added that government land rates would be used in the process of compensation in land, while gazetted Kenya Forest rates would be used to pay those whose trees will be affected.

He assured all in attendance that this process would be fair so as not to exclude anyone who genuinely is affected by the project. He concluded by thanking them listening to his agendas, and gave the floor back to the ward administrator who opened the plenary session.

17.0 MIN-04- Plenary Session

After discussion summarized in minutes 2,3 and 4 above, the community were invited to a question and answer session under the guidance of the chief and the Ward admin *Mr Tallam,* the Ward administrator. Detailed questions and suggestion of the plenary session are presented in **Table 1** on **Page 5**.

Table 1: Plenary Discussion

Suggestion / Question	Response
A Resident in attendance welcomed the proposed project and called for inclusive consultations so that all stakeholders within the area are given an opportunity to air their concerns. He wanted to know when the project is likely to start since The water table in the area was high which leads to fast filling up of pit latrines and septic tanks The resident also wanted to know if land for the treatment works was available or it was to be acquired from private owners.	Members were informed that at this stage, the consultant was only doing design for the sewer system, the designs are supposed to be ready by end of the year 2020 and submitted to the client (CRVWWDA). The client will then look for funding and determine when project implementation starts. Members were also informed that a preliminary design has been done for a gravity sewer system and a privately owned parcel of land identified for the treatment works. Land owners will be engaged for possible acquisition.
Residents wanted to know what will happen in the event of sewer blockages and breakages and also if the trunk will have any effects to the stream.	Residents were informed that supervision will be done properly during project implementation to ensure quality works is achieved, quality work will reduce the issue of blockages and breakages of the lines. In the event of blockages, residents were informed that the project will be operated by Chemususu water and Sewerage company,

	residents are encouraged to report any leakages as soon as possible for timely intervention.
A resident from the village where the sewer treatment plant has been proposed to be done protested that they have never been informed of the plans formerly She also lamented that the sewer treatment plant will affect quality of air in the area	Residents were informed that this meeting was an initial one to inform the entire public about the proposed project. The nest step will be to used the survey data provided to identify Project Affected Persons (PAPs) and make an inventory of their assets. This process will identify the actual affected persons for further engagement. She was also informed that there will be a buffer zone established from the ponds to the nearest homestead, also trees will be planted around the pond to act as wind breakers thereby reducing odour reaching homesteads.
Residents wanted to know how graves will be handled in the event they are within the proposed land for the treatment works. They also wanted to know what will happen to there areas of prayers and shrines in the event that they are affected by the proposed project	Residents were informed that the graves will be handled on a case by case basis depending on cultural and religious beliefs of different families. The client will facilitate the families accordingly. The issue of shrines and prayer centers will also be handled in the same way basing on elders advice.
Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for the job opportunities for consideration. Those that will get these job opportunities were encouraged to work responsively to avoid termination before the project is complete.

18.0 MIN-05- Adjournment

The meeting was adjourned at 3pm by a word from the Sub-County Administrator who emphasized the need for the people to take the Covid-19 virus very seriously. He pointed out that people no longer took precautions like sanitizing or wearing proper masks and this was becoming very dangerous. He added that the ongoing expansion of Ravine Town would benefit all of the community around the area as more services will come to the ground and the sewer project was just one of them. The administrator urged the people of Perkera ward to take up tree planting seriously as it had many advantages both to them and the environment at large. Lastly he urged the people about the need to stay closer to town where many services like hospitals, banks, water are very close, he had noted that the community around liked to stay far away from the roads. He thanked the consultant and the water company for organizing the forum and challenged them to do more thorough public participations for their upcoming projects. He then gave the floor back to the chief who invited the church pastor to close with a prayer.

SAMPLE PHOTOS OF THE MEETING

The acting chief officiating the meeting.

The town admin addressing the crowd.

The consultant's representative giving a project overview and scope of works.

Some of the elders in attendance being identified by the chief.

The ward admin Mr. Tallam giving his remarks.

Chemususu Water Company MD addressing the crowd.

