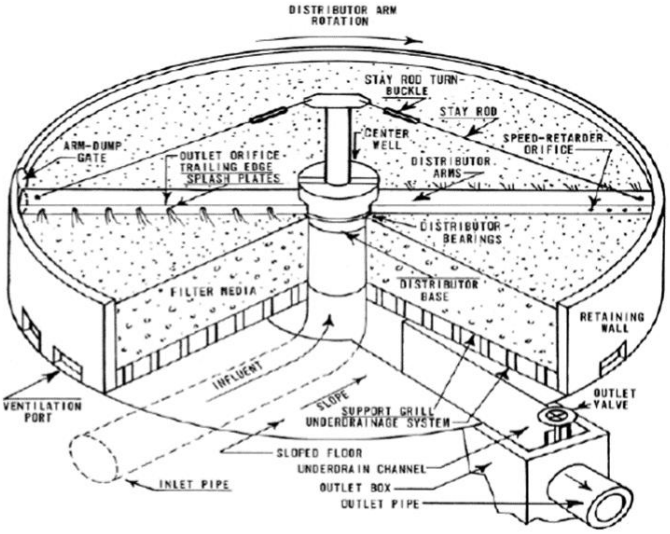
Government of Kenya

Tana Water Works Development Agency

African Development Bank

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED RUNYENJES SEWERAGE PROJECT



ESIA STUDY REPORT

Proponent:	Firm of Experts (Reg. No. 12508)
Chief Executive Officer Tana Water Works Development Agency P.O. BOX 1292 – 10100 **NYERI KENYA** Tel: 061-2032282	**Greenville Nexus International Ltd** P. O. Box 50173-00100, Nairobi. Tel: 0700 130 101/0725928477 Email: info@greenvilleint.com/greenvilleint@gmail.com Suraj Plaza Suite 504 along Limuru Road Website; www.greenvilleint.com

October 2024

FACT SHEET

Project name	Runyenjes Town Sewerage Project
Assignment Name	Environmental and Social Impact Assessment (ESIA) -Project Study Report
Location	Runyenjes Sewerage Project area is in Runyenjes constituency, Embu East sub county in Embu County
Project Description	The sewerage system shall consist of the following components. • Sewer lines • Exhauster bay • Inlet works with mechanized coarse and fine screens. • 2 No Primary and 2 No intermediary sedimentation tanks • Retention/emergency pod • 2 No High and 2 No low rate trickling filters • 2 No Final humus tank • Chlorination channel • Treated effluent discharge structure. • 4 units sludge digester and drying beds • 3 pumping units • Offices, laboratory, junior and senior staff houses • Suspended solids drying area and incinerator for burning solids
Project Cost	**Five hundred and eight million, two hundred and thirty-one thousand eight hundred shillings and thirty-eight cents (Ksh. 508,231,800.38)**
Address of the Proponent	Chief Executive Officer Tana Water Works Development Agency P.O. BOX 1292 – 10100 **NYERI KENYA** Tel: 061-2032282
Firm of Experts	**Greenville Nexus International Ltd** P. O. Box 50173-00100, **Nairobi**. Tel: 0700 130 101 / 0725928477 Email: info@greenvilleint.com / greenvilleint@gmail.com

CERTIFICATION

For and on behalf of:

TANA WATER WORKS DEVELOPMENT AGENCY. P.O. BOX 1292 – 10100 NYERI KENYA

This Environmental and Social Impact Assessment (ESIA) Comprehensive Project Report was prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental Impact Assessment and Audit Regulations 2003 (revised 2015 & 2019) to meet the statutory requirements for the implementation of projects under schedule II. We, the undersigned, confirm that the contents of this report are a true representation of the ESIA process for ***Proposed Runyenjes Sewerage Project area is in Runyenjes constituency, Embu East sub county in Embu County.***

FIRM OF EXPERTS

Greenville Nexus International Limited

Registration No: 12508

Lead Expert	**Lead Expert**
Name: Bernadett Wairimu Njoroge	**Name:** Simon Mwangi
Registration No: 7394	**Registration No.** 7772

Signature: ……..……. Date: ……

FOR PROPONENT
TANA WATER WORKS DEVELOPMENT AGENCY

Proponent Representative Name ……..……

Proponent Representative Title ……..……

Proponents Representative Contacts ……..

Signature: ……..……. **Date**: ……

Disclaimer
This Environmental Impact Assessment Report is being submitted in accordance with the terms and conditions of contract in respect of provision of consultancy services. It has been carried out in full observance of the EIA regulations and in compliance with the Environmental.

EXECUTIVE SUMMARY

Background

Tana Water Works Development Agency (TWWDA) is one of the nine Water Works Development Agencies (TWWDAs) established under the Water Act, 2016 and whose areas of jurisdiction are Nyeri, Meru, Embu, Kirinyaga and Tharaka Nithi County.

Tana Water Works Development Agency endeavors to undertake the development of proposed Runyenjes Sewerage Project to improve water supply and quality for residents of Runyenjes, Embu County. The overall goal of this project is to develop possible interventions to improve hygiene, sewage and faecal sludge management services.

Objectives

The principal objective of the ESIA study was to highlight the possible positive and negative environmental and social impacts expected during the establishment and operation of the proposed project, with the aim of proposing the possible mitigation measures to the negative impacts. This is in line with ensuring that such a development does not negatively impact the environment in terms of social, health, economic and physical (soil, water, plant, and animals) state of the area. The study has identified the possible environmental impacts during the construction, implementation, and operational phases of the project. The exercise was carried out in accordance with the National Environmental Management Authority (NEMA), Environmental Impact Assessment and Audit Regulations and guidelines.

Scope of work

The Environmental and Social Impact Assessment study included:

- Analysis of the socio-economic and socio-environmental status of the areas during pre and post construction- and thus justify development of the proposed project.
- Assessment of the Community's capacity to implement the proposed mitigation measures, and make appropriate recommendations, including potential capacity building and training needs and their costs.
- Preparation of an Environmental and Social Management Plan (ESMP) based on the Environmental baseline survey.
- Evaluation of the Social Impact and how the Communities in the area will benefit or lose upon implementation of the project.
- Based on the information collected from the Social Economic Baseline Survey, in the report the expert has shown how the identified adverse effects will be mitigated.
- The expert also consulted key stakeholders through interviews, focus group discussions, and public barazas. Records of public consultations are provided in the appendices.

ESIA Methodology

The study approach and methodology for this exercise were structured such as to cover the requirements under the EMCA, 1999 as well as the EIA/Audit regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, public consultation (which included discussions with local administration and the community), photography, as well as discussions with the Proponent.

The key activities that were undertaken during the assessment included:

- Literature Review: A detailed review of available documentation.
- Consultations with the Proponent and regarding the proposed project details, the site planning, and implementation plan.
- Interviews and consultations with the community and other project stakeholders.
- Data collection and physical inspections of the proposed site.
- Evaluation of the activities around the site and the environmental setting of the wider area through physical observations as well as from existing information in literature; and
- Reporting, review, and submissions

Project Location

Runyenjes WWTP is located at Latitude: -0°27'05.24"S Longitude: 37°34'10.84"E and an altitude of 1374m asl. and lays on the wind-wide side of Mt. Kenya and about 25 km from Embu town along the Nairobi-Meru-Isiolo road and 4km from Runyenjes town.

Runyenjes town is currently served with water by Kyeni Water and Sanitation Company whose intake lies at Thuci River. Kyeni Water & Sewerage Company (KYEWASCO) is one of the Water Service Providers.

The town currently has no planned system for treating the wastewater generated in public areas. Majority of these properties are served by pit latrines, soakage pits and septic systems. The scope of the proposed conveyance system includes approximately 12.3 km of sewer network with concrete pipes of various sizes ranging from 300mm to 400mm diameters, and ancillary facilities.

Project Description

The proposed sewage treatment system has been designed for a design peak flow of 3,000m^3/day. The system comprises of inlet works, sedimentation tank, high rate trickling filter, intermediary sedimentation tank, low rate trickling filter and the final humus tank, chlorine contact channel, wetland, river inlet structure, sludge digester, sludge drying beds, solid waste drying structure, and incinerator of solid waste.

The administration structures include office with a laboratory, staff houses, guard houses and fence. The land available is 8.6 acres of land is available for construction of treatment works.

The potential catchment areas to be considered under this proposal and are included in the sewer collection system Runyenjes Town, Mwenendenga, Gitare and Mbiruri.

Summary of Project Activities

(i) Preconstruction phase

Project preconstruction activities are important in the lifecycle of the project. This phase sets the groundwork for successful project execution, ensuring that all necessary preparations are made before actual construction begins. The key activities involved in the preconstruction phase are:

- Project feasibility study and preliminary design
- Design, cost estimation and tender documents preparation.
- Permitting and Approvals
- Procurements

(ii) Construction Phase

- Preparation and transportation of pipe and other equipment and facilities.
- Clearance of vegetation within pipeline Right of way.
- Pipeline installation through cut and fill trenching.
- Pipeline welding and finishing.
- Pre-commissioning and commissioning, including hydro-testing.
- Construction camps for pipeline workers; and Offices and other facilities.

Need for Project

TWWDA has developed a strategic plan for the period 2023 – 2027 with the aim of improving access to water and sanitation services by increasing access to quality water services from 57.8% to 90% over the planning period. The Project is among the initiatives of the Board towards achieving the strategic goal above. The Project addresses improved water supply, in small towns and surrounding rural areas, as well as water storage that underpins the Kenyan economic and social developments (Vision 2030) and its associated Medium-Term Plan (MTP) IV, Bottom-Up Economic Transformation Agenda (BETA), Sustainable Development Goal (6) which is the new 2030 agenda and expands Millennium Development Goal (MDG) as guided by resolutions of Rio+20 conference. The goal focuses more on investment in adequate infrastructure in Water, Sanitation, Hygiene, Water Quality, Wastewater Management, Water Scarcity and use Efficiency, Integrated Water Resource Management and Protection of Water related Ecosystems.

Policy, Legal and Regulatory Framework

The Kenya Government policy on all new projects or activities requires that an environmental impact assessment be carried out at the planning stages of the proposed undertaking to ensure that significant environmental and social impacts are taken into consideration during the planning/design, construction, operation and decommissioning of the facility. The project underwent screening process which identified the proposed Project as ***High-Risk Project*** as per the 2nd schedule of Environmental Management and Coordination Act (EMCA Cap 387) – amendment via legal notice no. 31 – April 2019. Additionally, the project also falls under category 2 of the Africa Development Bank Environmental and Social Safeguards Policies as defined in the Bank's Operational Safeguards (OSs). The project does not lead to displacement of Project Affected Persons (PAPs). This report has been prepared for submission pursuant to Regulation 7 (4) of the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 of the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019.

The African Development Bank (AfDB) Integrated Safeguards System (ISS)

The African Development Bank (AfDB) Integrated Safeguards System (ISS) are designed to promote the sustainability of project outcomes by protecting the environment and people from the potentially adverse impacts of projects. ***Table 0.1*** presents the applicable AfDB Integrated Safeguard System and their relevance to the proposed project.

Table 0.1: Applicable AfDB Integrated Safeguard System and their relevance

Policy	Relevance
OS 1: Environmental and Social Assessment	The Project components will trigger OS 1, the assessment identified that According to OS 1 screening provisions, Runyenjes Sewerage Project is a Category 2, the project is likely to have detrimental site-specific environmental and/or social impacts that are less adverse and largely reversible, and readily minimized by applying appropriate management and mitigation measures. Mitigation measures for impacts identified are detailed in chapter 6 of this report.
OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation	The policy aims to avoid involuntary resettlement where feasible, or minimize resettlement impacts where involuntary resettlement is deemed unavoidable after all alternative project designs have been explored. For Runyenjes Sewerage Project a RAP has been prepared to protect the rights of the affected person(s). Impact crops/trees / structures/fences will be identified along the easement to be used by water pipelines.

Policy	Relevance
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 project works might result in loss of vegetation diversity which provide habitat to wildlife and other related ecosystems benefits. However, the impacts to biodiversity by the above-described works will be less significant as detailed in Chapter 7 of this report.
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, EMSP prepared for operation phase provides for measures to be adopted to ensure efficient function of the Plant consequently reducing emission of methane and hydrogen sulphide gases. Also, the Project design has ensured that sewer flows through by gravity hence reducing the need for pumping.
OS 5: Labor 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 Labor Relations Act 201 will be applied by labor force on site in addressing disputes related to working conditions.

Stakeholder Consultations

Stakeholder consultations and public participation were conducted during the ESIA study with the following objectives:

- Disseminate and inform the public and stakeholders about the project with special reference to its key components and description.
- Create awareness among the public on the need for the ESIA for the proposed project.
- Gather comments, suggestions, and concerns of the interested and affected parties.
- Incorporate the information collected in the ESIA.
- Build community consensus and acceptance of the proposed project.

ESIA questionnaires were administered, to gather information from key stakeholder and the members of the public. This was done using structured questionnaires to assess the environmental and socio-economic views of the respondents. **36% of the responds were female while 64% were male.**

Some of the **positive social economic and environmental impacts** outlined by the respondents are summarised below:

(i) **Job Creation:** The construction stage is likely to create employment opportunities for local workers, contractors, and service providers.

(ii) **Boost to Local Economy:** Increased demand for local goods and services during construction can help stimulate the local economy.

(iii) **Improved Infrastructure:** The project may lead to improvements in roads and other infrastructure, benefiting the community at large.

(iv) **Enhanced Sanitation:** During the operation stage, improved sewerage systems will likely reduce public health risks, benefiting the overall well-being of the community.

(v) **Property Value Increase:** The establishment of modern sewerage infrastructure can lead to an increase in property values in the serviced areas.

(vi) **Reduction in Pollution:** Improved sewerage management may lead to reduced contamination of local water bodies and the surrounding environment.

(vii) **Improved Public Health:** With better waste management, there could be fewer cases of waterborne diseases, positively impacting public health.

(viii) **Sustainable Resource Use:** During the operation phase, the project might promote efficient use of water and recycling of treated wastewater for agricultural purposes.

Some of the **negative social economic and environmental impacts** outlined by the respondents are summarised below:

(i) **Disruption to local businesses and residents:** Construction activities may cause temporary disruption to businesses, local traffic, and daily life due to noise, dust, and restricted access.

(ii) **Land acquisition issues:** The project might lead to displacement of families or businesses if land is required for construction, leading to social discontent.

(iii) **Environmental degradation during construction:** The construction phase could result in the destruction of vegetation, soil erosion, and habitat disruption.

(iv) **Noise and air pollution:** Construction activities typically involve heavy machinery, which may lead to noise and air pollution, negatively affecting local wildlife and human health.

(v) **Waste generation:** Both during construction and operation, there could be issues with waste management, especially if the handling of waste is not done properly.

(vi) **Water contamination risks:** There might be concerns about potential leaks or operational issues in the sewerage system, which could lead to contamination of local water sources if not properly managed.

Proposed Environmental and Social Management Plan

Impact Receptor	Potential Impact	Mitigation and Enhancement Measures	Estimated Costs (KES)
Planning Phase			
Human (Local community, Contractor workers)	Conflicts related to loss of Land, Land Use and Livelihoods	• Prepare a Resettlement Action Plan (RAP) for purposes of compensation on land acquired for treatment works & assets and crops affected where land will be acquired for wayleave purposes. • Prepare a Grievance Redress Mechanism (GRM)	To be determined after completion of the RAP exercise
	Conflicts arising from delays in compensation	• Proper planning to ensure compensation is done in the agreed manner prior to project implementation	To be determined after completion of the RAP exercise
	Conflicts arising where the project is passing through culturally sensitive areas such as graves	• Consultations with the local community, elders and local leaders on the way forward • Facilitating cultural ceremonies such as cleansing ceremonies in line with the local cultures to pave way for grave relocation	To be determined after completion of the RAP exercise
	Conflicts arising from people living in areas not being served by the sewer project	• Public sensitization to the local community to understand the gravity supported sewer system being implemented. • Provide exhauster boosters for the unserved areas	To be determined based on availability of resources
	Risk of conflicts during workforce recruitment (discrimination, child labour engagement etc)	• Priority of employment to be given to the local people • Contractor to ensure equal opportunities in labor engagements for both men and women. • Contractor to adhere to the requirements of the Employment Act, Section 38 by keeping records of all workers engaged indicating date of employment, name, national ID number, age, sex, hours of work and wages paid. • Establishment of a project Grievance Redress Mechanism (GRM) • Sensitization of workers on the project Grievance Redress Mechanism (GRM)	350,000
	Potential risk of insecurity due to influx of job seekers	• Contractor to develop a Labor Influx Management Plan to manage influx of workers.	N/A
	Risks during construction of the Contractor' campsites	• Risk assessment for proposed campsite sites' which must be approved by the client. • Proper housekeeping measures to manage stock of materials. • Campsite not to be located in a highly inhabited site. • The campsite to be equipped with fire extinguishers. • Campsites must be well fenced and appropriate safety signages displayed in strategic locations. • Enforcement of speed limit of 20kph for vehicles within the campsite	5,000,000
Animals, plants and biodiversity	Visual impacts and loss of natural vegetation during campsite construction	• Vegetation clearance to be limited to the minimum required space. • Revegetation after construction activities	50,000

Impact Receptor	Potential Impact	Mitigation and Enhancement Measures	Estimated Costs (KES)
Construction phase			
Human	Delay in project implementation due to objections and stop orders	• The Contractor shall ensure that all pertinent permits, certificates, and licences have been obtained prior to any activities commencing on site and are strictly enforced/ adhered to. • The Contractor shall maintain a database of all pertinent permits and licences required for the contract as a whole and for pertinent activities for the duration of the contract	1,000,000
	Disruption of road users' movement on the road due to road closure or diversion during pipes' laying activities	• The client to seek necessary permits from authorities such as KERRA and KURA • Use of safety signage to guide road users to alternative routes on sections that may experience disruption	30,000
	Occupational health and safety risks	• Ensure that all construction machines and equipment are in good working conditions to prevent occupational hazards during excavation activities and laying of the pipes. • Establish a Health and Safety Plan 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 adequate manual labour to meet the requirements of the tasks. • Appoint a trained health and safety team for the duration of the construction work, monitor and advise appropriately on health and safety matters during the rehabilitation activities. • 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	500,000
	Dust pollution	• Vehicles and site trucks should be driven under the recommended speed of 40km/h within public areas such as schools, and markets. • Sprinkle water on degraded access routes to reduce dust emission during transportation of materials to project sites. • Provision of dust masks to workers working in dusty environs	250,000
	Noise pollution due to use of heavy machinery and earth moving equipment	• Discouraging hooting within public places or reserved places • Proper servicing of vehicles • Monitor noise levels at sensitive receptors (residential areas, schools, hospitals) • Use of hearing protective gears e.g. earmuffs and ear plugs by workers working in noisy environments • Inform residents when construction activities are likely to generate excessive noise in order to minimize disruption to local residents;	15,000
	Risk of gender-based violence/harassment/abuse	• All cases of gender-based violence (GBV) to be reported, investigated and resolved. • Sensitisation of workers on issues of GBV	15,000

Impact Receptor	Potential Impact	Mitigation and Enhancement Measures	Estimated Costs (KES)
	Public health risk; spread of HIV/AIDS, STDs and other communicable diseases	• Worker's sensitization on HIV/ AIDs and other STDs • Provision of condoms to workers • Distribution of HIV & AIDS awareness materials in collaboration with National Aids Control Council (NACC)	250,000
	Conflicts amongst workers and local communities	• Develop a GRM for workers. • Sensitization of workers on the project GRM and necessary procedures •	250,000
	Fire risks	• Provision of firefighting appliances in offices, stores, site vehicles • Regular training on fire risk reduction to workers during toolbox talks	120,000
	Poor hygiene and sanitation	• Provision of clean drinking water and sanitation facilities to workers at the workplace • Provision of mobile toilets and water for sanitation purposes	50,000
	Labor engagements risks	• Contractor to ensure equal opportunities in labour engagements for both men and women. • Timely payments to workers to be made in line with agreements	N/A
	Interruption of existing infrastructure such as roads, water pipes, internet cables	• Involvement of all parties utilising the road reserve to ensure minimum destruction during construction phase	30,000
	Solid waste generation	• A site waste management plan should be prepared by the contractor prior to commencement of construction works. • Proper solid waste receptacles and storage containers should be provided. • Arrangements should be made for the regular collection of litter and for its disposal with the County Government • Ensure that the solid waste collection, segregation, and disposal system is always functioning properly during the construction phase. • Recycle and re-use wastes where possible such as scraps metal.	50,000
	• Interference with physical setting • Blockage of natural drainage system at valley crossings. • Excavation for creation of access routes and related structures.	• The structures to be developed should be aesthetically acceptable to blend in with the surrounding. • The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations. • Restoration shall be undertaken to ensure that the original setting is as much as possible retained	N/A
	Water quality pollution risks	• 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.	20,000

Impact Receptor	Potential Impact	Mitigation and Enhancement Measures	Estimated Costs (KES)
Environment (Land, Biodiversity/ plants & animals, Water)	Drainage and Hydrology disruption	• Excavated channels to follow contours to avoid interference with surface drains. • Where necessary, the drains to be directed along the construction line towards existing drainage systems to cater for storm water during the rains. • Utilise excavated soil to level excavated ground where necessary and cover the sewer lines. • Construction materials and other debris (lime, cement and fresh concrete.) should be handled carefully to prevent them from finding their way into the nearby water sources	N/A
	Soil Erosion	• Re-plant the indigenous vegetation as much as practical once work is completed. • Limit vegetation clearance unless where unavoidable circumstances appear. • Contain excavated soils so that they will not find their way into nearby water sources. • Cement mixing should be done in a designated area away at a safe distance from storm water drains. • Spilled cement or concrete should be collected and disposed away from natural water ways or storm water drainage. • Sensitise workers and enable them to properly handle concrete spillages or waste cement. • Re-vegetation of exposed areas around the site should be carried out rapidly to mitigate against erosion of soil through surface water runoff and wind erosion	30,000
	Impact on natural vegetation	• Cutting of trees to be restricted to the wayleave area only. • Issuance of tree seedlings to PAPs and local community to compensate for the trees cut and increase forest cover	500,000
	Contamination of the soil, air and water by waste generated during construction works	• A site waste management plan to be prepared by the contractor prior to commencement of construction works. • Practicing 3Rs of waste management: reduce, reuse, recycle of materials. • Recycling of all E-waste	250,000
	Impacts on air quality from vehicle exhaust emissions	• Drivers shall not leave vehicles idling so that exhaust emissions are lowered. • Contractor to ensure that all machinery and equipment used on site are well maintained and in good working conditions to ensure minimum emissions are produced	N/A
Operation phase			
Human	Odour menace from leakage of the sewer pipelines	• Proper maintenance of the sewer infrastructure • Regular patrols to supervise leakages. • Installation of leak detectors	Operational Costs

Impact Receptor	Potential Impact	Mitigation and Enhancement Measures	Estimated Costs (KES)
Environment	Risk of encroachment and construction of structures on the sewer wayleave	• Mapping and installation of beacons which illustrate the width of the pipeline reserve. • Regular patrol of the pipeline corridor for encroachment • Prosecution of encroachers as required by County By-Laws on way leaves and road reserves maintenance. • Conduct public sensitization programs on way leave protection	To be determined
	Risk of vandalism of the infrastructure	• Put in place proper security measures to guard the infrastructure and reduce cases of vandalism. • Regular sensitisation of local community on importance of protection of the water infrastructure • Activate a community watch group for information sharing on the status of the water supply line	To be part of operational costs
	Contamination of soil and water from sewage leakages and overflows	• Regular monitoring and inspection of sewer lines to identify broken pipes and damaged manholes for repair or maintenance. • Use of high-quality materials that can withstand anticipated sewage loads and as recommended by the design engineers to prevent leakages and overflows. • Clear and unclog blocked sewer lines within the shortest time possible to contain sewage spills and overflows. • Clean and disinfect contaminated sites	To be established at operation phase and included in the operation of the projects

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PLATES

ACRONYMS

AfDB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CIDP	County Integrated Development Plan
CoK	Constitution of Kenya
DOSH	Directorate of Occupation Health and Safety
EDCP	Effluent Discharge Control Plan
EHS	Environmental Health and Safety
ESIA	Environmental and Social Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
GBV	Gender Based Violence
GHG	Green House Gases
HDPE	High Density Polyethylene Pipes
HIV	Human Immuno-deficiency Virus
KENHA	Kenya National Highway Authority
KERRA	Kenya Rural Roads Authority
KURA	Kenya Urban Roads Authority
KYEWASCO	Kyeni Water and Sanitation Company
MEAs	Multilateral Environmental Agreements
MWSI	Ministry of Water, Sanitation and Infrastructure
NCA	National Construction Authority
NEMA	National Environment Management Authority
NEAP	National Environmental Action Plan
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Act
PAPs	Project Affect Persons
PPE	Personal Protective Equipment
PRSP	Poverty Reduction Strategy Paper
RAP	Resettlement Action Plan
SDG	Sustainable Development Goals
TOR	Terms of Reference

TWWDA	Tana Water Works Development Agency
uPVC	Polyvinyl Chloride Pipes
WRA	Water Resources Authority
WSRB	Water Services Regulatory Board
WSTF	Water Service Trust Fund
WWTP	Waste Water Treatment Plant

1. INTRODUCTION

1.1 Background

According to WASREB Impact Report No. 15 of 2023, The population served with sewerage services remained at 16% despite the number of people served increasing by 5.7%. This increase was equivalent to 231,779 people which is low compared to the 459,781 increases in service area population. The total sanitation coverage remained constant at 93%.

Figure 1.1: Trends in water and sewerage coverage (Source: WASREB)

The Tana Water Works Development Agency (TWWDA) operates within Nyeri, Meru, Embu, Kirinyaga, and Tharaka Nithi County, established under the Water Act, 2016. The agency's mandates include the development, maintenance, and management of public water works. In response to the pressing need for improved sanitation services in Runyenjes town and its environs, the Runyenjes Sewerage Project will address these challenges when operational. Currently lacking a planned wastewater treatment system, the town relies on pit latrines, soakage pits, and septic tanks. This leads to inadequate disposal of wastewater and human waste, posing significant health and environmental risks. The proposed project, therefore, aims to address this issue by establishing a comprehensive sewerage system. The initiative is essential for controlling and treating effluents, preventing health hazards, and safeguarding aquatic ecosystems. With the population of Runyenjes town and its surrounding areas projected to grow, the proposed sewer system is poised to serve as a vital solution to the sanitation challenges. The project's scope includes a 12.3 km sewer network, with concrete pipes of varying diameters, and a sewage treatment system designed for a daily flow of 1500m^3. The system encompasses anaerobic and facultative ponds, as well as maturation ponds, requiring approximately 14.1 acres of land.

1.2 Project Justification

The proposed Runyenjes Sewerage Project aligns with the government of Kenya's commitment to expanding sewerage treatment facilities nationwide, aiming to enhance environmental sustainability and

public health. Currently, Runyenjes Town lacks a functioning sewerage system, leading to unsanitary waste disposal practices that pose significant health risks. According to the Kenya National Bureau of Statistics 2019, a large percentage of the population in Runyenjes uses pit latrines with 22.9% using VIP pit latrines, 5.6 % using uncovered pit latrines and 67.8% using covered pit latrines. Only a small percentage of 3.0% uses septic tanks. The implementation of this project will address these issues, safeguarding both the environment and public health from harmful pollutants. Moreover, the project plays a pivotal role in advancing the government's objectives outlined in the Big Four Development Agenda, Kenya's Vision 2030, and the SDG Sanitation targets. Kenya's Vision 2030 ambitiously aims for universal access to water and improved sanitation services by 2030, as outlined in the Kenya Environmental Sanitation and Hygiene Policy (KESHP) 2016–2030.

