KENYA RAILWAYS

THE REHABILITATION OF NAKURU-KISUMU METRE GAUGE RAILWAY (MGR), THE KISUMU-BUTERE METRE GAUGE RAILWAY (MGR) BRANCHLINE, THE GILGIL-NYAHURURU METRE GAUGE RAILWAY (MGR) BRANCHLINE AND THE CONSTRUCTION OF THE NEW KISUMU RAILWAY STATION

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE REHABILITATION OF THE NAKURU-KISUMU METRE GAUGE RAILWAY (MGR), THE KISUMU-BUTERE METRE GAUGE RAILWAY (MGR), THE GILGIL-NYAHURURU METRE GAUGE RAILWAY (MGR) PROJECT AND THE CONSTRUCTION OF NEW KISUMU RAILWAY STATION

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Version: Final Report **Date:October, 2021**	

CERTIFICATION

Proponent: Kenya Railways

Project Name: The Nakuru-Kisumu Metre Gauge Railway (MGR), the Kisumu-Butere Metre Gauge Railway (MGR) line, the Gilgil-Nyahururu Metre Gauge Railway (MGR) Branch line and the construction of the new Kisumu Railway station

Assignment: Environmental and Social Impact Assessment Study for The Nakuru-Kisumu Metre Gauge Railway (MGR), the Kisumu-Butere Metre Gauge Railway (MGR) line, the Gilgil-Nyahururu Metre Gauge Railway (MGR) Branch line and the construction of the new Kisumu Railway station

Report Title: ESIA Project Report

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Certification by Proponent

We, **Kenya Railways** confirm that this Environmental and Social Impact Assessment (ESIA) study report for the rehabilitation of Kenya Railways infrastructure has been prepared and submitted to NEMA with our authority as the proponent.

Signed for and on behalf of: **Kenya Railways**

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INFRASTRUCTURE DEVELOPMENT DEPARTMENT
KENYA RAILWAYS CORPORATION

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LIST OF ACRONYMS

BoQ	Bill of Quantities
CEMP	Construction Environmental Management Plan
CoK	Constitution of Kenya
COVID-19	Corona Virus Disease 2019
CSR	Corporate Social Responsibility
EA	Environmental Audit
EIA	Environmental Impact Assessment
EEZ	Exclusive Economic Zone
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management & Monitoring Plan
ESMF	Environmental and Social Management Framework
FOSI	Finding of Significant Impacts
GoK	Government of Kenya
GRCs	Grievance Redress Committees
GRM	Grievance Redress Mechanism
GPS	Global Positioning System
HSE	Health, Safety And Environmental
HIV/AIDs	Human immunodeficiency virus infection and Acquired Immune Deficiency Syndrome
ICD	Inland Container Terminal
KDF	Kenya Defense Forces
KES	Kenya Shillings
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KISIP	Kenya Informal Settlement Improvement Projects
KNBS	Kenya National Bureau of Statistics
KR	Kenya Railways
KRB	Kenya Roads Board
KUP	Kenya Urban Projects
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Service
MGR	Meter Gauge Railway
MSDS	Material Safety Data Sheet
MNSGR	Mombasa-Nairobi Standard Gauge Railway
NEAP	National Environment Action Plan
NEMA	National Environment Management Authority
NGOs	Non Governmental Organizations

NPEP	National Poverty Eradication Plan
NYS	National Youth Service
OHS	Occupational Health and Safety
PAPs	Project Affected Persons
PEC	Poverty Eradication Commiission
PPE	Personal Protective Equipment
PRSP	Poverty Reduction Strategies Project
RE	Resident Engineer
SEA	Strategic Environmental Assessment
SESA	Strategic Environmental and Social Assessment
SGR	Standard Gauge Railway
STDs	Sexually Transmitted Diseases
TOR	Terms of Reference

Non-Technical Summary

General Overview

Rail transport is Kenya's second most common mode of transport after road transport. It is suitable for transporting bulky and heavy commodities over long distances. Though the country has laid down rail tracks system, the tracks are not well maintained and as a result covered in bushes, overgrown grass as well as vandalized rail furniture. Kenya has both freight trains used mainly for the transportation of goods from the port of Mombasa to different destination.

The proponent, Kenya Railways (KR) proposes to revitalize the 217Km Nakuru-Kisumu Metre Gauge Railway (MGR), the 69.05Km Kisumu-Butere Metre Gauge Railway (MGR), the 77.8Km Gilgil-Nyahururu and the construction of the new Kisumu Railway station for Kenya Railways traversing through Nakuru, Kericho & Kisumu; Kisumu, Vihiga Siaya & Kakamega Counties and Nakuru, Nyandarua & Laikipia Counties respectively. In keeping with its mandate, Kenya Railways is committed to providing the country with safe, reliable and efficient railway transport services. As part of Kenya railways response to improved and efficient rail transport, the agency resulted to rehabilitate the railway lines as well as associated civil works at different sites along the rail networks. The main material inputs will include sand, ballast, cement, steel, bitumen and stones

Project Justification

The proposed revitalization of the Nakuru-Kisumu Metre Gauge Railway (MGR), the Kisumu-Butere Metre Gauge Railway (MGR) and the Gilgil-Nyahururu will act as the main transhipment point between the SGR and Road for freight traffic that is destined for areas beyond (Inland Container Depot) ICD Naivasha. In the interim, the lines will serve freight destined for Uganda, Southern Sudan, Democratic Republic of Congo, Rwanda and Burundi as Mombasa – Nairobi – Malaba SGR project has been implemented to completion. This will supplement and reduce congestion along Nairobi – Malaba highway (A104/A8) and Nairobi Inland Container Depot (ICD) which is currently in operation.

Additionally, the revival of Gilgil-Nyahururu railway will create jobs and improve the economy of the area. Among the economic benefits to be achieved, is the resumption of transportation of agricultural products from Nyandarua and livestock from Laikipia at reasonable cost. Moreover, in Nyandarua, potato processing plant and cold storage are being constructed hence the railway will be an efficient means of transportation of finished products and also required materials. The rail, which cuts across three counties of Nakuru, Nyandarua and Laikipia, is also expected to bring down the cost for transporting building materials in the region.

On the other hand, Kisumu-Butere railway line will facilitate ease of doing business as well as increasing competitiveness of locally produced goods in the region through

provision of efficient, reliable and cost effective logistic and value chain haulage services.

Anticipated Environmental and Social Impacts

The proposed revitalization of the Nakuru-Kisumu Metre Gauge Railway (MGR), the Kisumu-Butere Metre Gauge Railway (MGR) and the Gilgil-Nyahururu Metre Gauge Railway (MGR) that serves part of the western regional network is currently under poor state and therefore needs to be upgraded The core observation of this Study is that the proposed improvement of the railway lines and stations is aimed at opening up transportation sector by improving connectivity in Western Kenya. A more efficient railway service will allow a reduction in the use of road by trucks and thus an improvement of air quality within the project area and country at large.

Positive impacts of the projects include;

Primary Economic Benefits

The Project will replace the existing inefficient rail, signalling equipment, stations and locomotive-hauled coaches with modern and efficient rail infrastructure and passenger coaches with new technology that is more suited to rail operation.

In general the revitalization of the railway will go along way in promoting transport of bulky cargo, reduce congestion on the roads, besides reducing transport costs. Importantly the revitalization will promote uptake of cargo from the Port of Mombasa to Kisumu. In addition and through the newly rehabilitated Port of Kisumu, such cargo, can be transported to the Great Lakes countries thereby creating business opportunities for the Port.

Additionally, agricultural produce will easily be transported from one county to another. The farmers would once again be able to transport farm produce, including indigenous vegetables, to Nairobi and beyond cheaply and more reliably.

Primary Social Benefits

- The Project will provide dependable transport services allowing timely movement of goods.
- Traders will also benefit through timely delivery of their produce and services, thereby making them more competitive
- Supply of construction materials by traders during the construction phase
- Employed opportunity for locals for construction works.
- Demand for housing facilities, food supply, fuel, recreation and other requirements by the labour force will translate to economic benefits to the local investors and landowners.,
- Transfer of knowledge and skills to the community you through direct and indirect employment

The project, however, will also have negative impacts that will require to be addressed through the construction and operation phases. The positive and negative impacts may be viewed from the environment, social and economic perspectives.

In view of the above observations, the study will focus on the following impact factors;

i. The rehabilitation of railway lines, the construction of new stations and rail line will introduce nuisances such as dust, noise & vibration and fumes during the construction phase
ii. Noise generated during construction;
iii. Dust from construction activities and movement of vehicles;
iv. Potential increase of soil erosion in the area;
v. Potential spread of sexually transmitted diseases (STDs) and HIV/AIDS as a result of in-migration by workers;
vi. Risks of injuries and fatal accidents to workers at work sites;
vii. Gender inequality and sexual harassment;
viii. Sanitation and solid waste disposal at the construction camps are issues that could also impact negatively on the environment;
ix. Increase in solid waste by motorists and passengers, especially near bus stops and on road reserves

The above negative impacts require an integration of appropriate prevention actions through the construction and operations for enhanced environmentally and socially acceptability and sustainability. The listed impact factors and associated mitigation measures have been outlined in this report for consideration.

Impact Factors during Construction Phase

(i) Air quality
(ii) Noise and vibration
(iii) Vehicular traffic
(iv) Construction material sites
(v) Public disruptions
(vi) Waste management
(vii) Health and safety
(viii) Vegetation clearing and soil loss
(ix) HIV and AIDS and other sexually transmitted infections

Impacts Factors during Operation Phase

(i) Wastewater generation
(ii) Solid waste generation
(iii) Noise levels
(iv) Drainage management
(v) Hazardous materials and oil spills
(vi) Dangerous goods

Proposed mitigation measures

(i) Dust emissions can be reduced during construction by dampening the all areas to be worked on;
(ii) Bumps and clearly marked warning signs should be installed at all access to the site to reduce incidences of accidents and to reduce dust levels;
(iii) The contractor should maintain the plant and equipment regularly according to the manufacturer's specifications;
(iv) The contractor should ensure workers are provided with adequate and proper PPEs;
(v) The contractor shall prepare a Solid Waste Management plan to be approved by the RE for proper management of solid and liquid waste at the site;
(vi) HIV/AIDS and STD awareness campaigns should be conducted at the worksites as well as in the settlements and trading centres near the construction site;
(vii) The contractor shall ensure that no child is employed at the site;
(viii) The contractor shall be required, to prepare a code of conduct for his employees and enforce it on No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws;
(ix) Diligence on the part of the contractor is essential in mitigating negative impacts, and therefore mitigation measures should be embedded in the conditions of contract.

Environmental and Social Management and Monitoring Plan (ESMMP)

The Environmental Social and Management plan has been developed articulate clearly the key findings of the environmental impact assessment; recommending necessary mitigation actions, defining roles, monitoring indicators and the estimated cost. The Contractor will also be required to prepare a separate and specific ESMP for their works in order to control construction impacts and ensure compliance with applicable environmental and health and safety legislation and standards. Similarly, as far as air, water and noise pollution are concerned, the proponent will be required to strictly adhere to the EMCA air quality, water, and noise regulations to prevent pollution. The ESMMP is developed to ensure sustainability of the project, from construction through to operation. The plan provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitoring indicators. Implementation timeframes and responsibilities are also defined.

Since the project is within the KR land no compulsory acquisition will be required. However vacate notices will be issued to illegal occupants within the Right of Way (RoW).

Since these railway lines rehabilitation is being done internally by KR staff with immense technical support from Kenya Defence Force (KDF) and National Youth Service (NYS), the primary responsibility for the integration of the mitigation measures for the proposed developments lies with the project proponent (KR) during both the construction and operation stages. At every stage, the objective should be to ensure that the specified mitigation measures are implemented.

Conclusion and Recommendations

This Environmental and Social Impact Assessment report identifies the environmental and social issues that are likely to be significant (scoping) and thereafter undertaken their assessment in detail. In this screening and scoping process it has been determined that the project meets a threshold requirement of a Finding of Significant Impacts (FOSI) under established environmental examination procedures, and as stipulated under EMCA (1999) EIA procedures (2003). However, noting that the project impacts can be mitigated, the study recommends that the project be licensed but with conditions to implement the ESMMP.

In addition, the proponent – Kenya Railways will be required to develop and implement (if these do not exists already) internal environmental and social policies and plans, including setting up of relevant institutional frameworks to oversee their fruition. The stand alone plans that should be in place prior to construction include:

- Waste (Solid and Liquid) Management Plan
- Spill Prevention and Response Plan
- Occupational Health and Safety Plan

In addition to the Full EIA study, the Proponent is required to meet the following:

- An annual Environmental Audit
- A Fire audit, risk assessment and safety and health audit has to be conducted for the sites at least once every year.

Chapter 1: ESIA OBJECTIVES, SCOPE AND METHODOLOGY

1.1. Introduction

Kenya Railways (KR) is proposing for revitalization of the 217Km Nakuru-Kisumu Meter Gauge Railway (MGR). The re-operationalization of the railway services along this line will; reconnect the railway line with the recently rehabilitated Kisumu Port on Lake Victoria, reduce carbon emission and support establishment of Special Economic Zones along the Counties traversed. Additionally, the revitalization of the 77.8 Km Gilgil-Nyahururu MGR Branch line and the 69.05Km Kisumu – Butere MGR branch line is envisaged to; open up the regions, enhance inter-county connectivity, lower cost of transportation as well as spur economic development within the region, through transportation of goods, services and persons.

1.2. Project Background

Rail transport is the second most important mode of transport in Kenya, after road transport, for both freight and passenger services. The railroad system in Kenya consists of the national railway network transport and the metropolitan network. The Economic recovery strategy for wealth and employment creation identified the transport sector as the third pillar of Kenya's economic recovery. The railway system is under the parastatal management of Kenya Railways (KR) and comprises 2,765 km of track. In addition to provision of freight services within the country, KR also handles transit traffic to and from the landlocked countries in the East African region.

The railway network has 2,350 route-km of a meter gauge track of which 23 percent is of the 95lb rail type, 39 percent is of the 80lb rail type and 38 percent is of the 50lb rail type. About 1,421 km of the railway network form the main line of which 1,182 is in Kenya. Most of the railway network was constructed more than 100 years ago. The lack of investment in the rail network combined with vandalism has seen serious deterioration of track and train control systems. This has resulted in low train operating speeds and capacity restraints. The branch lines are the Nakuru-Kisumu and Nairobi-Nanyuki railway lines, while the minor branch lines consist of Voi-Taveta, Gilgil-Nyahururu, Kisumu-Butere, Rongai-Solai and Leseru-Kitale. These were built primarily to serve the former white highlands. KR operates a meter gauge (1000 mm) system built in the late nineteenth and early twentieth centuries

This proposed rehabilitation of Railways infrastructure will play a major role to provide public rail transport along the western region through the rehabilitation of the existing Nakuru-Kisumu MGR Branch line which is 217Km long, Kisumu-Butere (69.05km) and Gilgil-Nyahururu (77.8km). This is an important measure for improving Kenyan transportation network, and an important means to optimally improve the meter gauge railway operations.

Kenya Railways is a State Corporation established by an Act of Parliament (Cap 397) of the Laws of Kenya, and commenced operations on January 20, 1978. The mandates of the Corporation are:

(i) Provide skills and technology for the railway sector
(ii) Provide efficient and effective railway services
(iii) Leverage our assets to grow business
(iv) Promotion, facilitation and participation in national and metropolitan railway network development.

The collapse of transport on the Metre Gauge Railway (MGR) on the Nairobi-Kisumu line for the past two decades was an unfortunate occurrence. The most affected were those whose economies majorly depend on agriculture and were trading in produce that is highly perishable, bulky or with slim profit margins necessitating cheap mode of transport. For three decades the Nakuru- Kisumu, Kisumu –Butere and Gilgil- Nyahururu railway lines haves been sinking deeper into oblivion as heaps of soil collect above it and lush green grass grew on top of it. The revamping of the railway network will shone a ray of hope to the agricultural counties that were forced to turn to road transport, which is costly and unreliable especially during harsh weather. Some of the counties set to benefit include Nakuru, Kericho, Kisumu, Vihiga, Siaya, Kakamega, Nyandarua and Laikipia that have massive agricultural wealth.

Implementation of the KR Infrastructures rehabilitation project is expected to raise a number of environmental and social concerns that are both negative and positive to the surrounding environment and local communities. Kenya Railways commissioned this Environmental Impact Assessment (EIA) study to determine the likely impacts of the proposed development on the environment and local communities and advice on mitigation measures that need to be undertaken to address adverse negative impacts.

The Environmental Management and Coordination Act 1999 (Amendment 2015) it is compulsory that such a project undergoes an Environmental and Social Impact Assessment (ESIA) study process to evaluate the potential positive and negative impacts in accordance with the Environmental (Impact Assessment and Audit) Regulations, 2003 (Amendments 2019).

1.3. ESIA Justification

In accordance with the EMCA, 1999, all new projects must undergo environmental impact assessment study such as to comply with the EIA Regulation, 2003. The proposed Nakuru-Kisumu, Kisumu - Butere and Gilgil-Nyahururu revitalization Projects is expected to have an overall positive impact to the economy, people (social) and the environment. However, project construction phases and other civil associated works are anticipated to have environmental and social impacts that would require to be mitigated.

Construction related project including railway rehabilitation and railway stations construction are listed in the second schedule of EMCA, 1999 as among project

that should undergo EIA. The magnitude of the projects further justifies the EIA study to provide an environmental management plan (EMP) for integration into implementation process.

1.4. Terms of Reference (TOR) for the ESIA Process

The following terms of reference for the proposed relocation of Kathekani Secondary School were used by the ESIA expert team.

- Provision of baseline and background information;
- Project and site description;
- Identification of environmental impacts of the proposed development in the various phases and their level of significance;
- Impact of the project on existing infrastructure;
- Evaluation of alternatives;
- Stakeholder participation viz social survey of views from neighbours;
- Identification of possible conflicts;
- Suggest mitigation measures for identified negative impacts; and
- Prepare a comprehensive environmental management plan.

1.5. Scope and Objectives of the ESIA

According to the Kenyan Policy, all development project or improvement of facilities and infrastructure require an Environmental Impact Assessment. Social Impact assessment is also an integral part of the process. The goal is to ensure that any development does not have detrimental effect to the environment or the society. This consideration is important for development because it comes up with mitigation, control and improvement measures to ensure that the development is sustainable. Therefore this ESIA report has been undertaken in accordance with Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 13th June, 2003 established under the Environmental Management and Coordination Act (EMCA), 2015 of Kenya

1.6. Objectives of the ESIA

In accordance with the EMCA, 1999, all new projects must undergo environmental impact assessment study such as to comply with the EIA Regulation, 2003 and to ensure provisions for environmental protection. Therefore, the main objective of environmental and social impact assessment associated with development of the proposed project is to comply with the current requirements of the EIA regulations of 2003 as established under the EMCA, 2015, in addition to the requirements of the World Bank (project financier) OP 4.01 requirements.

Scope of the ESIA

The scope of ESIA study, therefore, covered the following key areas;

i. Provide a description of the environmental, social and economic issues associated with the proposed boreholes projects,
ii. Undertaking public and stakeholder consultations in the process through interviews and meetings with stakeholders and the affected members of public

iii. Identification of anticipated environmental and social impacts with particular focus on social, economic and natural resources aspects
iv. Development of mitigation measures and an environmental management plan for identified environmental and social impacts.
v. Preparation of ESIA Reports including a Project Report and ESIA Study Report for submission to NEMA,
vi. Obtain appropriate EIA Licenses from NEMA

1.7. ESIA Approach and Methodology

In accordance to the ESIA guidelines, the study included the following:

1) A clear description of the proposed project including its objectives, design concepts, proposed interventions and anticipated environmental and social impacts,
2) Description of the baseline conditions in the project area to cover the physical location, environmental setting, social and economic issues,
3) A description of the legal, policy and institutional framework within which the proposed rehabilitation of the railway lines project will be implemented,
4) Public consultation and engagement
5) Description of the project alternatives and selection criteria,
6) Details of the anticipated impacts to the environment, social and economic aspects of the area covered by the project.
7) Appropriate mitigation and/or corrective measures,
8) Development of an environmental and social management plan (ESMP) presenting the project activities, potential impacts, mitigation measures and responsibilities, associated costs and monitoring indicators,

1.8. Approach

According to the Environmental Management and Coordination Act (EMCA), 2015, section 58 requires that all projects falling under the second schedule of the Act must undergo comprehensive environmental and social impact assessment studies. ESIA study should also comply with the EIA Regulations of 2003 on the minimum and other convectional environmental guidelines. ESIA studies are adopted as integrated approach where desk documentary reviews, field investigations, consultations as well as interviews and discussions with stakeholders and affected communities are considered. The overall study was undertaken following these stages;

1.8.1. Environmental Screening

Screening process was undertaken to decide whether the proposed project needed to be subjected to an ESIA study or not. Based on literature review, the proposed project falls under Category 2 of projects to be subjected to ESIA project report as provided for by the second schedule of the Environmental Management and Coordination Act of 2015

1.8.2. Environmental Scoping

The aim of this stage was to ensure that the ESIA study adequately addresses all the crucial issues of environmental and social concern to the decision-makers. This was done by narrowing down on the proposed MGR rehabilitation project issues and also to those requiring detailed analysis. The process involved dialogue with all project stakeholders so as to ensure that this aim was fulfilled. It also involved the collection of primary and secondary data. From an evaluation of this data, a rapid assessment of the project site and its surrounding areas was made. The key benefits of scoping include:

- Identification and engagement of key stakeholders
- Identification the existing gaps
- Ensures that the assessment focuses on the key likely environmental and social impacts

1.8.3. Documentary Review

Several relevant documents were reviewed for a clear understanding of the terms of reference, environmental status of the project area,data on demographic trends (for the project area, the beneficiary areas and the adjoining towns and counties), land use practices in the affected areas (either as catchments, irrigation scheme, or the beneficiary areas), development strategies and plans (Local, National and International) as well as the policy, legal and institutional documents. The documents reviewed were:

- EMCA (Amendment), 2015
- Nakuru, Kericho, Kisumu, Busia, Vihiga, Kkamega, Siaya, Laikipia and Nyahururur County Development Master Plans
- Kenya National Bureau of Statistics , 2009
- Kenya Railways Strategic plan

1.8.4. Site Assessment

A physical inspection of the ground (proposed site and their surrounding environment) was conducted. This was done with an aim of establishing the anticipated positive and negative impacts on the physical and biological environment (hydrology, climatic patterns and geology), social and economic trends (population trends, settlement trends, economic patterns, cultural setting and linkages, land ownership issues, etc.) and the project affected persons (PAPs) and beneficiaries. Specific objectives of the field assessment included:

- Obtaining any available information and data from the local public offices including environment, water, lands and agriculture.
- Evaluating the environmental setting around the proposed site - observations were focused on the topography, land tenure, surface and ground water sources, public amenities, land cover, climate, flora and fauna, soils, etc.
- Undertaking comprehensive consultative public participation exercises so as to reach a large section of the affected persons as well as other stakeholders. Public consultations were also organized with the stakeholders to evaluating the environmental setting around the proposed site - observations were focused on the topography, land tenure, surface and ground water sources, public amenities, land cover, climate, flora and fauna, soils, etc.