ATTENDANCE LIST PEKERRA LOCATION MEETING

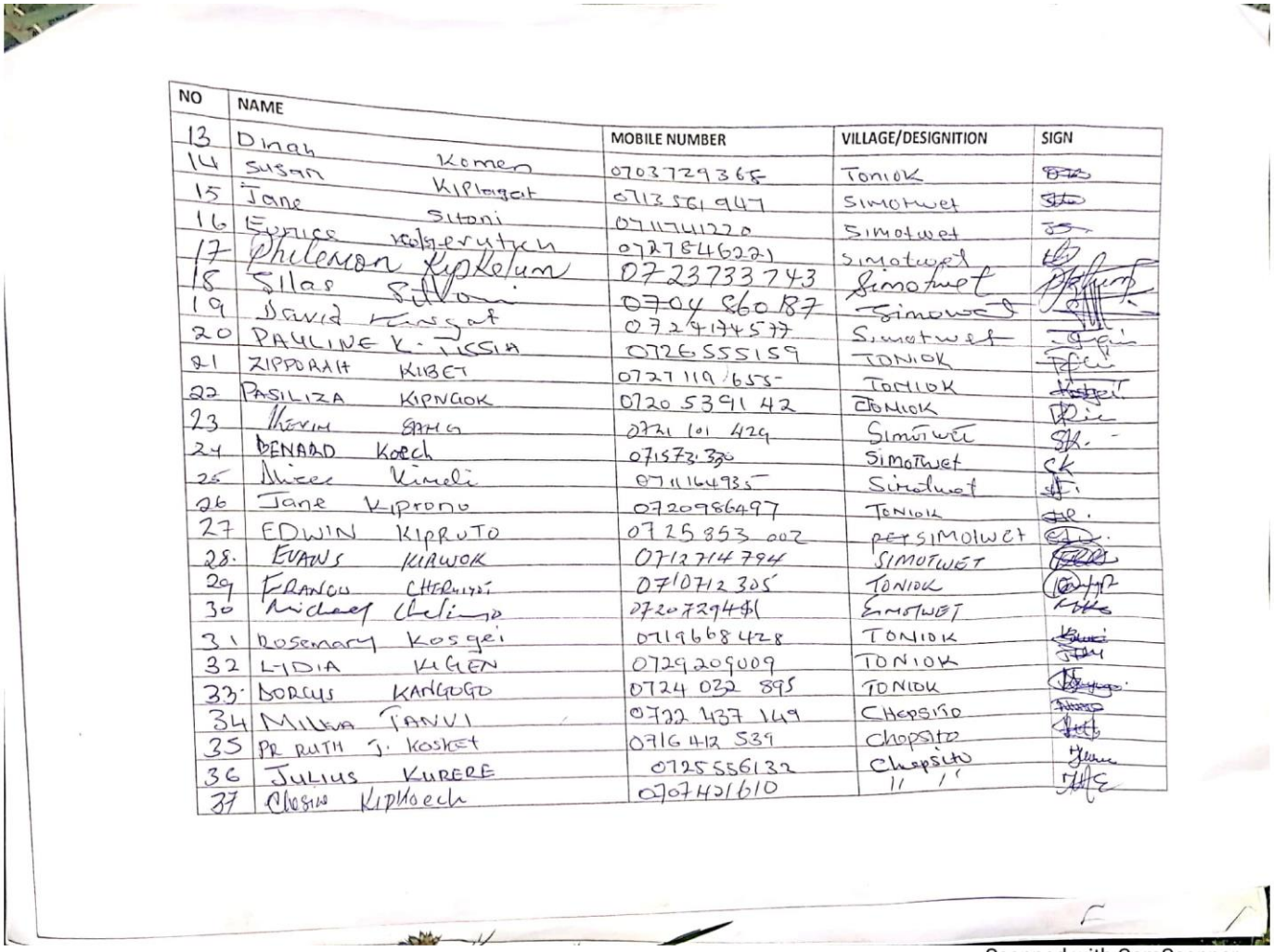
CONSULTANCY SERVICES FOR FEASIBILITY STUDY, DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR ELDAMA RAVINE SEWERAGE PROJECT