Currently, a substantial percentage of the Runyenjes population relies on pit latrines for sanitation, underscoring the urgent need for an upgraded system. The proposed project will not only ensure self-sustainability but also lead to waste reduction marking a significant stride towards improving the overall well-being of the community. TWWDA is therefore seeking to address these challenges by providing new and adequate sewerage facilities that will cover most of Runyenjes Town and its environs. This is hoped to improve public health and sanitation and promote environmental protection.

1.3 Significance of the Project

The Runyenjes Sewerage Project holds immense significance as it promises to elevate hygiene standards and mitigate waterborne diseases resulting from inadequate wastewater management. Through the establishment of an effective sewage collection and treatment system, both surface and underground water sources, as well as the overall environment, will be safeguarded from contamination, leading to an enhanced environmental quality. Additionally, the business community stands to benefit significantly, as the project will alleviate the financial burdens associated with constructing and maintaining pit latrines and septic tanks on their premises. Anticipated economic growth and increased investments in the region are expected outcomes, ultimately contributing to the improved well-being of the people in Runyenjes Sub-County.

1.4 Scope of the Work

1.4.1 Task: 1: Literature Review

The Consultant undertook a literature review on the available literature regarding the proposed project and its potential impacts. The client provided literature that served as a starting point for gathering environmental and social information related to the project. The desktop study included a thorough review of various documents concerning the proposed activities, project specifications, and layout. This review covered a wide range of materials, such as policy and legislative frameworks, and an analysis of the environmental context of the area. Key documents examined included Kenya's policies, strategies, guidelines, relevant national and county laws and regulations, literature on water infrastructure, and,

where applicable, Multilateral Environmental Agreements (MEAs) and the AfDB Integrated Safeguards System 2013.

1.4.2 Task 2: Description of the Baseline Environment

The Consultant collected, collated, and presented baseline information on the environmental characteristics of the proposed project site. This description included, but was not limited to, the following aspects:

(a) Physical environment (topography, land cover, geology, climate and meteorology, air quality, hydrology, etc.).
(b) Biological environment (i.e., flora and fauna types and diversity, endangered species, sensitive habitats etc.)
(c) Social and cultural environment, including present and projected. Where appropriate i.e., population, land use, planned development activities, community social structure, employment and labour market, sources and distribution of income, cultural/religious sites and properties, vulnerable groups, and indigenous populations etc.)
(d) Economic activities i.e., agriculture, livestock, small scale industries etc.

1.4.3 Task 3. Legislative and Regulatory Framework

The Consultant identified and described all relevant local and international regulations and standards related to environmental quality, health and safety, protection of sensitive areas, land use control, and ecological and socio-economic issues. Compliance issues were also stated. The Consultant then identified which project activities needed to comply with these regulations.

1.4.4 Task 4: Conducting water quality tests

Samples for water quality tests were collected at identified points along River Thuci to assess the chemical, physical, and biological properties. The key parameters tested included pH, dissolved oxygen levels, turbidity, temperature, nutrient concentrations, heavy metal concentrations, presence of pathogens, and levels of pollutants such as pesticides or industrial chemicals.

1.4.5 Task 5: Public Participation

As part of the ESIA process, public participation was undertaken through public barazas, questionnaires, and interviews with key stakeholders and informants. All engagements were documented, and the information gathered from the public was analyzed and integrated into the ESIA Report. The consultant developed a Stakeholder Management Plan to ensure that all stakeholder concerns were effectively and efficiently addressed.

1.4.6 Task 6: Determination of Impacts of Project Facilities and Activities

The Consultant evaluated and articulated the significant impacts anticipated from the proposed Runyenjes Town Sewerage Project. This included assessing the environmental, ecological, occupational safety and health, and social effects, both positive and negative, resulting from the project's interaction

with its surroundings, potentially altering current environmental and social conditions. The Consultant prioritized the identified concerns, distinguishing between short, medium, and long-term impacts, as well as cumulative effects, across the construction, operation, and decommissioning phases. Temporary and permanent impacts were differentiated, and a detailed analysis was provided on specific conditions unique to the facility and its operations that could affect the environment.

1.4.7 Task 7: Development of Environmental and Social Monitoring and Management Plan (ESMMP)

The Consultant developed a comprehensive environmental and social management plan, which outlined various measures for mitigating, monitoring, and implementing actions to eliminate, minimize, or mitigate adverse environmental and social impacts while enhancing the socio-economic benefits of the project. The plan included a set of strategies to reduce environmental impacts to acceptable levels or to maximize socio-economic benefits throughout all stages of the project.

In developing the ESMMP, the Consultant provided detailed cost estimates for proposed mitigation measures, considered institutional and financial support, set a timeframe for implementation, and assigned responsibilities. These provisions applied to all project phases, ensuring comprehensive management of environmental impacts and optimization of socio-economic benefits.

1.4.8 Task 8: Description of Project Alternatives

The consultant evaluated alternative pathways for the proposed project in regard to technology, location and materials weighing the potential environmental consequences. The objective was to appraise the advantages of the proposed project against potential environmental drawbacks. The fundamental principle guiding the exploration of the alternatives was to secure a choice that delivers the utmost social, environmental, and economic advantages.

1.4.9 Task 9: Development of a Waste Management Plan

Implementation of the proposed project shall result into waste generation in all project phases i.e., construction, operation and decommissioning phases. As such, in order to ensure that the waste generated does not result into adverse impacts on environment and human health in project areas, the consultant shall develop a Waste Management Plan to provide guidelines on waste management. The plan shall be implemented hand in hand with the projects' Environmental and Social Management Plans (ESMPs).

The plan shall have a detailed characterization of the types, quantities, and characteristics of waste generated by the project or facility in all the phases. This shall include solid waste, hazardous waste, wastewater sludge, construction and demolition debris, and other waste streams. The plan shall then outline procedures for the segregation, handling, transportation, and disposal of different types of waste to prevent contamination and ensure safety. Additionally, the plan shall integrate waste minimisation strategies and technologies to be adopted in all the phases of the project with rooms for improvement.

1.4.10 Task 10: Development of an Effluent Discharge Control Plan (EDCP)

The consultant shall prepare an Effluent Discharge Control Plan describing methods to be adopted to ensure that the effluent receiving environment is not adversely affected by the quality and quantities of the discharged effluent. Water quality monitoring of the receiving environment plays a critical role in the assessment of the impacts of the effluent discharge from the Sewage Treatment Plant over time. Based on its design and construction, treated effluent from the Runyenjes Sewage Treatment Plant (STP)shall he discharged into the adjacent Ithirae Stream that drains into River Ena. The results from the water tests to be conducted shall be used as the baseline for the development of the EDCP. The EDCP will describe the composition and quality of the effluent, including biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids, nutrients (nitrogen and phosphorus), heavy metals, pathogens, and other components as outlined in Schedule 3 0f the Environmental Management and Coordination Act (Water Quality Regulation 2006). The key components to be included in the effluent discharge plan shall include:

- Relevant local, national, and international regulations governing effluent discharge.
- Description of the composition and quality of the effluent.
- A narration of the treatment processes employed to treat the wastewater to meet regulatory standards before discharge.
- An outline of procedures for monitoring and sampling effluent to ensure compliance with discharge standards as per the Water Quality Regulations 2006
- Provisions for responding to emergencies such as plant failures, spills, or accidental releases that may result in the discharge of untreated or inadequately treated effluent.
- Strategies for engaging with stakeholders including local communities, regulatory agencies, non-governmental organizations, and other interested parties.
- Strategies laid for continuous monitoring, evaluation, and improvement of effluent discharge practices.

1.4.11 Task 11: ESIA Study Report

The ultimate outcome of the assessment process is an ESIA Study Report (this report), which will be specifically designed to ensure that the proposed development aligns with the requirements of the Environmental Management and Coordination Act. The report is structured into chapters, which are outlined as follows:

- Chapter 1: Introduction: Gives Background Information to the Study Describing the Objectives and the Terms of Reference.
- Chapter 2: Nature of the project: Description of Project
- Chapter 3: Location of the project: Outlines the Location of the Study Area.
- Chapter 4: Baseline Environmental Conditions

- Chapter 5: Policy, Legal and Institutional Framework
- Chapter 6: Public Participation and Stakeholder Consultation:
- Chapter 7: Analysis of the Proposed Project Alternatives
- Chapter 8: Anticipated Impacts and Mitigation Measures
- Chapter 9: Environmental and Social Management & Monitoring Plan (ESM&MP)
- Chapter 10: Grievance Readdress Mechanism
- Chapter 11: Conclusion and Recommendation:
- References of all the literature pursued to get information.
- Appendices including but not limited to: Minutes of meetings, Attendance lists, Public Participation questionnaires, Key Informant Interviews, Project Designs and Layouts, Stakeholder Engagement Plan, Waste Management Plan and Biodiversity Management Plan

1.4.12 Task 12: ESIA Study Report Presentation and Peer Review

The consultant shall present the draft report which may be subject to a peer review. In the event that any rectification is to be made on the report, the consultant shall bear any applicable costs.

1.4.13 Task 13: Approval

The Consultant shall present the report prepared under Task 11 for approval by the relevant authorities. The Consultant shall be responsible for making any modifications that the authorities may demand before approval of the report.

1.4.14 Task 14. Counterpart Staff

For the purpose of capacity building the consultant shall undertake the study together with counterpart staff seconded by the Tana Water Works Development Agency and the Embu Water and Sanitation Company i.e., Environmental Scientists, Engineers, Surveyors and Community Relations Officers.

1.5 Approach and Methodology

The ESIA study shall be carried out using the methodology described in EMCA, 1999 and Environmental (Impact Assessment and Audit) Regulations 2003. The following study procedures shall be employed in the study.

1.5.1 Environmental Screening

The screening process will help to narrow down to the most critical issues requiring attention during the Environmental and Social Impact Assessment study. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

1.5.2 Literature Review

The consultant reviewed the baseline information on the project area, project design documents and relevant government legislations and guidelines which are presented in Section 3 of this TOR. Literature review of relevant documents shall be continuous throughout the assignment.

1.5.3 Site Assessment/ Field Investigations

Field investigations were undertaken from June 2024 to August 2024 for data collection and community consultations. Public consultations in form of key informant interviews and public barazas were conducted with communities living within the vicinity of the project area.

Key stakeholder consultations have been done with various key stakeholders who included Embu County Government officials, public administration, key government ministries and public and private institutions within the project area. Some of the relevant stakeholders consulted are presented in Table 1.1.

Table 1.1: List of stakeholders consulted.

Category of stakeholder	**Stakeholder consulted**
Project Proponent	• TWWDA staff • KYEWASCO Staff
Embu County Government	• Governor/ Deputy Governor • County Executive (Ministry of Environ, Water and Natural Resources)
Public Administration	• Deputy County Commissioner, Embu County • Chiefs/ Sub chiefs
Key Ministries and related agencies	• Tana Water Services Board (TWSB) • Water Resources Management Authority • Public Health & Sanitation • Lands office • Ministry of Roads • Road Agencies – KENHA, KURA, KERRA • Directorate of Occupational Health and Safety Services
WRUA	• Chania River Water Resource User Association
Project Beneficiaries	• Local Communities

Data collection methods employed during field investigations included:

a. Public Consultations and Participation

Public consultation is a key element in the Environmental Impact Assessment process and can be carried out through public barazas or correspondence. This is done within the project area to inform the public of the proposed development and obtain views from community members on the likely positive and negative impacts of the proposed project. The public barazas were organized through the Provincial Administration (chiefs, sub chiefs).

b. Key Informant Interviews/ Expert Opinions

Key Informant interviews conducted with different people/representatives of institutions to solicit their views on the impacts of the proposed project and seek their views on possible mitigation and enhancement measures.

c. Household Questionnaires

The ESIA study team employed household questionnaires to particularly collect data on baseline socio economic status of communities within the project area. The questionnaires were randomly issued to various households by use of enumerators.

1.5.4 Data Analysis and Reporting

Data collected was analyzed both quantitatively and qualitatively to determine the potential impacts of the proposed sewerage project, the severity of effects arising from these impacts and how the adverse impacts can be best mitigated and positive impacts enhanced.

The analyzed data provided the framework for the recommendations on corrective actions and remedial measures and the basis for the formulation of the environmental and social management plan which forms part of this report.

2. BASELINE, ENVIRONMENTAL AND SOCIAL CONDITIONS

2.1 Location

The township of Runyenjes is located in Embu East District and lies on the slopes of the Mt. Kenya being approximately 20 kilometers in the northeastern direction of Embu Town. It is also approximately 165 km from Nairobi, the Kenyan capital. The town is classified as a municipal council with an area of jurisdiction currently covering 133 square kilometers (core urban is 2 square kilometers) and serves as the District Headquarters of Embu East Division and is the major commercial center in the district. A location map is given in **Figure 1.1**.

Runyenjes WWTP is located at Latitude: -0°27'05.24"S Longitude: 37°34'10.84"E and an altitude of 1374m asl. and lays on the wind-wide side of Mt. Kenya and about 25 km from Embu town along the Nairobi-Meru-Isiolo Road and 4km from

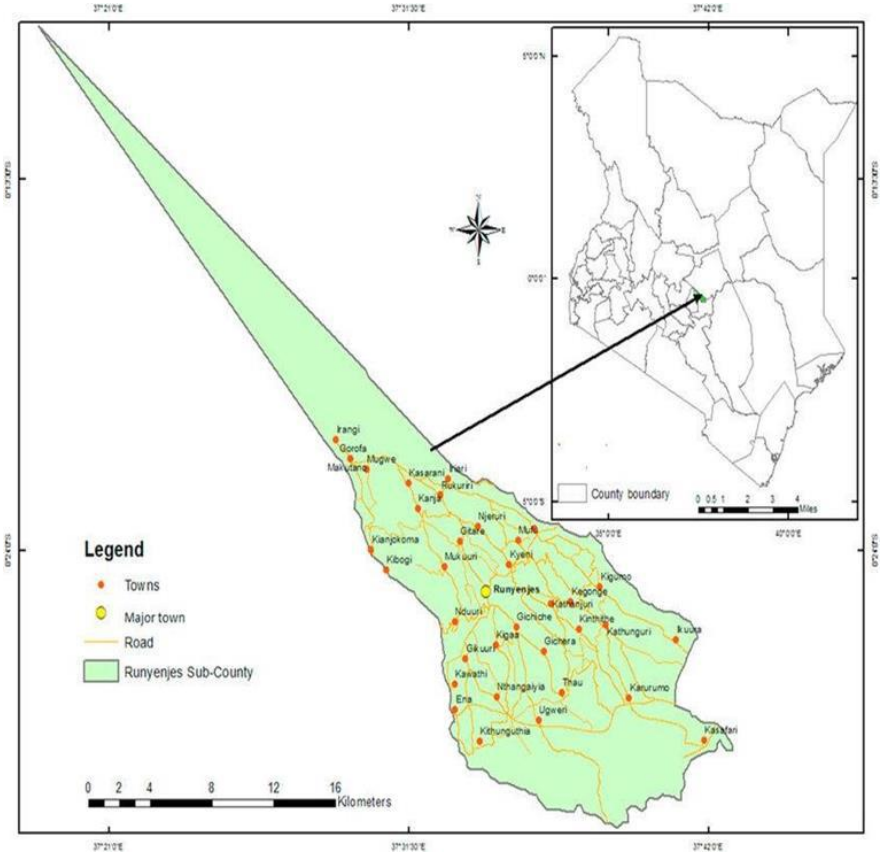


Figure 2.1: Map of project Area.

2.2 Physical Environment

2.2.1 Topography

The general topography of the project area is characterized by gentle slopes which turn to steep slopes along the alignment of Ena River that passes on the western side of the town. The town is situated at an altitude of

approximately 1500 metres above sea level. As a result, it is possible to provide gravity flow of the sewage on one side of the town. However, it some areas it will be hard to use gravity flow for the sewer pipeline. To ensure that these areas are served the following should be considered:

- Provide for a pumping station to pump the sewer to the trunk main across the road.
- Use deep excavations to ensure the sewer can still flow using gravity.

2.2.2 Climate

Runyenjes has a Tropical wet and dry or savanna climate. The area's yearly temperature is 22.57°C (72.63°F) and it is 0.07% higher than Kenya's averages. Runyenjes typically receives about 159.32 millimeters (6.27 inches) of precipitation and has 201.52 rainy days (55.21% of the time) annually. The annual mean temperature ranges from 12 °C to 27 °C. Rainfall distribution is bimodal with long rains commencing from mid-March to May while short rains occur between October and December, with the average annual rainfall ranging between 1,000– 2,000 mm.

2.2.3 Geology and Soil

Runyenjes soils are deep, well-drained Humic Nitisols of volcanic origin with moderate to high fertility. The soil's texture class is clay, with an average of 11% (sand) and 12.7% (silt), while the soil organic carbon content averages 2.8%. The sloppy terrain in Runyenjes stimulates conditions for soil erosion and degradation.

A topographical survey was also done on the land proposed for sewerage treatment works and it was observed that the area has red soil with an overlying weathered rock, exposed at some points through water and wind erosion with a possibility of becoming harder with depth. The many hills, valleys and rock outcrops indicative of varied weathering patterns over the years.

2.2.4 Biological Environment

Vegetation and Flora

The area where project activities are carried out covers both forest area and farmlands. In the farmlands, most natural vegetation has been cleared to pave way for farming. The natural vegetation is either a fence, within homesteads or along the river. Some of the natural species include: Anthocleista grandiflora, Casearia battiscombei, Commiphora eminii, Cordia abyssinica, Croton macrostachyus, Croton megalocarpus, Ehretia cymosa, Ficus sur, and Myrianthus holstii. Agroforestry trees include mangoes, avocadoes, and macadamia. The area is extensively farmed with tea on the steep slopes and subsistence farming at the valley near the river. Some of the crops farmed are maize, beans, kales and bananas. The vegetation in the proposed project site consists of both indigenous and exotic species.

2.3 Hydrology

The main sources of drinking water in Embu County include rivers, dams, piped water, boreholes, springs, wells and pans. The County is served by six major rivers; Thuci that borders Tharaka- Nithi that borders, Tana that borders Machakos County, forms the boundary to Kirinyaga County, Rupingazi forms the boundary to kirinyaga, Thiba and Ena. These major rivers originate from Mt. Kenya Forest in Manyatta and Runyenjes sub-counties, 30.1 percent of the population get water from rivers, 35. Percent from piped water and 21 percent from dug well.

2.4 Social Economic Activity

2.4.1 Agricultural Activities

The farming systems are complex smallholder farms that are intensively managed, consisting of an integration of crops, trees, and livestock. The main subsistence crops include maize, beans, yams, cassava, millet, sorghum, and bananas.

The main cash crops include tea, coffee, cotton, and macadamia nuts. The main livestock in the region includes cattle, goats, sheep, and poultry. Runyenjes sub-County represents typical agricultural systems in the East African Highlands that require sustainable intensification and efficient use of agricultural resources. This is due to low and unpredictable crop yields, changing climates, land sub-division, expected population increases in the next 3 decades, lack of fallowing land, and its proximity to the Mount Kenya forest ecosystem.

2.4.2 Livestock

Livestock keeping is practiced in the project area as follows: cattle, goats, chicken and pigs. Donkeys are kept in big proportion for transportation of goods. It is assumed that for every 3 households there is one livestock unit. Therefore, we can approximate the number of Livestock Units within the project area as 24101.

2.4.3 Education

The project area is well endowed with primary schools and secondary schools and tertiary institutions. The currently recorded according to Embu County Development Plan 2018-2022 for primary school enrolment is about 6250, 9669 for secondary enrolment and 274 for tertiary institutions. The community has taken advantage of the free primary education as envisaged by the high enrolment.

Table 2.1: Number of schools and enrolment in the Runyenjes

Schools	Number	Enrolment Totals
Primary schools	25	6250
Secondary schools	42	9669
Tertiary Institutions	9	274

2.4.4 Health Facilities

The proposed supply area is well covered with health facilities most of which are dispensaries, health centers and clinics. The table below outlines the health facilities based on data obtained from Embu County Integrated plan 2018- 2022.

Table 2.2: Distribution of various categories of Public Health facilities

Sub-County	Level 2 (Dispensary	Level 3 (Health Centre)	Level 4 (Hospitals)	Level 5 (Teaching & Referral)	Total
Runyenjes	20	3	2	0	25

.

3. : PROJECT DESCRIPTION

This chapter discusses the project location, population projections, wastewater flow projections, design criteria and standards, process and layout of the proposed project.

3.1 Project Geographical Location

The proposed Runyenjes Sewerage Project area is located in Runyenjes constituency, Embu East sub county in Embu County. The sub county lies on the approximately 20km the Northeastern side of Embu extending from the slopes of the Mt. Kenya. The subcounty covers a total of eight locations namely: Kyeni -Northeast, Kyeni Central, Kyeni Northwest, Kyeni South, Runyenjes East, Runyenjes West, Kagaari Southwest and Kagaari Southeast. Runyenjes is classified as a municipality, covering a total area 133 square kilometres with a core urban area of 2km^2. The town serves as the Headquarters of Embu East sub-county and is the major commercial centre in the sub county.

The proposed Runyenjes Sewerage project covers mainly three sub-locations: Mwenendega, Mbiruri and Gitare which are all covered within the municipality. The proposed Wastewater Treatment Plant (WWTP) is described by the coordinates Latitude 0°27'5.15"S and Longitude 37°34'12.46"E, at Muthuari area, Runyenjes East Sub-location. the proposed Runyenjes Sewerage Project lies in Embu East Sub County in Embu County and targets to serve the following areas: Runyenjes Town, Mwenendega, Gitare and Mbiruri locations. Wastewater collected from these towns will be treated at proposed treatment works at Muthuari Village, in Runyenjes East Location and effluent discharge released to Ithirae Stream (Latitude 0°27'8.84"S and Longitude 37°34'7.99"E) which drains water to River Ena. The sewerage system shall consist of the following components.

- Sewer lines
- Exhauster bay
- Inlet works with mechanized coarse and fine screens.
- Grit removal system with air blower to break down solids.
- Grit collection system
- Install Ultrasonic flow meter at the inlet and outlet works.
- 2No. Anaerobic ponds
- 2 No. facultative ponds.
- 2No.maturation ponds
- New onsite water testing laboratory and Staff housing

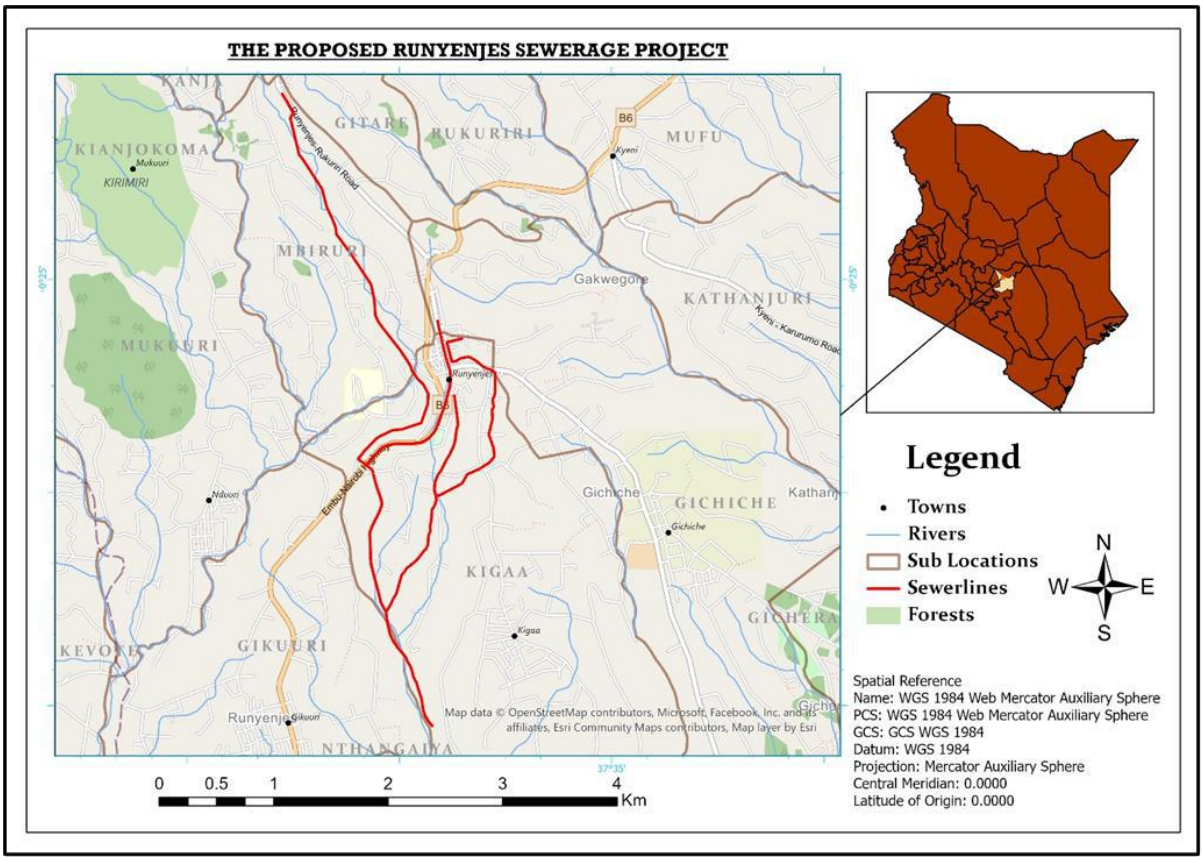


Figure 3.1: Proposed Runyenjes Sewerage Supply Area Layout

3.2 Population, Water Demand and Wastewater Flow Projections

3.2.1 Population Projections

The project design engineers undertook detailed assessments and projection of the population in the project area based on the 2019 census and adopting an annual growth rate of 1.1%. Population projection is one of the key studies governing the projection of water demand, sewage flow and consequently the capacity of the proposed sewage treatment components. The population data was extracted from the 2019 census. A design horizon up to 20 years has been adopted and planning horizons based on initial Design Year: 2023, Future Design Year: 2033 and the Ultimate Design Year: 2043. The Consultant has determined an annual growth rate figure of 1.1%, which was the average value adopted as the annual growth rate for the project area. General and institutional population projections for the project area were undertaken as shown in the **Table 3.1 -** Error! Reference source not found.