- Evaluate social, economic and cultural settings in the entire project site regarding the anticipated socio-economic and environmental impacts due to proposed project. The data collected was analysed with the help of summaries made by SPSS software. The findings have been presented using charts as shown on Chapter 6 of this ESIA report.

1.8.5. Public Participation

To ensure adequate public participation in the EIA process, the stakeholders and communities living around the project area was undertaken through of scoping and through the field data collection exercise. Findings of the detailed ESIA report will also be presented to stakeholders for their feedback. Among the forums undertaken were sensitization and feedback sessions involving all levels of stakeholders, and public participation through issuance of questionnaires and transect walks. A set of questionnaires were used to conduct interviews, one designed for the surrounding community and the other for key stakeholders (informants) with open ended and closed ended questions also formed part of the consultative process. The aim of carrying out the public consultation was to find out whether the people were familiar with the proposed project activities, impacts and whether they were ready for the project to be undertaken in their area. Public consultation was done through administration of questionnaires. The questionnaires were administered randomly in areas where the projects influence. Public consultative meetings were held as per the table 1 below. (Copies of minutes and attendance lists attached in annex 4).

Table 1: Stakeholder Engagement Meeting venue and dates

No	Area/ Location	Venue	Date	Time
1.	Gilgil	Gilgil Railway Station	25/08/2021	0900Hrs
2.	Nakuru	Nakuru Locoshed	27/08/2021	1100Hrs
3.	Nyahururu	Ol Joro Orok Chief's office	30/08/2021	1000Hrs
4.	Kericho	Chief's Office Kipkelion	01/09/2021	1100Hrs
5.	Muhoroni	Muhoroni township Chief's office	01/09/2021	1500Hrs
6.	Kisumu	Open field near Kanyakwar Chief's Office	03/10/2021	0900Hrs
7.	Butere	Butere Township-Chief's office	03/10/2021	1400Hrs

1.8.6. Impact Assessment and Mitigation Measures

The primary function of an environmental impact assessment study is to predict and quantify potential impacts, assess and evaluate the magnitude and their importance to develop an Environmental and Social management plan to mitigate the impacts. Environmental impacts could be positive or negative, direct or indirect, local or regional and also reversible or irreversible. Assessment of impacts depends on the nature and magnitude of the activity being undertaken and also on the type of mitigation measures

that are envisaged as part of the project proposal. For the proposed project, the anticipated impacts are divided into three components of the project: impacts based on Project Location, impacts during Construction phase, and impacts during De-commissioning and Operational phases. The identified positive and negative impacts of the project are presented in Chapter 7 of this report.

1.8.7. Environmental and social Management and Monitoring Plan (ESMMP)

The Experts have developed an Environmental and social Management and Monitoring Plan (ESMMP) to guide the project team in eliminating or reducing the project impacts to acceptable minimum/ standards. The ESMMP is based on good environmental practices of project implementation and safety of the operations. The proposed ESMMP can be improved through continuous monitoring and audits during project implementation. The plan is provided in a matrix form in Chapter 8 of this report and it identifies the anticipated impact; proposed measures to be undertaken; monitoring indicators; the party responsible for implement the measures, and the estimated cost likely to be incurred to undertake the measures.

1.9. ESIA Output

Final Environmental and Social Impact Assessment study report for approval by NEMA.

1.9.1. Presentation of the report

The report is presented as outlined below:

Chapter 1: Introduction of the project which include project Background, Scope of the ESIA Study, Study Methodology and Presentation of the report.

Chapter 2: Gives the Policy, Legal and Regulatory Framework Policy, Legal, Institutional and Administrative Framework.

Chapter 3: Project Description.

Chapter 4: Baseline Information of the Study Area.

Chapter 5: Outcome of the Public Participation and Consultation process.

Chapter 6: Alternatives to the Project.

Chapter 7: Identification of Potential Impacts and mitigation measures of the project.

Chapter 8: Mitigation Measures of Potential Impacts of the Project.

Chapter 9: Environmental and Social Management and Monitoring Plan (ESMMP)

Chapter 10: Conclusion and Recommendations

Reference

Appendices

1.10. ESIA Study Team

The study team composed of members from different professional disciplines. The team members included:

- Lead EIA Expert and Team Leader
- Design Engineer
- Sociologist
- Environmental support staff
- Architecture
- Survey team
- Field Data Collection Support staff

Chapter 2: The Project Description

2.1. Introduction

The proponent, Kenya Railways (KR) proposes to revitalization of Nakuru-Kisumu, Kisumu-Butere & Gilgil-Nyahururu Meter Gauge Railway and for Kenya Railways traversing through Nakuru,Kericho & Kisumu; Siaya, Vihiga & Kakamega and Nyandarua & Laikipia Counties respectively.

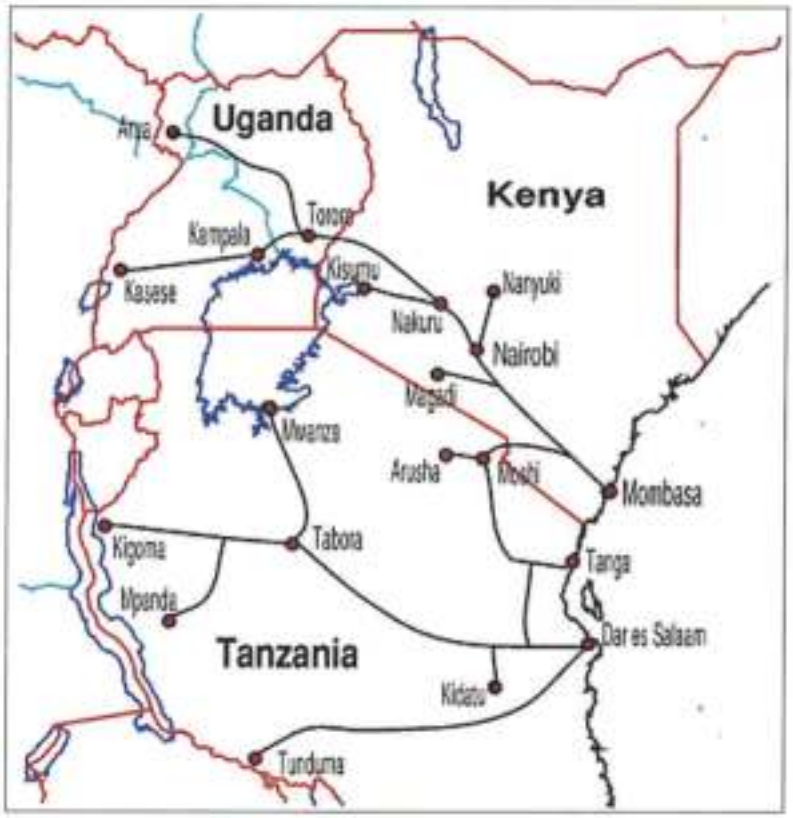

Figure 1: Meter Gauge Railway line Connectivity within East Africa

Rail transport is the second most important mode of transport in Kenya, after road transport, for both freight and passenger services. The railroad system in Kenya consists of the national railway network transport and the metropolitan network. The Economic recovery strategy for wealth and employment creation identified the transport sector as the third pillar of Kenya's economic recovery. The railway system is under the parastatal management of Kenya Railways (KR) and comprises 2,765 km of track. In addition to provision of freight services within the country, KR also handles transit traffic to and from the landlocked countries in the East African region.

The railway network has 2,350 route-km of a meter gauge track of which 23 percent is of the 95lb rail type, 39 percent is of the 80lb rail type and 38 percent is of the 50lb rail type. About 1,421 km of the railway network form the main line of which 1,182 is in Kenya. Most of the railway network was constructed more than 100 years ago. The lack of investment in the rail network combined with vandalism has seen serious deterioration of track and train control systems. This has resulted in low train operating speeds and capacity restraints. The branch lines are the Nakuru-Kisumu and Nairobi-Nanyuki railway lines, while the minor branch lines consist of Voi-Taveta, Gilgil-Nyahururu, Rongai-Solai and Leseru-Kitale. These were built primarily to serve the former white highlands. KR operates a meter gauge (1000 mm) system built in the late nineteenth and early twentieth centuries.

Table 2: Railway line network and gauge

Line Section	Line Type	Rail Type	Length
Mombasa - Nairobi	Main line	95lb	530.3Km
Nairobi – Nakuru – Malaba	Main line	80lb	551.88Km
Malaba - Kampala	Main line	80lb	239.62Km
Nairobi – Thika	Branch line	80lb	54.0Km
Thika – Nanyuki	Branch line	50lb	181.43 Km
Voi – Taveta	Branch line	50lb	118.6Km
Nakuru – Mau Summit	Branch line	80lb	64km
Mau Summit – Kisumu Viaducts	Branch line	60lb	-
Mau Summit – Kisumu line	Branch line	50lb	152.73
Kisumu – Butere	Branch line	50lb	69.05km
Leseru to Kitale	Branch line	50lb	64.95km
Tororo – Mbale	Branch line	50lb	55.82km
Mbale - Parkwach	Branch line	50lb	447.08Km

Along the railway line, there are various station buildings, maintenance sheds, workshops, depots, stores and warehouses / goods sheds and the marine facilities. The summary of these facilities is presented in Table 2.

Table 3: KR Facilities

Regions	Carriage and Wagon Examiners Sheds CXR	Locomotive Shed	Goods Shed	Diesel Depot.	Workshop	Treatment Plant(s)		workshop	Station Building(s)	Signal Cabin	Telecom Equip Room			Paint Shops
						Water	Waste							
Western	31	54	58	3	3	1	1	5	73	17	6	13	8	1
Nairobi	2	2	13	4	1	0	0	5	15	2	6	10	4	2
Eastern	4	1	16	1	0	0	0	3	49	38	2	2	6	0
Total	41	62	103	12	6	2	2	18	156	58	32	30	21	5

This proposed rehabilitation of Railways infrastructure will play a major role to provide public rail transport in the western region through the rehabilitation of the existing Nakuru – Kisumu Line (217 km), Kisumu – Butere Branch line (69.05) and Gilgil – Nyahururu Branch line (77.8km). This is an important measure for improving Kenyan transportation network, and an important means to optimally improve the meter gauge railway operations. The lines have been in disuse for many years because of poor condition. The rail infrastructure and equipment along the lines have overtime been vandalized and encroached due to lack of railway operations.

The re-operationalization of railway services for the the Nakuru-Kisumu line will reconnect the railway line with recently rehabilitated Kisumu Port on Lake Victoria, reducing transportation costs, reduce congestion on the road network, reduce carbon emission and support the establishment of Special Economic Zones along the Counties traversed. Rehabilitation of the Gilgil – Nyahururu line will ease the cost of transporting agricultural produce and goods in the region from the source market and enhance inter-county connectivity between Nakuru, Nyandarua and Laikipia Counties. It will also provide a means for high capacity haulage of freight such as cement and other hardware materials. This is expected to spur economic development within the region, through efficient, reliable and cost effective means of transportation of goods and services and people. On the other hand the revitalization of the Kisumu-Butere branch line follows the upgrading of the Kisumu Port, the region is open for local and regional development. The Kisumu – Butere

line will link the agriculturally rich Western Kenya to local and regional markets for agricultural goods. The line will also support the Kisumu port with additional cargo from the Western region making it viable and sustainable.

Implementation of the KR Infrastructures rehabilitation project is expected to raise a number of environmental and social concerns that are both negative and positive to the surrounding environment and local communities. Kenya Railways commissioned this Environmental and Social Impact Assessment (ESIA) study to determine the likely impacts of the proposed development on the environment and local communities and advice on mitigation measures that need to be undertaken to address adverse negative impacts

2.2. The Project Location

The Nakuru-Kisumu railway line revitalization is located at the western region that and it starts from Nakuru-Njoro-Elburgon-Turi-Molo-Mau Summit- Londiani-Kedowa-Lumbwa-Kipkelion-Tunnel-FortTernan-Koru-Muhoroni-Chemelil-Kibigori-Miwani-Kibos-Kisumu new station. The proposed project traverses through Nakuru, Kericho and Kisumu Counties. The Kisumu- Butere branch line starts from Kisumu-Kisian-Lela-Luanda-Yala-Butere.It traverses through Kisumu,Vihiga, Siaya and Kakamega counties. Finally, the Gilgil-Nyahururu railway line starts from Gilgil-Oleolondo-OlKalau-OljoroOrok-Nyahururu. It traverses through Nakuru and Laikipia counties. The start point for Nakuru-Kisumu MGR line is at Nakuru railway station (0.2838° S, 36.0776° E) and end point is at Kisumu railway station 0°17'1"N 36°4'39"E. For the Kisumu-Butere branchline, the start point is at Kisumu railway station (0.1049^0S, 34.7476^0E) and end point is at Butere railway station (0.2193° N, 34.5030° E). The start point Gilgil-Nyahururu branch line is at Gilgil railway station (0.4979° S, 36.3259° E) and end point at Nyahururu railway station (0.0385° N, 36.3681° E)

A summary of station and their chainage is as indicated in the table below:

Table 4: Stations along the Nakuru-Kisumu MGR Line (Kisumu Branch Line)

S/No	Name	Category	Chainnage
1	Nakuru	Freight and Passenger Station	KM 711.63 (KM 0.00)
2	Njoro	Passenger Station	KM 19.60
3	Elburgon	Passenger Station	KM 40.60
4	Turi	Passing Station	KM 49.48
5	Molo	Passenger Station	KM 56.68
6	Mau Summit	Passing Station	KM 68.30
7	Londiani	Passenger Station	KM 81.80
8	Kedowa	Passing Station	KM 95.15
9	Kipkelion	Passenger Station	KM 110.80
10	Tunnel	Passenger Station	KM 129.75
11	Fort Ternan	Passenger Station	KM 139.85
12	Koru	Passenger Station	KM 151.20
13	Muhoroni	Passenger Station	KM 161.63

14	Chemelil	Passing Station	KM 173.05
15	Kibigori	Passing Station	KM 180.85
16	Miwani	Passing Station	KM 188.10
17	Kibos	Passing Station	KM 207.40
18	Kisumu	Freight and Passenger Station	KM 216.73

Table 5: Stations along the Kisumu-Butere MGR Line (Butere Branch Line)

S/No	Name	Category	Chainnage
1	Kisumu	Freight and Passenger Station	KM 928.36 (KM216.73) KM (0.00)
2	Proposed New Kisumu Passenger Station	Passenger Station	KM 2.00
3	Kisian	Passing	KM 10.80
4	Lela	Passenger Station	KM 29.13
5	Luanda	Passenger Station	KM 41.03
6	Yala	Freight and Passenger Station	KM 51.85
7	Butere	Freight and Passenger Station	KM 69.05

Table 6: Stations along the Gilgil-Nyahururu MGR Line (Nyahururu Branch Line)

S/No	Name	Category	Chainnage
1	Gilgil	Freight and Passenger Station	KM 671.09 (KM 0.00)
2	Oleolondo	Passing Station	KM 24.50
3	Olkalou	Passing Station	KM 41.45
4	Oljoro Orok	Passing Station	KM 64.33
5	Nyahururu	Freight and Passenger Station	KM 76.85

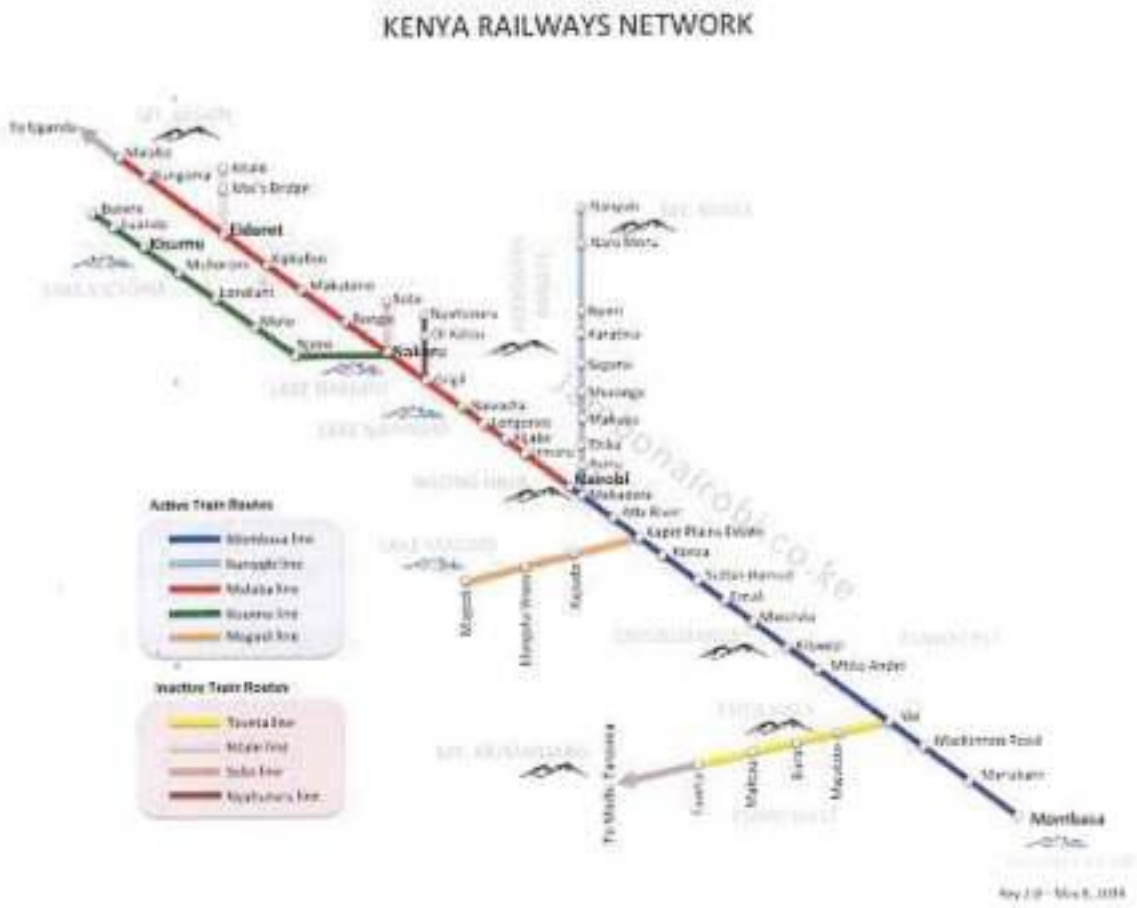

Figure 2: MGR Branch lines in Kenya Map

2.3. Project Components

Currently, the Nakuru – Kisumu line, Kisumu – Butere and Gilgil – Nyahururu MGR Lines are mostly in a dilapidated, vandalized or overgrown with vegetation. The dilapidated condition of the track is characterized by: ballast deficiency, silted side drains, overgrown bushes, buried tracks, encroachments of railway reserve; vandalized track elements; dilapidated station buildings and vandalized signaling and communication equipment. The poor condition of the line is due to deferred maintenance over a long time resulting in encroachment. Due to the deterioration of the railway lines, the lines have not been fully operational to ferry any transit cargo over the last decades.