CONTRACT NO. RVWSB/KTSWSSP/C/ELDAMA RAVINE /2017 – 2018

Public Participation Attendance ESIA/RAP

DATE 23/10/2020 **Venue** AIC CHEPSITO CHURCH - PERKERA LOCATION

NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
1	JOSEPH K. CHIRCHIR	0722702137	SIMOTWET	
2	LODENGO KIPTURU	0720054616	Chesito	
3	DESMOND BOLT	0723 584004	TONJK	
4	DOMINIC KIPROTICH KIPTOOR	0725842864	TONJK ENVIRONMENTALIST	
5	William Borvett	0722476011	Chepsito	Borvett
6	Karani Toroitich		Simotwee.	Karani.
7	Alfred Cheruiyot	0715345432	Chepsito	
8	Chebet Rono	0714855376	Simotwee.	
9	Noah Kolfasa	0710197327	Simotwet	
10	Solomon Toroitich	0723457760	Simotwet	
11	Gideon Chemjor	0720476805	Trikwen/Chepsito	
12	Sheila Jepkoech Tonkwo	0710510128	Kapdening	



NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
13	Dinah Komen	0703729365	TONIOK	
14	SUSAN KIPlangat	0713561947	SIMOTWET	
15	Jane Sitoni	0711741220	SIMOTWET	
16	Eunice [illegible]	0727846221	Simotwet	
17	Philemon Kipkelum	0723733743	Simotwet	
18	Silas Sitoni	0704 860 187	Simotwet	
19	David Kingat	0724174577	Simotwet	
20	PAULINE K. TISSIA	0726555159	TONIOK	
21	ZIPPORAH KIBET	0727119655	TONIOK	
22	PASILIZA KIPNGOK	0720 53911 42	TONIOK	
23	Kevin [illegible]	0721 101 429	SIMOTWET	
24	DENADD Koech	0715732320	SIMOTWET	
25	Moses Kimeli	0711164935	Simotwet	
26	Jane Kiprono	0720986497	TONIOK	
27	EDWIN KIPRUTO	0725353002	PET SIMOTWET	
28	EVANS KIAWOK	0712714794	SIMOTWET	
29	FRANCIS CHERUIYOT	0710712305	TONIOK	
30	Richard Cheruiyot	0720729481	SIMOTWET	
31	ROSEMARY Kosgei	0719668428	TONIOK	
32	LYDIA KIGEN	0729209009	TONIOK	
33	DORCAS KANGOGO	0724 032 895	TONIOK	
34	MILLY TANUI	0722 437 149	CHEPSITO	
35	PR RUTH J. KOSKEI	0716 412 539	Chepsito	
36	JULIUS KURERE	0725556132	Chepsito	
37	Cheruiyot Kipkoech	0707431610	" "	

NO	NAME	MOBILE NUMBER	VILLAGE/DESIGNITION	SIGN
38	Bernard Kopie	0725678218	TRIKWEN	
39	James Onamu Chemuchuu	0713016458	Chepsito	
40	Samoei Joseph	0716825120	TONIOK	
41	WESLEY KENIANY SEREM	0711602711	CHEPSITO	
42	Peter. Kavani	0725115946	SIMOTWET	
43	David K. Chilgong.	0721926377	Milimani	
44	Kalogo-Leonard	0722 344055	KAREN ROSES	
45.	Biny Cheleget	0720335912	KABURASO	
46	KELVIN SEREM	0222222202	CHEPSITO	
47	Pastor Simon Kosiey	0710972691	Chepsito	
48	Ulan Jator	0711601673	Chepsito	
49	Easter cherogony	.	simotwet	
50	Ruth Jepngetich	0743865377	Chepsito	
51	Collins Juma	0711806553	sociologist	
52	Josphat Chemyot	0720422005	Chepsito	
53	Billy Ki BIRIR	0727950713	Simotwet	
54	Kiplimo Sitton	0724 494 814	Simotwet	
55	Richard chebutuc	0713704882	simotwet	
56	Ken Chirchir	0714983175	simotwet	
57	David Ngeno	0720269031	Kaptumbu	
58	Robinson Serem	0721 890 582	Chepsito	
59	Evans Kipngok	0728 806 831	Chepsito	
60	Bismark Kosgei	0728733290	Town Admin-E/Ravine	
61	Jallam C. Paul	0723 423 578	Ward Admin. Ilp/Rawa	
62	Aengwo Dandi	0723 203574	Sub-County Admin	

Annex 2:

Chance Find Procedures

CHANCE FIND PROCEDURES

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT

ELDAMA RAVINE 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 Baringo County Government will be contacted immediately for appropriate reburial.

Annex 3:

Lead Expert License 2020

FORM 7 (r.15(2))

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