Table 3.1: Population Projection for Runyenjes Town

	Growth Rate		**1.1%**		
Area/Location	**Total person 2019**	**Current 2022**	**Initial 2023**	**Future 2033**	**Ultimate 2043**
Mwenendega	3,353	3,465	3,503	3,908	4,360
Gitare	3,439	3,554	3,593	4,008	4,472

Mbiruri	3,239	3,347	3,384	3,775	4,212
Total Population	**10,031**	**10,366**	**10,480**	**11,691**	**13,043**

Table 3.2: Educational Institutions Population in Ultimate Year

	Growth Rate		**1.1%**		
Institution	**Total persons 2019/No. of institutions**	**Initial 2022**	**Initial 2023**	**Future 2033**	**Ultimate 2043**
Boarding schools	6,274	6,274	6,274	6,274	6,274
Day school with W/C	3,750	3,750	3,750	3,750	3,750
Day schools without W/C	6,169	6,169	6,169	6,169	6,169
Total Population	**16,193**	**16,193**	**16,193**	**16,193**	**16,193**

Table 3.3: Health Institutions Population in Ultimate Year

	Growth Rate		**1.1%**		
Institution	**Total persons 2019/No. of institutions**	**Total Persons 2022**	**Initial 2023**	**Future 2033**	**Ultimate 2043**
Dispensaries and health centers	23	24	24.03	26.81	29.91
District Hospital (bed)	44	45	45.97	51.28	57.21
Administrative offices	430	444	449.23	501.17	559.11
Total Population	**497**	**514**	**519.23**	**579.26**	**646.23**

Table 3.4: Commercial Enterprises in Ultimate Year

	Growth Rate		**1.1%**		
Commercial	**Total persons 2019/No. of institutions**	**Total Persons 2022**	**Initial 2023**	**Future 2033**	**Ultimate 2043**
Bars	58	60.04	60.70	67.72	75.54
Shops	70	72.34	73.13	81.59	91.02
Hotels	63	65.10	65.82	73.43	81.92
Others	67	68.72	69.47	77.51	86.47
Total Population		**266.19**	**269.12**	**300.24**	**334.95**

3.2.2 Projection of Wastewater Flow.

The wastewater flows have been projected for the base, future and ultimate design periods respectively. This section provides a summary of the wastewater flow generation from the various water demands. A conversion factor of 0.8 for rural high potential 0.85% for urban middle class was used to convert the total water demand into wastewater dry weather flow.

Table 3.5: Projected Wastewater Flow for Domestic Population

Area	**Consumer Category**	**Waste water Generation factor**	**Waste Water Generation**			
			2022	**2023**	**2033**	**2043**
Mwenendega	UMC	0.8	208	210	234	262
Gitare	RHP	0.85	213	216	240	268
Mbiruri	RHP	0.85	134	135	151	168
Total demand (m^3/d)			**555**	**561**	**626**	**698**

Table 3.6: Projected Wastewater Flow for Educational Institutions

Institution	**Factor**	**Current (2022)**	**Initial (2023)**	**Future (2033)**	**Ultimate 2043**
Boarding schools	0.85	275.54	278.57	310.78	346.71
Day schools with W/C	0.85	82.35	83.25	92.88	103.61
Day schools without W/C	0.85	27.09	27.39	30.56	34.09
Total demand (m^3/d)	**0.85**	**384.98**	**389.22**	**434.21**	**484.41**

Table 3.7: Projected Wastewater Flow for Administrative and Health Institutions

Institution	**Factor**	**Current (2022)**	**Initial (2023)**	**Future (2033)**	**Ultimate 2043**
Dispensaries and health centers	0.85	101.01	102.12	113.93	127.10
District Hospital (bed)	0.85	2.32	2.34	2.62	2.92
Administrative offices	0.85	9.44	9.55	10.65	11.88
Total demand (m^3/d)		**112.77**	**114.01**	**127.19**	**141.90**

Table 3.8: Projected Wastewater Flow for Educational Institutions

Commercial	**Factor**	**Current (2022)**	**Initial (2023)**	**Future (2033)**	**Ultimate 2043**
Bars	0.85	25.52	25.80	28.78	32.11
Shops	0.85	6.15	6.22	6.93	7.74

Hotels	0.85	33.20	33.57	37.45	41.78
Others	0.85	5.84	5.91	6.59	7.35
Total demand (m^3/d)		**64.87**	**65.58**	**73.16**	**81.62**

Table 3.9: Total Dry Weather Flow

Category	**Waste Water Projections (m^3/day)**			
	Current (2022)	**Initial (2023)**	**Future (2033)**	**Ultimate 2043**
Domestic	555	561	626	698
Commercial	64.87	65.58	73.16	81.62
Educational	384.98	389.22	434.21	484.41
Institutional	112.77	114.01	127.19	141.90
Total	**1,118**	**1,130**	**1,261**	**1,406**

3.3 Total Design Flows

Infiltration flow of 5% was added to the projected wastewater.

Table 3.10: Total Peak Design Flows

	Total water demand (m^3/day)			
Category	**Current (2022)**	**Initial (2023)**	**Future (2033)**	**Ultimate (2043)**
Domestic	1665	1683	1878	2094
Commercial	64.87	65.58	73.16	81.62
Educational	384.98	389.22	434.21	484.41
Institutional	112.77	114.01	127.19	141.90
Total	**2227.62**	**2251.81**	**2512.56**	**2801.93**

Table 3.11: Total Design Flows

	Total water demand (m^3/day)			
Total DWF	2227.62	2251.81	2512.56	2801.93
Add 5% infiltration	111.38	112.59	125.63	140.10
Total	**2339**	**2364.4**	**2638.19**	**2942.03**

3.4 Project Design

3.4.1 Proposed Sewer Lines, Pipe Sizes

A minimum diameter of 300 mm diameter for the trunk sewers and a maximum of 400 mm diameter at the outfall sewer will be adopted. The proposed size will be adequate in minimizing blockages within

the pipes during the operation phase. The total length of the sewer network is 12.3 kilometers. The proposed sewer lines are as follows:

Table 3.12: Sewer lines

Trunk	Pipe Diameter (mm)	Length (Km)
Gitare main Line	300	4.1
CBD Distribution Line	400	2.1
Jua kali Distribution Main	300	2.1
CBD Central Main	300	1.7
Trunk Main Pipeline	400	2.3
Total		**12.3**

3.4.2 Pipe Material

The project proposes to use DWC HDPE pipes for its trunk sewers as they are durable compared to other pipes.

3.4.3 Hydraulic Design

The area serviced by the proposed sewerage scheme will be divided into drainage areas. Flows into manholes will be computed as proportions of the total catchment area served by the sewer section upstream of each manhole.

3.4.4 Depth of Sewers

The minimum depth of sewers at the starting points will be maintained at 900mm and 400mm at other locations. However, minimum, and maximum depths of sewers are dictated by the actual ground conditions on site and economic considerations. Some areas will require deep excavations due the terrain of the area. The sewers shall be protected by concrete bed and the surround or haunch as determined by the depth range, location, and structural stability state of pipes.

Table 3.13: Depth of Sewers and Protection Criteria

	Depth range in mm	Pipe protection
In Open fields	400-600	Concrete bed and surround
	600-750	Concrete bed and haunch
	Over 750	Protection governed by factors other than shallowness 100mm concrete bed to be used when founding on rock
In roads	600-750	Concrete bed and surround
	750-1200	Concrete bed and haunch
	Over 1200	Protection indicated by factors other than shallowness i.e. Type C/Type D as provided in the drawings

3.4.5 Minimum Velocities and Pipeline Gradients

The minimum gradients for foul sewers shall be such as to produce velocities sufficiently high to ensure that the pipes are self-cleansing. Gradients are largely dictated by practical ground conditions. A velocity of 1.0 m/s is normally recommended for trunk sewers in tropical climates to avoid the build-up of hydrogen sulphide in sewers, which causes odor and corrosion problems. This velocity shall be maintained in trunk sewers to avoid septicity. However, house connections and secondary sewers where flows may be intermittent and retention times short shall adopt a minimum velocity of 0.75 m/s. A velocity range of 0.75-3m/s is recommended to avoid abrasion of the sewer pipes.

3.4.6 Manholes

Manholes shall be constructed at every change of alignment, of gradient, at the head of sewers or branches, at every junction of two or more sewers and wherever there is a change in the size of sewers. Manholes can be constructed of locally manufactured bricks where the sewers are shallow (up to 600mm depth) but preference will be given to cast in situ or precast concrete manholes.

Precast concrete manholes/slab covers shall be adopted in order to discourage theft or vandalism. In areas with heavy traffic, heavy-duty cast-iron manhole covers could be used, while medium duty manhole covers and frames or equivalent could be used in areas with limited traffic access. The minimum height from the soffit of the pipe to bottom of the roof slab shall be maintained at 2m in order to provide comfortable space for the maintenance purposes.

An area of benching shall be provided in each manhole as to permit a man to stand easily, comfortably and without danger to himself, on such benching while working in the manhole. Manhole benching will be designed at a grade not steeper than 1 in 5 or flatter than 1 in 25 and will be battered back equally from each-side of the manhole channels.

Table 3.14: Manhole Spacing

Length Max	**100m**	
Sewer Pipe Size		
Smallest (mm)	**Largest (mm)**	**Manhole spacing (max)**
230	375	60
450	610	80
685	900	100

3.4.7 Sewer Pipe Beddings, Haunch and Concrete Surrounds

Where the depth of cover to pipes is low, concrete bedding, haunch and surround shall be provided. The pipe bedding, haunch and surround details will vary along the lengths of the sewer lines as shown on the drawings.

3.4.8 Road Crossings

Road crossings have been designed as follows:

- Where pipe is to cross a tarmac road, a gravel road or a busy earth road, a steel pipe casing or a concrete pipe/ culvert is to be installed to protect the pipe and allow easy maintenance.

3.5 Proposed Sewage Treatment Works Design

The sewage treatment works has been designed for the future year (2043) design flow. The design demand is capacity for the proposed plant is 3,000m^3/d. The sewer is of domestic in nature. It is assumed that the facilities that would like to discharge waste of other types shall have a pretreatment unit within the source.

The Wastewater treatment plant has the following units: -

- The inlet works comprising of the 2No parallel channels. One channel has a manual screen for coarse and fine screens. The other has automated coarse and fine screen. The automatic channel is always on duty and the manual is used during the maintenance of the automated screening.
- The exhausted discharge platform provides for truck discharge and inspection of the type of wastewater being discharged. It also provides for environmental easy cleaning of the accidental discharge from the truck.
- The primary sedimentology tank 2 units which can work together or independently.
- The high rate trickling filter with 2 units which can work together or independently.
- The intermediary sedimentation tank2 units which can work together or independently.
- The low-rate tricking filter2 units which can work together or independently.
- The final humus tank has 2 units which can work together or independently.
- The chlorination channel.

- The river discharge structure.
- The sludge digester 4 units which can work together or independently.
- The sludge drying beds.
- Due to terrain and for maximum utilization of space there are 3 pumping units.
    (i) To pump sewer after high rate trickling filter to a higher grounds for flow to intermediary sedimentation tank
    (ii) Pump sludge to sludge drying beds.
- The other structures are.
    (i) Office and laboratory
    (ii) 1No senior staff house
    (iii) 2No. Junior staff house
    (iv) access road.
    (v) The compound has 3No. Gates due to the terrain of the site.
    (vi) the fencing the compound
    (vii) The retaining wall along the stream to prevent flooding.
- The additional structures include.
    (viii) Suspended solids drying area.
    (ix) Incinerator for burning solids.
    (x) Inlets works has an ultra-sonic flow meter powered by solar power to prevent loss of data through prolonged power failure.

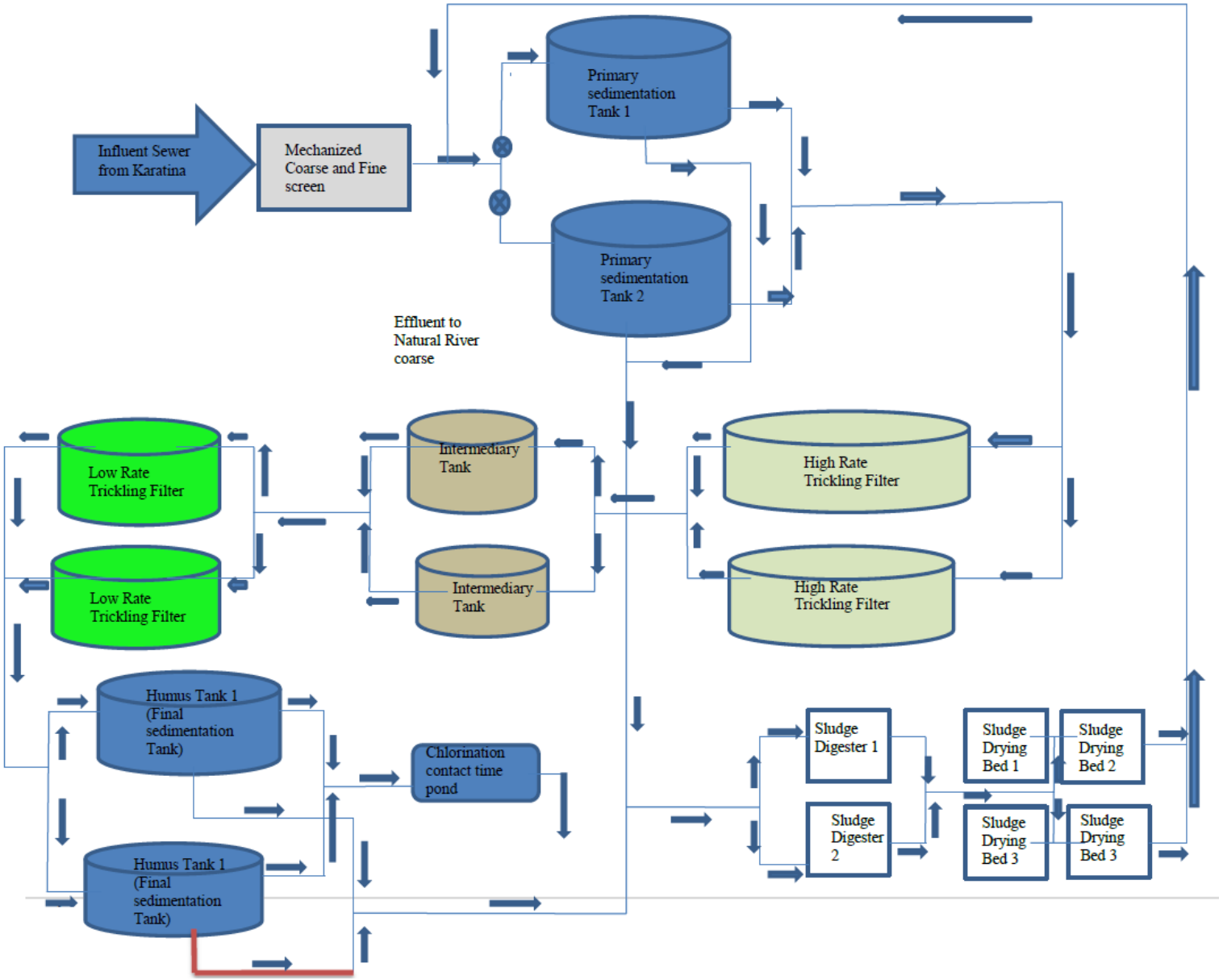


Figure 3.2: Schematic layout of Proposed Runyejes WWTP

3.6 Waste Water Treatment Process

3.6.1 Preliminary Treatment

The primary treatment of wastewater treatment is designed to remove large floating objects (such as rags, maize cobs, and pieces of wood among others) and heavy mineral particles (sand and grit). This is done in order to prevent, for example, floating material accumulating on the surface of sedimentation tank. The component of this preliminary treatment comprises of coarse and fine bar screening and grit removal.

The screening has two stages. The first stage coarse screens and secondly fine screening. The material making them must be rust proof for this design galvanized steel is selected where steel is required.

The design for this project has both manual and mechanical screening in order to facilitate this, the screens are inclined, at 60° to the horizontal. The submerged area of the manually raked screens is calculated on the empirical basis of 0.15–0.20 m2 per 1000 population; this assumes that the screens are raked at least forty-eight times in a 24-Hrs day or after every 30minutes. However, the manual raking shall only be used when the mechanized system is under maintenance.

The waste screened matter shall be cart away to a drying unit and burnt in an incinerator. The ash shall be buried or disposed in a pit within the compound.

3.6.2 Primary Treatment

The second stage is the sedimentation tank with a mechanical scrapper. The purpose of sedimentation tank is to separate the sewage into two main components, sludge and settled sewage, which by being treated separately are normally dealt with more efficiently and economically in the sludge digester. Generally, up to 50 per cent of the total polluting load in the sewage is removed in the sedimentation tank.

The secondary, or biological, treatment of sewage results in the production of further organic solid materials (secondary sludge) which are more difficult than primary sludge to dewater, consequently any process that can reduce or minimize the production of secondary biological sludge is to be favored. Primary sedimentation is the process by which the velocity of the sewage is reduced below the point at which it can transport the suspended matter, so that much of this settles and can be removed as sludge. Basically, the purpose of sedimentation is to remove the maximum amount of polluting matter, in the form of readily settleable solids, from the sewage as quickly and as economically as possible.

3.6.3 The Third Stage of Sewage Treatment

The third stage comprises of:

(i) Hydraulic driven high-rate trickling filters

(ii) Intermediary sedimentation with a mechanized scrapper blade

(iii) Hydraulic driven low-rate trickling filters and

(iv) Final Humus tank (Final Sedimentation tanks with a mechanized scrapper blades).

Intermediary sedimentation tank removes the extra sludge which could have passed the high and low-rate trickling filter. The Wastewater is applied to a trickling filter after it has already passed through a bar screen and primary clarifiers. The Wastewater is distributed over the top of the medium and slowly trickles through it. The high-rate trickling filter has larger size filter media as compared with low rate filter medium. The biological growth is attached to the media.

Trickling filters are composed of three basic components namely the distribution System, Filter Media and the underdrain System.

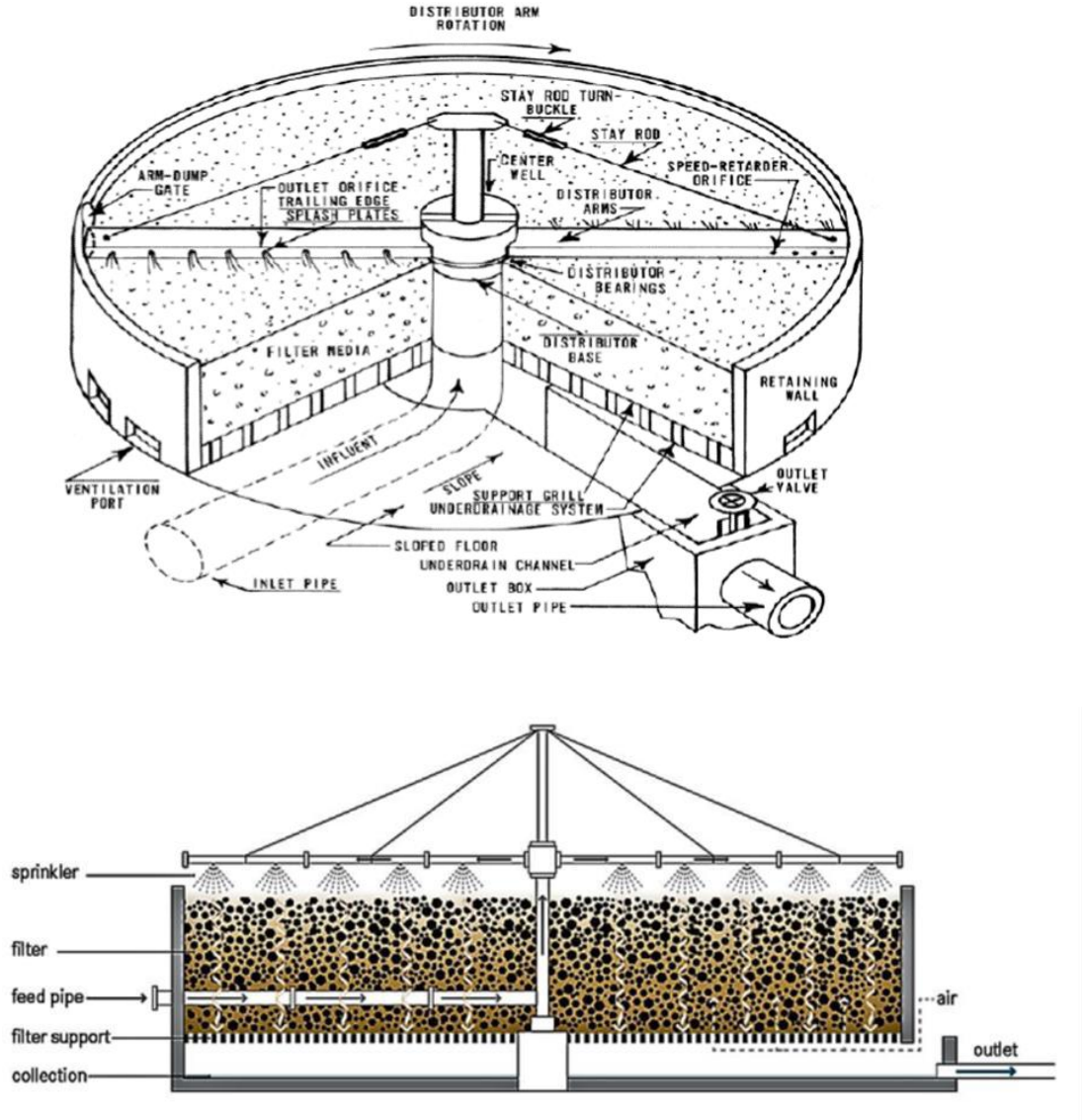


Figure 3.3: Typical Trickling Filter

3.6.4 The Fourth Stage Secondary Treatment System

Various factors affecting selection of secondary treatment processes include:

- Availability of Land

- Power supply availability and dependability
- Operating (and control) equipment and its indigenous availability
- Skilled staff
- Nature of maintenance problems
- Extent of sludge production and disposal requirements
- Loss of head through plant in relation to available head (to avoid/ minimize pumping as far as possible)
- Ease of strategic expansion of plant capacity over time

The high-rate trickling filter single stage is high recommended where land for large waste stabilization ponds (Facultative and maturation ponds). The high-rate trickling filters are recommended for medium to relatively high strength domestic wastewater. The BOD removal efficiency is normally between 70 to 90%.

3.7 Methods of Disinfection

3.7.1 Chlorination

Chlorination method shall be by use of HTH (65%) solution which shall be controlled by a dozer which is commonly applied method of application of disinfection. The factors of consideration are chlorine availability, and costs. The concentration shall remain constant so that only the dozing rate shall change. The powder HTH is available in Kenya in dry powder. The requirements for sodium hypochlorite feeding shall be automated.

3.7.2 De-chlorination

There effluent should be free of Chlorine. The plant should have the capability of applying a de-chlorination if required. Since this plant has automatic chlorine residual analyzer, automatic dozer and residual chlorine probe it may not require de-chlorination agent.

3.7.3 Chlorine Design Considerations

Chlorination system designs should consider the following design factors:

- Flow rate at maximum rate.
- Contact time minimum.
- Concentration and type of chlorine residual
- Mixing shall be a motorized mixing method with two tanks one duty and standby
- pH monitoring
- Suspended solids
- Industrial wastes
- Temperature
- Concentration of organisms

- Ammonia concentration

The design should provide adequate flexibility in the chlorination equipment and control system to allow controlled chlorination at minimum and peak flows over the entire life of the treatment plant. Special consideration should be given to the chlorination requirements during the first years of operation to ensure the chlorination system is readily operable at less than design flows without over chlorination. Chlorination equipment should operate between 25% and 75% of total operating range, to allow for adjusting flexibility at design average flow.

3.7.4 Sampling, Instrumentation, and Control

A modulated dosage control systems to be provided with automatic analyser and a marching chlorine dozing rate to accommodate fluctuations influent quality at the chlorine channel and an automatic residual analyzer to monitor affluent discharge into the wetland which provide an additional 2hours retention.

3.7.5 Residual Chlorine analyzer and automatic dozer

Residual Chlorine testing equipment shall be provided for automatically measuring chlorine residual. The chlorine demand analyzer and dozing are a critical area, the installation of facilities for continuous automatic chlorine residual analysis and recording systems may be required.

3.7.6 Water quality at effluent discharge point

(i) Physical, chemical, and microbiological laboratory results

Water sampled at the proposed discharge point for the Runyenjes Sewerage Plant in Runyenjes at River Ethirai. It is slightly turbid, soft water with moderate amounts of ions. It also tested positive for bacterial contamination ***Appendix 9: R. Ethirai (water discharge point) analysis.***

(ii) Effluent laboratory results

Water sampled at the proposed discharge point for the Runyenjes Sewerage Plant in Runyenjes at River Ethirai. The parameters are satisfactory for water discharge into the environment ***Appendix 9: R. Ethirai (water discharge point) analysis.***

3.8 Project Cost

The proposed project will cost approximately **Five hundred and eight million, two hundred and thirty-one thousand eight hundred shillings and thirty-eight cents (Ksh. 508,231,800.38)**

4. : POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This section provides an in-depth analysis of relevant financial institution policies, national environmental regulations, strategic plans, legislation, and multilateral environmental agreements relevant to the proposed project.

4.1 The African Development Bank Integrated Safeguards System 2013

Aligned with the Bank's overarching commitment to fostering inclusive and environmentally sustainable growth over the long term, the Bank Group dedicates its operations to aiding Borrowers in conceiving and executing projects, initiatives, and other activities that prioritize environmental and social sustainability. Moreover, the Bank is steadfast in its dedication to bolstering the capacity of member countries and Borrowers to assess and manage the environmental and social risks and impacts associated with their endeavors (AfDB 2013).

In pursuit of this objective, the Bank has established the Environmental and Social Operational Safeguards (OSs), which serve as guidelines to amplify positive outcomes and mitigate adverse environmental and social impacts, including those stemming from climate change, in projects. The Bank is committed to supporting Borrowers in adhering to these OSs throughout the project lifecycle, in accordance with the principles outlined in this Environmental and Social Policy.

The African Development Bank's Environmental and Social Operational Safeguards requirements for the Bank's Borrowers have been discussed in the sub chapters below.

4.1.1 OS 1: Assessment and Management of Environmental and Social Risk and Impact

The Environmental and Social Operational Safeguards aim to integrate environmental and social considerations, including climate change vulnerability, into Bank operations to foster sustainable development in the continent. Under OS1, Borrowers are responsible for assessing, managing, and monitoring environmental and social risks and impacts at each stage of Bank-supported operations. This includes stakeholder engagement and disclosing all documentation related to environmental and social assessment (ESA) prior to presenting operations to the Bank's Board of Directors.

The OSs is meant to aid the target economies in managing project risks and improving environmental and social performance through a risk- and outcomes-based approach. OS1 specifically focuses on identifying and assessing environmental and social risks and impacts, including gender inequalities and climate change vulnerabilities, and engaging stakeholders in the assessment process. It emphasizes adopting a mitigation hierarchy approach, which involves anticipating and avoiding risks and impacts, minimizing or reducing them to acceptable levels, mitigating them, and compensating for or offsetting significant residual impacts where feasible.

The proponent has ensured that the proposed project conforms to the project by engaging the registered and licensed experts to conduct a comprehensive Environmental and Social Impact Assessment. The

ESIA Process adhered to AfDB Operational Safeguards to the letter. All the stakeholders with interest in the project including the PAPs were involved in the entire process. This culminated in development of an ESIA report with a comprehensive Environmental and Social Management Plan to ensure that all the impacts of the projects are duly mitigated.