2.3.1. Scope of the works

Currently, the Nakuru -Kisumu MGR line is operational for freight services only and most of the sections are in a dilapidated state or overgrown with vegetation. The dilapidated condition of the track is characterized by: ballast deficiency, silted side drains, overgrown bushes, buried tracks, encroachments of railway reserve; vandalized track elements; dilapidated station buildings and vandalized signaling and communication equipment. On the other hand, the Kisumu-Butere and Gilgil-Nyahururu have not beenin operation for decades and infrastructure was immensely vandalized. The poor condition of the line is due to deferred maintenance over a long time resulting in encroachment. Due to the deteriorated condition of the MGR railway line, KRs operations have been experiencing various derailments and capsizements while transporting transit cargo.

Rehabilitation of these MGR lines scope of work include:

The technical specifications for the branch line rehabilitation are listed as follows;-

a. **Unclogging/ clearing existing storm water drainage systems**
   All blocked drainage systems and channels shall be unclogged to avoid wash away incidents during the rainy seasons and for railway line stability.

Figure 3: Clogged drainage culvert

b. Constructing new bridges and culverts where existing ones are dilapidated

The conditions of culverts between Nakuru – Kisumu line, Kisumu – Butere and Gilgil – Nyahururu MGR Lines have been surveyed and an inventory populated.

c. Tracks Rehabilitation and Reconstruction Plans

The railway track is composed of rails, sleepers, fastenings clips, ballast, roadbed, etc. The criteria for the track should be defined according to the annual passing tonnage and maximum operating speed of the line. Some of the activities to be done here are;-

- Desilting Ballast and pre screening
- Ballast Screening

Ballast is provided to give support, load transfer and drainage to the track and thereby keep water away from the rails and sleepers. Ballast must support the weight of the track and the considerable cyclic loading of passing trains. Ballast is made up of stones of granite or a similar material and should be rough in shape to improve the locking of stones. In this way they will better resist movement. Ballast stones with smooth edges do not work so well.

- Re-sleepering- replacing damaged / missing sleepers, replacing all rotten wooden sleepers at all turnout points.

Rail sleepers are an important part of railway components. In general, they are also called railroad ties, railway ties or crossties. In order to keep the correct distance of gauge, the rail sleeper usually lays between the two rail tracks.

- Re-railing
- Ballasting
- Geometry Correction

Track geometry is three-dimensional geometry of track layouts and associated measurements used in design, construction and maintenance of railroad tracks. The subject is used in the context of standards, speed limits and other regulations in the areas of track gauge, alignment, elevation, curvature and track surface.

Figure 4: Silted rail track

Railway track geometry is characterized by its external and internal geometric parameters. The external track geometry is defined by the absolute position of the track axis/centerline in 3D space, and the internal geometry is determined with five types of principal parameters, including alignment, longitudinal level, gauge, cross level and twist.

- Cess building
- Installation of missing track fittings i.e. fishplates, clips, fish bolts
- Overhaul of Turnouts (timber, self normalizing points to be fixed). Turnout is a combination of a set of points, V crossing and guard rails which permits traffic to turnout from one track to another.

d. Level crossing overhauls & other minor repairs

The frequency of train operation will become high after rehabilitation of the railway. Therefore, level crossings also need rehabilitation. The rehabilitation shall consist of installing the recommended check rails at the level crossings, whistle boards for approaching trains and St. Andrews warning signs for approaching vehicles

e. Bridge and Viaduct Repairs & Maintenance

Substructure Strengthening Works, Strengthening of joists & U-channel bearers, Repainting & Bituminizing, Replacement of vandalized Tie Rods, RCC Deck Bridge/Culverts

f. Embankment Repairs

The embankment earthworks should consider maintenance and prevention of problems such as shrinking of the roadbed, flowing out of the slope, collapse of the embankment due to heavy rainfall and landslide, and mud pumping. As rainfall is especially serious, it is necessary to construct auxiliary structures such as a drainage system and slope protection. Furthermore, the earthworks will continuously require maintenance even after completion of the construction work. The embankment works will need imported fill, therefore some earth borrow pits are required alongside the line to minimize the cost of transporting fill material.

2.3.2. Fencing of Railway Stations

All existing Railway stations shall be fenced off using chain link and concrete posts to keep off trespassers from accessing the railway stations. There are eighteen (18) station within the Nakuru- Kisumu network; Six (6) stations within Kisumu-Butere network and five (5) stations within Gilgil-Nyahururu Network.

Figure 5: Quarrying activities adjacent to Railway line

2.3.3. Removal of asbestos roofing sheets from the station buildings

Asbestos roofing sheets on all identified buildings shall be removed and replaced with corrugated iron sheets in accordance with the NEMA National Guidelines on Safe Management and Disposal of Asbestos. Kenya Railways will contract a registered Asbestos waste handler to remove and dispose appropriately the Asbestos wastes from the identified buildings. The stations identified with asbestos roofing include the following;

- **Nakuru- Kisumu MGR Line**- Nakuru Railway Station, Nakuru CXR Depot & Nakuru Loco shed, Kisumu Railway station; Kipkelion Railway station
- **Gilgil-Nyahururu MGR Line**- Ol kalau Railways Station, Ol Joro Orok Railway;

a) Risk Assessment for Asbestos removal

This means examining the potential risks posed by the Asbestos Containing Materials (ACMs) to health and identifying which precautions are needed to make the work safe.

All risk assessments are based on five key steps:

1. Identify the risks to health.
2. Identify who may be harmed by the risks.
3. Identify the precautions needed to remove or reduce the risks.
4. Record the findings and precautions, and implement them.
5. Review and update the risk assessment when required.

Figure 6: Loco shed with Asbestos roofing sheets at Nakuru Railway station

2.3.4. New Railway Station at Kisumu

The project shall entail the Site clearance excavation which shall be followed by the actual construction of the new station building.

The new railway station building shall consist of the station manager's office, reception tickets and sales, safe, security office, waiting lounge, lobby & information area, controlled entry to platform area and washrooms.

Drawings on the specific details relative to the new railway station are shown as indicated in the attached architectural drawings.

The following additional amenities shall be constructed and installed within the premises:-

- Access ramps for the disabled
- Spacious translucent windows for enough daytime natural lighting

Design specifications;

i) All dimensions to be checked on site before commencement of any work and any discrepancies to be reported to the architect.
ii) All reinforced concrete works to structural engineers design
iii) All soils under slab and around external foundation to be treated for termite control
iv) All soils on cut embankment to be stabilized. The slope is not to exceed the natural angle of repose of soil.
v) All testing pipes must be completed before plastering.
vi) Safloak 700 26 gauge sheeting to structural Engineer's details.
vii) Concrete slab over entrances to structural Engineer's details.
viii) Steel member to structural Engineer's details.
ix) Powder coated aluminium windows with 8mm translucent fixed gazing.
x) Powder coated aluminium louvre screen.
xi) 12mm thick tyrolean rendering.
xii) Columns to start off with a 600x300mm base up to 3565mm high then become 300x300mm.

xiii) Concrete ramp with 38mm thick terrazzo/granolithic finish to structural Engineer's details.
xiv) All plumbing sanitaria and works should comply with the local authority requirements/ specifications drainage
xv) All drainage pipes passing under the building and driveways to be encased in 100mm concrete surround.
xvi) All paints and colours to architects approval
xvii) All samples of materials to architects and structural Engineer's approval before fixing
xviii) All service ducts to be accessible.
xix) Water storage tank to be covered with mosquito proof wire gauze
xx) All inspection chambers or manholes along driveways or common areas to have heavy duty and air-tight cover.
xxi) All electrical work must be coordinated with mechanical works. Any conflicts must be clarified before work begins.

2.4. Project cost

The cost of the rehabilitation of Nakuru – Kisumu line is approximately Kenya Shillings Three Billion 3Billion; the cost of rehabilitation of Kisumu-Butere line is approximately Kenya Shillings Five Hundred and Thirty Seven Million 537Million, whereas the estimated cost of the rehabilitation of Gilgil – Nyahururu branch line is approximately Kenya Shillings One Billion, 1 Billion.

2.5. Projects Construction activities and inputs

Construction activities relate to preparatory stages of the project,

2.5.1. Pre- construction stage

This involves:

- Design and drawing of architectural plans and designs including establishing coordinates, elevation systems, resurveys and correcting any discrepancies between site and design drawings, review opinions on designs etc. has been ongoing.
- Survey of the project area.
- Application for the various permits and licenses including; the County Development Control Section approvals of the project
- Environmental and social impact assessment, public participation process and seeking approvals by NEMA.

2.5.2. Inputs

The project will basically handle input materials of various nature:

a. **Non-hazardous materials**: The store for non-hazardous materials will be accommodated within the site area. Materials to be stored shall include samples for review / testing by consultants and or inspectors.
b. **Hazardous materials:** Hazardous materials shall include paints, oil, grease, vehicle fuel, bitumen etc. The store to keep these materials shall have iron sheet walling

and roof and a waterproof concrete floor to contain spills. Storage and handling of all hazardous chemicals shall be in accordance with manufacturer's instructions as outlined on the material safety data sheets.

c. **Bulk construction materials:** The bulk materials to be stored on site include: sand, ballast, stones, cement, quarry chips, steel, timber etc. It is recommended that the project proponent should plan for material to be delivered in manageable quantities in order to avoid any form of deposit, which will impede site activities, induce safety hazards and create a nuisance to the neighbourhood.

Other inputs include:

- **Water**: The project will require significant volumes of water for various activities including spraying dusty sections, concrete-making, optimum compacting of different layers of materials constituting the roadway, cleaning operations in worksite camps. The project has the option of digging boreholes to supplement water needs for both road construction and campsite
- **Labour**: The contractor will hire skilled, semi-skilled and unskilled workers. In terms of numbers to be mobilized, this has not yet been estimated.

Figure 7: Dilapitated state of buildings in Kipkelion Railway Station

2.5.3. Site office

The proponent/contractor shall construct temporary site offices/sites especially for the KDF and NYS teams along the corridor to run and manage all activities at different phases. This will also include securing of the utility services such as water, electricity which will be crucial for the construction activities.

2.5.4. Site Management

Clearly visible signage on roads and buildings under construction will be set up. Sufficient and quality diversions will be created as well as protected walkways for pedestrians maintained. Provision and maintenance of access to all properties and project neighbours' facilities will be mandatory.

2.5.5. Foreseen Works

- Site clearing of the entire corridor and removal of encroachment; the bulk of the excavated material will be carried away from site by the contractor to approved dumpsite(s) in accordance with the EMCA (waste management) regulations, 2006.
- Rehabilitation of the permanent way infrastructure (i.e. subgrade, drainage system, line geometry correction, replacement of rails, replacement of sleepers, fittings and fastenings, replacement of collapsed pipe culverts, strengthen of bridges and viaduct, reinstatement of signaling, communication and control systems, repair of station building structures, construction of new stations, fencing of station areas etc
- Refurbishment of available locomotives
- Refurbishment of rolling stock A
- Landscaping

Chapter 3: Policy, Legal and Legislation Framework

3.1 Introduction

The Third Schedule of EIA/EA Regulations requires that environmental guidelines and standards which include Kenya government policies and strategies, national legislation, multi-lateral environmental agreements and the institutional arrangements to render them should be incorporated in an ESIA report. The legal and institutional frameworks provide important safeguards for protection and conservation of vulnerable and fragile environments and communities and support the implementation of the EMPs. Under this section, the ESIA will therefore review the applicable sets of laws, international agreements and institutions which environmental compliance requirements for the proposed Nairobi Commuter Railway Project.

The Kenyan Government has put in place a wide range of policy, institutional and legislative arrangements to address the causes of environmental degradation in the country. Laws governing environmental protection and conservation in Kenya are derived from the constitutional statutes and the ratified international conventions. These laws regulate the establishment and operation of development projects and their associated activities, which may have negative impact on the environment, human health and socio-economic well-being of the people who interact with such projects.

Before the enactment of the Environmental Management and Coordination Act (EMCA) 1999, Kenya did not have a consolidated legislation for the protection and management of the environment. It had about 77 statutes that touched on various aspects of environmental management. Some of the legislative instruments have been in place for many years and are duplicated in other legislations. Environmental protection and sustainable use of natural resources have also been stated in all development plans since independence. The sessional papers and presidential directives have also emphasized the need to conserve the environment and manage the natural resources sustainably. Lack of consolidated legislation offered inadequate protection for the environment due to the absence of legal and institutional framework.

3.1.1. The Constitution of Kenya

The Constitution of Kenya 2010 is the supreme law of the land. Under Chapter IV, Article 42 provides for the right to a clean and healthy environment for all. Further, Article 43 states the supporting of public involvement in ensuring the need for every person to have access to clean and safe water in adequate quantities; Article 69 - Environment and natural resources (1) (d) encourages public participation in the management, protection and conservation of the environment (f) Supports environmental impact assessment, environmental audit and monitoring of the environment (g) Eliminates processes and activities that are likely to endanger the environment; and Article 66 – Regulates use of any land or any interest or right over any land, in the interest of public health or public planning; Article 185: 22 - Protects the environment and natural resources with a view to establishing a durable and sustainable

system of development.

Relevance to the proposed project

The proponent should ensure that railway operations does not infringe on the right to a clean and healthy environment for all. Additionally, the proponent must ensure that the operations are carried out in an ecologically, economically and socially sustainable manner, the project will contribute to social and economic development at national level and also in the Nakuru, Kericho,Kisumu, Nyandarua and Laikipia Counties.

3.1.2. Kenya Vision 2030

Article 42 of the Bill of Rights of the Kenyan Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures'. Under Chapter 5 (Land and Environment), Part 1 is devoted to land. It requires that land be used and managed in 'a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles:

Equitable access to land;

(i) Security of land rights;
(ii) Sustainable and productive management of land resources;
(iii) Transparent and cost effective administration of land; and
(iv) Sound conservation and protection of ecologically sensitive areas.

Part 2 of Chapter 5 of the Constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall;

(i) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
(ii) Work to achieve and maintain tree cover of at least ten per cent of the land area of Kenya;
(iii) Encourage public participation in the management of, protection and conservation of the environment;
(iv) Protect genetic resources and biological diversity;
(v) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
(vi) Eliminate processes and activities that are likely to endanger the environment; and
(vii) Utilize the environment and natural resources for the benefit of the people of Kenya.

3.1.3. National Environment Action Plan

According to the Kenya National Environment Action Plan (NEAP), 1994 the Government recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregarded environmental sustainability. In this regard, establishment of appropriate policies and legal guidelines, as well as harmonization of the existing ones, has been accomplished, while some others are in the process of development. Under the NEAP process Environmental Impact Assessment (EIA) was introduced and among the key participants identified were the institutions dealing with water resources

management. Chapter 4 sub-section 4.1.3 the NEAP report recommends that EIA be made a pre-condition for approval of all projects as well as post investment impact assessment for all related operations.

Relevance to the proposed project

The proponent should ensure that the school construction conforms to the NEAP as set out by the National Environmental Committee through ensuring environmental concerns are implemented through the ESMP formulated.

3.1.4 Sessional Paper No. 6 of 1999 on Environment and Sustainable Development

Among the key objectives of the Sessional Paper No. 6 of 1999 on Environment and Sustainable Development (1993) include ensuring that development policies, programmes and projects take environmental considerations into account, ensuring that an independent environmental impact assessment (EIA) report is prepared for any development before implementation and to ensure that effluent treatment standards that conform to acceptable health standards. This paper provided the basis for the environmental Policy framework that is in the process of formulation. Under this paper, broad categories of development issues have been covered that require sustainable approach. These issues include the waste management and human settlement sectors. The paper recommends the need for enhanced re-use/recycling of residues including wastewater and increased public awareness raising and appreciation of clean environment as well as the participation of stakeholders in the

3.1.5 The National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategies Paper (PRSP)

The objective of the NPEP is to reduce the incidence of poverty in both urban and rural areas by 50% by the year 2015 as well as strengthening the capabilities of the poor and the vulnerable groups to earn income. Also it aims to narrow gender and geographical disparities and create a healthy, better educated and more productive population. The plan has been prepared in line with the goals and commitment of The World Summit for Social Development (WSSD) of 1995 and focuses on the four WSSD themes of poverty eradication, reduction of unemployment, social integration of the disadvantaged people and creation of enabling economic, political, and cultural environment. This plan is to be implemented by the Poverty Eradication Commission (PEC) formed in collaboration with government ministries; community based organizations, the private sector, non-governmental organizations, and bilateral and multilateral donors.

3.2 Legal Framework

3.2.1 The Environment Management and Co-ordination Act, 1999 (Revised 2015)

Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to partly ensure this is achieved, Part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environmental Management Authority (NEMA), who in turn may issue a license as appropriate.

Section 87 sub-section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a license. Sections 90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides.

Finally, the environmental impact assessment guidelines require that study be conducted in accordance with the issues and general guidelines spelt 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, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures.

Compliance Aspects: ***This applies in all aspects of the intervention project including among others;***

i. ***Social disruption control***
ii. ***Waste management***
iii. ***Effluent discharge practices***
iv. ***Aerial emissions,***
v. ***Excessive noise and vibrations***
vi. ***Excavations and soil loss***
vii. ***Adverse interference with natural resources including wetlands and water resources.***
viii. ***The project cycle should ensure compliance with this statute all the time.***

3.2.2 Environmental Management Regulations

Water Quality Regulations, 2006 (Legal Notice No. 120) These regulations were drawn under section 147 of the Environmental Management and Coordination Act 1999. In accordance with the regulations, every person shall refrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The regulation also provides for protection of springs, streams and other water sources from pollution.

Compliance Aspect: This will apply anytime there is a discharge of effluent into the environment without meeting the established standards. This requires all time compliance through the project cycle.

Table 7: Recommended guidelines for waste water discharge.

Parameters	Units	Discharge into public sewer	Discharge into open water bodies
PH	-	6.0-9.0	6.0-9.0
BOD (5 days at 20°) not to exceed	Mg/l	500	20
COD not to exceed	Mg/l	1000	50
Total suspended solids not to exceed	Mg/l	500	30
Copper (Cu) not to exceed	Mg/l	1.0	0.05
Lead (Pb) not to exceed	Mg/l	1.0	0.1
Total Mercury (Hg) not to exceed	Mg/l	0.05	0.005
PCB not to exceed	Mg/l	Nil	0.003
Sulphates not to exceed	Mg/l	1,000	500
Dissolved Magnesium (mn)	Mg/l	-	1.0
Chlorine not to exceed	Mg/l	1000	1000
Fluoride not to exceed	Mg/l	-	2.0
Coli form bacteria	Mg/l	-	1,000/100ml
Total dissolved solids not to exceed	Mg/l	3,000	1,200
Temperature not to exceed	-	+/-2 of the ambient temperature	
Oil/ grease	Mg/l	No trace	Nil/No trace

Source: Department of water development.

Waste Management Regulations, 2006 (Legal Notice No. 121)

The regulations are formed under sections 92 and 147 of the Environmental Management and Coordination Act, 1999. Under the regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling, packaging, treatment, conditioning, storage and disposal of waste. The regulations requires a waste generator to collect, segregate and dispose each category of waste in such manners and facilities as provided by relevant authorities. Regarding transportation, licensed persons shall operate transportation vehicles approved by NEMA and will collect waste from designated areas and deliver to designated disposal sites.

Compliance Aspect: This will apply on disposal of solid wastes in compliance with the established standards and procedures. This requires all time compliance.

Noise and Excessive Vibration Pollution Control Regulations, 2009 Part II section 3(I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30m from any moving source.

Compliance Aspect: This will apply to effects of activities with noise and vibrations in excess of the established standards.

Fossil Fuel Emission Control Regulations, 2006 This Regulation aims at eliminating or reducing emissions generated by internal combustion engines to acceptable standards. The regulation provides guidelines on use of clean fuels, use of catalysts and inspection procedures for engines and generators. This regulation is triggered as the proponent would use vehicles and equipments that depend on fossil fuel as their source of energy. It is recommended the requirements of the regulation be implemented in order to eliminate or reduce negative air quality impacts.

Compliance Aspect: This would be relevant for construction equipment and vehicles and operations within the project road thereafter, and particularly with respect to utilization of the pavements

Integrated Environmental (Impact Assessment and Audit) Regulations, 2003 (Revised 2018)

These regulations are made under section 147 of the EMCA, 1999 (Amended 2015), and contain rules relative to content and procedures of an EIA in the sense of section 58 of the Act. They also contain rules relative to environmental impact audit (EA) and monitoring and strategic environmental assessment (SEA) and regulate some other matters such as appeal and registration of information regarding environmental impact assessment.
Regulation 3 states that:
"These Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act."

This study was done to comply with this regulation under Second Schedule of the EMCA, 1999, Amendment 2015.

3.2.3 The Water Act 2002

Part II section 18 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand.

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is

provided for under section 35 of the Act.

Compliance Aspect: ***The statute established to coordinate sustainable utilization of water resources including protection of the same from pollution and degradation (abstraction, use and disposal of wastewater thereof). Related water rules should be applied at all times. Water related initiatives should undergo ESIA process.***

3.2.4 Public Health Act (Cap 242)

Part IX section 115 states that no person shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.

Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as, in the opinion of the medical officer of health, to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into Public Street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

On the responsibility of local authorities, Part XI section 129 of the Act states in part "It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes, and purifying such supply so polluted". Section 130 provides for making and imposing on local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 129.

Compliance Aspect: ***The proponent will therefore observe the public Health act to mitigate on the negative environmental health and safety to the public.***

Legal Notice No. 50 of 2020

Due to the COVID 19 Pandemic The Cabinet Secretary for health invoked the Public Health Act under section 36, to restrict Movement of Persons and Related Measures Rules, in view of the serious threat posed to the health and lives of Kenyans by the spread of the COVID-19 pandemic. Section 7 of the Legal Notice bans all public gatherings except funerals which are limited to fifteen people.

Compliance Aspect: ***All public meetings which were scheduled to be held within the allowable limit and protocols.***

3.2.5 National Guidelines on Safe Management and Disposal of Asbestos, Revised 2013

The guidelines developed in 2012 and revised in 2013 require the proponent to:

- Take appropriate measures to prevent or control release of asbestos dust into the air.
- Ensure that exposure limits or other exposure criteria are complied with.
- Reduce exposure to asbestos dust to as low a level as is reasonably practical.
- Provide, maintain and replace as necessary, at no cost to the workers, adequate respiratory protective equipment in the event measures prescribed in (a) to (c) do not bring exposure to asbestos within exposure limits or do not comply with other exposure criteria.
- Establish and implement practical measures for prevention and control of exposure of workers to asbestos and for their protection to hazards due to asbestos.
- Engage contractors recognized by NEMA as qualified in removal of asbestos according to provision of the guidelines.
- Ensure that the contractor before starting demolition works (removal of asbestos) draws up a work plan (in consultation with workers or their representatives) specifying the measures to be taken including:
- Provide appropriate personal protective equipment like respirators, overalls, Rubber boots, gloves and eye protection to the workers coming into contact with asbestos.
- Limit the release of asbestos dust into the air and
- Provide for disposal of asbestos according to Article 19 of the Asbestos Convention of 1986.
- Provide appropriate working clothes (PPEs) which shall not be worn outside the workplace in situations where the workers' personal clothing may be contaminated with asbestos dust.
- Ensure handling and cleaning of used work clothing and special protective clothing is carried out under controlled conditions as required by NEMA to prevent release of asbestos dust.
- Clean, maintain and store work clothing, special protective clothing and PPEs.
- Provide facilities for workers exposed to asbestos to wash, take a bath or shower at workplace as appropriate.
- Dispose waste containing asbestos in a manner that does not pose health risks to workers concerned including those handling asbestos waste or population in the vicinity of the railway stations.
- Take appropriate measures to prevent pollution of the general environment by asbestos dust released from the workplace.

The KR shall be required to follow these guidelines when handling, transporting and disposing the asbestos from the roofs of the various old structures at the stations.

3.2.6 The Lands Act, No. 6 of 2012

Part II Section 8 provides guidelines on management of public land by National Land Commission on Behalf of both National and County Governments. This law in Section 8(b) stipulates that the Commission shall evaluate all parcels of public land based on land capability classification, land resources mapping consideration, overall potential for use, and resource evaluation data for land use planning. Section 8(d) stipulates that The Commission may require the land to be used for specified purposes subject to such conditions, covenants, encumbrances or reservations as are specified in the relevant order or other instrument.

In managing public land the Commission is further required in Section 10(1) to prescribe guidelines for the management of public land by all public agencies, statutory bodies and state corporations in actual occupation or use. In these guidelines management priorities and operational principles for the management of public land resources for identified uses shall be stated. This in essence means that the Commission shall take appropriate action to maintain public land that has endangered or endemic species of flora and fauna, critical habitats or protected areas. As well the Commission shall identify ecologically sensitive areas that are within public lands and demarcate or take any other justified action on those areas and act to prevent environmental degradation and climate change

<u>Compliance Aspect:</u> This part of the law seeks to preserve and direct management of fragile public land held by the various public bodies for sustainable development.

3.2.7 Physical Planning Act (Cap 286)

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used. Section 29 of the Physical Planning Act gives the county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also

states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, subsection 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions.

3.2.8 HIV/AIDS Prevention and Control Act (Act No.14 of 2006).

Part 11, Section 7 requires HIV and AIDs education in the work place. The government is expected to ensure provision of basic information and instruction on HIV and AIDs prevention and control to; Employees of all Government ministries, Departments, authorities, and other agencies; and, Employees of private and informal sectors. The information on HIV/AIDs is expected to be treated with confidentiality at the work place and positive attitudes shown towards infected employees and workers.

Compliance Aspect *: **During the rail rehabilitation, the contractor is expected to create awareness to the employees and the local communities on the issues related to HIV/AIDs***

3.2.9. Traffic Act (Cap. 403)

The highway authority is expected to erect and maintain traffic signs as prescribed so as plainly to indicate to drivers entering or leaving such roads or areas where the fifty kilometer per hour speed limit restriction begins and ends. Section 47 of the act states that any person who drives a motor vehicle on a road recklessly, or at a speed or in a manner which is dangerous to the public, shall be guilty of an offence and liable to a fine . Part VIII of cancelling any driving license or provisional driving license held by the offender and declaring the offender disqualified for holding or obtaining a driving license for such period as it thinks fit.

Section 52 Part 1, The driver of the vehicles are expected at all times to obey directions given by the police officer whether verbally or in signal, conform to the indications given by any traffic sign, and when any person in charge of any cattle raises his hand or in any manner signaling to stop, and keep it stationary for as long as it is reasonably necessary.

Section 52 A forbids any person who, being the driver of a vehicle from leaving the vehicle

for a period in excess of the time, failing to comply with any traffic sign or leaving the vehicle in contravention of any traffic sign in any parking bay or parking area. Section 71, gives permission to the authority or the authority representative to close the roads for purpose of preventing damage caused to any road, carry out any works considered necessary in connection with maintenance/improvement of road or close whole or part of road to vehicles of particular type at any time for any period.

Under the Traffic sign rules part 13, temporary traffic sign signal unit may be used for purposes of controlling the movement of vehicles on the road where the road works are in progress or where the width of the carriageway is temporary restricted.

3.2.10 Urban Areas and Cities Act, 2011

Section 5 states that a municipality is eligible for a city status if it has infrastructural facilities including but not limited to roads, street lights, market and fire station and an adequate capacity for disaster management. Has infrastructure that provides national and regional connectivity.

Under section 26 (b) gives power to the council of the city or large municipality to formulate and implement a master plan for urban and physical planning and infrastructural development and provision of essential services including; provision of water, sanitation, health care, education, housing, transport, disaster management systems and facilities for safe environment.

According to section 26 (c) the council is expected to exercise control over land use, land sub-division, land development and zoning by public and private sectors for any purpose including; agriculture, industry, commerce, markets, employment centers, residential, recreational parks, entertainment, passenger transport freight and the transit stations within framework of spatial and master plans for the city and municipality. Section 44 provides for the council to form partnership on provision of social infrastructural services with companies within and outside the country. This includes; construction of roads, environment conservation and preservation, construction of health centers and promotion of tourism and cultural events.

3.2.11 Occupation Safety and Health Act, 2007

Section 13 part 1(a) the employee is expected to ensure his own safety and health and of the other person who may be affected by his acts or omissions at work place, (c)requires the employee at all times to use protective equipment or clothing provided by the employer for purpose of preventing risks to his safety and health, (f) report to the supervisor any accidents or injury that arise in connection with his work Part 2 states that any employee who fails to follow this section commits an offence and shall on conviction be liable to a fine or imprisonment.

Section 21 provides that the employer or self employed person to notify the occupational health and Safety Officer of any accidents, dangerous occurrence, or occupational poisoning which has occurred at the work place. Section 32 gives power to the occupational safety and Health officer to enter inspects examine by day or night, a work place which he has

reasonable cause to believe to be a work place and any part of any building of which forms a work place. Section 55 requires all plant, machinery and equipment whether fixed or mobile for use at work place to be used for designed work and operated by a competent person. Section 97 prohibits employers to employ persons below the age of 18 years at the work place or perform work by which its nature its likely to harm the persons safety or health.

3.2.12 Work Injury Benefits Act, 2007

This Act provides for compensation to employees for work related injuries and disease contracted in the course of their employment and for connected purposes. Key sections of the Act include the obligations of employers; right to compensation; reporting of accidents; compensation; occupational diseases; medical aid etc. In case of any accidents or incidents during the project cycle, this Act will guide the course of action to be taken.

3.3 The World Bank Safeguards

3.3.1 OP/BP 4.01 (Environmental Assessment)

The World Bank has well-established environmental assessment procedures, which apply to its lending activities and to the projects undertaken by borrowing countries, in order to ensure that development projects are sustainable and environmentally sound. Although its operational policies and requirements vary in certain respects, the World Bank follows a relatively standard procedure for the preparation and approval of an environmental assessment study, which:

i. Identifies and assesses potential risks and benefits based on proposed activities, relevant site features, consideration of natural/human environment, social and trans-boundary issues,
ii. Compares environmental pros and cons of feasible alternatives,
iii. Recommends measures to eliminate, offset, or reduce adverse environmental impacts to acceptable levels (sitting, design, technology offsets),
iv. Proposes monitoring indicators to implement mitigation measures,
v. Describes institutional framework for environmental management and proposes relevant capacity building needs.

The environmental assessment evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The assessment takes into account: the natural environment (air, water, and land); human health and safety) social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. Preventive measures are favoured over mitigation or compensatory measures, whenever feasible. This approach is universally applied in many institutional projects.

The World Bank considers environmental impact assessment (EIA) as one among a range of instruments for environmental assessment. Other instruments used by the World Bank

include regional or sectoral environmental assessment, strategic environmental and social assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF). The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of environmental assessment.

3.3.2 OP/BP 4.04 (Natural Habitats)

The policy is designed to promote environmentally sustainable development by supporting the protection, conservation, maintenance and rehabilitation of natural habitats and their functions. The policy seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water area where most of the native plant and animal species are still present).

3.3.3 OP/BP 4.11 (Physical Cultural Resources)

This policy is meant to assist in preserving physical cultural resources including the movable or immovable (above or below ground, or under water) objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance including sites and unique natural values. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The objective of this policy is to avoid or mitigate adverse impacts on physical cultural resources from development projects. There are no significant conflicts in this regard.

3.3.4 OP/BP 4.12 (Involuntary Resettlement)

The policy states that "Where large-scale of population displacement is unavoidable, a detailed resettlement plan, timetable, and budget are required. Resettlement plans should be built around a development strategy and package aimed at improving or at least restoring the economic base for those relocated. Experience indicates that cash compensation alone is normally inadequate. Voluntary settlement may form part of a resettlement plan, provided measures to address the special circumstances of involuntary re-settlers are included. Preference should be given to land-based resettlement strategies for people dislocated from agricultural settings. If suitable land is unavailable, non land-based strategies built around opportunities for employment or self-employment may be used".

Involuntary resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The objective of this policy is to avoid or minimize involuntary resettlement, though participation in resettlement planning and implementation and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare

adequate resettlement planning instruments prior to Bank appraisal of proposed projects. There are notable resettlement issues along the corridor triggering this aspect. The RAP study was being reviewed alongside this ESIA Review.

3.4 Institutional Framework

3.4.1 Ministry of Environment and natural resource

Kenya's Ministry of Environment and Natural Resource is mandated to monitor, protect, conserve and manage environment and natural resources of the country. The Ministry is to achieve this monumental task through sustainable exploitation of natural resources for socio-economic development geared towards eradication of poverty, improving living standards and maintaining a clean environment for present and future generations.

3.4.2 The Ministry of Transport, Infrastructure, Housing and Urban Development (MTIHUD)

The MTIHUD is the project proponent and is implementing the rehabilitation of the Rmgr lines through Kenya Railways

3.4.3 National Environment Management Authority (NEMA)

The Government established the administrative structures to implement EMCA as follows:-

3.4.3.1 The National Environmental Council

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

3.4.3.2 The National Environmental Management Authority

EMCA allows for formation of the National Environmental Management Authority (NEMA) as the body charged with overall responsibility of exercising 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 the context of the EIA process NEMA is responsible for approving the ToR for the ESIA and for the approval of the ESIA. Without this latter approval, the project cannot proceed.

The Authority shall review this ESIA Report for the proposed project, visit the project site to verify information provided in this report and emanate an ESIA license whether all the relevant issues to the project have been identified and mitigated in accordance to the proposed measures.

3.4.3.3 County Environmental Committees

The County Environmental Committees also contribute to decentralized environmental management and enable the participation of local communities. These environmental committees are to be constituted by the governor and are responsible for the proper management of the environment within the county for which it is appointed.

3.4.3.4 Public Complaints Committee

Under EMCA 2015, a Public Complaints Committee has been established to provide an administrative mechanism for addressing environmental harm. The Committee whose membership include representatives from the Law Society of Kenya, NGOs and the business community has the mandate to investigate complaints relating to environmental damage and degradation.

3.4.4. Kenya Railways Corporation Act, 2012

Kenya Railways (KR) is a State Corporation established in 1978 under the Kenya Railways Act (Cap 397) of the Laws of Kenya. The overall mandate of the Corporation then was to provide a coordinated and integrated system of rail and inland waterways transport services and inland port facilities within Kenya.

Kenya Railways mandate is it to provide a co-ordinate and integrated system within Kenya, including rail inland waterways transport services, port facilities in relation to inland waterways transport services and auxiliary road services in connection therewith. In addition, it gives KRC the powers to provide all reasonable facilities for the carriage of passengers and goods.

Chapter 4: Baseline Conditions

4.1. Kenya National Socio-Economic Profile

4.1.1 Environment

The environment in Kenya consists of a wide range of natural ecosystems including arid and semi-arid areas, savannah and forests within its total area of 581,700 km2. The Great Rift Valley is a mega geomorphic landscape which cuts across the country from North to south with a total length of over 800km in Kenya, a width of 50-100km, and a depth of 450-1000 m, The rift valley is characterized by geological instability due to on-going tectonic motion and is therefore a major challenge in engineering operations. The country, like the rest of the world, has a rapidly expanding built environment in the urban areas. The water or aquatic environment is composed of marine and coastal ecosystems, inland freshwater and saline lakes and a network of periodic and permanent rivers. The aquatic environment includes 14,300 km^2 and 143,100 km^2 of territorial waters and Exclusive Economic Zone (EEZ) respectively in the Indian Ocean. The country has over 35 000 known species of flora and fauna for which remarkable conservation efforts have been made with about 53 national and international protected areas including 5 Biosphere Reserves, 4 Ramsar Sites and 3 World Heritage Sites .

4.1.2. Administration and Size

Kenya is divided into 47 counties and each county is further divided into sub-counties and wards, which are now the focal points of service delivery. The total land area covered by Kenya is approximately 583,000km^2, which consists of land area of 569,300 km^2, water area of 13,400 km^2 and other area of 536 km^2.

4.1.3. Population

Currently, the national total population had reached 47,564,296, with an annual population growth rate of 1.57%. 27% of the total population is in urban areas. Although the level of urbanization is still low in Kenya, the rate of urbanization is high. The rate of urbanization is 4.23 percent for the period of 2015-2020. Forty-five (45) percent of the urban population is located in Nairobi out of the 194 urban centers in Kenya. The rise of squatter settlements and slums in urban centers is a major obstacle in the establishment of social infrastructure such as roads and railways. The country has a total of 42 tribes and economic development is expected to penetrate into all ethnic groups.

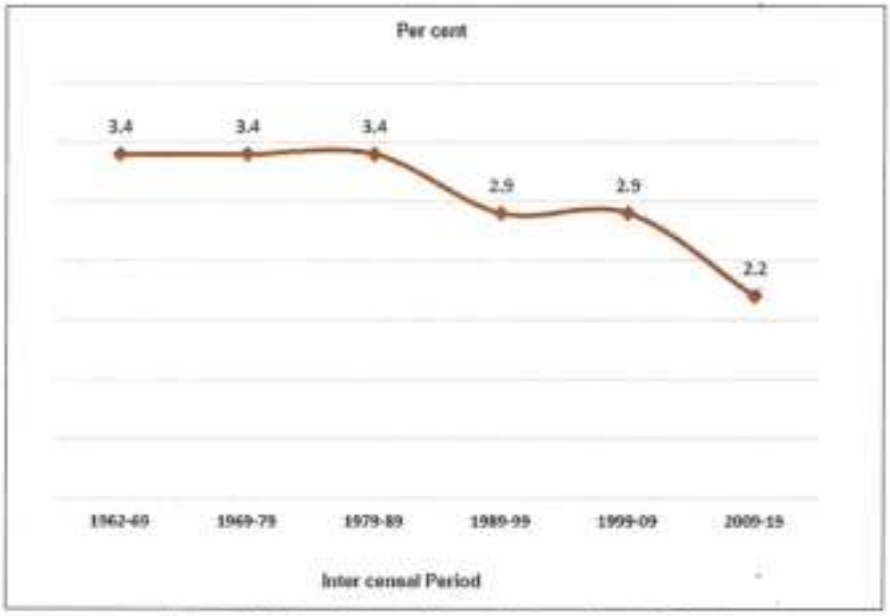

Figure 8: Inter-Censual Population Growth Rate

4.1.4. Agriculture

Growth in Agriculture Value Added at constant prices increased to 6.6 per cent in 2018 from 1.8 per cent recorded in 2017. The improved performance during the year under review was due to favourable weather conditions for both crops and livestock production, occasioned by the long rains in 2018. Maize production increased by 26.0 per cent from 35.4 million bags in 2017 to 44.6 million bags in 2018. Production of tea and coffee recorded growths of 12.1 and 7.0 per cent, respectively, during the review period. The volume of fresh horticultural exports increased by 6.1 per cent to 322.6 thousand tonnes in 2018. The value of marketed livestock and livestock products increased by 8.3 per cent to KSh 146.8 billion during the year under review.

During the review period, the prices of tea and coffee declined by 15.5 per cent and 15.3 percent to Kshs. 25,896.47 and Kshs. 40,286.41, respectively, per 100 kilogram. The price paid for wheat increased by 11.2 per cent from Kshs. 3,197.99 per 100 kilogram in 2017 to Kshs. 3,555.50 per 100 kilogram in 2018. The total domestic sugar production increased by 30.6 per cent from 376.1 thousand tonnes in 2017 to 491.1 thousand tonnes in 2018. Overall, marketed production increased by 11.4 per cent from Kshs. 446.9 billion in 2017 to Kshs. 497.9 billion in 2018.

4.1.5. Transport and Storage

The value of output from transport and storage expanded by 14.6 per cent from Kshs. 1,092.1 billion in 2017 to Kshs. 1,252.0 billion in 2018. Cargo throughput handled at the Port of Mombasa rose from 30.3 million tonnes in 2017 to 30.9 million tonnes in 2018. Commercial passenger traffic handled at the airports increased by 16.8 per cent to 11.8 million in 2018. Domestic and international passengers handled increased by 22.5 per cent and 13.1 per cent to 4.9 million and 6.9 million, respectively, during the review period.

Rail freight traffic more than tripled from 1,147 thousand tonnes in 2017 to 3,544 thousand tonnes in 2018, mainly due to introduction of freight transportation services on

the Standard Gauge Railway (SGR). Revenue from railway freight increased from Kshs. 3.0 billion in 2017 to Kshs. 9.8 billion in 2018. Similarly, earnings from passenger traffic stream more than doubled to Kshs. 1.7 billion in 2018.