4.1.2 OS 2: Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement

This safeguard emphasizes the avoidance and minimization of involuntary resettlement, where possible. The OS acknowledges the potential negative consequences of project-related land acquisition, land access restrictions, and property loss on communities and individuals. These impacts can include physical displacement (such as relocation or loss of shelter) and economic displacement (resulting in the loss of land, assets, or livelihood opportunities), or both. Involuntary resettlement encompasses these impacts and the processes to mitigate and compensate for them. Resettlement is deemed involuntary when affected persons or communities lack the genuine opportunity, free from coercion or intimidation, to refuse land acquisition or access restrictions leading to asset loss or displacement.

If left unaddressed, physical, and economic displacement can lead to severe economic, social, and environmental risks. This includes the dismantling of production systems, potential impoverishment due to loss of productive resources or income sources, relocation to less conducive environments, weakening of community institutions and social networks, exacerbation of social inequalities, dispersion of kin groups, and erosion of cultural identity and traditional authority. Therefore, the safeguard emphasizes the avoidance of involuntary resettlement whenever possible. In unavoidable instances, efforts will be made to minimize it, and appropriate measures to mitigate adverse impacts on displaced persons (and host communities) will be carefully planned and implemented. Prior to implementing physical investments supported by the Bank

The Sewerage Project designs has avoided involuntary resettlement by utilizing the road reserve. In addition, a Resettlement Action Plan (RAP) has been developed to address any potential impacts on Project Affected Persons (PAPs), ensuring adequate compensation if necessary.

4.1.3 OS 3: Habitat and Biodiversity Conservation, and Sustainable Management of Living Natural Resources

This safeguard aims to conserve biodiversity and promote sustainable natural resource management. It further reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the sustainable management and use of natural resources. It also aligns with the Ramsar Convention on Wetlands, the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the World Heritage Convention, the United Nations Convention to Combat Desertification, and the Millennium Ecosystem Assessment. Its recommendations also align with the International Plant Protection Convention, which covers the movement of invasive alien species and pests, as well as pest risk analysis

for quarantine pests, including an analysis of the risks and impacts of genetically modified organisms. OS6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development.

The Environmental and Social Impact Assessment (ESIA) process includes an assessment of the project's impact on biodiversity and ecosystems, with mitigation measures outlined in the ESMP to prevent severe impacts.

4.1.4 OS.4: Resource Efficiency and Pollution Prevention and Management

This safeguard focuses on preventing pollution and efficiently managing resources. This Operational Safeguard (OS) recognizes that economic activities often cause air, water, and land pollution, and consume finite resources that may threaten people, ecosystem services, and the environment at the local, regional, and global levels. The current and projected atmospheric concentration of greenhouse gases (GHGs) threatens the welfare of current and future generations. In addition, more efficient and effective resource use, pollution prevention, and GHG emission avoidance, and mitigation technologies and practices have become more accessible and achievable. OS3 sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle in a manner consistent with Good International Industry Practice (GIIP)

A Waste Management Plan and an Effluent Discharge Control Plan has been developed to guide waste reduction, segregation, collection, and disposal practices, ensuring compliance with international best practices. Solid waste generated during the sewerage treatment process will be processed, treated and recycled through composting and sold as manure to rural farmers. Effluent water from the treatment process will undergo testing before release into the environment or use for irrigation purposes.

4.1.5 OS5: Labour and Working Conditions

This safeguard addresses risks related to labor and working conditions. This safeguard establishes the AfDB's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation.

Various types of workers will be engaged in the project, including civil servants, workers from the Tana Water Works Development Authority (TWWDA), contractor workers, consultants, and community workers. Potential labor risks include environmental, health, and safety hazards, sexual harassment and exploitation, child labor, forced labor, disputes over employment terms and conditions, and discrimination against vulnerable groups. Measures to manage these risks include adherence to minimum wage regulations, limitations on working hours, provision of rest periods, annual leave entitlements, maternity and paternity leave, death benefits, and medical treatment for injured workers. The contractor will adhere to all the best practices to ensure the health and safety of employees is well taken care of.

Specific measures shall be undertaken by the contractor in conjunction with the proponent to protect vulnerable groups of workers, such as women, persons with disabilities, and youth (if any are employed in accordance with relevant regulations), ensuring they are not exploited and are provided with necessary support.

4.2 Relevant National Policies and Strategies

4.2.1 The Constitution of Kenya, 2010

The Constitution holds the highest legal authority in the nation and forms the foundation of Kenya's well-being. Its provisions are tailored to ensure the sustainable and productive management of land resources, the transparent and cost-effective administration of land, and the effective conservation and protection of ecologically sensitive areas.

Article 21 (3) outlines that all branches of government and public officials bear the responsibility of addressing the needs of vulnerable segments within society. This includes women, the elderly, persons with disabilities, children, youth, members of marginalized communities, and those from specific ethnic, religious, or cultural backgrounds.

Article 42 asserts the right of every individual to a clean and healthful environment, encompassing the following aspects:

- The safeguarding of the environment for the benefit of present and future generations through legislative measures and other strategies, particularly those detailed in article 69.
- The fulfilment of obligations concerning the environment as detailed under article 70. Section 69 specifies that the state shall:
- Promote public participation in environmental management, protection, and conservation.
- Institute mechanisms for environmental impact assessment, environmental auditing, and environmental monitoring.
- Eliminate processes and activities that pose potential harm to the environment.

It is anticipated that the guiding principles of Kenya's constitution with regard to environmental preservation and conservation will direct the construction and operation of the proposed sewer treatment and the associated infrastructure. The project proponent will make earnest efforts to ensure that the rights of marginalized and vulnerable groups are duly considered in all project-related decisions. Through this comprehensive study report and the formulated Environmental and Social Management Plan (ESMP), the proponent has undertaken proactive measures to ensure that the project contributes positively to a clean and healthful environment for the community.

4.2.2 The Kenya Vision 2030

The Vision 2030 maps the development agenda by seeking to make Kenya a globally competitive middle- income country by 2030 (GoK 2012). Chapter 5 of the Vision 2030 blueprint focuses on

education, health, water, environment, housing and urbanization amongst other sectors. Vision 2030 is being implemented through a series of five-year Medium- Term Plans (MTP). The MTP identifies the key policy actions and programs for each Ministry Department and Agency (MDA).

The overarching objective of the Environment, Water, and Sanitation Sector, as highlighted in the Vision, is to achieve a "clean, secure, and sustainable environment" by the year 2030. The planned development initiatives are focused on enhancing the overall health and hygiene conditions of the community. Furthermore, a dedicated Environmental and Social Impact Assessment for the sewer project will be undertaken to ensure effective mitigation of any potential negative environmental consequences that could arise from the project's execution.

4.2.3 The Sessional Paper No 1 on National Water Policy 2021

The Sessional Paper proposed a range of measures and actions through which Kenya can respond to the challenges facing the water sector. The Policy re-engineered the water sector through interventions that are geared towards achieving sustainable development in Kenya and in consonance with the sustainable Development Goals, 2030 (GoK 2021). The policy is geared to addressing the emerging challenges and realities in the sector more specifically addressing low sewerage coverage and supply of water resulting from rising population and expansion of economic activities across the sector.

This undertaking therefore conforms with the government policy as it aims to increase access to sewerage services in Runyenjes. With the growing population in Runyenjes township, there is need to readjust the sewerage infrastructure to satisfy the needs of the town.

4.2.4 National Policy on Water Resources Management and Development (1999)

The Sessional paper No. 1 of 1999 was established with the objective of preserving, conserving, and protecting available water resources and to ensure that water is allocated in a sustainable, rational, and economic way. The policy further desires to provide water of good quality and in sufficient quantities that meets the various water needs while ensuring safe disposal of wastewater and environmental protection. To achieve these goals, water provision through increased household connections and developing other resources and improved sanitation is required.

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors of socio-economic progress, it recognizes the by-products of this process as wastewater. The proposed project is towards providing sufficient access to sewer by the Runyenjes township residents.

The primary objective of the proposed efforts is to improve the community's access to improved sanitation and hygiene. The proposed developmental activities are designed to safeguard the community and water sources from potential disease-causing organisms.

Given that the project will involve activities that may be harmful to the environment, it is imperative for the project proponent to establish comprehensive strategies and plans for managing wastewater. Appropriate measures need to be put in place to ensure responsible effluent discharge management that adheres to environmental standards and safeguards the local ecosystem.

4.2.5 Sessional Paper No. 10 of 2014 on the National Environment Policy

The Republic of Kenya has a policy, legal and administrative framework for environmental management. This Policy sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The policy further acknowledges that natural resources are under immense pressure from human activities particularly for critical ecosystems including forest, grasslands and arid and semi-arid lands.

The policy seeks to develop an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools. Under the National Environment Policy, the government will.

- Ensure optimal use of natural resources while improving environmental quality.
- Conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
- Develop awareness that inculcates environmental stewardship among the citizenship of the country.
- Integrate environmental conservation and socio-economic aspects in the development process.
- Ensure that national environmental goals contribute to international obligations on environmental management and social integrity.
- Ensure Strategic Environment Assessment (SEA), Environmental Impact Assessment, Social Impact Assessment and Public participation in the planning and approval of infrastructural projects.
- Develop and implement environmentally friendly national infrastructural development strategy and action plan.
- Ensure that periodic Environmental Audits are carried out for all infrastructural projects.

To achieve this, it is a policy direction that appropriate reviews and evaluations the proposed Runyenjes Sewerage Project and operations are checked to ensure compliance with the environmental policy. The ESIA process ensure that conservation strategies are laid down in the in the critical decision points of the project.

4.2.6 National Environmental Sanitation and Hygiene Policy, 2016

The National Environmental Sanitation and Hygiene Policy is dedicated to addressing environmental sanitation and hygiene matters in Kenya, serving as a significant contribution to enhancing the dignity, health, welfare, social well-being, and overall prosperity of all residents in the country. The (Kenya

environmental Sanitation and Hygiene Policy 2016)acknowledges that the foundation of healthy and hygienic behaviours and practices originates at the individual level.

The proposed Sewerage project is in harmony with the policy's objectives to bolster sanitation, hygiene, the utilization of safe drinking water, and effective wastewater management at the household level. In accordance with the fundamental human right to live with dignity in a clean and sanitary environment, every Kenyan should have the opportunity to do so.

The intended works are designed to actively contribute to the enhancement of sanitation and hygiene within Runyenjes. The proposed development will strictly adhere to the hygienic and sanitation practices set forth in the policy.

4.2.7 Gender Policy, 2011

This Policy Framework aims at mainstreaming gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya. The policy provides direction for setting priorities to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality.

This policy will be referred to during project implementation especially during hiring of staff to be involved in the implementation of the project. Moreover, the project will be of benefit to women and girls by providing opportunities to reduce poverty and food insecurity among the rural poor households by improving the performance of irrigation and marketing infrastructure, as well as enhanced methods of post-harvest management.

The proponent through this ESIA carried out adequate social assessment of the project and through the ESMP to provide adequate measures to comply with the provisions of this legislations on; national legal and policy provisions on gender, HIV/AIDS and Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA).

4.3 Relevant Legislative Framework

There are several legal provisions on environmental protection, which touch on and regulate the development of infrastructure like the proposed Last Mile Connectivity of Meru Sewerage project. A brief review of the various legislations relevant to the development is given hereunder.

4.3.1 Environmental Management and Coordination Act CAP 387 and EMCA Amendments 2015

The Environmental Management and Coordination Act (EMCA) of Cap 387 was enacted to provide an appropriate legal and institutional framework for the management of the environment and for

matters connected therewith and incidental thereto. EMCA does not repeal the sectoral legislation but seeks to coordinate the activities of the various institutions tasked to regulate the various sectors. These institutions are referred to as Lead Agencies in EMCA. Lead Agencies are defined in Section 2 as any government ministry, department, parastatals, and State Corporation or local authority in which any law vests functions of control or management of any element of the environment or natural resource.

EMCA Cap 387 applies to all policies, plans and programs as specified in part IV, part V and the Second Schedule of the Act. A number of legislations are in place to ensure the provision of a healthy and clean environment, but EMCA Cap 387 takes precedence. It is the principal law that governs the use, management and regulation of environmental resources in Kenya.

Under the second schedule, amended via (Legal Notice 31 & 32 of 2019 on EIA 2019), the proposed project is categorized as a High-Risk Project and therefore and ESIA study report is required.

4.3.2 ESIA and EA regulations (EIA regulations 2003)

The regulations specify the necessary steps and guidelines for conducting an EIA and Environmental Audit, covering various aspects of environmental assessment and mitigation measures. The ultimate goal is to ensure the submission of a comprehensive report to NEMA, thus contributing to effective environmental management and compliance with regulatory frameworks.

The regulations further stipulate that a qualified expert(s) should prepare a report based on the assessment and audit, which must be submitted to the National Environmental Management Authority (NEMA). This ensures compliance with the regulatory requirements and facilitates the appropriate management of environmental impacts.

The ESIA process was conducted in accordance with the regulations, involving qualified experts and following the guidance provided by NEMA. The proponent is dedicated to adhering to the environmental management plan specified in the ESIA report, ensuring responsible environmental practices and the effective management of potential impacts.

4.3.3 Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003 (amended 2019)

These regulations stipulate the steps to be followed when undertaking an Environmental Impact Assessment, and Environmental Audit. The regulations stipulate the ways in which environment impact assessment and audits should be conducted. The regulations require that the Environmental Impact Assessment and Environmental Audit be conducted in accordance with the issues and general guidelines spelled out in the second and third schedules of the regulations. These include coverage of the issues on schedule 2 (ecological, social, landscape, land use, and water considerations) and general guidelines on schedule 3 (impacts and their sources, sub-projects details, national legislation, mitigation measures, a management plan, and environmental auditing schedules and procedures. In the second schedule

amended in 2019, the project is classified as a low-risk project. It finally states that a project report, drawn by a qualified expert(s) should then be filed to the National Environmental Management Authority (NEMA).

In carrying out the ESIA and writing the report the requirements of this regulations and those of the international Social Safeguards were integrated and followed throughout the process. The proponent shall observe the guidelines as set out in the environmental management plan laid out in the ESIA report as well as the recommendation provided for mitigation, minimization, and avoidance of adverse impacts arising from the project activities.

4.3.4 Environmental Management and Coordination (Water Quality) Regulations, 2006

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget. The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent and sewer into aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment. Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA Cap 387).

The Proponent will adhere to the provisions of this regulation to protect the proposed water resource for disposal from all possible pollution during the construction and the operation phase by carrying out this ESIA. Considering the technology undertaken, the proposed project will adhere the effluent compositions as it is in schedule IV of the regulations to endure the project have minimal impacts on the ecosystem. The consultants shall outline the water quality control measures in the ESIA through the development of an Effluent Discharge Plan.

4.3.5 Environmental Management and Coordination (Waste Management) Regulations, 2006

These regulations stipulate how the different types of waste streams should be stored, transported, and disposed of. The type of waste streams described herein include solid waste, industrial waste, hazardous waste, pesticides and toxic substances, biomedical waste, and radioactive substances. The regulations also stipulate the conditions for licensing any person dealing with the transport or waste disposal. The regulations prohibit anyone from disposing of any waste on any part of the environment except in

designated waste receptacle or facility provided by the relevant local authority which may be legitimate dumpsites or landfills.

Since the proposed works will generate waste in form of waste soils during construction, human waste during operation and other solid wastes this act provides for the waste generator to be responsible for the collection, segregation at source and proper disposal of their wastes. Through the ESMP and the Effluent Discharge Plan the measures for managing waste generated through this sub project will be provided. The proponent will comply with the provisions of EMCA in managing wastes as stipulated under waste management regulations by offering proper guidelines in waste management.

4.3.6 Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These regulations prohibit any person from making or causing any loud, unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. It also stipulates the factors to be considered when determining the amount of noise produced from various sources. The regulations further provide the permissible noise levels within different neighborhoods at different times. In determining whether noise is loud, unreasonable, unnecessary, or unusual, the following factors may be considered:

- Time of the day.
- Proximity to residential area.
- Whether the noise is recurrent, intermittent, or constant.
- The level and intensity of the noise.
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

The regulations give permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial.

4.3.7 Environmental Management and Coordination (Air Quality) Regulations, 2014

These regulations provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It applies to all internal combustion engines, all premises, places, processes, operations, or works to which the provisions of the Act and Regulations made thereunder apply, and any other appliance or activity that the Cabinet Secretary may by order in the Gazette, specify. They stipulate the measures to prevent air pollution from both stationary and mobile phases. They also provide for the permissible occupational exposure limits.

The proponent will ensure that ambient air quality is maintained during the during the project life cycle. The proposed works will ensure compliance with Air quality regulations by enforcing all the proposed preventive and mitigation measures in the ESMP.

4.3.8 Water Act, 2016

This Act provides the legal framework for the regulation, management and development of water resources and water, and sewerage services in line with the Constitution. The Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, and requirement for permits, state schemes and community projects. The act gives Mandate Water Resources Authority to manage and monitor all water related resources. The proposed Sewerage project will comply with the Act by acquiring the necessary permits from the relevant bodies in relation to water resources.

4.3.9 Land Act, 2012 (The Land Laws (Amendment) Act, 2016 No. 28 of 2016)

This is an Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources, and for connected purposes. Part VIII of this Act provides procedures for compulsory acquisition of interests in land. Section 111

States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined.

The Act also provides for settlement programs. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination. Under section 3. (1) the Act applies to all land declared as— (a) public land under Article 62 of the Constitution; (b)private land under Article 64 of the Constitution; and (c) community land under Article 63 of the Constitution and any other written law relating to community land. In section 8(d) the Commission on behalf of the National or County Government may require the land to be used for specified purposes and subject to such conditions, covenants, encumbrances, or reservations as are specified in the relevant order or other instrument.

The proposed Sewerage project shall fully utilize the road reserves to minimize any form of livelihood displacement. The project proponents have made necessary arrangement for a Resettlement Action Plan in case there are instances of loss of livelihood through land. This has been undertaken in regards also to the requirements of the AfDB Integrated Safeguards Policies

4.3.10 Occupational Safety and Health Act (OSHA 2007)

Occupational Safety and Health Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of the Act is to secure the safety, health, and welfare of persons at work and protect persons other than persons at work against risks to safety and health arising out of the activities of persons at work. Section 19 of the Act provides that an occupier of any premises

likely to emit poisonous, harmful, injurious, or offensive substances, into the atmosphere shall use the best practicable means to prevent such emissions into the atmosphere and render harmless and inoffensive the substances which may be emitted. This Act was found relevant for reference in this ESIA since the construction phase will involve workers who will be exposed to various occupational hazards.

There will be the need to ensure that all employees and people around the area are protected against any risks that could arise from the operations, hence the provisions of this Act will be incorporated. A comprehensive occupational health and safety audits will be carried out periodically to ensure compliance with this Act particularly in the construction phase.

4.3.11 The Public Health Act (Cap. 242) Revised 2012

Section 115 of the Act states that no person/institution shall cause a nuisance or condition liable to be injurious or dangerous to human health. The law requires that all lawful, necessary, and reasonably practicable measures be taken to maintain areas under jurisdiction clean and sanitary to prevent the occurrence of nuisance or condition liable for injurious or dangerous to human health.

Section 136 state that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pest shall be deemed nuisances and to be dealt with in the manner provided by this Act.

The proponent through the ESIA, the Effluent Discharge Plan and the ESMP will define the necessary measures to be taken by the Contractor, and other responsible parties to prevent the occurrence of nuisance or condition liable for injurious or dangerous to human health during the construction and the operation phase of the project.

4.3.12 County Governments Act, 2012

This is an Act of parliament to give effect to Chapter Eleven of the Kenyan Constitution; to provide for the County government's powers, functions, and responsibilities to deliver services and for connected purposes. The Act lays emphasis on the need for a consultative and participatory approach where the principles of planning and development facilitation in a county serve as a basis for engagement between the county government and the citizens and other stakeholders. Specifically, Part VIII of the Act outlines the principles of citizen participation in counties as.

- Timely access to information, data, documents, and other information relevant or related to policy formulation and implementation.
- Reasonable access to the process of formulating and implementing policies, laws, and regulations, including the approval of development proposals, sub-projects, and budgets, the granting of permits and the establishment of specific performance standards.

- Protection and promotion of the interest and rights of minorities, marginalized groups and communities and their access to relevant information.
- legal standing to interested or affected persons, organizations, and where pertinent, communities, to appeal from or, review decisions, or redress grievances, with particular emphasis on persons and traditionally marginalized communities, including women, the youth, and disadvantaged communities.
- Reasonable balance in the roles and obligations of county governments and non- state actors in decision-making processes to promote shared responsibility and partnership, and to provide complementary authority and oversight.

4.3.13 National Gender and Equality Act, 2011

National Gender Equality Commission is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution. NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEC Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination.

Gender mainstreaming in development endeavors guarantees that both the interests of women and men are fully integrated into every facet of the project's design, execution, operation, and subsequent monitoring and evaluation processes. This approach ensures equitable benefits for both genders, while simultaneously working to prevent the perpetuation of any existing inequalities.

4.3.14 Employment Act, 2007

The Act is enacted 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 and federations. The purpose of the Act is to promote sound labor relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute for the protection and promotion of settlements conducive to social justice and economic development for connected purposes. This Act is important since it provides for an employer employee relationship that is important for the execution of the project.

The Proponent through the Contractor will ensure that fairness and gender equity are followed during the recruitment of the labor force to be used during the construction phase.

4.4 Institutional Framework

4.4.1 The Land and Environment Court Act, 2012

This is an Act of Parliament to give effect to Article 162(2) (b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected

purposes. The principal objective of this Act is to enable the Court to facilitate the just, expeditious, proportionate, and accessible resolution of disputes governed by this Act.

Section 13 (2) (b) of the Act outlines that in exercise of its jurisdiction under Article 162 (2)

(b) Of the Constitution, the Court shall have power to hear and determine disputes relating to environment and land, including disputes:

- Relating to environmental planning and protection, trade, climate issues, land use planning, title, tenure, boundaries, rates, rents, valuations, mining, minerals, and other natural resources.
- Relating to compulsory acquisition of land.
- Relating to land administration and management.
- Relating to public, private and community land and contracts, chooses in action or other instruments granting any enforceable interests in land; and
- Any other dispute relating to environment and land.

Section 24 (2) also states that the Chief Justice shall make rules to regulate the practice and procedure, in tribunals and subordinate courts, for matters relating to land and environment.

Section 30 (1) states that all proceedings relating to the environment or to the use and occupation and title to land pending before any Court or local tribunal of competent jurisdiction shall continue to be heard and determined by the same court until the Environment and Land Court established under this Act comes into operation or as may be directed by the Chief Justice or the Chief Registrar.

Any land or/and environmental cases arising from the project will be handled in accordance with the provisions of this Act. Land is a basic factor of production for any development. The proponent shall acquire the land at the proposed project site and the wayleaves via the acceptable standards put up by the court. In the event of any issues, the requirements of the court should be adhered to during project implementation.

4.4.2 The National Environment Council

The National Environmental Council is responsible for policy formulation and directions for the purposes of the Act. The Council also sets national goals and objectives and determines policies and priorities for the protection of the environment.

The proponent shall ensure that the project abides by the set goals and objectives of the council.

4.4.3 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

In addition to NEMA, the Act provides for the establishment and enforcement of environmental quality standards to be set by the Cabinet Secretary in consultation with the Authority, which will govern the discharge, limits to the environment by the proposed project.

NEMA must approve the project before implementation and also participates in subsequent stages of construction environmental management and annual audits review.

4.4.4 County Government of Embu

The County Government is established by the Constitution of Kenya 2010 and operates under the Cities and Urban Areas Act, The Devolved Governments Act, and other relevant legislation. It is responsible for providing various services to the residents of Meru Municipality, including those previously provided by the defunct Municipal Council and services transferred from the national government.

The former includes Physical Planning, Public Health, Social Services and Housing, Primary Education Infrastructure, Inspectorate Services, Public Works, Environment Management while the latter include Agriculture, Livestock Development and Fisheries, Trade, Industrialization, Corporate Development, Tourism and Wildlife, Public Service Management and Water services.

The County Government plays a vital role to ensure sound waste management and control of the environmental degradation within its jurisdiction, so they will also act to ensure that the proponent manages its environment well.

4.5 Institutional Structure of the Water and Sewerage Sector

4.5.1 Ministry of Water, Sanitation, and Irrigation

This is the overall Ministry in charge of water and sewerage in Kenya. It is responsible for policy development, sector co-ordination, monitoring, and supervision to ensure effective Water and Sewerage Services in the Country, sustainability of Water Resources and development of Water resources for irrigation, commercial, industrial, power generation and other uses. It's mission statement is to contribute to national development by promoting and supporting integrated water resource management to enhance water availability and accessibility. The MWI has the following technical departments: Water Services, Water Resources, Water Storage and Land Reclamation, and Irrigation and Drainage. The Ministry executes its mandate through the following sector institutions presented below.

(i) Water Services Trust Fund (WSTF)

The Water Services Trust Fund (WSTF) serves to assist in the financing of water deficient service area through providing financial support to improve water services towards.

- Active community participation in the management of water services
- Capital investment to community water schemes in underserved areas.
- Capacity building activities and initiative among communities

- Water services activities outlined in the Water Services Strategic Plan as prioritized by the Government.
- Awareness creation and information dissemination regarding community management of water services

(ii) Water Services Regulatory Board (WASREB)

The regulatory Board is responsible for the regulation of the water and sewerage services in partnership with the people of Kenya. Its mandate covers the following key areas.

- Regulating provision of water and sewerage services including licensing, quality assurance and issuance of guidelines for tariffs, prices, and disputes resolution.
- Overseeing the implementation of policies and strategies relating to provision of water services licensing of Water Services Boards and approving their appointed Water Services Providers,
- Monitoring the performance of the Water Services Boards and Water Services Providers,
- Establishes the procedure of customer complaints,
- Informs the public on the sector performance,
- Provides advice to the Minister in charge of water affairs.

(iii) Water Services Boards (WSBs)

The WSBs are responsible for the efficient and economical provision of water and sewerage services in their areas of jurisdiction. The proposed project by TWWDA shall fall under the jurisdiction of Tana Water Services Board and shall be managed by Kyeni Water and Sewerage Company (KYEWASCO), the area Water Service Provider. The board shall assist in preparation of performance targets for the project which will directly have an impact on provision of water and sanitation services to the proposed estates.

(iv) Water Services Providers

Water Service Providers are the utilities or water companies. KYEWASCO being the area WSP, it will be responsible for the following:

- Ensure effective communication of all matters related to project to the target group.
- Sensitize the community for buy in of the project and ensure its sustainability.
- Ensure implementation of the project in accordance with the project rules

4.5.2 County Environment Committee

The County Environment Committee is responsible for environmental management at the County level through preparation of County environment action plans for consideration and adoption by the respective County Assemblies.

Relevance

TWWDA shall ensure that the project abides by the set County environment action plan for Embu County.

4.5.3 County Government of Embu

The Fourth Schedule of the Constitution of Kenya 2010 Part 2 (3) provides for devolved environmental functions to be undertaken by the County Governments and includes control of air pollution, noise pollution, and other public nuisances. In addition to development approvals, the county government has some jurisdiction of environmental management including waste management, drainage, noise permit issuance, and enforcing public health act.