The total length of Kenya railway network is 2,210 km. The network runs from Mombasa through Nairobi, Nakuru, to the Uganda border at Malaba, a distance of some 1,083 km. A branch line of 217km is going from Nakuru to Kisumu, where it links with a ferry service on Lake Victoria. There is a set of additional branch lines, 618km long in total, to Magadi, Taveta (Tanzania border), Nanyuki, Kitale, Butere, Nyahururu and Solai. The existing railway line links Mombasa Port to Nairobi and then Nairobi to Nakuru, Kisumu and Malaba) and facilitates import and export trade in the country and also to the neighboring countries. Figure 4-5 shows the current distribution of railway network in East Africa.
The railway network distribution in Kenya is shown as below:

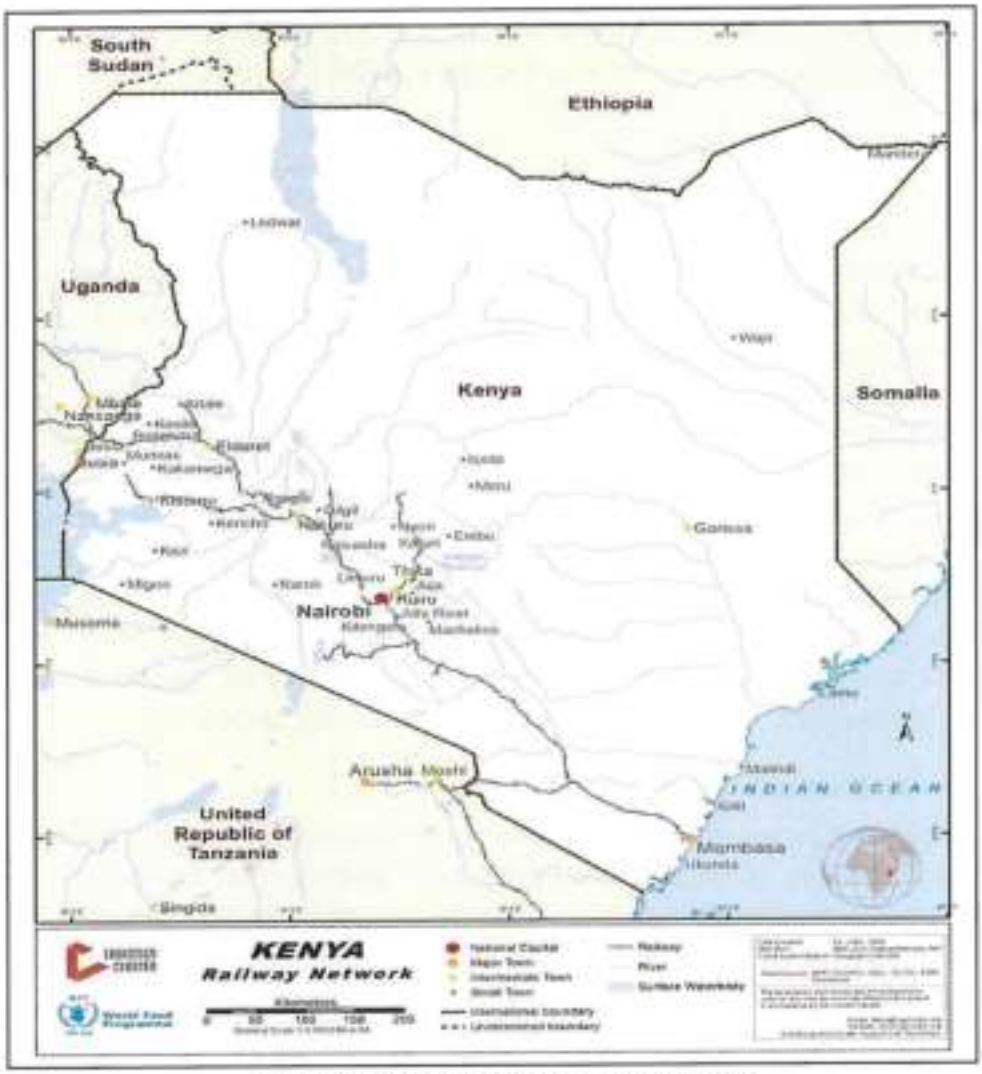

Figure 9: Existing MGR Network in Kenya

4.2. Nakuru County

4.2.1 Overview

Nakuru County is one of the 47 counties of the Republic of Kenya as provided for in the Constitution of Kenya 2010. The name Nakuru means 'a dusty place' in the Maasai language-in reference to frequent whirlwinds that engulf the area with clouds of dust. The County is among the most cosmopolitan in the country. The dominant communities include; Kikuyu and Kalenjin. Other communities present in the County include; Luo, Luhya, Maasai, Kamba, Meru among others. The County is among the 14 Counties within the Rift Valley region. The major economic activities include; agriculture, tourism and financial services. Nakuru is an agricultural rich County whose background was shaped by the early white settlement schemes. The County human settlement has been shaped by major transport infrastructure i.e. early colonial rail network and road A104. The poverty level for the County is at 29.1 percent below the National target which is at 36.1 percent.

4.2.2. Position and Size

The County covers an area of approximately 7,498.8 Km² and is located between Longitudes 35.41 ° East or 35 ° 24' 36" East and 36.6 °East or 36 °36' 0" East and Latitude 0.23 ° North or 0 ° 13' 48" North and 1.16 ° South or 1° 9`36" South. The County headquarters is Nakuru Town It is located in the Rift Valley and it borders seven Counties; Laikipia to the north-east, Kericho to the West, Narok to the south-west, Kajiado to the South, Baringo to the North, Nyandarua to the East and Bomet to the West. The County has 11 sub-counties/constituencies namely; Naivasha, Nakuru Town West, Nakuru Town East, Kuresoi South, Kuresoi North, Molo, Rongai, Subukia, Njoro, Gilgil and Bahati. There are 55 wards in the County. Nakuru County is home to 2.1 Million people as per the Kenya National Bureau of Statistics (KNBS) projections for 2017. The County's two major towns are; Nakuru Town which is the County's headquarters and Naivasha town which is popular for both local and international tourism because of its proximity Nairobi the capital city of Kenya. Nakuru and Naivasha towns are complemented by other urban centres spread across the County that include; Molo, Njoro, Gilgil, Mai Mahiu, Subukia, Salgaa and Rongai.

4.2.3. Administrative Setting

Administratively Nakuru county is divided into nine sub-counties namely; Naivasha, Gilgil, Nakuru, Rongai, Nakuru North, Subukia, Njoro, Molo and Kuresoi. These are further sub-divided into 31No. administrative divisions, 106No. Locations and 219No. Sub-Locations. Politically, Nakuru County is divided into 11No. Constituencies and 55No. Electoral wards

4.2.4. Physiographic and Natural Conditions

4.2.4.1 Physical and Topographic features

The main topographical features in Nakuru County are the Mau Escarpment covering the Western part of the County, the Rift Valley floor, Ol-Doinyo Eburru Volcano, Akira Plains and

Menengai Crater. The County boasts of an elaborate drainage and relief system with various inland lakes on the floor of the Rift Valley where nearly all the permanent rivers and streams in the County drain into. These rivers include river Njoro and Makalia which drain into Lake Nakuru, Malewa which drains into Lake Naivasha and Molo River which drains into Lake Baringo among others. The topographical features provide an interesting niche for research as well great tourist attraction sites.

One of the predominant features is the Hells Gate gorges in Naivasha which is part of the important tourist sites. The topography in Naivasha and Gilgil Sub-Counties is characterized by mountain ranges and savannah vegetation that supports various species of wildlife. The County's soil pattern presents a complex distribution of three main classifications that have been influenced by climatic conditions, volcanic activities and the underlying rock type.

4.2.4.2 Ecological conditions

The Ecological zones of Nakuru County are strongly influenced by the climatic conditions and physical features. The Mau Escarpment with an average altitude of 2,400m above sea level is very important as most of the forests are located on it. It is also the source of Njoro River that drains into Lake Nakuru which is inhabited with flamingos, and among the tourist attraction sites in Kenya. The forests in Nakuru County include, Menengai Crater, Mbogoini, Solai, Mau, Bahati, Subukia, Eburru and Dundori) are a major source of timber and firewood as well as providing employment to high number of the county population. The forest and the high altitude also influence climate condition in the county resulting to wet conditions suitable for agro-based economic activities. The climatic conditions are also favourable for micro-organisms that catalyses the decomposition of organic matter thereby enriching the soil that support agricultural activities especially dairy and crop farming enabling the county to be almost food sufficient. Mau forest is also home to the indigenous Ogiek community. Underground hot springs in Olkaria are an important source of geothermal power that serves not only the county but also provides power supply to the national grid. Further explorations are underway at Menengai Crater and Ol-Doinyo Eburru with a view to generating more electricity.

4.2.5. Population

According to 2019 Kenya Population and Housing Census, Nakuru County has a total population of 2,162,202 million, comprising of 1,077,272 males and 1,084,835 females. The county covers an area of 7,462.4km^2, with a population density of 290 persons/km^2 and annual growth rate of 3.05%. The population is estimated to increase to 2.4 million by 2022

4.2.6. Socio- Economic Activities

Land is the main source of livelihood for many people in Nakuru County. All socio-economic activities depend largely on land hence, rights of land ownership and land use are critical in influencing growth in all sectors. The main economic activities in the county include; Tourism, Livestock farming, Crop farming in both commercial and subsistence and Mining among a host of others. As per the UN study/research for the Kenya Vision

2030, the County is marked as one of the fundamental counties for the achieving economic pillar.

4.2.7. Roads and Railway Network

i. Road network

The entire road network in the Nakuru County is approximately 12,491km. Out of which paved roads are 993.7 Km and gravel roads are 4,500 Km and earth roads are 6998Km.The road infrastructure can be described as 20% good, 35% fair and 45% poor. Some roads especially in agricultural rich areas including Kuresoi North and South, Molo, Njoro Subukia, Naivasha and Gilgil are still in Dilapitated condition hence leading to delays in transporting of agricultural produce to the market making farmers to incur losses for perishable goods. This situation is set to be improved in the plan period by opening up of more feeder roads. The proposed dualing of the Nairobi- Nakuru Highway will ease traffic on the A104 road since this is a major highway connecting Kenya to Uganda, Rwanda, South Sudan and Democratic Republic of Congo (DRC

ii. Rail Network

The old railway line traverses through the County to Uganda which transports cargo mainly from the port of Mombasa to Malaba border. The Standard Gauge Railway (SGR) Phase 2A passes through Mai Mahiu (Naivasha) as it joins Narok. The line is currently operational for both freight and passengers. Currently, there is an ongoing construction of a new 24km MGR line that will connect the Naivasha ICD to Longonot MGR station. The proposed dry port in Naivasha as a result of the SGR is expected to boost economic activities in the County.

iii. Airport and Airstrips

Currently, the County does not have an existing airport. However, there are plans for expansion of the airstrip at Lanet Military Base for commercial services. This will improve economic integration with the rest of the nation and open international market for products within the County including direct export of horticulture and floriculture

4.2.8. Land Use patterns

Nakuru County has few large-scale land owners holding approximately 263 Hectares (Ha) of land on average. On the other hand, the County is dotted with many small-scale land owners with mean landholding size of 0.77 Ha. There are alternative land uses which are open to landowners, namely agricultural, livestock and wildlife production. The most prevalent use of land in the county is mixed farming, with portions of the farm allocated to tree crops, cash crops and vegetables, while fallow land is used to graze livestock. There has been sub-division of land into uneconomic

4.2.9. Informal settlements

Due to rapid urbanization and failure of the formal sector to supply adequate houses especially for the low-income segment of the society, there has been proliferation of informal

settlements to meet the housing gap. This is manifested by the slums and squatter settlements and other form of shanty developments. There is need to embrace the national housing policy and planning regulations to enhance housing delivery in the affected towns. The major informal settlements are: Bondeni, Manyani, and Lakeview in Nakuru East), and Ronda, Kaptembwo, and Gituima in Nakuru West (CIDP 2018-2022).The situation is likely to worsen in the future if certain strategic measures are not undertaken in areas of housing, sewerage connectivity and solid waste management. Proper planning and development control needs to be implemented.

4.2.10. Housing

The majority of households in the County have durable roofing materials with corrugated iron sheets being the major roofing material used at 92.8 percent at indicated in the KIHBS 2015-16. 12.2 percent of rural population use non-durable roofing materials for their houses. The main wall material is stone at 39.9 percent whereas the main floor material is cement and earth/sand which is at 52.4 percent and 33.3 percent. The housing tenure is majorly rent/lease which is at 46.3 percent, however 45.1 percent of house are occupied by owners.

4.2.11. Environment and Climate Change

Environmental degradation in Nakuru County is mainly as a result of inappropriate farming methods, effects of climate change, poor solid waste and liquid waste disposal, soil erosion, inadequate sanitary facilities, massive felling of trees for firewood, encroachment of forest Nakuru County Integrated Development Plan 2018-2022 34 reserves, timber and clearing land for agricultural use. In addition, poor physical planning in urban areas, quarrying activities, pollution and toxic from agro-chemicals also contribute to environmental degradation.

4.2.12. Major degraded areas/hotspots and major contributions to environment degradation

Pollution of the environment especially related to land, water and air has led to adverse effects on animal and human health as well as the quality of the environment. In Nakuru County, farming and other human activities along the rivers, lakes and wetlands lead to disposal of chemicals into the water bodies hence polluting the water and endangering aquatic life. Extensive destruction of forests is still rampant in the County due to illegal logging and excisions among other threats. This has also led to the loss of forest cover and the subsequent destruction of water catchment areas. Loss of tree cover has significantly reduced the vegetative cover which acts as natural sinks for carbon dioxide. Land degradation is caused by both natural and human activities leading to aridity, poor crop yields and loss of biodiversity. Major degrades areas include: the quarry mining areas in (Nakuru Town East and West, Gilgil, Naivasha and Bahati, Njoro and Kuresoi North).

4.2.13 Environment threats

The major environmental threats in the County include; climate change threats, deforestation, pollution, drought and flooding. Demand for wood fuel and other timber products has caused deforestation leading to aridity and increased soil erosion within the County. Efforts will be put in place to encourage use of alternative sources of energy to save

on the forest cover in the County. Use of pesticides and chemicals in farming as well as effluent discharge leads to water and air pollution.

4.2.14 Solid waste management facilities

There are three County designated solid waste disposal sites situated in Naivasha, Nakuru and Mai Mahiu towns. These sites are few and do not meet the ever-growing needs of the urban population. The County will manage solid waste through rehabilitation of the existing disposal sites, acquisition of land for transfer stations & landfills and new dumpsites.

4.3. Kericho County

4.3.1. Physiographic and Natural Conditions

4.3.1.1. Physical and Topographic features

The county is characterized by undulating topography. The overall slope of the land is towards the West, consequently drainage is in that direction. The county forms a hilly shelf between the Mau Escarpment and the lowlands of Kisumu County. To the North West are the hilly areas of Kipkelion rolling towards Koru. The Kericho plateau forms the central part of the county sloping gently from 2,500m to about 1,800m above the sea level. The county is surrounded by Tinderet Hills to the North and to the North-East is the Mau Escarpment and between them is the gently rolling land which forms Londiani hills (*Tuluap-sigis*). The central part of the county rises eastward towards 3,000m above sea level.

The county is well drained with a good number of rivers that include Chemosit, Kiptaret, Kipsonoi, Timbilil, Maramara, Itare, Nyando, Kipchorian and Malaget. Some of these rivers are characterized by rapids and falls which could be harnessed for hydro-electric power generation. Some of the rivers with the waterfalls include Maramara, Itare and Kiptaret.

4.3.2. Ecological Conditions

Kericho County lies in the Lake Victoria Basin. Its geology is characterized by volcanic rocks as well as igneous and metamorphic complexes. The county is predominantly underlain by tertiary lavas (phonolites) and intermediate igneous rocks. A small part of the county is dominated by undifferentiated basement system rock (granites), volcanic ash admixture and other prolific rocks. The hilly nature in some parts of the county encourages soil erosion. This problem is however minimized by the presence of a dense vegetation cover, except in a few areas like Sigowet in Soin-Sigowet sub-county, Chilchila in Kipkelion west and partly the lower zones covering Koitaburot in Ainamoi sub-county.

4.3.3. Climatic Conditions

The county enjoys favorable climate and receives relief rainfall, with moderate temperatures of 170C and low evaporation rates. Temperatures range between 100C - 290C. The rainfall pattern is such that the central part of the county, where tea is grown, receives the highest rainfall of about 2,125mm p.a while the lower parts of Soin and parts of Kipkelion receive the least amount of rainfall of 1,400 mm p.a. The county experiences two rainy seasons: the long rainy season between April and June and the short rainy season between October and

December. The dry season starts in January and progresses through March although weather shocks have changed the patterns. The variations in the temperatures and rainfall are mainly determined by the altitude of the place.

4.3.4. Administrative Units

4.3.4.1. Administrative sub-divisions

The county is divided into 6 sub-counties, which are further sub-divided into 85 locations and 209 sub-locations as indicated in table 1 and figure 2. There are also a total of 333 villages.

Table 8: Sub counties and locations in Kericho County

S/NO	Sub-Counties	Area (km^2)	No. of locations	No. of Sub locations
1	Kericho East	239.6	11	24
2	Kericho West	337.4	12	27
3	Soin/Sigowet	473.2	13	38
4	Kipkelion West	333	16	35
5	Kipkelion East	774.4	14	32
6	Bureti	321.1	19	53
	TOTALS	**2,479**	**85**	**209**

Source: County Commissioner's office, Kericho, 2013

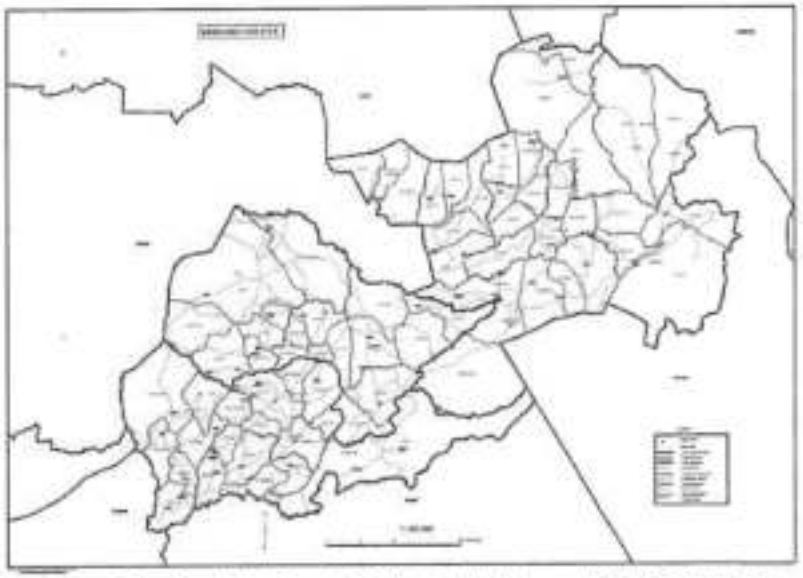

Figure 10: Kericho County Administrative and Political Units

Source: Kenya National Bureau of Statistics, 2010

4.3.5. Demographic Features

This section presents the county's demographic profile in terms of distribution by age, gender, settlement and projection up to the year 2022. The 2009 Kenya Population and Housing Census statistics forms the basis for the population projections. The county's annual population growth rate is 2.5 per cent.

4.3.5.1 Population Size and Composition

The county's population was 758,339 in 2009 as per the 2009 National Population and Housing Census. This comprised of 381,980 males and 376,359 females translating to male to female ratio of 1.01:1 meaning that there were more males than females (i.e. 1.01 males for every 1 female). Population was rojected at 995,566 in 2018 is, males being 514,069 and 481,879 are females. A further projection puts the county's population at 1,046,216 by 2020 with male population being 547,136 while females will be 499,080. This is further projected to increase to 1,137,716 by 2022 and it will consist of 583,924 males and 553,894 females.

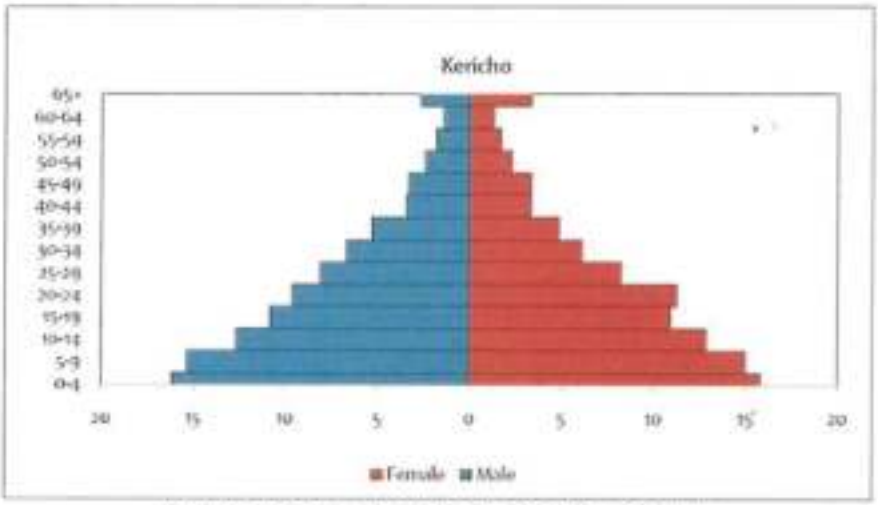

Figure 11: Male - female ratio Kericho County

Source: Kenya National Bureau of Statistics (KNBS) and Society for International Development (SID), 2013

4.3.6. Infrastructure Development

4.3.6.1 Roads and rail network, ports and jetties and airstrips

The infrastructural development is mainly carried out by the Department of Public Works, Roads and Transport. Public Works sub sector is invoved in the provision of planning, maintenance and supervision services of public buildings and structures. The goal is therefore to ensure standards are followed during construction of the public projects and safety concerns are adhered to as per the building and construction codes. The roads subsector is mandated to open up county road networks countywide, build drainage structures, maintain urban and rural county roads. The sub sector is set to achieve opening up of specific lengths of priority road networks identified in the Annual Development Plan.

The transport subsector also implements the transport policy and is set to achieve specific road safety initiatives in specific roads identified, issue licenses to public transport with aim of

management of the transport services and increase the targeted value of revenue that is also expanded through enforcement of axle load controls at toll stations.

4.3.7. Energy Access

The Kenya power company has played a significant role in lighting up both the urban and rural areas in the county. This is mainly through the Rural Electrification and the last mile connectivity programs. *Table 6* shows household distribution by main lighting fuel. It indicates that majority of the households use lantern (46.1 per cent) and tin lamp (39.1 per cent) as the main source of lighting fuel followed by electricity (11.8 per cent) and solar (1.7 per cent) while the rest constitute less than one per cent each.

Table 9: Household lighting distribution

Type	Households (%)
Electricity	**11.8**
Pressure lamp	0.4
Lantern	46.1
Tin lamp	39.1
Gas lamp	0.5
Fuel wood	0.3
Solar	1.7
Others	0.2

Multinational companies like James Finlay and Unilever Kenya generate their own power to supplement what the Kenya Power Company supplies them. The county needs to diversify its sources of energy and the focus is on green energy so as to enhance reliability and reduce on costs incurred on power consumption. The county has the potential for harnessing solar energy, wind and biogas energy. The county is also endowed with several waterfalls along rivers which can be harnessed to generate hydro- electrical power.

4.3.8. Housing: Types

The County's household distribution by main roofing materials is as follows: corrugated iron sheets (83 per cent), grass (14.7 %), asbestos sheets (1.2 %), and concrete (1.2 %) while tiles, tin, and makuti constitute less than one per cent each. On distribution of households by main wall materials, 53.2 % use mud/wood, 15 per cent use brick/block, 12.4 % use wood only, 10.6% use stone and 7.7% use mud/cement. Others use corrugated iron sheet (6%t), grass straw (0.1%), tin (0.1%) and other materials (0.8%). 64.2 % of the households have earth floors while 34.4% have tiled floors

4.3.9. Land and Land Use

4.3.9.1. Land ownership categories/classification

There are two major land tenure systems in Kericho County namely the Leasehold Tenure and the Freehold Tenure. The Freehold Tenure is governed under the Land Registration Act of 2012 and is mainly utilized for farming. On the other hand, Leasehold Land Tenure system is an interest in land for a definite term of years usually 99 years renewable upon request by the proprietor. All urban areas exist under leasehold tenure in the county which includes Kericho Town, Londiani Town, Kipkelion Town, Litein Town and parts of Sondu Town.

4.3.9.2. Mean land holding size (ha)

The average land holding size in the county is 0.9 ha. for the smallholders and 14 ha. for large scale holders. The large-scale holders are mostly the multinationals which utilize the land for tea and flower farming. Small scale farms are under food crop and livestock production.

4.3.10. Settlement patterns

The County is characterized by various settlement patterns, Soin areas of Soin/Sigowet, Ainamoi and Kipkelion West are sparsely populated while Ainamoi, Bureti and Belgut are densely populated. Urban sprawl along the highways in areas such as Chesinende, Kapsoit, Sondu and Kipsitet is rampant.

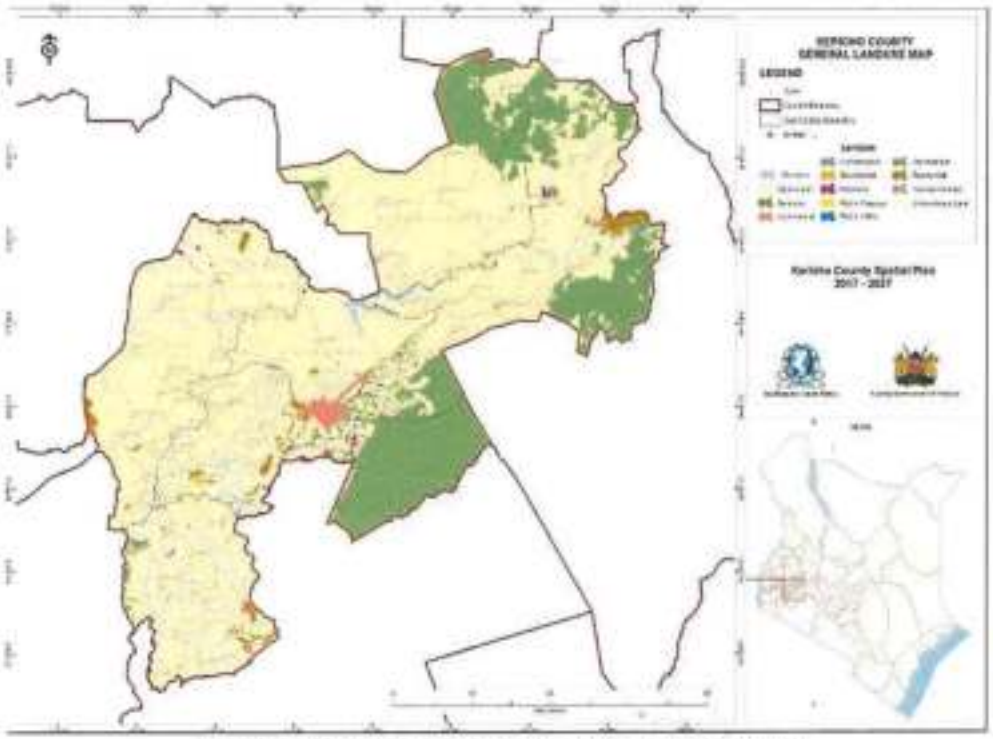

Figure 12: Settlement patterns in Kericho County

4.3.11. Environment and Climate Change

The major causes of climate change are greenhouse gas emission, particulate matter in atmosphere, high level of deforestation and urbanization. The impacts of climate change have clearly manifested in the county. The main climate events are associated with rising

temperatures and increased precipitation. These have particularly become frequent and more severe in the past two decades presenting huge additional burden towards sustainable development of the county. Rising average temperatures have made the county a favorable habitat for anopheles mosquito. This explains the increasing cases of malaria in areas hitherto unknown for the disease.

Further, climate change is attributed to variations in rainfall patterns and shifting seasons. These are likely to have implications on productivity as the levels of awareness of these changes among communities remain relatively low. Climate change effects are clearly not confined to a single sector. The government has already recognized the risks of climate change and has formulated a climate change strategy to provide a framework for addressing these risks. Focus will need to be directed towards building community resilience through adaptation measures.

4.3.11.1. Major degraded areas / hotspots and major contributions to environmental degradation

Environmental degradation in the County is caused by an increase in the number of tea and coffee factories, population pressure on available land including water catchment areas and hilltops, rural-urban migration, unplanned and uncontrolled settlements, ineffective enforcement of Environmental Policies and Laws, inefficient solid waste management and lack of awareness on environmental issues.

The county has several degraded hilltops especially in the lower altitude. The wetlands available in the county have problems of ownership and uncertainty thus causing encroachment and sub segment destruction. Tionysoyet wetland along Kericho town-Nyagacho road and Daraja sita wetland in Kapkatet are the most affected wetlands by car-washing activities. Kuje wetland in Chemamul area has been degraded by overgrazing and farming within the wetland due to encroachment. Riverbanks more often than not are encroached by individual farmers to an extent of collapsing the banks.

Few industries mainly tea factories have incorporated environmental costs in their management practices especially in the area of pollution, emission control and waste management. Packaging materials used in industries e.g. polythene bags and plastics are unfriendly to the environment. The recent ban on use of plastic carriers/bags by NEMA has eased the hitherto challenge of handling waste plastic paper especially in most urban centres within the county. People dispose them in unsafe manner leading to blockage of storm drains and act as breeding places for disease vectors.

Over reliance on wood fuel is one of the major contributors of environmental degradation which deplete the forest cover. Majority of the residents, 80 percent rely on wood fuel for cooking while 14.4 percent use charcoal. Tree felling exposes the soil hence becomes susceptible to soil erosion during the rainy season.

4.3.11.2. Environmental threats

Environmental degradation in the County has contributed to loss of biodiversity: floods especially in towns and low lands, destruction of habitats along river basins, drying up of

springs and poor harvest due to loss of soil fertility. It has also led to diminishing health and sanitation standards as a result of environmental pollution.

4.4. Kisumu County

4.4.1. Kisumu Socio-Economic Profile

Kisumu County is one of the 47 counties created through the devolved system of governance by the Constitution of Kenya 2010 delineated as County number 42. The population is estimated at 1,224,531 persons as at the start of the plan period 2018. The county has a diverse background comprising of urban and rural set-ups as well as rich ethnic, racial and cultural diversity with the Luo being the dominant community. The county's strategic position serves as a gateway for Kenya into the rest of the African Great Lakes region. It is located on the shores of Lake Victoria and serves as the main commercial and transport hub for the Western part of Kenya and the East African region.

The county hosts the third largest city in Kenya, Kisumu city, which serves as the County's headquarters. There are five major urban centers; Ahero, Katito, Muhoroni, Chemilil, and Maseno. Other emerging fast-growing centers include Awasi, Pap-Onditi, Holo, Kombewa and Sondu. The major economic activities of the residents are trade, farming and fishing.

4.4.2. Location and Size

Kisumu County lies between longitudes 330 020'E and 350 20'E and latitude 000 20' South and 000 50' South. The County is bordered by Homa Bay County to the South, Nandi County to the North East, Kericho County to the East, Vihiga County to the North West, Siaya County to the West and surrounded by the second largest freshwater lake in the World; Lake Victoria. Kisumu County covers approximately 567 km2 on water and 2086km2 land area, representing 0.36% of the total land area of Kenya's 580,367km2.

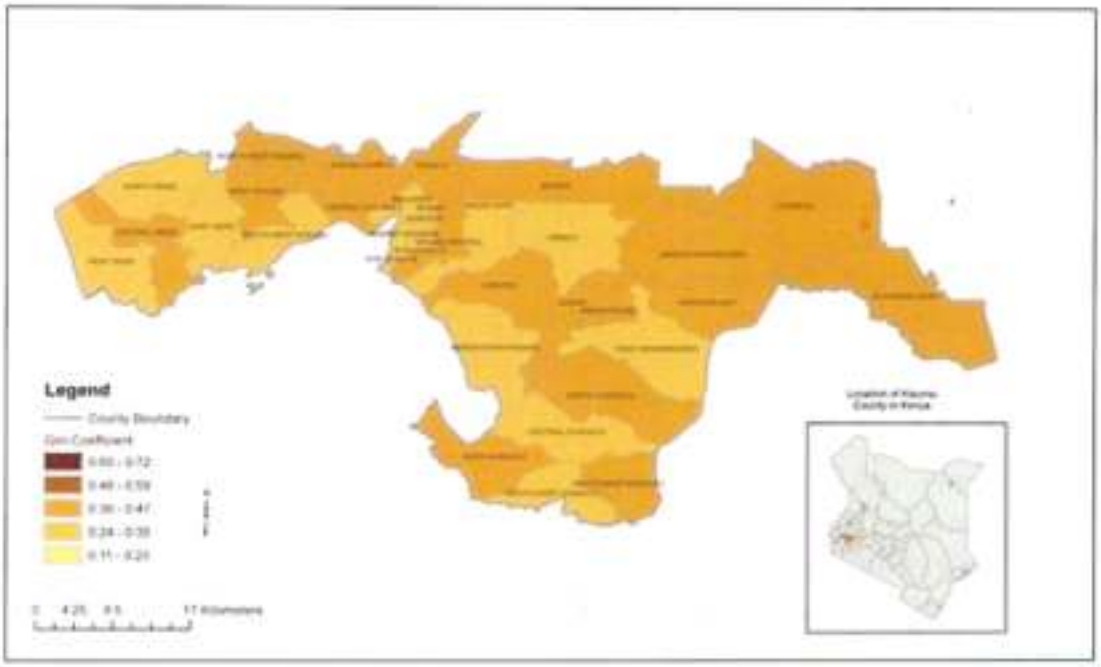

Figure 13: Map of Kisumu County

4.4.3. Administration and Local Political Unit

Kisumu County has seven Sub-Counties/ Constituencies namely: Kisumu East, Kisumu West, Kisumu Central, Muhoroni, Nyando, Seme and Nyakach. The County has thirty- five wards covering the locations and sub-locations as indicated in table 2 below:

Table 10: Kisumu County Administrative Zones

County Name	Sub County Name	Ward Name	Sub Locations
Kisumu County	Kisumu East	Kajulu	Got Nyabondo, Kadero, Okok, Konya Wathorego
		Kolwa East	Buoye, Chiga & Mayenya
		Manyatta "B"	Manyatta "B"
		Nyalenda "A"	Nyalenda "A"
		Kolwa Central	Nyalunya, Kasule
	Kisumu West	South West Kisumu	Ojolla, Osiri Kanyawegi
		Central Kisumu	Kogony, Korando "A" Korando "B"
		North Kisumu	Dago. Mkendwa, Bar "A" Bar "B" & Nyahera
		West Kisumu	Newa, Upper Kadongo, Lower Kadongo, south Kapuonja & north Kapuonja
		North Kisumu	West Karateng' East Karateng', Sunga & Marera
	Kisumu Central	Railways	Kanyakwar, Bandari and Nyawita
		Migosi	Migosi
		Shaurimoyo	Kaloleni
		Market Milimani	Northern and Southern
		Kondele	Manyatta "A"
		Nyalenda	Nyalenda "B"
	Seme	West Seme	West Reru, East Reru, West Ngere, East Ngere, Ang'oga, Alwala, Kadinga West, East Kadinga, North Alungo, and South Alungo
		Central Seme	West Kanyadwera, East Kanyadwera, Upper Kombewa, East Othany, West Othany &Lower Kombewa
		East Seme	West Kolunje, East Kolunje, Kaila, Kitmikayi, Koker/ Kajulu.
		North Seme	East Katieno, Kadero, West Katieno, North Kowe, South Kowe, North Ratta & South Ratta
	Nyando	East Kano Wawidhi	Magina, Nyakongo, Katolo, Achego & Ayueyo
		Awasi Onjiko	Kobong'o, Border1, Border2, Ayucha, Kakmie & Wang'anga

		Ahero	Kakola, Ahero, Kakola Ombaka, Tura, South Kochogo, Kochogo Central and Kochogo North
		Kabonyo- Kanyagwal	Kabonyo Irrigation Scheme, Kapiyo, Upper Bwanda, Kwakungu, Central Bwanda, Kolal, Anyuro, Ogenya, Ugwe, Nduru and Kadhiambo
		Kobura	Kotieno, Kamayoga, Lela, Masogo, Nyamware North, Nyamware South, Rabuor, Kochieng'& Okana
	Muhoroni	Miwani	East Kabar, central Kabar, West Kabar, Miwani North Miwani East, Miwani Central and Miwani West.
		Ombeyi	Obumba, Kang'o, Ramula, Kore& Ahero Irrigation Scheme
		Masogo/ Nyang'oma	Wang'aya1, Wang'aya 2, Kamswa North, Kamswa South, Sidho1 & Sidho East 2
		Chemelil	Songhor East, Songhor West, Upper Tamu, Lower Tamu, Kibigori, Chemelil, Nyangore, Got Abuoro
		Muhoroni/ Koru	Muhoroni town, Orego, Owaga, Tonde, Nyando, Koru, Ochoria, Fort- Ternan & Homaline
	Nyakach	South West Nyakach	Kajimbo, Ramogi, Gari & West Kadiang'a
		North Nyakach	Rarieda, Lisana, Kasae, Jimo Middle, Gem Rae, Gem Nam, Agoro East, Jimo East, Awach, Agoro West and Kandaria
		Central Nyakach	Moro, Kabodho East, Olwalo, Jimo West, Kabodho North and Kabodho West
		West Nyakach	Upper Kadianga, Adingo Opanga, West Koguta, Nyong'onga and Lower Kadiang'a
		South Nyakach	East Koguta, East Kadiang'a and Ramogi

4.4.4. Population size and Composition

The population of the County according to the 2009 Kenya National Population and Housing Census was 968,909 persons with 474,687 (49.0 percent) males and 494,222 (51.0 percent) females. The projections for the start of the plan year 2018; mid of the plan year 2020 and the end of the plan year 2022 have been tabulated with a population growth rate of 2.6 percent basing on the 2009 population census.

4.4.5. Infrastructure Development

The County is served with effective and reliable infrastructure which is critical in lowering the cost of doing business and increasing the competitiveness of the County.

4.4.5.1. Road Network

Kisumu County is served with reliable road network, Major players in the road sub-sector in the County include; Kenya National Highways Authority (KeNHA), Kenya Urban Roads Authority (KURA), Kenya Rural Roads Authority (KeRRA), Kenya Informal Settlement Improvement Projects (KISIP), Kenya Wildlife Services (KWS), Kenya Roads Board (KRB), Kisumu Urban Projects (KUP).

4.4.5.2. Kisumu International Airport

This is the third busiest airport in Kenya and the Country's fourth International airport. Although classified as an International Airport scheduled passenger services is available only to Nairobi and Mombasa. The Airport is set for a second phase expansion that will include the construction of a parallel taxiway, cargo apron and associated facilities. Airlines operating include Kenya Airways, Fly 540, Jambo Jet and Silverstone. So far it's only the Silverstone that offers direct flight to Mombasa.

4.4.5.3. Rail Network

The railway line reached Kisumu (then known as Port Florence) in 1902. The existing 1000m railway network traverses through Kisumu County linking Kisumu port and the Mombasa Port. However the Kisumu railway Station which was handling cargo, with connections to the EAC market through the Kisumu Pier has been dormant with some of the issues attributed by the water hyacinth, the port became a low business zone with ships cancelling deliveries to the port on several occasions.

4.4.6. Information, Communication Technology

ICT is a foundation for economic development. Kenya's vision of knowledge-based economy aims at shifting the current industrial development path towards innovation where creation, adoption, adaptation and use of knowledge remain the key source of economic growth. ICT is a critical tool for expanding human skills and rests largely on a system of producing, distributing and utilizing information and knowledge that in turn plays a great role in driving productivity and economic prosperity.

4.4.7. Energy access

The main sources of energy within the County are electricity and thermal (firewood, charcoal, kerosene, LPG, biogas and solar). The County has not fully tapped into the potential of solar power and renewable energy. Currently, the growth of urban areas requires the installation of floodlights to promote the 24-hour economy and improve on security.

4.4.8. Electricity Consumption

The total annual electrical energy consumption in Kisumu County was estimated at 250.3 GWh as at the year 2015. Household consumption accounts for only 5.8 percent of the total electricity supplied by Kenya Power.

Electricity coverage stood at 46.24 percent in 2015. The County targets to increase electrification by 90 percent by the end of the plan period (2022) through a partnership programme between the County Government and the Rural Electrification Authority.

The main sources of renewable energy that have been exploited in the County for electricity generation are hydropower and biomass. The County has two hydro plants: Sondu Miriu and Sang'oro which contributes 60MW and 20.2MW respectively to the National grid

4.4.9. Land and Land Use

Land is the most important natural resource that the county is endowed with. It is critical to economic, social, political and cultural development. It is also considered as the principal source of livelihood and material wealth by playing host to natural resources. Secure access to land, sustainable land use planning and equitable distribution of land remain immensely important for food and nutrition security, attraction of foreign investors, employment and growth of industries and generally the socio-economic development of the county. Approximately 50 percent of the county's land surface is grossly underutilized with sparse or no development especially in rural areas. In addition, most of the land in the county has not been registered which hinders people from asserting their rights over land. The rapid population growth and urbanization trends coupled with low investment in infrastructure and basic service expansion has resulted into enormous pressure on the urban housing and is expected to adversely affect allocation and utilization of resources, environmental degradation and availability to social amenities. The urban development challenges include: water, sanitation, shelter, energy and electricity, transportation and infrastructure, market infrastructure, solid and liquid waste management, citizen safety and security.

4.4.10. Labour and Employment

An efficient, motivated and healthy human resource base is pivotal for enhanced County competitiveness, economic growth and development. The Constitution advocates for decent work where freely chosen productive employment is promoted simultaneously with fundamental rights at work, adequate income from work, representation and social security. In Kisumu County, the informal sector cutting across retail and wholesale trade, industry, transport, agriculture and extraction of minerals employ approximately more than 60 percent of those in gainful employment.

4.4.11. Irrigation infrastructure and schemes

There are two irrigation systems in the County namely; pump fed systems in National Irrigation Board schemes covering 4,162 Ha and gravity fed systems in small holder farmer owned schemes covering 6,042 Ha against the potential of 14,309 Ha in rice growing areas only. The County is well endowed with water bodies such as Lake Victoria and permanent rivers such as Sondu/Miriu, Awach-Kano, Nyando, Oroba/Ombeyi, Kibos, Awach-Seme, Kisian, and Mugru which can be harnessed for gravity fed irrigation purposes to enhance self-employment and economic development.

4.4.12. Crop, Livestock, Fish Production and Value addition

The County's performance in this sector has been dismal despite its suitable ecological and climatic conditions for the production of cotton, sugarcane, rice and horticulture. The County's total area under food crop (maize, beans, rice, sorghum, green grams, sweet potatoes, cassava, tomatoes, cowpeas, kales and groundnuts) is estimated at 107,335 Ha with 3,443 Ha under horticulture during the long rains and 5,985 Ha under rice production.

Area under cash crops is approximately 45,309 Ha with sugarcane covering the largest area at 44,988 Ha. Sugarcane growing is majorly done in Muhoroni Sub- County covering approximately 43,700 Ha and employing 14,585 farmers directly.