4.5.4 The National Environment Management Authority

The responsibility of the National Environment Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment. In addition to NEMA, the EMCA Act provides for the establishment and enforcement of environmental quality standards to be set by the Cabinet Secretary in consultation with the Authority, which will govern the discharge, limits to the environment by the proposed project.

Relevance

NEMA shall have the role of licensing the proposed project after reviewing the ESIA report. The proponent shall be mandated to adhere to the conditions of licensing issues by NEMA. The Authority shall also review annual audit reports on the project.

4.5.5 Water Resource Authority (WRA)

WRA is responsible for regulation of water resources issues such as water allocation, source protection and conservation, water quality management and pollution control and international waters. Its roles and responsibilities are as follows:

- Planning, management, protection, and conservation of water resources.
- Planning, allocation, apportionment, assessment, and monitoring of water resources.
- Issuance of water permits.
- Water rights and enforcement of permit conditions.
- Regulation of conservation and abstraction structures.
- Catchment and water quality management.
- Regulation and control of water use; and
- Coordination of the Integrated Water Resource Management (IWRM) Plan.

Relevance

The contractor and TWWDA will be required to consult WRA regarding discharge of treated effluent water for construction. They will also be required to apply for a permit to discharge treated water effluent as well as adhere to the rules and regulations stipulated by WRA. The WRA is responsible for protection, conservation and management of the riparian areas. It is their mandate to ensure that there are WRUAs in place to actively manage the water resource.

5. GRIEVANCE REDRESS MECHANISM

5.1 Overview

A Grievance Redress Mechanism (GRM) is an instrument through which dispute resolution is sought and provided. It involves the receipt and processing of grievances from individuals or groups negatively affected by activities of a particular project. A Grievance Redress Mechanism (GRM) plays a critical role in preventing negative interruptions in project implementation occasioned by legal redress that are costly and time consuming. It spells out avenues to mitigate grievances from stakeholders and provides a legitimate, accessible, and cost-effective avenue for receiving and addressing grievances whenever they occur.

5.2 Objectives of the Grievance Redress Mechanism

The objectives of the GRM are as follows:

(i) To provide and operationalize structures for receiving and addressing grievances emanating from project activities and providing feedback.
(ii) To sensitize stakeholders on existing avenues and channels for registering and resolving grievances
(iii) To establish a trusting and respectful relationship between the Project and the community.
(iv) To promote early identification of grievances and address them effectively and efficiently towards better manage of project impacts.
(v) To promote good relations between the project implementers, executers and the local communities.
(vi) Facilitate a learning culture, by means of analysing trends and patterns to drive continuous performance improvement and reduce repeat grievances thus improving project management decisions.

5.3 Principles of the GRM

The effectiveness of this GRM will be guided by following principles:

(i) Accessibility – The GRM shall be accessible to everyone and at any time.
(ii) Predictability – time bound at any stage with specified timeframes for the responses.
(iii) Fairness – The procedures herein are perceived as unbiased in regard to access to information and meaningful public participation.
(iv) Rights compatibility – The outcome of the mechanism should be consistent with the Bank and national standards and should not restrict access to other redress mechanisms.
(v) Transparency and Accountability – The entire GRM process to be open and transparent and done out of public interest.
(vi) Culturally appropriate, thus sensitive to people's perceptions about fairness, justice and respectful solutions

(vii) Feedback – The GRM to serve as a means of feedback from various stakeholders to improve project outcomes.

5.4 Types of Grievances

The GRM will solely be dedicated to handling grievances related or emanating from activities of the proposed projects under the National Urban Water Supply and Sanitation Programme. The type/ scope of grievances shall include those related to:

(i) Grievances and disputes emanating from compensation.
(ii) Inadequate stakeholders' consultation and participation at any stage of projects implementation
(iii) Negative social and environmental impacts emanating from projects implementation.
(iv) Concerns on prioritization and/ or distribution of project interventions
(v) Concerns on social and environmental safeguards matters.
(vi) Cases of gender-based violence, particularly sexual exploitation and abuse/sexual harassment
(vii) Any concerns/ complaints from stakeholders relating to contractors and consultants engaged during projects implementation.

Any grievances that will be raised outside this scope shall be redirected to other GRMs discussed at national level. Matters that are within project management and coordination will also not trigger the use of this GRM and will be dealt with administratively within the projects.

5.5 The Grievance Redress Mechanism Structure

The GRM structure presents procedures and timeframes for grievance redress at various levels. ***Figure 5.1***. presents the general steps for each grievance reported.

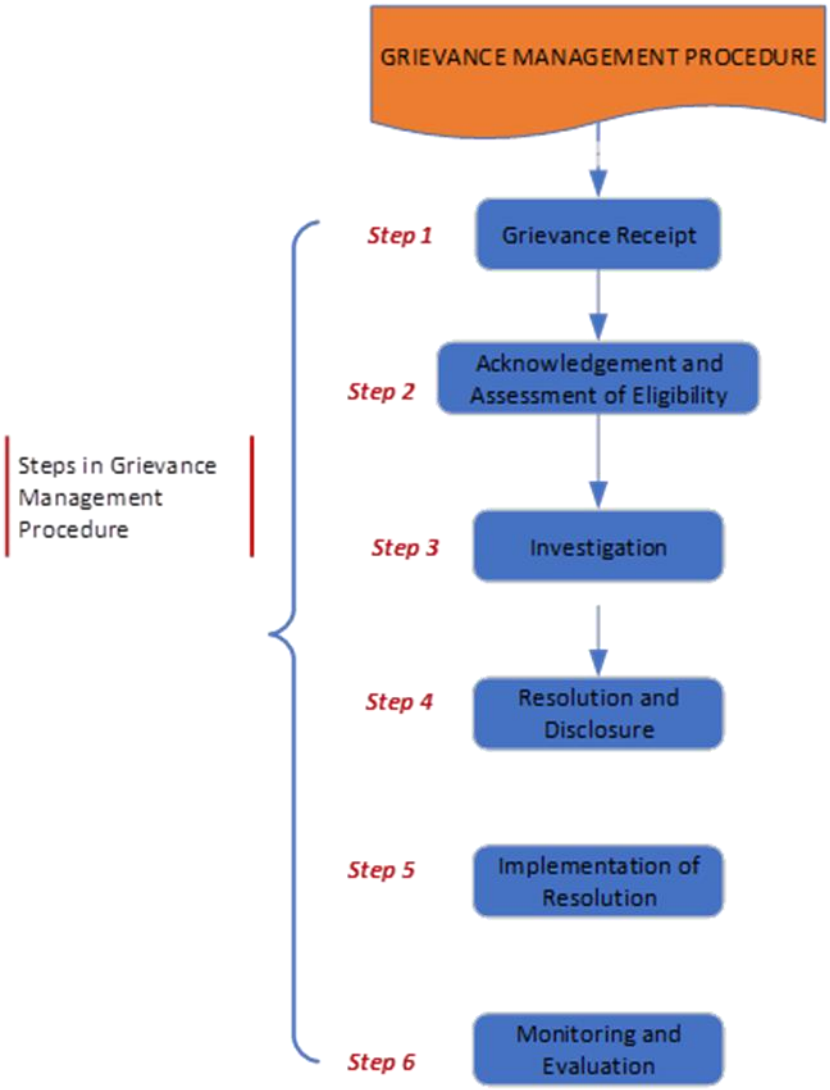


Figure 5.1: Grievance Management Procedure

A three-level redress mechanism targeting all stakeholders involved in project implementation will be adopted.

5.5.1 First Level of Redress: Community Level

The first level of grievance redress will be at the community level mainly targeting the local beneficiary communities and the project affected persons (PAPs). For every community at location level, a local grievance management committee shall be formed and trained to handle community grievances/ complaints emanating from the implementation of the proposed water supply and sanitation projects. The committee shall comprise of five members who shall include the local chief as the chair. The other members shall be nominated by the project beneficiaries ensuring gender balance and a representation of the vulnerable where applicable. The committee shall be trained by the community liaison officer from the local water service provider (WSP) on conflict resolution, group dynamics, project sustainability among other areas that shall be deemed necessary.

(i) Step 1: Receipt of grievances

The mode of receipt of the complaints/ grievances may either be in writing, reported verbally, over the phone or emails. Once the local grievance management committee receives a grievance, the committee secretary shall be mandated to register the grievance. The received grievance and relevant information related to the grievance shall be recorded on a standardized grievance register.

(ii) Step 2: Acknowledgement, assessment for eligibility and recording

The committee shall then determine the eligibility of the grievance received and if eligible, they shall notify the complainant and acknowledge receipt within three (3) days of receiving it. If not eligible, the complainant shall be informed of the reasons and advised on other existing GRMs to address his grievance. The complainant shall also be informed of the next steps and the timeframes including any further information/ documentation that maybe required to aid in investigation. The timeframes should not be later than twenty-one (21) days after the grievance is received.

(iii) Step 3: Investigation

The committee shall then set a day when all members are available and begin the investigation by assessing the seriousness/ severity of the grievance and classifying it either as high, medium, or low based on its impact to the complainant and the project. The assessment may necessitate the need for additional data collection through field visits to the sites, interviews with the relevant groups and follow up meetings with the affected groups to validate the information provided by the complainant. Minutes of such meetings shall be recorded and attached to the grievance report.

(iv) Step 4: Grievance Resolution and Disclosure

Depending on the findings and severity of the grievance, a resolution shall be decided immediately, and the deliberations recorded in the grievance resolution form. However, if the grievance cannot be resolved by the local grievance management committee it shall be escalated to the county level and to the national level if not resolved at the county level. In cases where the complainant shall not be satisfied with the resolution given by the concerned committee, they shall be advised to report to the next level of redress. Also, in cases where the project GRM levels are unable to resolve the grievance, the complainant will be referred to the existing legal and judicial mechanisms in Kenya. This process should take a maximum of thirty (30) days from the time the parties are informed of the acceptance of the grievance.

(v) Step 5: Implementation of the Resolution Mechanism

Once a resolution has been determined and the same communicated to the affected parties, an agreement shall be drawn outlining the following among other strategies for settlement of the grievance:

- Requesting the relevant agencies/ contractors responsible for the grievance to take appropriate measures to address the root causes of the grievance.
- Determining reasonable compensation for loss from the accused parties
- Signing agreements between the accused persons and the project for solutions mutually agreed upon.

(vi) Step 6: Grievance monitoring

The local grievance management committee shall then monitor the implementation of the grievance resolution mechanisms given and assess any further impacts of the project related grievances. They shall also monitor to ensure that the redress is granted to complainant in a timely and efficient manner and give regular feedback to the complainants about the progress.

5.5.2 County Level

The second level of redress will be at the county level where a county grievance management committee shall be established and chaired by a nominee of the proponent, TWWDA. The membership of the committee shall entail a nominee from the water service providers (WSPs), community liaison officers from the WSPs and the chairs of the various local grievance management committees in the County. The committee will also be trained in handling project grievances.

Just like the case with the first level of redress, once a complaint has been registered, the county grievance management committee will set a day to investigate the same and offer an action/ solution. If possible, a meeting will be held between the complainants and the concerned project officer to find a solution. Similarly, like in the first level of redress, a grievance resolution form shall be filled providing details of how the grievance was investigated and the recommended action provided. The resolution period shall be expected to take a maximum of fourteen (14) working days after which the complainant shall be notified through a grievance disclosure form. Grievances that shall not be resolved at this level shall be referred to the next level.

The county grievance management committees shall be obligated to submit a quarterly report using the standardized format. of registered complaints to Tana Water Works Development Agency, TWWDA.

5.5.3 Third Level of Redress: National Level

At the National Level, a Grievance Handling Committee shall be appointed and equally trained to handle grievances. The committee shall be chaired by a nominee at the Ministry of Water, Sanitation and Irrigation, other membership shall include the CEO TWWDA, the project co-ordinators at TWWDA, the chairs of the county grievance management committees and a representation from TWWDA legal department. The ministry shall appoint a grievance handling officer who shall foresee operations of the committee. As in other levels, the reporting tools for other levels shall equally apply at national level reporting.

The resolution period at national level shall be expected to take a maximum of twenty (21) working days and the concerned shall be notified through the GRM/003 form. Should the grievance not be solved within this period, the complainant shall be advised to seek recourse through the legal and judicial mechanisms in Kenya discussed below.

TWWDA shall maintain databases and reports on all grievances and regularly assess the overall effectiveness and the impact of the GRM. The results of the assessment shall be used to improve the performance of the GRM and provide valuable feedback to project management.

5.5.4 National Arbitration Processes in Kenya

If the complainants are dissatisfied with the outcome of grievance resolution, they shall be advised to seek recourse through the following national arbitration processes:

(i) Commission on Administrative Justice (CAJ)
(ii) National Environment Tribunal (NET)
(iii) Land Acquisition Tribunal
(iv) Courts

(i) Commission on Administrative Justice (CAJ)

The Commission on Administrative Justice (CAJ) also known as the Office of the Ombudsman is an independent commission established by the Commission on Administrative Justice Act, 2011 pursuant to Article 59 (4) of the Constitution of Kenya. It is the foremost constitutional commission whose primary function is to ensure public officers and public institutions respect sovereignty of the people of Kenya. The CAJ is mandated to address all forms of maladministration, promote good governance and efficient service delivery in the public sector by enforcing the right to fair administrative action. The CAJ investigates abuse of power, manifest injustice and unlawful, oppressive, unfair or unresponsive official conduct.

(ii) National Environment Tribunal

Tribunals are an integral component of the justice system in Kenya and play an important role in reducing pressure on courts and facilitating expeditious access to justice. The Constitution of Kenya, 2010 recognizes tribunals as part of subordinate courts in the judicial hierarchy hence demonstrating their importance in the administration of justice in Kenya. The National Environment Tribunal (NET) is established under the Environmental Management and Co-Ordination Act (EMCA). The jurisdiction of the Tribunal is set out under section 125 of the Act. The Tribunal hears and determines appeals concerning *grant of a license or permit or refusal to grant a license or permit; imposition of any condition, limitation or restriction on a license; revocation, suspension or variation of a license the amount of money required to be paid as fee under the Act or imposition against the person of an environmental restoration order or environmental improvement order by the Authority under the Act or its regulations*. The Act requires appeals to be lodged with the Tribunal within sixty days of the occurrence of the event which a person is

dissatisfied with.8 In addition, the jurisdiction of the Tribunal extends to appeals against decisions of the Director General of the National Environment Management Authority (NEMA). All grievances related to project licensing by NEMA shall be referred to the National Environment Tribunal.

(iii) Land Acquisition Tribunal

The Land Act, 2012 was amended in 2019 to include Section 133A which provided for the establishment of a tribunal, the Land Acquisition Tribunal to hear and determine appeals from decisions of the National Land Commission in matters relating to the compulsory acquisition of land.

The jurisdiction of the Land Acquisition Tribunal is in respect of appeals from the decision of the National Land Commission (NLC) on matters compulsory acquisition, as per section 133C (1) of the Land Act. Further, section 133C (6) of the Land Act grants initial/first instance jurisdiction to the tribunal to deal with disputes on creation of wayleaves, easements, and public right of way. Also, as per section 133C (8) of the Land Act, the Land Acquisition Tribunal has the powers to uphold and enforce the Bill of Rights and review any administrative action as to compulsory acquisition. In summary, the LAT has jurisdiction on disputes regarding:

(i) Compulsory acquisition of land
(ii) Wayleaves; easements; and public right of way
(iii) Upholding and enforcement of the Bill of Rights, as well as review of administrative action, as to compulsory acquisition

Even though, compulsory acquisition of land is not envisaged in this project, the role and provisions of the Land Acquisition Tribunal have been reviewed and provided as a precaution.

The Courts have power to hear and determine disputes, primarily of criminal and civil nature. Criminal cases are those in which the State prosecutes a person or an organization for committing an act which is not in the interest if the public, and therefore considered to be an offence against the state. Civil cases originate from a person who seeks redress for a private wrong such as breach of contract, trespass or negligence; or to enforce civil remedies such as compensation, damages or to stop some action.

Figure 5.2 presents a summary of the levels of grievance redress mechanism.

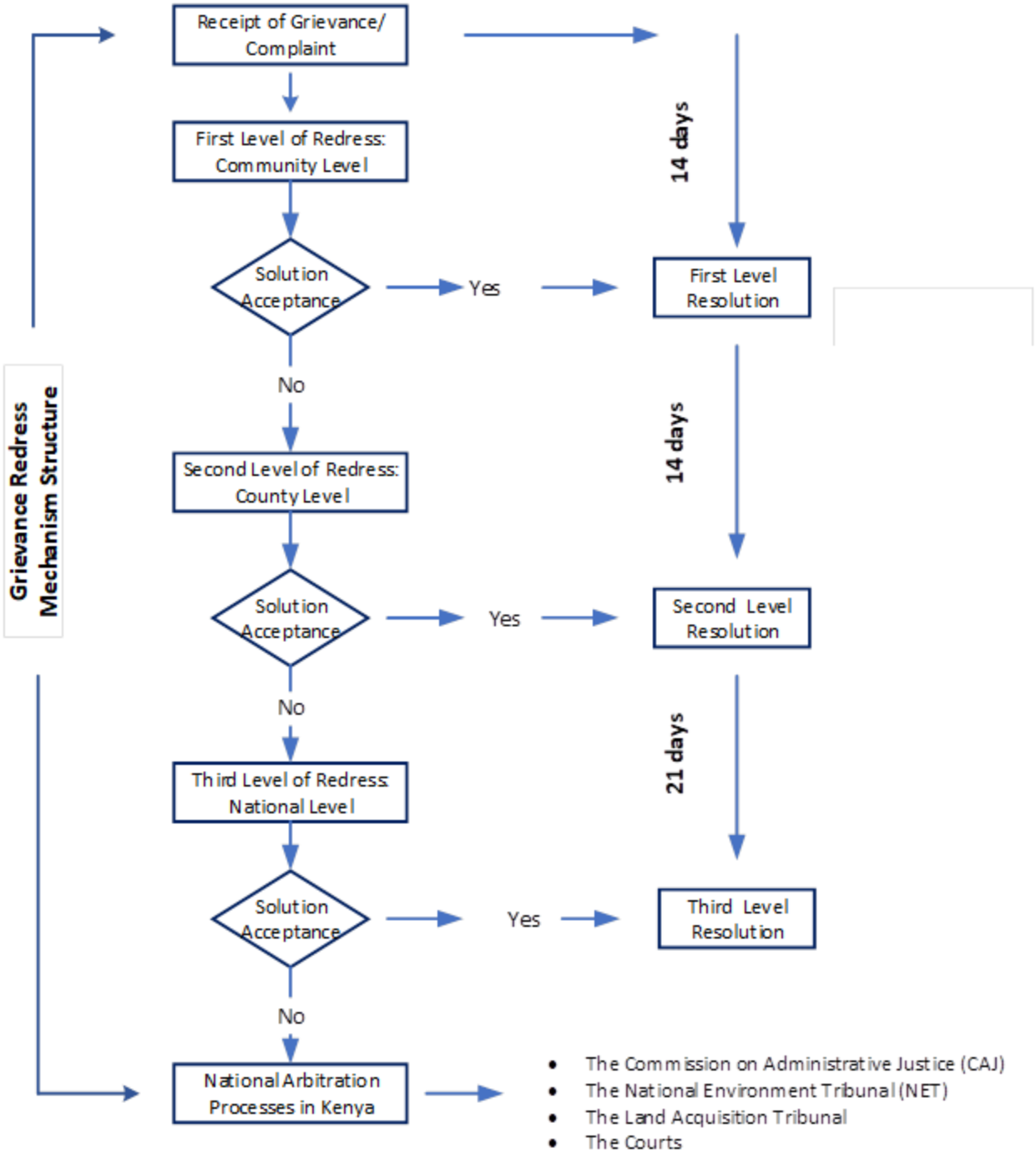


Figure 5.2: Levels of Grievance Redress Mechanism

6. STAKEHOLDERS CONSULTATION

6.1 Overview

This report section discusses the stakeholder engagement and public participation process conducted as part of the Environmental and Social Impact Assessment (ESIA) Study. It details the legal prerequisites for engaging stakeholders, describes the methodology employed in analyzing stakeholders, and summarizes the results of the consultations. Engaging with key project stakeholders is crucial within an ESIA study, as it significantly contributes to gaining the social acceptance for the project from both the local community and regulatory authorities.

6.2 Legal Requirements for Stakeholder Engagement

Kenya has established legal frameworks that mandate public involvement in development projects. In addition to the stipulations of the constitution of Kenya, specific laws have been enacted by parliament to implement these requirements. Furthermore, Kenya has adopted international conventions that further govern the consultation process.

6.2.1 Constitution of Kenya 2010

- 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) make 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) 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) state objectives of devolutions, among them is that devolution give 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 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 provision provide **for participation by residents in the governance of urban areas and cities**.
- Article 201(a) provides principles of public finance which require openness and accountability, **including public participation in financial matters**.

- Article 232(1) provides values and principles of public service include among others **involvement of the people in the process of policy making**.

6.2.2 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

6.3 Objectives of Public Consultations

The key objectives of the consultation and public participation for the proposed project was to:

(i) Disseminate and inform the public and stakeholders about the project with special reference to its key components and description.
(ii) Create awareness among the public on the need for the ESIA for the proposed project.
(iii) Gather comments, suggestions, and concerns of the interested and affected parties.
(iv) Incorporate the information collected in the ESIA.
(v) Build community consensus and acceptance of the proposed project.

6.4 Methodology and of Public Consultations Process

Public participation for the proposed project was conducted through the public consultative meetings and admission of questionnaires to allow for systematic understanding and interaction of the project beneficiaries, neighbours, local community members/ surrounding enterprises and any other would be affected/ interested parties.

6.4.1 Public Consultation Questionnaires

ESIA questionnaires were administered, to gather information from key stakeholder and the members of the public. This was done using structured questionnaires to assess the environmental and socio-economic views of the respondents. Copies of the filled questionnaires administered in the project area are appended to this report (Appendix 1: Sample Questionnaires).

The data obtained from the questionnaires is summarised in the sections below:

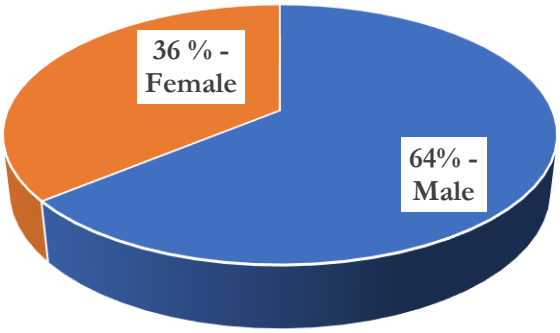


Figure 6.1: Percentage male and female respondents.

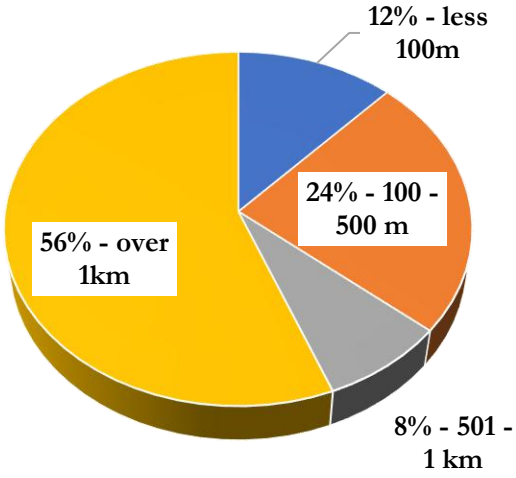


Figure 6.2: Respondent homestead distance from the ETP.

Table 6.1:Respondents' Level of Familiarity, Anticipated Impact, and Acceptance of the Proposed Project

Level of familiarity with the project.	Will you be affected by the project?	Project acceptance level
Yes	**Yes**	**Yes**
96%	64%	100%

No	No	No
4%	36%	0%

Some of the **positive social economic and environmental impacts** outlined by the respondents are summarised below:

(ix) **Job Creation:** The construction stage is likely to create employment opportunities for local workers, contractors, and service providers.

(x) **Boost to Local Economy:** Increased demand for local goods and services during construction can help stimulate the local economy.

(xi) **Improved Infrastructure:** The project may lead to improvements in roads and other infrastructure, benefiting the community at large.

(xii) **Enhanced Sanitation:** During the operation stage, improved sewerage systems will likely reduce public health risks, benefiting the overall well-being of the community.

(xiii) **Property Value Increase:** The establishment of modern sewerage infrastructure can lead to an increase in property values in the serviced areas.

(xiv) **Reduction in Pollution:** Improved sewerage management may lead to reduced contamination of local water bodies and the surrounding environment.

(xv) **Improved Public Health:** With better waste management, there could be fewer cases of waterborne diseases, positively impacting public health.

(xvi) **Sustainable Resource Use:** During the operation phase, the project might promote efficient use of water and recycling of treated wastewater for agricultural purposes.

Some of the **negative social economic and environmental impacts** outlined by the respondents are summarised below:

(vii) **Disruption to local businesses and residents:** Construction activities may cause temporary disruption to businesses, local traffic, and daily life due to noise, dust, and restricted access.

(viii) **Land acquisition issues:** The project might lead to displacement of families or businesses if land is required for construction, leading to social discontent.

(ix) **Environmental degradation during construction:** The construction phase could result in the destruction of vegetation, soil erosion, and habitat disruption.

(x) **Noise and air pollution:** Construction activities typically involve heavy machinery, which may lead to noise and air pollution, negatively affecting local wildlife and human health.

(xi) **Waste generation:** Both during construction and operation, there could be issues with waste management, especially if the handling of waste is not done properly.

(xii) **Water contamination risks:** There might be concerns about potential leaks or operational issues in the sewerage system, which could lead to contamination of local water sources if not properly managed.

6.4.2 Key Informant Interviews

The key stakeholder engagements were conducted to foster better and mutual understanding of public concerns as well as incorporate key stakeholders' opinions to this report. Some of the key informant consulted are summarized in **Table 6.2** and in Appendix 2: Key informant interview list**.**

Table 6.2:Key Informants

Category of stakeholder	Stakeholder consulted
Project Proponent	• TWWDA staff • KYEWASCO Staff
Embu County Government	• Governor/ Deputy Governor • County Executive (Ministry of Environ, Water and Natural Resources)
Public Administration	• Deputy County Commissioner, Embu County • Chiefs/ Sub chiefs
Key Ministries and related agencies	• Tana Water Services Board (TWSB) • Water Resources Management Authority • Public Health & Sanitation • Lands office • Ministry of Roads • Road Agencies – KENHA, KURA, KERRA • Directorate of Occupational Health and Safety Services
WRA	• Water Resource User Association

The minutes for the key informant meeting held at CEC Water & Environment in Embu County on 13th August are summarized in Appendix 3: Minutes for the Key Informant Interview.

6.4.3 Public Consultation Meetings

To gather the perspectives of essential stakeholders and any other parties that might be affected or interested, the consultant arranged a meeting that primarily targeted the local administration, including the client. This meeting aimed to inform attendees about the proposed project, its expected impacts, and benefits. A

stakeholder mapping exercise was conducted before the meeting to determine which key stakeholders should be invited. Those directly impacted by the project were carefully examined in discussions with the project's initiator.

The meeting included a presentation on the project's scope, followed by an open discussion forum where all relevant issues were addressed, and consensus was reached among stakeholders. At the public participation meeting, stakeholders had the opportunity to engage with the project's representative, the ESIA expert. The outcomes of this engagement are documented in this report, capturing the issues, suggestions, concerns, and recommendations from the public meetings held on-site. The meeting saw high attendance, with participants actively engaging in the discussions (refer to the ***Appendix 4: Minutes for the public participation meeting*** and the ***Appendix 5: List of Participants*****).**

6.5 Consultation and Disclosure Outputs

The appendices contain details on the public consultations conducted as part of the environmental impact assessment for the proposed project. The details feature selected responses recorded in the minutes ***(Appendix 4: Minutes for the public participation meeting).*** It was observed that attendees praised the initiative and expressed eagerness for the project's commencement. Nonetheless, there were certain aspects for which the members requested further clarification. A summary of the main issues highlighted by the participants is outlined in **Table 6.3** below:

Table 6.3:Summary of the baraza outcome

Member's Name	Question asked	Technical team response
Ephantus Ndwiga	• When were the projects going to commence? And how long will the construction for the same take?	• As soon as the implementing agency; TWWDA got the funding from the project financier. The estimated duration of project implementation shall be two years.
Julia Wangui	• How soon would the project affected persons be compensated?	• The process of compensation shall kick off immediately all the details of the PAPs are verified and the funds for compensation are availed to TWWDA.

Member's Name	Question asked	Technical team response
Daniel Nyaga	• What happens if family members of an affected parcel of land that is affected by the project fails to agree amongst themselves on how to share the money given as compensation for RAP?	• A family that may have disputes regarding how to share the money given as compensation should seek for mediation from the local administration offices like that of the chief, assistant chief, or the county commissioner.
Faith Karimi	• In case a person detects leakage from the proposed sewer line during the project operation phase, where can they report the leakage?	• After construction and successful commissioning of the water and sewer project, the TWWDA shall hand over the project to the area Water Service Provider; KYEWASCO and therefore any reports pertaining to leakage or system failure should be reported to their field officers who carry out inspectorate work of the water and sewerage projects.
John Murithi Alfred	• The cost of exhausting fecal sludge from septic tanks is too high and he requests that the sewerage project is implemented as soon as possible. He also added that most exhauster trucks are a nuisance since they pollute the environment during the exhausting process.	• The process of project implementation is at the inception stage with the preliminaries of ESIA & RAP taking place first and once all the preliminary conditions are met and the financing for the project secured then the construction project shall commence.
Joseph Nyaga Njoka	• He explained fears for delayed compensation of PAPs in some of the projects within Runyenjes town and how that had affected the quality of life especially for the aged community members who were losing hope of receiving compensation. • Sought to know how the project would benefit all community members without discrimination.	• The technical team assured him that the compensation would be done diligently once the project funds were made available by the development partner. Additionally, a robust grievance redress mechanism shall be put in place to ensure that all complaints and concerns are addressed appropriately. • An assurance for connection for all was given, provided that the topography allowed, and the members wished to be connected.
Fidecia Jura	• Wondered if it would be possible to have her household connected to the sewer line since	• In the event that the topography of the area does not favor connection of a household to the sewer line, then such a

Member's Name	Question asked	Technical team response
	she was living at a low point from where the proposed sewer line would be installed.	community member would have to use an exhaust truck to have their septic tanks are emptied on need basis and the fecal sludge delivered to the treatment plant.
Kinyua	• He wondered how the proposed Runyenjes sewerage project would be of benefit to them, yet they had no piped water and the area suffers from severe water shortage. • Sought to know if the community members would be required to pay any fee to be connected to the sewerage project and also whether there would be any payments to be paid regularly to the service provider.	• The Runyenjes Water Supply project has gotten a green light from NEMA, and an EIA License was issued, the agency remains hopeful that the funds for implementation of the project shall be availed and the project shall deliver piped water to the area. This is the water that will power the sewerage project. • The community members will be required to pay a connection fee and water bills to the service provider. The amount to be paid shall be tariff based and WASREB is responsible for setting tariffs for the water service providers, through a participatory approach that engages community members.
Catherine Wanja	• Expressed her joy and anticipation of the proposed Runyenjes sewerage project and noted that with piped water and a working sewerage system, the level of water borne diseases would decrease, thus allowing the mothers to contribute to the development of the area as opposed to caring for children who fall sick from hygiene related issues like poor disposal of human fecal waste.	• The technical team commended her for her thoughts and assured her that for sure, the disease burden in the area would reduce with the construction of the sewerage project since it will enhance safe disposal of human waste.
Njue	• Expressed his worries about the compensation taking very long, therefore rendering some of the community members desperate due to old age. • As a former councilor, he explained that during his tenure, many years ago they earmarked the land for construction of Runyenjes sewerage treatment and the project has taken too long to actualize. He explained that they had visited many sewerage treatment facilities in the country in order to benchmark	• The technical team from TWWDA assured the community members that compensation for all the PAPs would be done diligently upon the receiving of project funds by the agency. • The technical team noted his concerns and assured him and other community members that the project would be implemented with priority once the funds are secured. • The team further thanked him for his contribution in earmarking the land for

Member's Name	Question asked	Technical team response
	and pleaded that the project is made a reality since Runyenjes is growing at a fast rate.	sewer treatment plant when he was in leadership.
Henry/Edwin	• Sought to know the safety measures that the implementing agency was going to put in place to ensure that there were no sewer leakages of bursts and if the eventualities occurred, the community would be safeguarded from the risks associated with such.	• The technical team elaborated that the project shall be under the management of a registered Water Service Provider and the responsible WSP would ensure that regular maintenance of the sewerage system is carried out to avoid leakages and bursts but if they take place, then immediate remedies should be employed in order to safeguard the health of the community members.
Martin	• How long from the river does the sewer line pass?	• The riparian zone is marked as 6 meters from the center of the river and the sewer line shall be positioned along the riparian zone.
John Ireri	• He sought to know whether the proposed sewerage treatment technology was going to make use of any chemicals and whether the treated water was capable of hurting the environment and the communities downstream. • Wondered whether the fecal sludge, after treatment would have any value like being used as a fertilizer.	• The technical team explained that the treatment technology was not going to use any chemicals but through a natural process, the fecal sludge would be treated and the wastewater would only be discharged into the environment after meeting the quality standards that are set by KEBS. • Resource recovery from fecal sludge would involve using the treated substance as a soil stabilizer on soils where perennial crops like trees, coffee and tea are grown or production of briquettes that can be used as a source of fuel.
Isaac Njiru	• He explained that they had witnessed survey works being carried out in the area about five years ago and wondered if the same route that they had been shown then was going to be used or there were any changes. • Expressed concerns over the small area of coverage by one of the water companies- Kigaa Water and further explained his frustrations with the said company in making	• The findings from the preliminary survey which was carried out almost five years ago was to be enhanced with the findings of the current survey for optimal routing of the sewer line. • He was assured that the implementation of a water supply project; Runyenjes Water Supply Project was underway and since access to clean water is a right that is enshrined in the constitution, then the

Member's Name	Question asked	Technical team response
	it difficult for any other company to supply water in the area.	community members will be free to connect to the water supply project at will.
Denis	• Can a person use their land where the sewer line has been constructed to plant crops or what activities are prohibited along such a line? • Will there be bad smell coming from the wastewater treatment facility and will the site treatment facility act as a site of mosquito breeding?	• Where the sewer line passes, compensation for loss of utility of that space is given to the project affected person and they are expected to cede the ownership of the place. Construction of a permanent structure on such a space is prohibited. • The proposed technology of treating the wastewater can remove bad smell from the fecal sludge and the mosquitoes do not breed around the ETP.
James Mugendi	• Are there pressure break tanks in the construction of sewerage systems like in the case of water supply systems? • Who is responsible for repairing broken pipes along the sewer line? • He sought to know whether the community members were under any obligation to connect to any water project since the water projects are several in the area.	• Unlike water, sewerage loses pressure as it flows and manholes are the interventions that are used to increase the speed of flow at different intervals. • The water and sewerage service provider company in the area is responsible for the routine maintenance and repairs of the system. • Connecting to any water or sewerage services provider was at the will of the individual community member and no coercion would be given to use services of any company.

Member's Name	Question asked	Technical team response
Arthur Nyaga	• How will the compensation to the PAPs be done?	• Upon assessment of the assets that will be affected by the project, the valuers will cost them, and a price shall be agreed upon between the property owner and the project implementing agency. Compensation shall then be done just before project implementation, and after verification of the ownership of the land that will be affected by the project.
Felix Nyaga	• How can the site of the treatment of wastewater be secured to ensure that it does not become an area of dumping dead bodies?	• The area shall be securely fenced off to keep off any unauthorized persons from accessing the place. Additionally, there will be a security company keeping guard of the area to keep off any persons that are not meant to be accessing the facility.
Ndwiga Ephantus	• Sought to know whether there will be monthly charges payable by the community members who will be connected to the sewer line and where would such payments be made? • Requested that the implementing agency considers giving employment opportunities to the local youths especially during the construction phase of the project.	• The payment for water bills informs the charges for connection to sewer and payments are made to the company that'll be registered to provide the services in the area. • The representatives of TWWDA took note of the need to employ the local youths during project implementation and committed to ensuring that their request shall be honoured.
Jairus Njagi	• Sought to know the amount of land that'll be consumed by the project and whether compensation would be based on the length of the land that the sewer line will consume of even the width shall be factored.	• A space of 6 metres in width shall be taken up as project site where the sewer line shall run, and compensation shall be based on that width and the length that the sewer line shall take up.

Member's Name	Question asked	Technical team response
Charity Ruguru	• How will the people that did not make it to the meeting get to be updated for about the deliberations that were carried out in the meeting? • Will there be compensation for people who will give way leave for construction of the sewer line?	• The community members that made it to the meeting were urged to be the ambassadors of the project by giving the information to those who had not made it to the meeting.
John Ireri	• How will the proposed project affect the environment? • Will implementation of the proposed project lead to soil erosion since the sewer line shall be installed very close to the river?	• Implementation of the proposed project shall have both positive and negative impacts to the environment. Among the many positive impacts that the project shall have on the environment are reduced soil and water pollution that is caused by failed septic tanks since the proposed project would ensure centralized treatment of wastewater. • Excavation works during the construction phase of the project would potentially cause soil erosion; however, care will be taken to keep the impacts minimum. Planting of Napier grass and bamboo trees along the riparian zone is encouraged to reduce soil erosion.
Japheth Njiru	• Where exactly will the sewer line be laid? Inside or besides the river?	• Alongside the river
Lewis Murithi	• Is there a chance of having the pipes carrying sewerage bursting and what actions should the community members take?	• Human activities like deep excavations might break the pipes carrying the sewerage, thereby causing harm to the environment and to public health. Community members are encouraged to report such incidents promptly either at the chief's office or at the office of the WSP.

Addressing these potential negative impacts requires careful planning, effective community engagement, and sustainable management practices to ensure the long-term success and acceptance of the project.

Plate 6.1 **- Plate 6.6** represents some of the photographs taken during the filed participation conducted in the project area.

Plate 6.1: ESIA Lead expert addressing community members

Plate 6.2: ESIAexpert addressing community members

Plate 6.3: ESIA Lead expert addressing community members

Plate 6.4: Community members raising their concerns

Plate 6.5: Experts at the WWTP site

Plate 6.6: Community members present in the meeting

7. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION

7.1 Introduction

The Environmental and Social Impact Assessment (ESIA) for the proposed project has been thoroughly conducted to evaluate its potential environmental effects. Guided by the Environmental Management and Coordination Act (EMCA) No.8 of 2015, which sets forth the legal framework for such assessments in Kenya, the study identifies the project's impacts across various phases—construction, operation, and decommissioning.

These effects are classified into three main categories**: impacts on the biophysical environment**, **health and safety impacts,** and **socio-economic impacts**, all derived from an analysis comparing the project's anticipated environment against its proposed actions.

7.2 Positive impacts during project planning and design phase

7.2.1 Creation of awareness

During the planning and design phase of the proposed project, awareness done through consultations on different aspects of the project strengthened project acceptance and ownership. Awareness creation improves project acceptance in its planning, implementation and operations phases as well as promote project sustainability.

7.2.2 Employment opportunities

With the planning and design phase of the proposed project, there will be employment opportunities especially for professionals such as engineers, surveyors, environmentalists, health and safety, public health experts and sociologists among others. Those employed will improve their living standards from the fees they will be paid for their services.

7.3 Negative impacts during planning and design phase

The proponent mobilized a team of project design experts from Tana Water Works Development Agency and Environmental and Social consultants to undertake the surveys and other EA studies required for the project. There are potential risks of poor siting of the facilities or non-adherence to the guidelines and specifications on the design of the infrastructure. However, the planning and design studies do not allow for any large-scale destruction and disturbance of vegetation and soils.

Mobilization of the skilled experts and the process of consultations with key stakeholders however led to heightened expectations and speculations and especially on employment opportunities for the surrounding community members.

Proposed Mitigation Measures:

It is envisaged that there will be minimal to no negative impacts during the planning and design stage. However, the design team, Environment and Social experts shall take the necessary measures to mitigate risks through:

- Liaising with the relevant Technical Government department in development of the designs.
- Proper siting of the distribution pipeline to avoid destruction of properties and existing infrastructure.
- Ensure all the legally required permits such as getting the designs approved, acquiring the ESIA License prior to undertaking the construction activities.
- The contractor bidding documents should contain clauses on Environmental Social Health and Safety (ESHS) requirements to guide the contractor on the key requirements; and
- Project Management Team (PMT) specifically the Environmental and Social Expert should ensure the design requirements are adhered too in the planning stage.

7.4 Positive impacts during construction phase

The construction stage of the Project is divided into Pre-Construction and Construction phases. The duration of this phase is contingent on the specific activities involved in the project, typically ranging from one to three years. The project's direct positive effects include:

- **Job Creation**: The immediate and most tangible benefit is the creation of jobs. Construction projects require a workforce comprising various skills, from laborers and machine operators to engineers and safety inspectors. This can lower local unemployment rates and boost the local economy.
- The projects will stimulate the local economy through the purchase of materials, services, and other resources from local businesses. This can lead to a multiplier effect, where the initial investment in the project helps generate further economic activity within the community.
- Workers involved in the project have opportunities to enhance their skills through on-the-job training and experience. This skill development can be beneficial for their career advancement, making them more employable in future projects.
- Construction projects often require upgrades to local roads and utilities to accommodate the increased activity and machinery. These enhancements can remain as permanent improvements to the community's infrastructure.
- During construction, careful planning and implementation can minimize environmental impact. Techniques such as proper site management and the use of environmentally friendly materials and methods can set a precedent for future projects, promoting sustainability.
- Construction projects, like sewer systems, often involve community meetings and consultations. This process can enhance community engagement and give residents a voice in local development issues.

7.5 Negative Impacts During Construction Phase

7.5.1 Vegetation Clearing, Soil Erosion and Siltation

Construction activities have the potential to clear vegetation and loosen soils particularly on slopes which can then be washed down into the lower areas (streams and valleys). Soil quality degradation is also likely to occur during construction as a result of disposal of construction materials on the adjacent lands especially near the base of the valleys and ultimately into the rivers.

Proposed Mitigation Measures:

The following measures are proposed to mitigate against soil erosion and measures to enhance vegetation cover.

- Re-plant the indigenous vegetation as much as practical once work is completed.
- Limit vegetation clearance unless where unavoidable circumstances appear.
- Contain excavated soils so that they will not find their way into nearby water sources.
- Cement mixing should be done in a designated area away at a safe distance from storm water drains.
- 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.

7.5.2 Air Pollution Impacts

Potential air pollution caused by emissions from construction equipment (Carbon, Hydrocarbons, Particulate Matter) – earth movers and excavators, vehicles, concrete and cement batching plants and trucks, emission of dust from trucks and vehicles accessing the construction areas and camp sites as well as material piling (sand, aggregate and pipes).

Proposed Mitigation Measures:

The following measures are proposed to mitigate against air pollution:

- Maintain construction equipment at high operational conditions such as to control emissions into the air.
- Earth moving be done under dump conditions as much as possible to prevent emission of dust into the air.
- Similarly, piled materials (sand and aggregate) should be maintained dump to prevent dust emissions.
- It will be necessary to notify the immediate neighbourhoods on the potential odours during the excavations. The period should, however, be kept as short as possible (odour generation may not be fully eliminated during the period)

- Use of sprinklers to regularly water construction site, this suppresses the dust menace at construction sites.
- People working in the sites with dust emissions to use dust masks to prevent respiratory infections.

7.5.3 Noise Pollution

Construction Phase for the proposed Project will most likely result in noise emissions and excessive vibrations because of the machines that will be used (excavation equipment among others) and construction vehicles delivering materials to site. Noise can be a nuisance to the local community if construction works begin too early in the day and continues into the night.

Proposed Mitigation Measures:

- Avoid nighttime construction when noise is loudest.
- Conduct periodic noise measuring and monitoring to determine levels and extent of harmful noise.
- Clearly label the high noise areas.
- Provide PPE personal protective equipment (PPE) including masks, goggles, scarfs, boots and overalls among other protective clothing to persons operating within or visit identified high noise areas.
- To meet noise level requirements, the equipment should be equipped with standard noise attenuation features. Machines that exceed acceptable noise limits should be equipped with silencers or lagging materials or specially designed acoustic enclosures.
- Inform residents when construction activities are likely to generate excessive noise in order to minimize disruption to local residents.
- Sensitize truck drivers to avoid hooting especially when passing through sensitive areas such as churches, residential areas, and hospitals.

7.5.4 Water Resources Pollution

Limited discharge of silt into rivers and other local drainage system 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 and washed down into the river and other drains.

Mitigation Measures

- 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.

7.5.5 Drainage and Hydrology Disruptions

Project construction will involve earthworks and excavation that could interfere with local drainage with a potential to divert the normal surface drains towards homes and private plots. No significant implications are expected in the general hydrology of the larger Project area.

Earthwork activities will result in the generation of some soil materials. When not handled properly the soils could lead to sedimentation of the nearby water sources which will interfere with the habitats and hence flora and fauna downstream of such rivers within the project area.

Mitigation Measures

- Excavated channels to follow contours to avoid interference with surface drains.
- Where the drainage system and pavements might be interfered with, restoration to be done after construction activities are completed.
- Whenever necessary, drains along the construction line are directed towards existing drainage systems to cater for storm water during the rains. However, construction should be carried out during a dry season and should take the shortest period possible.
- Utilize excavated soil to level excavated ground where necessary and cover the water and sewer lines that will have been laid in the ground.
- Construction materials and other debris (lime, cement, and fresh concrete.) should be handled carefully to prevent them from finding their way into the nearby water sources.
- Ensure compliance with environmental laws.

7.5.6 Interruption of Existing Infrastructure

There are various installations that will be crossed, move in or move along installations among them:

- Roads both main roads and feeder roads in the towns and estates
- Underground utilities e.g., water lines and communication lines
- Fences and temporal structures along the main roads

These services are critical and have implications with spillover effects on the social and economic performance.

Mitigation Measures

- Formal request for permission to cross, break in and lay the pipelines should be sought from affected property owners; and
- A work plan with clear responsibilities for each party should be developed to ensure smooth execution of the construction.

7.5.7 Waste Generation Impacts (Liquid and Solid)

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.

Also, 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 wildlife especially for meeting their drinking water needs. This can affect wildlife especially primates.

Mitigation Measures

To minimize pollution and visual intrusion, the waste will have to be managed appropriately as provided by Waste Management Regulation of 2006.

(i) Solid Wastes

- The contractor shall develop a comprehensive waste management plan prior to commencement of works.
- Properly labelled and strategically placed waste disposal containers shall be provided at all places of work.
- Recycling of construction material shall be practiced where feasible e.g., containers and cartons.

(ii) Liquids Wastes

- 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.
- Wash areas shall be placed and constructed in such a manner 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.

(iii) Hazardous Wastes

- Ensure proper handling of lubricants, fuels and solvents while maintaining the 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.
- 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.

7.5.8 Resettlement Impacts

Displacement not triggered as pipelines are designed to follow road Right of Way (RoW) and River Riparian, however, there will be impact on crops / trees / structures / fences.

Mitigation Measures

Prepare a Resettlement Action Plan (RAP) for purposes of compensation of likely assets and sources of livelihood for Project Affected Persons.

7.5.9 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 in Market centres and towns along the proposed Project route.

This assessment has identified potential social risks associated with the Project as listed below:

(i) Project Impacts to Vulnerable and Marginalized Groups (VMGs)
(ii) Labor Influx Impacts
(iii) Human Rights and gender inclusivity
(iv) Increased Transmission of communicable diseases including HIV/AID

(i) Labor 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:

- Strain on various resources especially water resources for road works.
- Grievances from local community members over job opportunities
- Sexual Offences
- Teenage Pregnancies

Mitigation Measures

- 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 as provided for in Chapter 6
- Proper records of labour force on site while avoiding child and forced labour.
- Comply to provisions of WIBA 2007
- Develop and implement a children Protection Strategy, this strategy will ensure that no child under the legal age of 18 years in employed to the Project.

(ii) 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:

- Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule.
- Failure to protect Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights, and interfering with Labor Rights

Mitigation Measures

- 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.
- Protecting Human Risk Areas Associated with, Disadvantaged Groups, Interfering with Participation Rights and interfering with Labor Rights

(iii) 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

- 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

(iv) 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

- HIV/AIDS 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.

7.6 Positive Impacts During Operational Phase

The project's main objective is to improve the quality of life of people within Runyenjes township and environs through provision of improved Water Services. Specific benefits are listed below:

- **Reduction in Water Pollution**: Sewer systems collect wastewater from homes, businesses, and industries, treating it before releasing it back into water bodies. This process significantly reduces the levels of pollutants such as pathogens, chemicals, and heavy metals in natural water sources, thereby protecting aquatic ecosystems and biodiversity.
- **Protection of Groundwater**: Proper sewer connectivity prevents the contamination of groundwater by untreated sewage, which is especially important in areas where groundwater serves as a critical source of drinking water. This helps maintain the purity and safety of underground water reserves.
- **Reduction in Soil Contamination**: By diverting wastewater to treatment facilities, sewer systems prevent the leaching of contaminants into the soil, thereby preserving soil health and fertility. This is crucial for agriculture and landscaping in urban and peri-urban areas.
- **Improved Public Health**: Sewer connectivity eliminates exposure to untreated sewage, significantly reducing the incidence of waterborne diseases such as cholera, dysentery, and typhoid fever. This leads to healthier communities and reduces the burden on healthcare systems.
- **Enhanced Living Conditions**: Access to proper sewage disposal and water treatment is a fundamental aspect of urban infrastructure that improves the overall quality of life. It eliminates unsanitary conditions, reduces foul odours, and prevents the proliferation of disease vectors such as mosquitoes.
- **Economic Benefits**: Investments in sewer infrastructure generate employment during construction, operation, and maintenance phases. Moreover, a healthy population and a clean environment boost productivity and attract business investments, fostering economic growth.
- **Social Equity and Inclusion**: Extending sewer connectivity to underserved communities can bridge the gap in sanitation access, promoting social equity. It ensures that all residents, regardless of their socio-economic status, benefit from basic sanitation services.

- **Education and Awareness**: The development of sewer systems is often accompanied by educational programs on hygiene and environmental protection, raising awareness among the population and encouraging sustainable practices.

7.7 Negative Impacts During Operation

7.7.1 Public Health and Safety Issues

Occupation health and safety hazards during the operation and maintenance phases shall result from various sources and have adverse effects if not controlled within recommended limits.

Some of the risk sources are opening of air valve to vandalize water; disease vectors; water borne diseases. The air valves have high pressure and can lead to fatal accidents or even flooding of project area among other sewerage related accidents.

Proposed Mitigation Measures

- Educate community against interfering with sewer infrastructure for example pipes and water valves.
- Conduct continuous monitoring to curb vandalism; monitoring can also be done through use of online electronic monitoring gadgets to enable curb vandalism on time.
- Ensure that, sewerage connection infrastructure is tested for integrity prior to commencing work.

7.7.2 Odour and Air Pollution:

The operation of sewage systems can sometimes lead to unpleasant odours and air pollution in the surrounding areas.

Proposed Mitigation Measures

- Regular maintenance and cleaning of the sewer lines,
- Installation of odour control systems such as activated carbon filters or biofilters, can help mitigate odour and air pollution issues.

7.7.3 Potential Contamination of Water Sources:

Improperly maintained sewer lines or sewage leaks can result in the contamination of water sources, posing risks to public health and the environment.

Proposed Mitigation Measures

- Implementing regular monitoring programs to detect leaks.
- Promptly repairing any damaged or leaking sewer lines can help prevent contamination of water sources.
- Ensuring that sewage treatment plants are operating effectively can reduce the risk of contamination.

7.7.4 Infrastructure Damage and Disruptions:

The operation of heavy machinery or vehicles required for maintenance and repairs of sewer lines can cause damage to roads and disruptions to traffic flow in the area.

Proposed Mitigation Measures

- Proper planning of maintenance activities to minimize disruptions to traffic flow,
- Timely repairs of any damages caused to roads or infrastructure, can help mitigate this impact.
- Implementing traffic management plans and providing advance notice to residents about planned maintenance activities can help minimize inconveniences.

7.7.5 Vandalism

Vandalism of sewer infrastructure can have serious consequences, including service disruptions, environmental contamination, and costly repairs.

Proposed Mitigation Measures

- The county government through KYEWASCO shall educate the community about the importance of sewer infrastructure and the negative impacts of vandalism on public health, the environment, and community well-being.
- KYEWASCO shall foster a sense of ownership and pride in the sewer system by involving local residents in its protection and maintenance.
- KYEWASCO shall install clear signage indicating that the sewer infrastructure is protected by law and that vandalism will be prosecuted.
- The project proponent Consider situating infrastructure in areas with high visibility and natural surveillance to discourage vandalism.
- KYEWASCO shall employ security personnel and community patrol appointees to monitor sewer infrastructure and respond promptly to any suspicious activities.
- KYEWASCO shall collaborate with local law enforcement agencies and community organizations to establish neighbourhood watch programs aimed at preventing vandalism and promoting community safety.
- The KYEWASCO technical team shall ensure prompt repair of any damage to sewer infrastructure to minimize service disruptions and prevent further deterioration.

7.7.6 Social Disruptions:

The presence of sewerage infrastructure and associated maintenance activities may cause social disruptions and inconvenience to residents in the area.

Proposed Mitigation Measures

- Engaging with the community through effective communication channels, providing timely updates on maintenance schedules, and addressing any concerns or complaints promptly can help minimize social disruptions.
- Involving local community members in the planning and decision-making processes related to sewerage system operation can foster a sense of ownership and cooperation.

7.8 Decommissioning and withdrawal

7.8.1 Loss of jobs

The decommissioning of the sewer project may lead to job losses, impacting individuals employed directly or indirectly in various project-related activities. This loss of employment can have economic and social repercussions on affected individuals, their families, and the community at large.

Proposed Mitigation Measures

- Establish social safety net programs, including unemployment benefits, job retraining grants, and financial assistance, to support affected workers and their families during the transition period.
- Implement community development projects aimed at creating employment opportunities, improving infrastructure, and enhancing local amenities to stimulate economic growth and mitigate the negative impacts of job losses.
- Notify the employees in advance on the Project closure date and adequately compensate them.
- Dismissal procedures to be compliant with Employment Act, 2007.
- Provide counselling & alternative skills for alternative activities.
- Employer should find alternative means of livelihood for the staff who were employed at the sewerage project where possible.