4.4.13. Mining and extraction

Kisumu County is rich in mining and extraction activities (Quarry, sand harvesting, cement etc.) used in the construction industry ranging from sand harvested along river banks, Murram in Kanyakwar and Nyakach; ballast in Kajulu, Kisumu West and Nyakach and lime in Koru.

4.4.14. Tourism and Wildlife

Kisumu County has unique features such as the shoreline of Lake Victoria, Kit Mikayi, Ndere, Island National Park, and Impala Park among others which collectively make Kisumu a major tourist destination. , abundant hospitality industry with excellent conference facilities ranging from the Grand Royal Swiss Hotel, situated in a serene environment of Riat hills providing a clear aerial view of the City, Acacia Hotel within the Central Business District, Impala & Jambo Safari Eco-lodge, Kiboko Bay on the shores of L. Victoria for hippo watching, Sunset Hotel to Lwang'ni Beach chain of hotels where the Luo cuisine is enjoyed, Dunga Beach where tourists enjoy local fish cuisine and hired boat rides.

4.4.15. The Blue Economy

Kisumu County lies on the shores of the expansive Lake Victoria and has a huge potential in achieving sustainable development through the Blue Economy approach. The County is endowed with inland waters of Lake Victoria and rivers; Sondu-Miriu and Nyando and a total of 19 gazetted Beach Management Units (BMUs) all of which are fish landing bays providing a variety of fish. Main Species of fish are Tilapia, Nile perch, Rastienabola (Omena), mud fish and Cat fish.

The fish industry has been hampered by the use of traditional technologies (such as boats and rafts), inadequate cooling storage facilities and a processing plant within the county which leads to losses. The fish stock in the lake has also been dwindling due to overfishing, disposal of both liquid and solid waste, use of illegal fishing gears and bad fishing methods. Water hyacinth and hippo grass remains a major hindrance and has hampered fishing and use of modern fishing methods in the lake. Fish processing companies have also scaled down their operations due to low fish stocks from the lake and instead opting to import fish.

4.4.16. Environmental Aspects and Climate Change

4.4.16.1. Ecological Conditions

Kano Plains is predominantly black cotton soil which is poorly drained and unstable though suitable for rice, horticulture and sugarcane production. Seme and the lower parts of Nyakach Sub-counties are dominated by lake sediments, commonly sand and clay soils while Kisumu West Sub-county and upper-Nyakach are predominantly red-loamy soils suitable for agricultural production. The lake shores are generally swampy and offer fertile ground for horticulture and fish breeding.

4.4.16.2. Climatic Conditions

The climate of the County is generally warm with minimal monthly variation in temperatures between 230C and 330C throughout the year. The rainfall is determined by a modified equatorial climate characterized by long rains (March to May) and short rains (September to November). The average annual rainfall varies from 1000-1800mm during the long rains and 450-600mm during the short rains. The altitude in the County varies from 1,144 meters above the sea level on the plains to 1,525 meters above sea level in the Maseno and Lower Nyakach areas. This greatly influences temperatures and rainfall in the County.

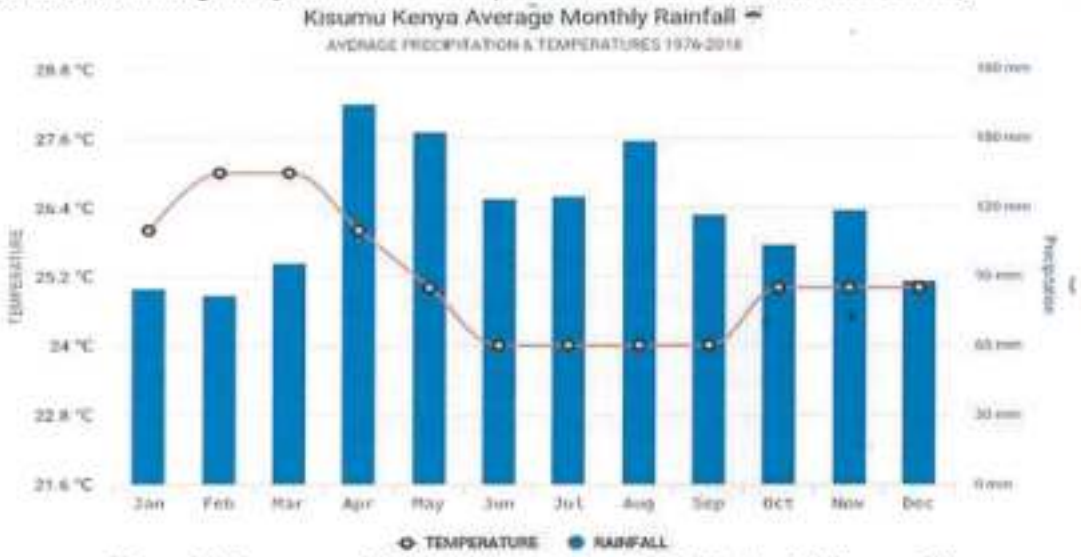

Figure 14: Average rainfall and temperature distribution in Kisumu City

(Source: Climate data.org)

4.4.16.3. Rainfall

January is entirely a dry month. The peak generally falls between March and May, with a secondary peak in September to November. Despite the challenges experienced in land preparation as black cotton soils are difficult to work on manually during dry and heavy rain seasons, the available rainfall is adequate and evenly distributed for small- scale food- crop production and cash-crop growing.

4.4.16.4. Temperature

The annual maximum temperature ranges between 25^0C and 33^0C and the annual minimum temperature ranges between 16^0C and 18^0C.

4.4.16.5. Degradation of natural resources

Amongst the threatened natural resources in Kisumu County is the L. Victoria and the wetlands. Other threatened resources include land (murram, sand, soils and ballast), flora and fauna. Water sources are also increasingly under threat from discharge of raw sewer and industrial waste, deforestation, point and non-point source of pollution.

4.4.16.6. Noise and air pollution

Particulate air pollution from industrial process exists in the County. Increased production activities introduce carbon compounds and greenhouse gases which contribute to climate change. Increased noise pollution from entertainment spots, outdoor advertising and

community social and religious gatherings are in the County, threatening the peaceful and ambient environment.

4.4.17. Water and Sanitation

The water coverage for the county currently stands at 58 percent. Seme Sub-county has the lowest water coverage at 29 percent against Kisumu central Sub-county which has the highest water coverage at 72 percent. In terms of wards Nyalenda "A" has the highest share of residents using improved sources of water at 88 per cent as opposed to South West Nyakach with the least coverage at 22 percent. The county has gazetted water supplies covering a total area of 956 Km^2 with an average water production of 38,308.8m^3/ day. The gazetted water supply includes: Kisumu rural, Nyakach, Muhoroni, Ahero, Dunga, Kajulu, Koru Mnara, Tamu, Kibigori and Awasi. The key component of each water source supply scheme includes; Raw water intake sourced by either river or spring or lake; Treatment plants either full or partial; Storage reservoirs for both raw and potable water and Pipeline network with requisite communal water points.

Sanitation and hygiene has continuously suffered from low or no allocation of resources. This has jeopardized the overall objective of increasing sanitation coverage to help reduce the disease burden due to poor sanitation. If objectives of sanitation and hygiene are to be achieved, there must be a deliberate effort to allocate adequate budgetary resources towards the same function. According to the Wash and Sanitation Programme (WSP) report of 2014, 30.4% of people in Kisumu use improved latrine, 31.3% use unimproved latrines while 25.9% use shared latrines and 12.4% practice Open Defecation (OD). Lack of access to improved sanitation coupled with poor hygiene practices result in huge burden of disease and the associated economic, human, social, health burden. Access to acceptable sanitation services is important to discourage open defecation which is detrimental to the environment and health of the general population.

The low sanitation coverage is also a major challenge in schools especially primary and early Childhood Development Centers within Kisumu County. Most of the latrines in these institutions are dilapidated and in poor state of repair. Coverage for primary school sanitation facilities in functional condition is 85.83% due to of lack of maintenance.

4.4.18. Physiographic and Natural Conditions

4.4.18.1. Physical and topographic features

The county's topography is undulating and characterized by Kano-Plains which is a flat stretch lying on the floor of the Rift Valley, the Nyabondo Plateau and the over-hanging huge granite rocks at Riat hills, Maseno and Seme areas. Due to flash flooding, the Kano- Plains have rich alluvial soils which favour agricultural production in horticulture and rice. Granites on the other hand, find their use essentially in the building and road construction industry.

The county is endowed with the second largest freshwater lake in the world; L. Victoria with two major rivers; Nyando and Sondu-Miriu and seven permanent rivers, Awach- Kano, Oroba/Ombeyi, Kibos, Awach-Seme, Kisian, and Mugru, in its catchment. These resources

provide a big potential for development of blue economy. Impala sanctuary, Ndere is land, the legendary Luanda Magere and Kit-Mikayi sites are among the unique topographical features.

4.4.18.2. Geology

The geology of the area is comprised of Tertiary volcanic rocks, which include phonolites and basalts. These are overlain by recent alluvial deposits and soil composed of sands, clays and gravel. The influence of faults, joints and other fractures on groundwater in the

study area is two way. They act as drainage channels of groundwater flow and also as aquifers in the area. The area receives groundwater recharge from Nandi Hills and Mau Hills Complex which are to the east and flow is towards the lower areas to the west. The soil retains water for an extended period of time after the rains and this partly recharges aquifers in the area.

4.4.18.3. Soils

Soils in the Kisumu area are chemically a fine blend of all sediments transported from the surrounding hills and mountains. Therefore its cat ion content is well balanced and adding rock dust for this reason seems unnecessary at first glance. Rock dust addition for nutrients might be more effective on soils outside this area. Structure A more important issue to address is the physical properties of the soil. The high clay content of this soil makes it swell and become impermeable during heavy rainfall. On the other hand, during drought deep cracks develop and damage plant root systems. The soil retains water for an extended period of time after the rains and this partly recharges aquifers in the area.

4.5. Vihiga County

4.5.1. Location and Size of the County

Vihiga County is located in the Lake Victoria Basin of western region of Kenya between longitudes 34°30' and 35°0'E and latitudes 0° and 0°15'N. The County covers an area of 531.0 Km^2.

4.5.2. County Administrative Units

The County has five sub-counties, namely Hamisi, Emuhaya, Luanda, Sabatia and Vihiga. Hamisi is the most expansive with an area of 156.4 Km^2, Sabatia 110.9 Km^2, Vihiga 90.2 Km^2, Emuhaya 89.5 Km^2 and Luanda 84 Km^2. There are twenty-five electoral wards within the five sub-counties.

Table 11: Vihiga County sub-county Wards

SUB-COUNTY	WARD
Hamisi	Tambua, Banja, Jepkoyai, Shiru, Muhudu, Shamakhokho, Gisambai
Sabatia	Chavakali, Busali, Wodanga, Sabatia West, North Maragoli, Lyaduywa/Izava
Vihiga	Lugaga/Wamuluma, Central Maragoli, South Maragoli, Mungoma
Emuhaya	North East Bunyore, Central Bunyore, West Bunyore
Luanda	Luanda Township, Luanda South, Emabungo, Mwibona, Wemilab

4.5.3. Population Size and Composition

According to the 2009 National Population and Housing Census, the County had a population of 554,622. The county has one of the highest population densities in the country at 1,033 persons per square kilometer compared to the national average of 66 persons per square kilometer. 47.8% of the population were male while 52.2% were female. The county population is estimated to have grown to 637,877 persons in 2017 and is projected to grow to 694,819 in 2022. The county's demographic profile depicts a youthful population comprising of 46% of persons aged below 15 years.

4.5.4. Socio-Economic Activities

The County has potential for crop farming like tea, coffee, beans, maize and bananas. Dairy farming, poultry, fish farming as well as pig farming are practiced

4.5.5. Climate and Physical features

The district experiences modified equatorial type of climate with high reliable rainfall of 1800mm to 2000mm. The rains are well distributed and bimodal, showing two distinct seasons i.e. long and short rains. The long rainy season is experienced in the month of April, May and June while the short rainy season comes in September, October and November. The temperature ranges between 14o C and 32oc with mean temperature of 23oC. The district lies on the eastern fringes of the Rift valley's Lake basin (Figure 1). The altitude ranges between 1,300m and 1,500m above sea level and slopes gently from east to west. It is characterised with undulating hills and valleys. The main rivers are Esalwa and Yala with drain in Lake Victoria. The southern part is characterised by rugged granite hills of Maragoli, Bunyore and Nyangori.

4.5.6. Social, Cultural, and Economic Characteristics

The abundance of rain enables the district to rear and grow several crops and fruits including tea, horticultural crops, coffee, and French beans that are vital for agro- based industries. These activities are having a toll on the environment, as most of them are done not on a very environmental sustainable manner. This has caused the encroachment of the environmentally delicate areas such as river backs, hilly areas and forested areas.

There is a very high poverty incidence in the district. During the 1999 population census it was shown that the poverty levels was 65% and in 2002 this increased to 68%. The income levels are very low in 2002 per capita income recorded as KSh. 2000/=. Poverty has led to people exhausting all agricultural land especially through poor agricultural practises. This in done has led to encroaching on the forest reserves and ecologically fragile areas like swamps, sloppy and hilly areas and dams to earn a living. Cultural sites are also being destroyed to pave way for agricultural land. Most of the poverty reduction strategies in the district are geared towards increasing industrial activities within the district through the Jua kali sector, brick making and the exploitation of the mineral resources in the district like gold. All these activities are having negative impact on the environment. Industrialisation has the potential for emission of pollutants into the air and water, and bringing up informal settlements. Brick making and mineral exploitation is leading to many open pits in many places within the district have a danger to many accidents occurring.

The district is also rich in culture. This is exemplified through various cultural activities in the district. In the district every 26th of December there is a cultural celebration where the culture of various sub tribes in the district is exhibited. These include the prowess of rain making among the Banyore sub tribe, the Tiriki and Maragoli circumcision rites and various traditional Ndances and foods. The district is also famous with the traditional circumcision forests among the Tiriki that are well conserved specifically for the rite of passage.

4.5.7. Soils and land use

The major soils found in the district are acrisols which are deep well drained and slightly acidic covered with humic top soils from both volcanic and basement complex with yellowish red loams derived from sediments and basements. Humic nitosols and ferrosols are also found but to a smaller extent especially on the southern parts of neighbouring Vihiga district. The soils are generally shallow and rocky and are favourable for oil, root, and cereal and horticultural crop production.

4.5.8. Land use changes

There are significant land use changes in the district due to increased demand for arable land. There is serious encroachment of riverine ecosystems and wetland for cultivation. Wetlands in particular are being reclaimed for settlement and farming activities. The hilltops have been encroached for farming and settlement, which has led to severe land degradation through soil erosion.

4.5.9. Biological environment

The sub-county has both exotic and indigenous vegetation. Trees are used mainly for shade, boundary demarcation, fencing, production of fruits, timber, fuel-wood and for ornamental purposes. Common trees in the district include: Eucalyptus spp, Markhamia lutea, Cupressus lusitanica, Bischovia javonica, Spathodea nilotica, Croton megalocarpus and Pinus sp. Common fruit trees are Psidium guajava, Persea americana, Syzygium guminii and Eryobotria japonica. Shrubs include lantana camara, Tethonia diversifolia and Solanum incanum. Animals in the sub-county are mainly domestic animals such as cattle, sheep, goats, pigs and poultry. There are no animals or resources of wildlife and tourism importance.

4.5.10. Wetlands Ecosystems

Wetlands play a major role in the provision of environmental goods and services including the storage and retention of water for domestic, agricultural and industrial use. Their regulating services include modifying water flows (hydrological flows), recharging and discharging groundwater resources and diluting or removing pollutants. Their supporting services with regard to the hydrological cycle are important for soil formation and soil retention and nutrient cycling. The ecosystems also provide habitats for a great number of species, promoting biodiversity which underlies the resilience and productivity of ecosystems. They are also important for recreation (e.g., Yala River, Edzava River, Jordan River and associated streams) as well as their spiritual and inspirational roles among the peoples of Vihiga County. Several wetland zones have potential for the development of recreational centres such the Kikuyu Wetlands along the Edzava River, the silted old

Kaimosi Dam along the Galagoli River bordering Shamakhokho and Muhudu Wards, and the Emahondo Wetlands along the Mulwanda River in North East Bunyore.

4.6. Siaya County

The County Government of Siaya is one of the 47 County Governments created by the Constitution of Kenya 2010. It was established in March 2013 following the general elections held that year. It consists of two arms; The Executive and The Legislature headed by His Excellency the Governor and Honourable the Speaker respectively. The executive has 10 departments headed by County Executive Committee Members and a semi autonomous Public Service Board headed by the chairman. The first legislature comprised 30 elected and 18 nominated members.

4.6.1. Position and Size

Siaya County is one of the six counties in Nyanza region. It has a land surface area of approximately 2,530 km² and water surface area of approximately 1,005 km2. It borders Busia County to the North West, Vihiga and Kakamega counties to the North East, Kisumu County to the South East and Homa Bay County across the Winam Gulf to the South. The water surface area forms part of Lake Victoria (the third largest fresh water lake in the world). It approximately lies between latitude 0° 26´ South to 0° 18´ North and longitude 33° 58´ and 34° 33´ East.

Figure 15: Location of Siaya County in Kenya

Source: Kenya National Bureau of Statistics, 2013

4.6.2 Physiographic and Natural Conditions

4.6.2.1 Physical and Topographic Features

Siaya County has three major geomorphological areas namely: Dissected Uplands, Moderate Lowlands and Yala Swamp. These areas have different relief, soils and land use patterns. The altitude of the County rises from 1,140m on the shores of Lake Victoria to 1,400m above sea level on the North.

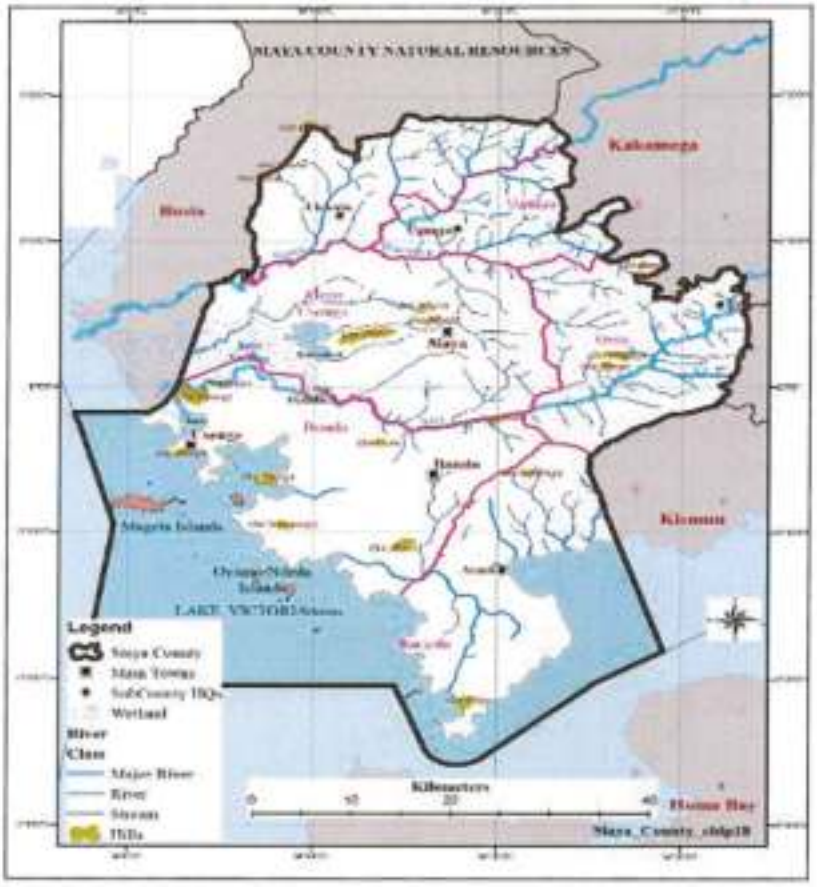

Figure 16: County Natural Resources

There are few hills found in the County namely: Mbaga and Akara in Alego Usonga; Odiado in Ugenya; Regea, Rawalo and Nguge in Gem; Usenge, Ramogi hills, Got Abiero, Sirafuongo in Bondo and Rambugu and Naya hills in Rarieda. Rivers Nzoia and Yala traverse the County and enter Lake Victoria through Yala Swamp. The features have a bearing on the overall development potential of the County. High altitude areas of Ugenya and Ugunja sub-counties and parts of Gem sub county experience higher rainfall hence suitable for agriculture and livestock keeping. The low altitude areas of Bondo, Rarieda, parts of Alego Usonga and part of Gem Sub Counties experience less rainfall and thus are suitable for cotton growing and drought resistant crop varieties.