7.8.2 Air Pollution:

During the decommissioning phase, vehicle emissions from transportation of materials and machinery activity can contribute to air pollution. Dust generation from site access and material piling could further degrade air quality, leading to respiratory issues and environmental pollution.

Proposed Mitigation Measures

- Provide appropriate Personal Protective Equipment (PPE) for workers involved in decommissioning.
- Apply water on exposed areas and access roads to suppress dust emissions.
- Transportation trucks carrying debris and scrap materials should be well covered.

7.8.3 Solid Waste Generation:

Decommissioning activities can generate various types of solid waste, such as debris, concrete, and human waste. Inadequate handling and disposal of these wastes can result in environmental pollution and pose health hazards to workers and nearby communities.

Proposed Mitigation Measures

- Execute careful demolition to maximize material reusability.
- Sell or donate reusable/recyclable materials to minimize waste.
- Adhere to an approved Decommissioning plan by the National Environmental Management Authority (NEMA) for proper site rehabilitation and waste management.

7.8.4 Water Pollution

The decommissioning process may contaminate nearby water bodies or groundwater sources. Activities such as pipe excavation and material handling can introduce pollutants into the environment, adversely affecting water quality and posing risks to aquatic ecosystems and human health.

Proposed Mitigation Measures

- Implement a comprehensive waste management plan to handle, store, and dispose of materials and waste properly.
- Minimize the use of harmful chemicals or substances during decommissioning.
- Develop spill prevention and response protocols to handle any accidental releases of pollutants.

7.8.5 Noise and Vibration

Demolition works during decommissioning can produce significant noise and vibrations, causing disturbance to residents and disrupting local ecosystems. Increased noise levels can lead to annoyance, stress, and sleep disturbances among nearby residents.

Proposed Mitigation Measures

- Schedule demolition activities during daytime hours when noise impact is expected to be lower.
- Choose demolition equipment designed to minimize noise emissions.
- Conduct regular maintenance of equipment to prevent excessive noise.

7.8.6 Occupational Health and Safety Concerns

Risks associated with the decommissioning phase include accidents due to material movement, uncovered holes, and structures. Workers may be exposed to hazards such as falls, trips, and exposure to harmful substances if proper safety measures are not implemented.

Proposed Mitigation Measures

- Supply proper Personal Protective Equipment (PPE) and provide safety training to workers.
- Establish designated pathways for machinery and personnel movement.
- Develop incident reporting mechanisms to address any safety concerns promptly.

7.8.7 Disruption of Ecosystems

Decommissioning activities may disrupt local ecosystems and habitats, leading to the displacement of wildlife and loss of biodiversity. Disturbance of soil and vegetation can result in erosion, habitat fragmentation, and loss of ecosystem services.

Proposed Mitigation Measures

- Restore the land to its original state by revegetating the surrounding.
- Development of a decommissioning plan to take care of the native ecosystem.
- Conduct biodiversity assessment before decommissioning.
- Unnecessary cutting down of trees should be avoided.

7.8.8 Visual and Aesthetic Impact

The decommissioning phase may result in unsightly construction sites and temporary disruptions to the visual landscape. This can negatively impact the aesthetics of the area and reduce property values in the vicinity.

Proposed Mitigation Measures

- The contractor to utilize landscaping techniques to camouflage construction areas, such as planting trees or shrubs.
- Schedule decommissioning activities during off-peak hours to minimize disruptions to the visual landscape.
- Coordinate with local authorities and stakeholders to ensure that decommissioning activities adhere to aesthetic guidelines and regulations.
- Restore the visual landscape post-decommissioning by cleaning up construction debris and restoring affected areas to their original state.

8. ANALYSIS OF PROJECT ALTERNATIVES

8.1 Introduction

This Section provides the project alternatives considered to ensure that the most feasible option is adopted. The project alternatives have been compared in regard to their potential environmental and social impacts, capital costs and acceptability by potential beneficiaries. The project alternatives considered include the following:

As mandated by the National Environmental Management Authority), this section assumes a pivotal role in shaping the most fitting development approach while minimizing any disruptive impact on the environment. To achieve this, an exhaustive analysis has been conducted on a range of feasible land-use options. These options were subject to rigorous assessment criteria, encompassing their environmental implications, acceptance within the community, economic viability (including land productivity), and feasibility in terms of design and execution.

8.2 "No-action" Alternative

8.2.1 Evaluation

The "No-action" alternative means maintaining the current status quo of no project. This option would ensure preservation of the environment with the existing vegetation and ecosystem without introducing any changes. The decision to select this alternative could stem from various principles, including:

- **Environmental Sensitivity**: If the site hosts threatened, rare, endangered, endemic, or keystone plant or animal species, or if it holds a designation for preservation under legislative acts.
- **Archaeological or Historical Significance:** If the site contains valuable historical or archaeological artifacts or holds substantial cultural importance.
- **Environmental Implications:** If implementing the project would lead to significant and adverse environmental impacts.

Opting for the "No-action" alternative safeguards the site's environmental sensitivity, historical or archaeological value, and averts potential negative environmental consequences linked to the proposed project.

8.2.2 Findings

The proposed Runyenjes Sewerage Project will not hinder or obstruct any existing developments in the vicinity, including the presence of similar developments. With the implementation of the necessary mitigation measures, there are no anticipated adverse impacts to the physical environment, biodiversity, cultural heritage, or local communities.

Fundamentally, this option is the most unsuitable alternative as the environmental and economic benefits expected from the project will not be realized. The proposed project is anticipated to improve

access to sanitation services to the residents of Runyenjes town and its environs. It is anticipated that the project will seamlessly integrate with established developments, displaying nominal environmental repercussions and inconsequential apprehensions concerning the area's physical, biological, cultural, and socio-economic dimensions.

8.2.3 Implications

The "No-action" alternative will compromise sanitation services for the people of Runyenjes. The residents within the municipality will continue using other inefficient systems of wastewater disposal which are not cost effective.

8.3 Relocation Alternative

8.3.1 Evaluation

This alternative involves the relocation of the proposed project to an alternative site. Should this option be selected, the proponent would need to identify a new site either within or outside the designated zone. The rationale for considering this alternative might be guided by the following considerations concerning the proposed development:

- **Conflict with Existing Development:** The project could hinder the progress of an already established development.
- **Incompatibility:** The project might be incongruent with other ongoing or planned developments in the vicinity.
- **Ecological Sensitivity:** Like the "no-development" alternative, the project site could lie in an ecologically sensitive area.

8.3.2 Findings

The proposed development does not obstruct or deter the continuation of other projects in the future. The projects form a fundamental consideration for future developments within the municipality. The pipe routes have been adequately surveyed to ensure they don't compromise the sensitive ecosystems including wetlands and forests. Given that the present sewer system in the area does not meet the current and future demand for sanitation in the project area, then the need for the project surpasses that of any other commodity and the necessity for reliable sanitation service is paramount within the municipality.

8.3.3 Implications

Choosing a different route for the sewer trunks would diminish the project's ability to benefit the intended Runyenjes people within the municipality. The project aims to improve access to sanitation services by the residents of Runyenjes. The sewer has been designed to flow using the conventional gravitational system where it's expected to flow with gravity to the treatment plant. Changes to the pipelines would lead to additional pumping charges and development of discharge bays for the sewer trucks disposal.

Akin to the "no-action" alternative relocation option, would incur additional financial charges and losses due to the investments already committed to project design and planning. Furthermore, the process of surveying and identifying a new location is time intensive. Even if a suitable site is found, there's a possibility that its costs might surpass the project's financial capacity, rendering it unaffordable.

8.4 Alternative Wastewater Infrastructure

Having a sustainable infrastructure is essential because it directly affects all measures of sustainable development. As it is essential for every society and its economy, the sewage infrastructure system is a critical component in meeting the sustainable development goals. Furthermore, having a sustainable infrastructure can accelerate the balance of the economic, social, and environmental aspects of sustainable development.

Some of the alternative infrastructure to the proposed Runyenjes Sewerage Project are outlined below:

8.4.1 Septic Systems

Septic systems are individual wastewater treatment systems which consist of a septic tank and a drain field. Wastewater from the household flows into the septic tank, where solids settle and are partially decomposed by bacteria. The liquid effluent then flows into the drain field, where it percolates through the soil, undergoing further treatment before returning to the groundwater.

The infrastructure only works in small scale, developing it for a large-scale purpose in situations like Runyenjes municipality might not efficiently work. The inefficiencies brought to the environmental might be so expensive to mitigate.

8.4.2 On-Site Treatment and Reuse Systems

On-site treatment and reuse systems treat wastewater on-site and reuse it for beneficial purposes. These systems include advanced treatment technologies such as membrane bioreactors, ultraviolet disinfection, and reverse osmosis. Treated wastewater can be reused for irrigation, industrial processes, toilet flushing, and groundwater recharge. The onsite treatment systems may not be feasible for municipal and communal use as it would incur a lot of costs to manage infrastructure at different locations. The systems require a lot of input from individuals which may not work for the proposed project.

8.4.3 Vacuum Sewer Systems

Vacuum sewer systems use vacuum pumps to transport wastewater through underground pipes to a central collection point. Vacuum sewer systems are particularly suitable for areas with difficult terrain or low population density. They require smaller pipes and shallower excavation compared to traditional gravity sewer systems.

The vacuum sewer systems would work in stances where there are difficult terrains in contrary to the proposed project where the treatment unit was set at the lower side of the municipality where the sewer

will be conveyed by gravity. The vacuum sewer systems require a higher initial capital cost compared to gravity sewer systems in addition dependence on vacuum pumps for wastewater transport, requiring backup power systems in cases of blackouts rendering it unsustainable.

8.4.4 Decentralized Treatment Systems

Decentralized treatment systems consist of smaller-scale treatment facilities distributed throughout a community or neighborhood. These systems can include packaged treatment plants, decentralized membrane bioreactors, and small-scale activated sludge systems. Decentralized treatment systems provide flexibility, redundancy, and resilience to the overall wastewater management infrastructure.

This would require that the proponent develops several decentralized systems to satisfy the needs of the entire municipality. The decentralized infrastructure may require higher maintenance and operational costs compared to centralized systems. With also limited capacity for treating large volumes of wastewater as it is in the municipality. The system is prone to potential oduor and aesthetic issues if not properly managed.

8.4.5 Implementation of the proposed project

Implementation of the proposed Runyenjes Sewerage project as it is in the design would create a more efficient system for collection and disposal of wastewater from various targeted estates. This will alleviate sanitation problems particularly in peri urban areas and provide employment opportunities to locals during construction and operational phase. Even though some negative impacts such as noise, soil and water contamination associated with such a development maybe experienced, these negative impacts shall be mitigated through various measures proposed in the project Environmental and Social Management Plan (ESMP).

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

9.1 Purpose and Objectives of ESMMP

The specific objectives of the ESMMP are to:

- Act as a binding agreement and guide for the contractor to follow the Environmental and Social Management and Monitoring Plan (ESMMP), including adhering to the approval conditions set by NEMA.
- Serve as a key reference for overseeing environmental and social monitoring tasks for the supervising consultant, contractor, and client management, encompassing necessary progress updates.
- Offer precise guidelines for managing and lessening the negative impacts of project activities on the environment.
- Provide directives to project staff on procedures aimed at environmental conservation and reducing environmental harm, aligning with the project's objective of achieving minimal to no incidents.
- Record environmental issues and recommended protective steps, ensuring that remedial measures are executed promptly.

9.2 Auditing of ESMMP

TWWDA 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.

9.3 Management Responsibility of ESMMP

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 who will be involved in the project. The following entities should be involved in the implementation of this ESMMP:

(i) TWWDA/ KYEWASCO

(ii) NEMA

(iii) Contractor

(iv) Design Consultant

(v) Embu County Government

9.3.1 Tana Water Works Development Agency/ Kyeni Water & Sewerage Company

TWWDA in conjunction with KYEWASCO the 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.

9.3.2 National Environment Management Authority (NEMA)

NEMA's responsibility 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.

9.3.3 The Contractor

The persons/firms contracted to construct the proposed Last Mile Connectivity for Runyenjes Sewerage Project 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.

9.3.4 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.

9.3.5 Embu County Government

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

9.4 Emergency procedure during construction and operation phase of the project

An emergency means unforeseen happening resulting in serious or fatal injury to employed persons or the neighbouring communities. In the event of an emergency during construction, the workers shall: -

(i) Alert other persons exposed to danger.

(ii) Inform the OSHA coordinator.

(iii) Do a quick assessment on the nature of emergency.

(iv) Call for ambulance.

When emergency is over, the OSHA coordinator shall notify the workers by putting a message: "ALL CLEAR". In the event of such an emergency during operation the workers shall:

a) Alert other persons exposed to danger.
b) Ring the nearest police station and ambulance service.

The proponent has already put measures to respond to emergencies like alarms and a fire assembly point there are also trained staff can assist in case of emergency.

9.5 Proposed ESMMP for Planning phase

Table 9.1: Environmental and Social Management and Monitoring Plan (ESMMP) during planning phase

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Human (Local community, Contractor workers)	Conflicts related to loss of Land, Land Use and Livelihoods	High	• Prepare a Resettlement Action Plan (RAP) for purposes of compensation on land acquired for treatment works & assets and crops affected where land will be acquired for wayleave purposes. • Prepare a Grievance Redress Mechanism (GRM)	• TWWDA • Consultant Team	• Minutes of PAPs consultation meetings • Comprehensive RAP Report • Grievance Redress Mechanism	To be determined after completion of the RAP exercise[1]
	Conflicts arising from delays in compensation	High	• Proper planning to ensure compensation is done in the agreed manner prior to project implementation	• TWWDA	• RAP implementation report capturing the status of compensation	To be determined after completion of the RAP exercise
	Conflicts arising where the project is passing through culturally sensitive areas such as graves	High	• Consultations with the local community, elders and local leaders on the way forward • Facilitating cultural ceremonies such as cleansing ceremonies in line with the local cultures to pave way for grave relocation	• TWWDA • KYEWASCO	• Minutes of meetings with local leaders	To be determined after completion of the RAP exercise
	Conflicts arising from people living in areas not being served by the sewer project	High	• Public sensitization to the local community to understand the gravity supported sewer system being implemented. • Provide exhauster boosters for the unserved areas	• TWWDA • KYEWASCO	• Minutes of sensitization meetings done • Number of exhauster boosters acquired	To be determined based on availability of resources
	Risk of conflicts during workforce recruitment (discrimination, child labour engagement etc)	Medium	• Priority of employment to be given to the local people • Contractor to ensure equal opportunities in labour engagements for both men and women. • Contractor to adhere to the requirements of the Employment Act, Section 38 by keeping records of all workers engaged indicating date of	• TWWDA • Contractor • Resident Engineer	• Staff records • Records of grievances resolved	350,000

[1] A comprehensive RAP exercise has been undertaken and all of PAPs identified details of which are in a separate annexed report.

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
			employment, name, national ID number, age, sex, hours of work and wages paid. • Establishment of a project Grievance Redress Mechanism (GRM) • Sensitization of workers on the project Grievance Redress Mechanism (GRM)			
	Potential risk of insecurity due to influx of job seekers	Medium	• Contractor to develop a Labour Influx Management Plan to manage influx of workers.	• TWWDA • Contactors	• Availability of a Labour Influx Management Plan and the project GRM • Public sensitisation minutes	N/A
	Risks during construction of the Contractor' campsites	Medium	• Risk assessment for proposed campsite sites' which must be approved by the client. • Proper housekeeping measures to manage stock of materials. • Campsite not to be located in a highly inhabited site. • The campsite to be equipped with fire extinguishers. • Campsites must be well fenced and appropriate safety signages displayed in strategic locations. • Enforcement of speed limit of 20kph for vehicles within the campsite	• TWWDA • Resident Engineer • Contractor	• Risk Assessment Report • Accident reports	5,000,000
Animals, plants and biodiversity	Visual impacts and loss of natural vegetation during campsite construction	Low	• Vegetation clearance to be limited to the minimum required space. • Revegetation after construction activities	• TWWDA • Resident Engineer • Contractor	• Restored site • Visual aesthetics	50,000

9.6 Proposed ESMMP for Construction phase

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Human	Delay in project implementation due to objections and stop orders	Low	• The Contractor shall ensure that all pertinent permits, certificates, and licences have been obtained prior to any activities commencing on site and are strictly enforced/ adhered to. • The Contractor shall maintain a database of all pertinent permits and licences required for the contract as a whole and for pertinent activities for the duration of the contract	• TWWDA • Contractor	• Number of approvals and permits issued	1,000,000
	Disruption of road users' movement on the road due to road closure or diversion during pipes' laying activities	Medium	• The client to seek necessary permits from authorities such as KERRA and KURA • Use of safety signage to guide road users to alternative routes on sections that may experience disruption	• TWWDA • Contractor	• Permits • Availability of safety signage in affected road sections	30,000
	Occupational health and safety risks	High	• Ensure that all construction machines and equipment are in good working conditions to prevent occupational hazards during excavation activities and laying of the pipes. • Establish a Health and Safety Plan 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 adequate manual labour to meet the requirements of the tasks. • Appoint a trained health and safety team for the duration of the construction work, monitor and advise appropriately on health and safety matters during the rehabilitation activities.	• TWWDA • Contractor • Resident Engineer	• Availability of PPEs and first aid kits • Availability of safety signage in appropriate areas • Availability of a Health and Safety Plan • Attendance list	500,000

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
			• 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			
	Dust pollution	Low	• Vehicles and site trucks should be driven under the recommended speed of 40km/h within public areas such as schools, and markets. • Sprinkle water on degraded access routes to reduce dust emission during transportation of materials to project sites. • Provision of dust masks to workers working in dusty environs	• TWWDA • Contractor • Resident Engineer	• Adequate PPEs to workers • Records of traffic accidents involving site vehicles	250,000
	Noise pollution due to use of heavy machinery and earth moving equipment	Low	• Discouraging hooting within public places or reserved places • Proper servicing of vehicles • Monitor noise levels at sensitive receptors (residential areas, schools, hospitals) • Use of hearing protective gears e.g. earmuffs and ear plugs by workers working in noisy environments • Inform residents when construction activities are likely to generate excessive noise in order to minimize disruption to local residents;	• TWWDA • Contractor • Resident Engineer	• Vehicle maintenance records • Availability of PPEs such as ear plugs	15,000
	Risk of gender-based violence/harassment/abuse	Low	• All cases of gender-based violence (GBV) to be reported, investigated and resolved. • Sensitisation of workers on issues of GBV	• Contractor • Resident Engineer	• GBV Reports • Training Reports	15,000
	Public health risk; spread of HIV/AIDS, STDs and other	Medium	• Worker's sensitization on HIV/ AIDs and other STDs • Provision of condoms to workers	• Contractor • Resident Engineer	• Records of toolbox talks	250,000

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
	communicable diseases		• Distribution of HIV & AIDS awareness materials in collaboration with National Aids Control Council (NACC)			
	Conflicts amongst workers and local communities	Low	• Develop a GRM for workers. • Sensitization of workers on the project GRM and necessary procedures •	• TWWDA • Contractor • Resident Engineer	• Training reports • Grievance reports	250,000
	Fire risks	Medium	• Provision of firefighting appliances in offices, stores, site vehicles • Regular training on fire risk reduction to workers during toolbox talks	• Contractor • Resident Engineer	• Availability of firefighting appliances • Records of tool box talks	120,000
	Poor hygiene and sanitation	High	• Provision of clean drinking water and sanitation facilities to workers at the workplace • Provision of mobile toilets and water for sanitation purposes	• Contractor • Resident Engineer	• Availability of clean drinking water and sanitation services on site	50,000
	Labor engagements risks	Medium	• Contractor to ensure equal opportunities in labour engagements for both men and women. • Timely payments to workers to be made in line with agreements	• Contractor • Resident Engineer	• Staff records (M/F)	N/A
Environment (Land, Biodiversity/ plants & animals, Water)	Interruption of existing infrastructure such as roads, water pipes, internet cables	Medium	• Involvement of all parties utilising the road reserve to ensure minimum destruction during construction phase	• TWWDA • Contractor • Resident Engineer	• Copies of agreements	30,000
	Solid waste generation	High	• A site waste management plan should be prepared by the contractor prior to commencement of construction works. • Proper solid waste receptacles and storage containers should be provided.	• TWWDA • Contractor • Resident Engineer	• Availability of a solid waste management plan	50,000

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
			• Arrangements should be made for the regular collection of litter and for its disposal with the County Government • Ensure that the solid waste collection, segregation, and disposal system is always functioning properly during the construction phase. • Recycle and re-use wastes where possible such as scraps metal.			
	• Interference with physical setting • Blockage of natural drainage system at valley crossings. • Excavation for creation of access routes and related structures.	Low	• The structures to be developed should be aesthetically acceptable to blend in with the surrounding. • The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations. • Restoration shall be undertaken to ensure that the original setting is as much as possible retained	• TWWDA • Contractor • Resident Engineer	• Restored/ rehabilitated sites	N/A
	Water quality pollution risks	High	• 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.	• Contractor • Resident Engineer	• Water quality tests	20,000
	Drainage and Hydrology disruption	High	• Excavated channels to follow contours to avoid interference with surface drains.	• Contractor • Resident Engineer	• Clear drainage	N/A

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
			• Where necessary, the drains to be directed along the construction line towards existing drainage systems to cater for storm water during the rains. • Utilise excavated soil to level excavated ground where necessary and cover the sewer lines. • Construction materials and other debris (lime, cement and fresh concrete.) should be handled carefully to prevent them from finding their way into the nearby water sources			
	Soil Erosion	Medium	• Re-plant the indigenous vegetation as much as practical once work is completed. • Limit vegetation clearance unless where unavoidable circumstances appear. • Contain excavated soils so that they will not find their way into nearby water sources. • Cement mixing should be done in a designated area away at a safe distance from storm water drains. • Spilled cement or concrete should be collected and disposed away from natural water ways or storm water drainage. • Sensitise workers and enable them to properly handle concrete spillages or waste cement. • Re-vegetation of exposed areas around the site should be carried out rapidly to mitigate against erosion of soil through surface water runoff and wind erosion	• Contractor • Resident Engineer	• Rehabilitated sites • Incidents of soil erosion reported	30,000
	Impact on natural vegetation	Medium	• Cutting of trees to be restricted to the wayleave area only. • Issuance of tree seedlings to PAPs and local community to compensate for the trees cut and increase forest cover	• TWWDA • Contractor • Resident Engineer	• Records of number of trees cut. • No. of tree seedlings issued to PAPs and local community	500,000

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
	Contamination of the soil, air and water by waste generated during construction works	Medium	• A site waste management plan to be prepared by the contractor prior to commencement of construction works. • Practicing 3Rs of waste management: reduce, reuse, recycle of materials. • Recycling of all E-waste	• Contractor • Resident Engineer	• Re-use/ recycling documents • Contracts with licensed waste handlers	250,000
	Impacts on air quality from vehicle exhaust emissions	Low	• Drivers shall not leave vehicles idling so that exhaust emissions are lowered. • Contractor to ensure that all machinery and equipment used on site are well maintained and in good working conditions to ensure minimum emissions are produced	• Contractor • Resident Engineer	• No vehicle idling on site. • Vehicle maintenance records	N/A

9.7 Proposed ESMMP for Operation phase

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Human	Odour menace from leakage of the sewer pipelines	High	• Proper maintenance of the sewer infrastructure • Regular patrols to supervise leakages. • Installation of leak detectors	• KYEWASCO	• Number of complaints on leakages	Operational Costs
Environment	Risk of encroachment and construction of structures on the sewer wayleave	High	• Mapping and installation of beacons which illustrate the width of the pipeline reserve. • Regular patrol of the pipeline corridor for encroachment • Prosecution of encroachers as required by County By-Laws on way leaves and road reserves maintenance. • Conduct public sensitization programs on way leave protection	• KYEWASCO	• Well maintained wayleave	To be determined
	Risk of vandalism of the infrastructure	High	• Put in place proper security measures to guard the infrastructure and reduce cases of vandalism. • Regular sensitisation of local community on importance of protection of the water infrastructure • Activate a community watch group for information sharing on the status of the water supply line	• TWWDA • KYEWASCO	• Sensitisation Meetings and minutes	To be part of operational costs
	Contamination of soil and water from sewage leakages and overflows	High	• Regular monitoring and inspection of sewer lines to identify broken pipes and damaged manholes for repair or maintenance. • Use of high-quality materials that can withstand anticipated sewage loads and as recommended by the design engineers to prevent leakages and overflows. • Clear and unclog blocked sewer lines within the shortest time possible to contain sewage spills and overflows. • Clean and disinfect contaminated sites	• TWWDA • KYEWASCO	• Well maintained structure and quick response to leakages	To be established at operation phase and included in the operation of the projects

9.8 Decommissioning

Project decommissioning involves the process of safely closing or dismantling a project and its facilities once they reach the end of their useful life or operational period. It aims to minimize environmental impacts, restore sites to their natural state or prepare them for future use, and address any social implications, ensuring compliance with relevant regulations and standards.

At the end of its design life, the proposed project will undergo decommissioning. This can take two forms:

(i) Abandoning the pipeline.
(ii) Removing the pipeline from the ground and restoring the area.

In case of the first option, there will be minimal damage and disturbance to the environment. However, if the Proponent opts for the second option, the impacts will be far reaching. Apparently, these impacts compare favourably to the impacts in the Construction Phase. Thus, similar mitigations to those of construction phase will apply. The responsibility of the implementing decommissioning phase ESMMP will be shared between the Contractor and the Proponent.

9.8.1 Decommissioning Flow Chart

The Project has been designed to operate effectively for over 20years. If the infrastructure will be required to be overhauled, then the following 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.

Step	Action	Actor
1	**Initiation** Development of an Objective Worksheet and checklist incorporating references, legal and policies Undertake decommissioning audit	Proponent then
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
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
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	Action	Actor
5	**Commissioning Environmental Management Plan**	Contractor
6	**Non-Conformance, Corrective/Preventive Action** Determine root cause. Propose corrective measures. Propose future preventive measures.	Contractor

9.9 Proposed ESMMP for Decommissioning Phase

Impact Receptor	Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Human	Occupational health and safety risks	High	• Provide the correct PPE for the workers when conducting the demolition activities. • Conduct training on health and safety procedures to the workers prior to commencement of demolition. • Provision of adequate PPEs to all workers e.g. safety shoes, helmets, gloves, overalls, dust masks etc • Display of appropriate safety signage to enhance awareness creation on the potential hazards involved during decommissioning. • Provision and display of emergency contacts in appropriate areas. • Provision of a well-stocked first aid kit at all active sites and regular training of workers on basic first aid procedures • Acquisition of WIBA Insurance for all workers as per Work Injury Benefits Act, 2007	• TWWDA • Contractor • KYEWASCO	• Availability of PPEs and first aid kits • Availability of safety signage in appropriate areas • Records of Toolbox talks • Attendance list	To be determined during development of a decommissioning plan
	Loss of jobs and income	High	• Notify the employees in advance on the Project closure date and adequately compensate them. • Dismissal procedures to be compliant with Employment Act, 2007. • Provide counselling & alternative skills for alternative activities. • Employer should find alternative means of livelihood for the staff who were employed at the water supply project where possible.	• TWWDA • KYEWASCO	• Notice to employees	N/A
	Dust pollution	Low	• Speed control of site vehicles to a max of 40kph • Water should be sprayed on dusty excavated areas. • Provision of dust masks to workers for use when working in dusty conditions	• TWWDA • KYEWASCO • Contractor •	• Adequate PPEs to workers • Records of traffic accidents involving site vehicles	To be determined during development of a decommissioning plan

			• Use of serviceable vehicles and machinery to avoid excessive smoke emission.			
	Noise pollution due to use of heavy machinery and earth moving equipment	Low	• Schedule noisy activities during the daytime period • Use silencers on machines where possible. • Ensure machinery is well maintained to reduce noise emitted	• TWWDA • KYEWASCO • Contractor	NEMA license	To be determined during development of a decommissioning plan
	Risk of gender-based violence/harassment/abuse	Low	• Sensitisation of workers on issues of GBV	• Contractor • KYEWASCO	GBV Reports • Training Reports	To be determined during development of a decommissioning plan
	Public health risk; spread of HIV/AIDS, STDs and other communicable diseases	Medium	• Worker's sensitization on HIV/ AIDs and other STDs • Provision of condoms to workers • Distribution of HIV & AIDS awareness materials in collaboration with NACC	• Contractor • KYEWASCO	• Records of toolbox talks	To be determined during development of a decommissioning plan
	Conflicts amongst workers and local communities	Low	• All Contractor to have a GRM for workers. • Sensitization on project GRM • Reporting on all grievances	• TWWDA • Contractor • KYEWASCO	Training reports • Grievance reports	To be determined during development of a decommissioning plan
Environment (Soil, air and water)	Solid waste generation	Low	• Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations. • Segregation of waste to encourage reuse and recycling. • Engagement of a registered waste handler	• TWWDA • Contractor • KYEWASCO	License of the waste handler Waste recycling plan	To be determined during development of a decommissioning plan
	Contamination of soil, air and water by waste generated during decommissioning works	Medium	• Collect, segregate, and dispose wastes generated responsibly by engaging a registered waste handler	• TWWDA • KYEWASCO • Contractor	Contracts with licensed waste handlers	To be determined during development of a decommissioning plan
	Visual impacts	Medium	• Rehabilitate/restore the site to its original state	• TWWDA • KYEWASCO • Contractor	Restored/ rehabilitated sites	To be determined during development of a decommissioning plan

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

There was upmost acceptability and goodwill from the enterprises and community living around the project area. There are major environmental and social issues both positive and negative associated with the construction, operation, and decommissioning of the proposed project. Mitigation measures have been proposed in every negative impact raised in construction, operation, and decommissioning under the environmental and social management plan (ESMP) for consideration in these various stages of the proposed project.

The ESIA and preparation of this Comprehensive Project Report was carried out to fulfil legal requirements, as outlined in the Environmental Management and Co-ordination Act (1999), and the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015&2019. Mitigation measures for the potentially significant and/or adverse environmental and social impacts and safety risks have been provided as an integral part of this ESIA report. The positive impacts outweigh the negative impacts. The listed negative impacts can be corrected with the proposed mitigation measures, and it is also economically viable therefore the project should be allowed to proceed.

10.2 Recommendations

The following are some of the recommendations made to minimize or mitigate for the adverse environmental and social impacts from the proposed project:

(i) There is need for rigorous implementation of the Environmental Management and Monitoring Plan which will facilitate the mitigation and/or prevention of potentially adverse environmental impacts.

(ii) The proposed ESM&MP should be followed fully by the contractor with the supervision from the proponent. A report on the findings from the monitoring of the ESM&MP right from implementation all through to decommissioning phase submitted quarterly.

(iii) The mitigation measures proposed should be followed by the proponent as it is highlighted in this ESIA report.

(iv) The design, construction and operation should be carried out in accordance with the specific report for the proposed project.

(v) All contractor's employees and any other person visiting the site should be provided with appropriate PPE and trained on their proper use.

(vi) On completion of the Civil Works, KYEWASCO 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 non-conformities which the

Contractor together with KYEWASCO will address through the defect's liability period of the Project. This audit will also form basis of annual Project self-audits by KYEWASCO.

11. REFERENCES

Advisian 2018a, "Provision of Pre-FEED Geosurveys: Materials Investigation Report", Document number 407011-00566-SS-0002, in preparation

African Journal of Science and Technology, Vol. 6, No. 1, pp. 105-115.

American Public Health Association, 1999. Standard methods for examination of water and wastewater, American Public Health Association (APHA), American Water Works Association (AWWA), Water Environment Federation (WEF), 46 pp.

Birdlife International (2022) Species factsheet: Gyps africanus. Downloaded from http://www.birdlife.org on 11/02/2022. Recommended citation for factsheets for more than one species: Birdlife International (2022) IUCN Red List for birds. Downloaded from http://www.birdlife.org on 11/02/2022.

Booth, Julie & Cooper, Laura & Donovan, M. & Huyghe, Alexandra & Koedinger, Kenneth & Paré-Blagoev, E. (2015). Design-Based Research Within the Constraints of Practice: Algebra by Example. Journal of Education for Students Placed at Risk (JESPAR). 20. 79-100. 10.1080/10824669.2014.986674.

Bosworth, W., Lambiase, J. and Keisler, R., 1986. A new look at Gregory's Rift: the structural style of continental rifting. EOS, Trans. Am. Geophys. Union, 67 (29):577-582.

Brauneder KM, Montes C, Blyth S, Bennun L, Butchart SHM, Hoffmann M, et al. (2018) Global screening for Critical Habitat in the terrestrial realm. PLoS ONE 13(3): e0193102. https://doi.org/10.1371/journal.pone.0193102

Carter S. & Smith A.R. (1988). Flora of Tropical East Africa - Euphorbiac v2 (1988) EPUB, CRC Press.

Chorowicz J. 2005. The East African Rift System, Journal of African Earth Sciences 43 (2005) 379–410.

Darbyshire, I., David J. Goyder, John R.I. Wood, Aurélio Banze and John E. Burrows (2010). Further new species and records from the coastal dry forests and woodlands of the Rovuma Centre of Endemism. Plant Ecology and Evolution, Vol. 153, No. 3 (2020), pp. 427-445.

Eken G, Bennun L, Brooks TM, Darwall W, Fishpool LDC, Foster M, Knox D, Langhammer P, Matiku P, Radford E, Salaman P, Sechrest W, Smith ML, Spector A, and Tordoff A (2004). Key biodiversity areas as site conservation targets. Bioscience 54(12): 1110-1118.

Environmental Coordination and Management Act (Air Quality) Regulations, 2014. Environmental Coordination and Management Act (Fossil Fuel Emission Control) Regulations, 2006.

Environmental Coordination and Management Act (National Sand Harvesting) Guidelines, 2007.

Environmental Coordination and Management Act (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Environmental Coordination and Management Act (Waste Management) Regulations, 2006.

Environmental Coordination and Management Act (Water Quality) Regulations, 2006.

Environmental Coordination and Management Act (Wetlands, Riverbanks, Lakeshores and Seashores Management) Regulations, 2009.

EPA, AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, 13.2.4 Aggregate Handling and Storage Piles, November 2006.

Food and Agriculture Organization (FAO) (2019). Ecosystem Services & Biodiversity (ESB). www.fao.org

GBIF (2021). Global Biodiversity Information Facility (GBIF, 2019 & 2020). https://www.gbif.org/what-is-gbif

Kenya Gazette Supplement No.56.Environmental Impact Assessment and Audit Regulations 2003.

Kenya National Bureau of Statistics, 2019. 2019 Kenya Population and Housing Census Volume II: Distribution of Population by Administrative Units.

Kenya Wildlife Service (2021). National wildlife census report, 2021. Kenya Wildlife Service, Nairobi, Kenya.

KWCMA (2013). Wildlife Conservation and Management Act, 2013 (No. 47 of 2013). Government Printer, Nairobi, Kenya.

12. APPENDICES

12.1 Appendix 1: Sample Questionnaires

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m ☐ 100 – 500m ☑ 501 -1000m ☐ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☐ No ☑

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....

.....

.....

.....

.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

.....
.....
.....
.....
.....
.....
.....

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

.....
.....
.....
.....
.....
.....
.....

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

.....
.....
.....
.....
.....
.....
.....

Name: ..... Date: .....

Designation / Residence: .....

Contact.....

Signature.....

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m ☐ 100 – 500m ☑ 501 -1000m ☐ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....

DAMAGES OF THE TREES IN THAT AREA.

.....

.....

.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

PEOPLE SHOULD KEEP FAR WAY FROM WHERE THE PLACE OF CONSTRUCTION TAKING PLACE.

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

THE GOVERNMENT SHOULD GIVE PEOPLE IN THAT AREA JOB.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

THE AREA MUST BE WELL AND GOOD AREA.

Name: PATRICK NYAKA Date: 13/2/2024

Designation / Residence: RUNYENJES

Contact: 0734555265

Signature: P.N

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? *(Tick where applicable)*

Less than 100m [✓] 100 – 500m [ ] 501 -1000m [ ] Over 1Km [ ]

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes [✓] No [ ]

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes [✓] No [✓]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

...It will bring water near homes.....
.....
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

loss of trees and damages at property

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Use the best quality materials in construction

fencing the working place

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

project job opportunity to member of the residence

Work is done

Take short time

Name: NANCY MURUGI Date: 13/08/2024

Designation / Residence: KYENI

Contact: 0705262853

Signature: NKJ

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m [ ] 100 – 500m [ ] 501 -1000m [ ] Over 1Km [x]

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes [x] No [ ]

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes [x] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [x] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

Disposal of waste people of the area

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Damage of property

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

people will get Job

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

1. Fencing where Construction is done
2. use the machines of the Job

Name: FREDRICK M MUNYI Date: 13/2/2024

Designation / Residence: sub/Area Nthagaiya

Contact: 0727896353

Signature: FMunyi

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? *(Tick where applicable)*

Less than 100m ☐ 100 – 500m ☑ 501 -1000m ☐ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

There will be damage of Roadway on the ground.

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

....
....
....
....
....
....
....

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Let this project employ the people on the area where the project is.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

Let the project take the shortest time.

Name: Renson Karanja Date: 13/03/2024

Designation / Residence: Village Elder muhi

Contact: 0742395476

Signature: Karanja

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m [✓] 100 – 500m [ ] 501 -1000m [ ] Over 1Km [ ]

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes [✓] No [ ]

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes [✓] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....
..... Sexual abuses, ...
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Loss of trees as its has cut down.

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Securities to our children during the operation.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

Job creation among our Peoples in this area.

Name: PATRICK MUNDUKI NJUE Date: 13/2/2024

Designation / Residence: KIGAA/MUTHUARU

Contact: 0790764406

Signature:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m [✓] 100 – 500m [ ] 501 -1000m [ ] Over 1Km [ ]

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes [✓] No [ ]

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes [✓] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

Everything will work well because water is essential to every one

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Destruction of property

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Cooperate with land owners and to show respect

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

N/A

KAUNYA

Name: JOHN SAMMY NYAGA Date: 13/02/24

Designation / Residence: Farmer & Plot owner Kathanjuri

Contact: Tel 0724861611

Signature: clyaga

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m ☐ 100 – 500m ☐ 501 -1000m ☑ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

Enough water hence Save Time
Employment
.....
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Cutting down of trees

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Being seedlings from groups that deal with tree nursery so as to be planted to replace tree cut down
- employ youth during putting up pipes

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

This project will profit us very much with clean waters hence reduce water borne diseases.
- Enough works hence save time. We use to fetch waters when it not enough.
- No paying water that is not enough. Therefore we save money.

Name: Silas Njeru Gilbert Date: 13/04/24

Designation / Residence: SUB-AREA - MUNYUIN IN KANJA NORTH SUB-LOCATION

Contact: 0726355421

Signature:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Runyenjes Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m ☐ 100 – 500m ☑ 501 -1000m ☐ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

The projekt will ~~emp~~ easen the burden of families who had pain many of water shortages and problems

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Conflicts with members of public

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Resettlements of affected persons.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

Timely compensation of the affected persons.

Name: David Nyaga Date: 13/02/2024

Designation / Residence: Area chief

Contact: 0725 204 702

Signature: [signature]

THANK YOU FOR YOUR RESPONSE

12.2 Appendix 2: Key informant interview list

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA)
AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN EMBU COUNTY

TANA WATER WORKS DEVELOPMENT AGENCY

KEY INFORMANT INTERVIEW LIST

S/ No.	NAME	INSTITUTION	CONTACTS	SIGNATURE
	Eng. Albert Gatuita	Embu County Government	Director of water & Irrigation service, 0720746515	
	MOSES M. KIGORO	E.C.G.	DIRECTOR ENVIRONMENT & NATURAL RESOURCES	
	MERCY GATOBU	DCC EMBU WEST SUBCOUNTY	DEPUTY COUNTY COMMISSIONER	
	ALEX SAPINGOT	ACC-CC office	0710235522	
	JACK ODHIAMBO OGWO, MBS	COUNTY COMMISSIONER EMBU	0727 788860	
	Eric M Mugo	General Manager	0726002964	
	JANE W. WARWIMLE	DCC-EMBU EAST	0725643808	
	J.S. KIANJIE	LANDS OFFICE-EMBU-VALUATION DIRECTORATE	0722786610	

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA)
AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN EMBU COUNTY

TANA WATER WORKS DEVELOPMENT AGENCY

KEY INFORMANT INTERVIEW LIST

S/ No.	NAME	INSTITUTION	CONTACTS	SIGNATURE
	ERICK N. MURATHI IRERI	ASS. CHIEF KIAMURINGA SUB-LOC	0722920079	
	DOROTHY WAWIRA NJERU	CHIEF ITABUA LOC.	0717029216	
		CHIEF ITABUA LOCATION EMBU-WEST SUB-COUNTY DATE.... SIGN		

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA)
AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN EMBU COUNTY

KEY INFORMANT INTERVIEW LIST

S/ No.	NAME	INSTITUTION	CONTACTS	SIGNATURE
1.	MIRIAM KAMAU	KFS	0722290251	
2	IRENE MUTHONI	C.F.A	0727021160	
3.	SAMUEL MBOGO MUNYI	CFA	0711663307	
4	Eng. Eric Mugo	Kyeni Water & Sewerage	0726002964	
5	MAXWELL MBOGO	TWWDA	0706514081	

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA)
AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN EMBU COUNTY

KEY INFORMANT INTERVIEW LIST

S/ No.	NAME	INSTITUTION	CONTACTS	SIGNATURE
	ELIZABETH M. KARIUKI	KFS - AICFC GMBH	0721484017	
	MIRIAM W. KAMAU	Kenya Forest Service Fm-Irangi	0722290251	

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA)
AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN EMBU COUNTY

KEY INFORMANT INTERVIEW LIST

S/ No.	NAME	INSTITUTION	CONTACTS	SIGNATURE
	Joseph Romeu	NEMA	0713041092	

12.3 Appendix 3: Minutes for the Key Informant Interview

MINUTES FOR THE KEY INFORMANT INTERVIEW CONDUCTED ON 13-08-2024 AT THE OFFICE OF THE CEC WATER & ENVIRONMENT IN EMBU COUNTY, FOR THE PROPOSED RUNYENJES SEWERAGE PROJECT & EMBU SEWERAGE PROJECT.

Members present.

1) Eng. Njue-Managing Director EWASCO
2) Evans Kageche-TWWDA
3) Bernadett Wairimu-ESIA Lead Expert at Greenville Nexus Int'l Ltd
4) Irene Mutahi-Environmentalist TWWDA
5) Enid Waithera-TWWDA
6) Florence Musyoka-CEC Water & Environment in Embu County
7) Emily Muthoni Environment ECG
8) John Nyaga CEC Agriculture

Agenda

1) Preliminaries
2) Overview of the two projects; the proposed Runyenjes sewerage project and the proposed Embu sewerage project by Ms.Enid Waithira of TWWDA & Eng.Njue of EWASCO
3) Introduction of ESIA & RAP for the two projects by the ESIA Lead Expert
4) Feedback from the key informants (CEC Water & Environment and CEC Agriculture)
5) Closing remarks
6) Adjournment

Min 01/13/08/2024; Preliminaries

The CEC water & environment madam Florence Musyoka welcomed the members and requested her colleague madam Emily Muthoni to open the meeting with a word of prayer. She then led members in a round of introductions.

Min 02/13/08/2024; Overview of the proposed Runyenjes sewerage project and the proposed Embu sewerage project

Ms. Enid gave a vivid explanation of the project details, area of coverage, where the sewer lines will cross, who the beneficiaries will be, and the technology that shall be used in the treatment of waste water and where the treatment works shall be carried out. She explained the principle of operation of the trickling filters technology and the benefits of that technology over the ponds. Eng.Njue, the managing director of EWASCO explained the status of the current waste water treatment plant and emphasized on the challenges that they are facing as a service provider in ensuring connections to more

people since the system seems to be getting overwhelmed due to high population growth in the recent past. He noted that the proposed waste water treatment plant would be a good solution for residents of Embu as well as the residents of Runyenjes since Runyenjes area is also growing and developing at a high rate and septic tanks and pit latrines were proving not feasible for the area.

Min 03/13/08/2024; Introduction of ESIA & RAP for the two projects by the ESIA Lead Expert

The ESIA Lead Expert Ms.Bernadett Wairimu explained the likely environmental and social impacts that the project may bring about and the viable mitigation measures that can be employed, to keep the negative impacts to a possible minimum. The consultant elaborated that the project affected persons may be people who lose utility of their land due to a sewer line passing through their parcel of land and those that will give their land for construction of the treatment plant will lose possession of the land, in which case a compensation shall be given to all project affected persons following the resettlement action plan.

Min 04/13/08/2024; Feedback from the key informants (CEC Water & Environment and CEC Agriculture)

The CEC Water & Environment madam Florence Musyoka expressed her excitement and gratitude for the proposed development in the county of Embu. She expressed that the growth in population in the county has been taking place steadily and the pit latrines and septic tanks are proving to be inefficient in the treatment of waste water. She noted that the proposed sewerage projects would lead to a reduction in water borne diseases and mortality rate in the county. The CEC Agriculture Mr.John Nyaga expressed his gratitude to TWWDA and EWASCO and urged the ESIA consultants to conduct thorough public consultations in order to have the community buy-in, which would lead to high success rates of the project.

Min 05/15/08/2024; Closing remarks

Madam Florence Musyoka, the CEC Water & Environment gave a vote of thanks and requested TWWDA and EWASCO to implement the project speedily since the county is in dire need of proper handling and treatment of waste water.

Min 06/15/08/2024; Adjournment

There being no other business, the meeting closed with a word of prayer from the consultant.

Minutes' certification

Name	**Designation**	**Signature**	**Date**
Ms.Florence Musyoka	CEC Water & Environment		
Ms.Bernadett Wairimu Njoroge	ESIA Lead Expert		
Ms. Irene Mutahi	Environmentalist TWWDA		

12.4 Appendix 4: Minutes for the public participation meeting

12.5 Appendix 5: List of Participants

12.6 Appendix 6: Land ownership documents.

REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(*Chapter* 300)

Title Deed

Title Number KAGAARI/KIGAA/3274

Approximate Area 0.81 HA.

Registry Map Sheet No. 16, 23

This is to certify that TANA WATER SERVICES BOARD.

is (are)/now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

EMBU District Land Registry

this 15TH day of MAY 2013

J. M. Land Registrar 099

REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(*Chapter* 300)

Title Deed

Title Number KAGAARI/KIGAA/3274

Approximate Area 0.81 HA.

Registry Map Sheet No. 16, 23

This is to certify that TANA WATER SERVICES BOARD.

is (~~are~~) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the EMBU District Land Registry this 15TH day of MAY 2013

J. M. Land Registrar 099

REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(*Chapter* 300)

Title Deed

Title Number KAGAARI/KIGAA/3017

Approximate Area 1.21 Ha.

Registry Map Sheet No. 16

This is to certify that TANA WATER SERVICES BOARD = =

P.O. Box 1292, EMBU= = = = = = = =

is (~~are~~) now registered as the absolute proprietor(~~s~~) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

E M B U District Land Registry

this TWENTY-NINTH day of JANUARY 2013

Land Registrar

12.7 Appendix 7: Firm's NEMA License

EAE 2 3060341

FORM 7 (r.15(2))

nema
Mazingira Yetu | Uhai Wetu | Wajibu Wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/20228

Application Reference No: NEMA/EIA/EL/26791

M/S **Greenville Nexus International Limited**
(individual or firm) of address
P.O. Box 50173 - 00100 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts** registration number **12508**

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

Issued Date: 12/18/2023 Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

12.8 Appendix 8: Lead Expert License

EAE 2 3060340

FORM 7 (r.15(2))

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/20229

Application Reference No: NEMA/EIA/EL/26793

M/S **BERNADETT WAIRIMU NJOROGE**
(individual or firm) of address
P.O. Box 50173 - 00100 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
General
registration number **7394**

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

Issued Date: **12/18/2023** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

12.9 Appendix 9: R. Ethirai (water discharge point) analysis

FORM F/9/1/4

WATER RESOURCES AUTHORITY

Tana Basin Area
Along Embu - Meru Highway, Behind Embu Law Courts
P.O. Box 1930 – 60100
EMBU

Tel: 061 2309370
Email:tba@wra.go.ke
Website: www.wra.go.ke

Physical Chemical & Microbiological Laboratory Results Certificate

Report Issue Date:	**12/03/2024**	**Sample No:**	**120/2023-2024**
Name of Customer:	TANA WATER WORKS DEVELOPMENT AGENCY	**Received By:**	JORAM
Address:	P.O BOX 1292, 10100	**Date Received:**	01/03/2024
Email:		**Type of Sample:**	SURFACE WATER
Telephone Number:	0724 259891	**Source of Sample:**	PROPOSED RUNYENJES SEWERAGE DISCHARGE POINT AT ETHIRAI STREAM
Sampled/submitted by:	ESTHER	**County:**	EMBU
Purpose of Sampling:	BASELINE QUALITY MONITORING	**GPS:**	
		Latitude:	
Date of Sampling:	01/03/2024	**Longitude:**	

PARAMETERS	UNIT	RESULTS	WHO GUIDELINES	KEBS(KS 459-1:2007) STANDARDS.
pH	pH Scale	**9.17**	6.5-8.5	6.5-8.5
Temperature	°C	**22.08**	Ambient	Ambient
Dissolved Oxygen	mgO_2/l	**3.02**	--	--
Turbidity	N.T.U	**30.9**	Max 5	Max 5
Conductivity (25^0 C)	µS/cm	**64**	Max 2500	-
Iron	mg/l	**0.95**	Max 0.3	Max 0.3
Manganese	mg/l	-	Max 0.1	Max 0.5
Calcium	mg/l	**8**	Max 100	Max 150
Magnesium	mg/l	**12**	Max 100	Max 100
Sodium	mg/l	-	Max 200	Max 200
Potassium	mg/l	-	Max 50	-
Total Hardness	$mgCaCO_3/l$	**20**	Max 500	Max 300
Phosphates	$mgPO_4/l$	**1.26**	Max 2.2	-
Chloride	mg/l	**8**	Max 250	Max 250
Fluoride	mg/l	**NIL**	Max 1.5	Max 1.5
Nitrate	$mgNO_3.N/l$	**1.6**	Max 10	Max 45
Nitrite	$mgNO_2.N/l$	**0.035**	Max 0.1	Max 0.003
Sulphate	mg/l	**2**	Max 450	Max 450
Total Dissolved Solids	mg/l	**32**	Max 1500	Max 1000
Total Coliforms	MPN /100ml	**1100**	Shall be Absent	Shall be Absent
Faecal Coliforms (E. Coli)	MPN /100ml	**28**	Shall be Absent	Shall be Absent

Comments:
This is water sampled at the proposed discharge point for the Runyenjes Sewerage plant in Runyenjes at River Ethirai. It is slightly turbid, soft water with moderate amounts of ions. It is also tested positive for bacterial contamination.

J. KIHUMBA
Laboratory Analyst

J. KIHUMBA
PWQ&PCO

Disclaimer:
The results contained herein apply to the particular sample(s) tested, whose sample number and tests carried out as detailed in these results. The information contained here reflects the laboratory's findings at the time of analysis and based on the samples submitted by the customer.

FORM F/9/1/6

WATER RESOURCES AUTHORITY

Tana Basin Area
Along Embu - Meru Highway, Behind Embu Law Courts
P.O. Box 1930 – 60100
EMBU

Tel: 061 2309370
Email:tba@wra.go.ke
Website: www.wra.go.ke

Effluent Laboratory Results Certificate

Report Issue Date:	**12/03/2024**	**Sample No:**	**120/2023-2024**
Name of Customer:	TANA WATER WORKS DEVELOPMENT AGENCY	**Received By:**	JORAM
Address:	P.O BOX 1292, 10100	**Date Received:**	01/03/2024
Email:		**Type of Sample: (SW/GW)**	SURFACE WATER
Telephone Number:	0724 259891	**Source of Sample:**	PROPOSED RUNYENJES SEWERAGE PROJECT DISCHARGE POINT AT ETHIRAI RIVER
Sampled/submitted by:	ESTHER	**County:**	EMBU
Purpose of Sampling:	BASELINE QUALITY MONITORING	**GPS:**	
		Latitude:	
Date of Sampling:	01/03/2024	**Longitude:**	

PARAMETERS	UNIT	RESULTS	EFFLUENT STANDARDS	
			DISCHARGE INTO ENVIRONMENT	DISCHARGE INTO PUBLIC SEWER
Temperature	°C	22.08	±3 ambient temp.	20-30
pH	pH Scale	9.17	6.5-8.5	6-9
Dissolved Oxygen	mgO_2/l	3.02	-	-
Conductivity	µ S/cm	64	-	-
BOD_5 days at 20 °C	mgO_2/l	12	30	500
COD	mgO_2/l	44	50	1000
Total Suspended Solids	mg/l	35	30	250
Total Dissolved Solids	mg/l	32	1200	2000
Sulphates	mg/l	2	-	-
Nitrate	mgNO3-N/l	1.6	-	20
Nitrite	mgNO2-N/l	0.035	-	-
Total Nitrogen as N	mg/l	-	Two guideline value	
Phosphates	mg/l	1.26	Two guideline value	30
Heavy Metals				
Chromium, Cr	mg/l	-	0.05	0.05
Lead, Pb	mg/l	-	0.01	1.0
Mercury, Hg	mg/l	-	-	0.05
Copper, Cu	mg/l	-	1.0	1.0
Cadmium, Cd	mg/l	-	0.01	0.5

Comments:

This is water sampled at the proposed discharge point for the Runyenjes Sewerage project in Runyenjes at River Ethirai. The parameters are satisfactory for water discharged into the environment.

WATER RESOURCES AUTHORITY
REGIONAL MANAGER
TEL: 061-2309370

JORAM KIHUMBA
Laboratory Analyst

JORAM KIHUMBA
PWQ&PCO

Disclaimer:
The results contained herein apply to the particular sample(s) tested, whose sample number and tests carried out as detailed in these results. The information contained here reflects the laboratory's findings at the time of analysis and based on the samples submitted by the customer.

12.10 Appendix 10: R. Design Report

Runyenjes sewer design report 11-9-2

12.11 Appendix 11: Bill of Quantities

NEMA BOQ RUNYENJES WWTP 3

12.12 Appendix 12: Book of Drawings

BOOK OF DRAWINGS.pdf