The geology of Siaya County ranges from early Precambrian to Quaternary and can be divided into the following well defined groups based on their relative age and lithology. Precambrian Intrusive, Nyanzian system rocks, Kavirondian system rocks and Pleistocene to

Recent formations. The Precambrian intrusives are a series of linear intrusive coarse grained quartz dolerite dykes invading both the Nyanzian and Kavirondian rock systems. They occur roughly as co-linear groups with strikes either in NW-SE or NE-SW directions. They are normally dark green, fine to coarse grained rocks. The Nyanzian system rocks consist of Granites, Rhyolites, Basalts and Andesites while the Kavirondian system rocks comprise of conglomerates, grits and mudstones which are sedimentary derivatives of the Nyanzian system as outliers. Deposits of Pleistocene to recent age include hill wash gravels (alluvium), semi-consolidated river alluvium, quartz, rubble and lateritic ironstone capping. Alluvium flats and marshes are common along the courses of rivers in the area.

4.6.2.2 Ecological Conditions

The County spreads across agro-ecological zones LM1 to LM 5. According to the Kenya Soil Survey and Integrated Regional Development plan for the Lake Basin Development Authority, the lower part of the County and especially the shores of Lake Victoria can be categorized into semi-humid, semi-dry Lower Midland zones (LM4 and LM5). These zones cover the whole of Uyoma in Rarieda Sub-County and Yimbo in Bondo Sub-County. The lower central parts of the County, covering the whole of Sakwa and Asembo in Bondo and Rarieda Sub-counties respectively and the lower parts of Boro Division are classified as the midland zone LM3. The northern part of the County comprising Gem, Ugunja and Ugenya Sub-counties and the upper parts of Boro Division in Alego Usonga Sub-County are classified as the low-midland zones (LM2 and LM3).These are sub-humid and humid zones with reliable precipitation. There are also pockets of upper midland zones (about 30sq.kms) in Yala Division, Gem Sub-County with a high potential for agricultural activity.

4.6.2.3 Climatic Conditions

The County experiences a bi-modal rainfall, with long rains falling between March and June and short rains between September and December. The relief and the altitude influence its distribution and amount. Siaya County is drier in the southern part towards Bondo and Rarieda sub-counties and is wetter towards the higher altitudes in the northern part particularly Gem, Ugunja and Ugenya sub-counties. On the highlands, the rainfall ranges between 800mm – 2,000mm while lower areas receive rainfall ranging between 800 – 1,600mm.

Temperatures vary with altitude rising from 21° C in the North East to about 22.50° C along the shores of Lake Victoria while in the South, it ranges from mean minimum temperature of 16.3° C and mean maximum temperature of 29.1° C. Humidity is relatively high with mean evaporation being between 1,800mm to 2,200mm per annum within the County. The relative humidity ranges between 73 per cent in the morning and 52 per cent in the afternoon. Climate variations are evident in all these areas due to human activity distorting some of the statistics above.

4.6.3 Administrative and Political Units

4.6.3.1 Administrative Sub Division

The county consists of six sub-counties and thirty wards. Alego Usonga, Bondo and Gem sub counties have six wards each; Rarieda, Ugenya and Ugunja sub counties have five, four and three wards respectively. Of the six sub-counties, Alego Usonga is the largest with an approximate area of 605.8 km2 while Ugunja is the smallest with an approximate area of 200.9 km^2. Table 12 shows details of the administrative units forming Siaya County.

Table 12: Sub-counties and sub-locations

Constituency/ Sub-County	No of Wards	Ward	Ward Area	Sub Location	Area (Km2)
Alego-Usonga	6	Township	42.6	Mulaha, Nyandiwa, Karapul	605.8
		Usonga	79.2	Sumba, Nyadorera A, Nyadorera B	
		North Alego	53.8	Hono, Nyalgunga,Ulafu,Nyamila,Umala, Olwa	
		South East Alego	191.5	Mur Ngiya, Bar Agulu, Bar Ding, Masumbi, Nyangoma, Pap Oriang, Randago, Bar Osimbo, Pap Oriang, Nyajuok, Murmalanga, Bar Olengo	
		Central Alego	139.8	Kadenge, Obambo, Ojuando A, Nyandiwa, Kochieng A, Kochieng B, Ojuando B, Koyeyo, Kakumu kombewa, Komolo	
		West Alego	98.9	Kaugagi Hawinga, Gangu, Kaugagiudenda, Maholaulawe, Sigomauranga, Kaburauhuyi, Kalkadauradi, Komenyakowala, Komenyakalaka, Kodiere,	
Gem	6	North Gem	86	Ndere, Nyabeda, Malanga, Got Regea, Maliera, Lundha, Asayi, Sirembe	405
		South Gem	63.3	Kaudha West, Kaudha East, Kanyadet, Ndori, Rera, Kambare, Oyinyore, Gombe	
		East Gem	71.9	Ramula, Uranga, Lihanda, Marenyo	
		Central Gem	52.5	Siriwo, Kagilo, Gango, Nyandiwa, Nyawara	
		Yala Townshi	46.1	Nyamninia, Sauri, Anyiko, Jina	
		West Gem	85.2	Dienya West, Dienya East, Wagai West, Wagai East, Nguge, Uriri, Malunga West, Malunga East, Malunga Central	
Ugenya	3	North Ugenya	68	Kagonya, Sega, Jera, Nyamsenda, Ligala	322.3
		East Ugenya	97.3	Anyiko, Sihay, Ramunde, Kathieno A, Kathieno B, Kathieno C	
		Ukwala	55.9	Doho West, Doho East, Simur, Simur East, Yenga, Siranga, Simurkondiek	
		West Ugenya	101.1	Sifuyo West, Sifuyo East, Masat West, Masat East, Karadolo West, Karadolo East, Ndenga, Uyundo, Nyalenya	
Ugunja	3	Ugunja	80.3	Magoya,	200.9

				Rambula South,Rambula North, Ugunja, Ambira, Ngunya, Umala, Ligega	
		Sigomre	68.4	Got Osimbo, Mungao, Sigomre, Madungu, Asango East, Asango West, Tingare East, Tingare West	
		Sidindi	52.2	Rangala, Simenya, Yiro East, Yiro West, Ruwe, Uhuyi	
Bondo	6	North Sakwa	96	Bar Kowino, Ajigo, Bar Chando, Abom	
		South Sakwa	102.7	West Migwena, East Migwena, Got Abiero, Nyaguda	
		Central Sakwa	85.2	Ndeda/Oyamo, Uyawi, Nyang'oma	
		West Sakwa	109.8	Maranda,Kapiyo, Usire,Utonga,Nyawita	
		East Yimbo	159	Got Ramogi, Usigu,Nyamonye, Bar Kanyango,Pala, Othatch	
		West Yimbo	40.3	Got Agulu,Usenge, Mahanga,Mitundu	
Rarieda	5	North Uyoma	73.9	asala, East Katwenga, West Katwenga, Ragegni, Ochieng'a	403.4
		North Uyoma	57.8	Ndigwa, Lieta, Naya	
		East Asembo	78.5	Omiamalo, Omiadiere, South Ramba, North Ramba, Omiamwalo	
		East Asembo	101.1	Nyagoko, Siger, Memba, Mahaya, Akom	
		W.Uyoma	92.1	Nyabera, Kokwiri, Rachar, Kobengi,Kagwa	

Figure 17: County's Administrative / Political units

4.6.3.2 Political Units

The county consists of six constituencies and thirty wards. Alego Usonga, Bondo and Gem constituencies have six wards each; Rarieda, Ugenya and Ugunja constituencies have five, four and three wards respectively.

4.6.4 Demographic Features

This section gives information on population size and composition; population density and distribution, population projection for special age groups and demographic dividend potential. Kenya in her implementation of United Nations principles and recommendations for census has been undertaking decennial census since 1969. The 2009 Kenya Population Housing Census (KPHC) was the latest census conducted premised on a theme —Counting our people for the implementation of the Vision 2030‖. The County has not undertaken census since 2013 but has relied on the figures in the 2009 KPHC reports by Kenya national Bureau of Statistics (KNBS) to project her population.

4.6.4.1 Population Size and Composition

Population size, structure and distribution against the county resource endowment are major challenges to the setting of priorities for development and in implementing plans. In 2009, the population of the county was 842,304 consisting of 398,986 males and 443,318 females. This figure was projected to increase to 1,027,795 consisting of 488,077 males and 539,718 females in 2018. The population has been further projected to rise to 1,114,735 comprising 529,646 males and 585,088 females and 1,285,971 comprising 610,179 males and 675,792 females in 2022 and 2030 respectively. The population of the county is dominated by females at 53 percent against 47 per cent males due to high mortality rate for males between

ages 0 years to 19 years and high life expectancy for females. The rapidly increasing population requires increased investments in basic social infrastructure and utilities such as schools, health facilities, water, sanitation and services.

4.6.5 Infrastructure Development

4.6.5.1. Road, Rail Network, Airstrips and Jetties

Roads - As of 2017 the county had 434.2km of bitumen standard roads, 1297.41km gravel, 532.78 km of earth and a further 1,170 narrow roads. Major roads traversing the county are Kisumu-Busia Highway (which is an international trunk road, class B1), Luanda-Siaya (30 km), Siaya-Nyadorera (22 km), Rangala-Siaya-Bondo (34 km), Ngiya-Ndori(17 km), Ndori-Luanda-Kotieno (47 km), Bondo-Misori (26 km) and Kisian-Bondo-Usenge (72 km) roads. In addition, there are roads which are being upgraded to bitumen standard; these include Akala-Luanda, Kodiaga-Wagai-Aluor-Onyinyore-Akala, Ugunja-Ukwala-Nyadorera, Butere-Ugunja and Boro-Ndere roads.

Airstrips - There are three main airstrips in the county namely Gombe, Dominion and Sega. Their conditions are not very good and require attention. There is no airport in the county but Kisumu International Airport is only 75kms to Siaya town centre.

Rail Network – Railway line passes through the county in Gem with a station at Yala. However, the line is not in use.

Harbours and Jetties - There are three jetties in the county namely Luanda K'otieno, Asembo Bay and Usenge. Out of these, Asembo Bay is not functional.

4.6.6 Land and Land Use

4.6.6.1. Land Ownership Categories

Land in the County is categorised based as per the Constitution of Kenya 2010 as private land, public land and community land.

Private land, which forms most of the land in the county, is the category of land owned by private individuals. The rights and interests of this category of land have been fully ascertained through the process of land adjudication and therefore relatively easy to acquire for investment purposes. There however still exist sections whose rights and interest have not been determined and the county government needs to intervene to have the process finalised.

Approximately 2059 square kilometres of land is arable and a major form of land use is peasantry agriculture. Only small portion of Siaya town has been planned for industrial use. There is need to demarcate more land for industrial use in major urban centres in the county. Most of the lands in the rural areas are under general boundaries prone to a lot of boundary disputes, while in Urban centers there are fixed surveys which are free from disputes. The first category requires that this general surveys be geo-referenced to reduce the number of disputes arising from the boundaries.

4.6.7 Tourism and Wildlife

4.6.7.1 Main Tourist Attractions and Activities

Siaya prides herself of great Luo heroes, scholars, politicians as well as great chief cognizant of Odera Akang'o who is well remembered for his powers being the first chief in Kenya to instill formal education.

Siaya County has diverse tourism attractions, ranging from natural, historical, flora and fauna and cultural attractions. This land potentially harbors different forms of tourism including agro tourism, sport tourism, eco-tourism, cultural tourism and culinary tourism. Main categories of tourism attraction include and not limited to:

a. **Cultural Tourism:** Ramogi Hill(Got Ramogi), Jaramogi Oginga Odinga Mausoleum
   and Museum, Achieng' Oneko Mausoleum, Holy Got Adodi, Justice Ayanga Museums, Huluwino Blacksmiths, Chief Odera Akang'o Office and Cells in Yala and Cultural Activities in Siaya County.
b. **Eco Tourism**: Lake Kanyaboli, Yala Swamp Wetland, Dominion Farm Birds Sanctuary, Anyiko Wetlands, Uwasi/Muluhwa Rice Scheme, Elmolo Crocodile Park, Lake Namboyo, Lake Bob, Lake Sare and Lake Victoria Fish Cages in Lake Victoria.
c. **Nature based Tourism**: Ndanu Falls, Mahira Falls, Godha Falls, Mageta Island, Sirigombe Island, Rawalo Hills and Naya Hills
d. **Leisure based Tourism:** Goye Beach, Madundu Beach and Luanda Kotieno

There have been several investments in cultural and heritage centre, linkages of the County with the western circuit and tours and travel investments. Some of these investments include **Got Ramogi Cultural Festival** aimed at promoting pilgrimage and cultural heritage tourism, conserving the forest cover, rekindling a sense of identity among the Luo Community, developing alternative activities to benefit the communities around the forest and providing a forum for continued scientific and cultural studies at Got Ramogi. Lake Victoria Sitatunga **Conservation Boat Race** mainly for wildlife conservation and to promote water sports in Lake Victoria, an important and key natural economic resource for the five Counties of the Lake region. Among other activities lined up during the boat race are; the fish eating day, exhibitions, traditional wrestling and Ajua. Piny Luo Event which is jointly funded by predominantly Luo speaking counties; Kisumu, Siaya, Homabay and Migori Counties with intention to strengthen and celebrate the Luo culture. Miss Tourism Kenya national beauty pageant whose main objective is to create tourism ambassadors who will champion the uniqueness of the respective counties and by extension the country at large.

4.6.7.2 Main Wildlife

The varieties of wildlife found in the County include hippopotamus (Lake Victoria, Rivers Nzoia and Yala), crocodiles (Yala Swamp, parts of the Lake Victoria), Sitatunga (Yala Swamp) and monkeys and leopards. The County has several species of fish, but the most popular ones are Nile perch, Rastrineobolaargentea (Locally known as Omena),

Hatlochromines (locally known as Fulu or Wiu) and Nile Tilapia. Nile perch has a very high commercial value and is responsible for the economic break through which has been experienced along the shore of Lake Victoria. Others are bushpig (mainly in Yala Swamp), Hyenas (Got Abiero, Utonga), various species of snakes e.g. pythons, cobras and various species of birds.

4.6.7.3 Wildlife Conservation areas (Game parks, Reserves, Conservancies, Game Ranches)

The county hosts Elmolo Crocodile Park which is approximately 5 acres along the shore of Lake Victoria. It is an Eco – Tourism destination showcasing animals like Nile crocodiles and tortoise. The park is also inhabited by different species of birds including the Guinea fowls, ducks and goose. In addition, reptiles like lizards and snakes can also be seen at the park. The proposed Lake Kanyaboli National Reserve is a top priority of the Department as means to promote and conserve wildlife as well as the ecosystem.

4.6.7.4 Major Contribution to Environmental Degradation

Environmental degradation is the deterioration of environment through consumption of assets such as water, air and soil; destruction of environment and eradication of wildlife. Siaya County has areas experiencing environmental degradation and there is need by the government to put interventions to reduce or counter its effect. Some of the factors that contribute to environmental degradation include;

a) Land disturbance/damage

Rapture in the environmental surrounding provides chance for invasive weedy and parasitic species such as water hyacinth in Lake Victoria and the popular dodder parasitic plant. Theseplants can assume control over nature resulting in predominant plants which do not give satisfactory food asset to environmental life and instead are a threat. Therefore, the whole environment can be destroyed with invasive species.

b) Pollution

Air, water, land and noise pollution are all harmful to environment. In Siaya, water pollution is dominant because of the many water bodies that either borders or traverse the county. The polluted waters, majorly caused by dumping of waste into the water bodies, have affected aquatic life and further, reduction in fish species. Noise pollution in form of large sounds like honking of vehicles is experienced in busy roads and major towns like Siaya, Bondo, Ugunja and Usenge. Continuous exposure to noise pollution can cause irreparable damage to our ears. Polluted air that is inhaled by the people has increased respiratory diseases whereas land pollution has caused degradation of earth surface as a result of human activities.

c) Population growth

A rapid population growth has been experienced in the recent years in Siaya County. Devolution is one of the factors and there has been an influx of people into major towns of Bondo, Siaya, Yala and Ugunja in addition to the existing growing population. More population means more demand for food and shelter and to achieve this, space is required to

practice agriculture and to develop homestead. This has brought strain in the available natural resources through deforestation that causes environmental degradation.

d) Deforestation

Rapid population growth and urban sprawl in Bondo and Siaya town are two major causes of deforestation in the County. Use of forest for agriculture, animal grazing, harvest for fuel wood and logging are common in rural areas, along lake Victoria, river Yala and Nzoia region. Deforestation contributes to global warming as decreased forest size brings carbon to the environment.

4.6.7.5 Environmental Hotspots

Environmental hotspots in the County are those areas with significant level of animal and plant life that is threatened with destruction. Some of the notable environmental hotspots include: Kamalunga and Sumba flood plains in Usonga ward of Alego-Usonga Sub-County; Masawa flood plains in West Ugenya ward of Ugenya Sub-County; Yala Swamp and other wetlands encroachment within the County; Land Degradation in Wichum sand harvesting sites in Central Sakwa ward of Bondo Sub-County; Land Degradation in Kamariga sand harvesting sites in West Uyoma ward of Rarieda Sub-County; Barding Gold mining sites in South-East Alego ward in Alego-Usonga Sub-County; Wuoroya River pollution and associated disease outbreaks; River Nzoia pollution caused by sugar industries upstream; Undesignated dumping sites in town centres within the county and Ungazetted Hills as hotspots for deforestation.

4.6.8 Solid Waste Management Facilities

The county government has put in place the following solid waste management facilities in urban and market centres: 10 Skips; 850 Garbage Bins; 2 Dumping Sites reserved in Ugunja and Alego-Usonga Sub-Counties and 6 Tractors in each sub-county for waste collection.

4.6.9 Invasive Species and Impacts on Health

The County bears the burden of a variety of invasive species. Water Hyacinth, occurring in unpredictable seasons, is a major problem in Lake Victoria affecting about 60% of the beaches. It provides substrate and breeding grounds for snails which carry the bilharzia causing protozoa. Its infestation has also had negative effects by blocking public water supplies with intakes in the lake as well as affecting livelihoods among the fishing community by blocking entrance into the lake. Fish is a vital component of human diet and its deficiency is likely to affect human health.

4.6.10 Loss of Biodiversity

Loss of biodiversity in Siaya County is characterized by loss of certain fish species, extinction of certain wild animals and indigenous trees. In Lake Victoria fish species such as —sire", "ngege", "fulu", "nyamami", "odhadho", have declined due to a variety of reasons. Key amongst them are climate change, introduced alien species, over-fishing, poor harvesting technologies and changing breeding patterns. Another reason has been the continuous clearing of the papyrus reeds which are breeding grounds of fish leading to migration of fish thus decline in fish populations.

The preference of eucalyptus as source of timber and wood has led to cutting down of indigenous tree species such as "olwa", "ng"owo", "chwa", and "ogongo". The sitatunga, majorly in Yala Swamp, is faced with serious extinction due to poaching and hunting whereas the wild pig (mbidhi) is almost extinct as its habitat (bushes) is being cleared to pave way for agricultural activities. Hippos are another mammal species whose population is dwindling. In areas such as Nyadiang'a, killing of leopards has led to increase in monkey populations. The monkeys then invaded maize farms prompting poisoning that eventually led to their reduction. Other mammals and reptile species facing extinction are, Monitor Lizards, Mongoose, Hyenas and Warthogs.

4.6.11 Climate Related Disasters

Siaya County experiences a number of climate-related disasters in different magnitudes. Amongst the most serious of them is flooding experienced in Usonga and Mahawa swamp in West Ugenya.

Drought is also being experienced in the county. The frequency of occurrence has lately increased with the resultant effects of famine and crop failure. Disease epidemics especially cholera as a result of water pollution arising from faecal contamination and malaria due to poor drainages, open excavations and over-grown vegetation within human dwellings.

14.6.12 Deforestation

Population increase has led to a high demand for wood products and pasture land exerting undue pressure on the existing forest vegetation. Additionally the need for space for human settlements necessitates clearing of forests. Human encroachment into the non-gazetted forest areas such as Nyambare, Regea and Mbaga hill tops has also lead to deforestation. Unless controlled, the effects of deforestation would affect the county in loss of habitat, change in micro-climate and the general environmental ambience. This would be a setback on the county and national targets. Urgent intervention measures have therefore to be put in place for afforestation programmes to reverse the otherwise impending adverse effects.

4.7 Kakamega County

4.7.1 Position and Size

Kakamega County is located in the Western part of Kenya and borders Vihiga County to the South, Siaya County to the West, Bungoma and Trans Nzoia Counties to the North and Nandi and Uasin Gishu Counties to the East. The County covers an area of 3,051.3 KM2 and is the second populous county after Nairobi with the largest rural population. Figure 15 indicates the Position of Kakamega County on the Map of Kenya.

Figure 38: Map of Kenya indicating the location of Kakamega County

Source: Kenya National Bureau of Statistics (KNBS)

4.7.2 Physiographic and Natural Conditions

4.7.2.1 Physical and Topographic features

The altitudes of the County ranges from 1,240 metres to 2,000 metres above sea level. The southern part of the county is hilly and is made up of rugged granites rising in places to 1,950 metres above sea level. The Nandi Escarpment forms a prominent feature on the county's eastern border, with its main scarp rising from the general elevation of 1,700 metres to 2,000 metres. There are also several hills in the county such as Misango, Imanga, Eregi, Butieri, Sikhokhochole, Mawe Tatu, Lirhanda, Kiming'ini hills among others.

4.7.2.2 Ecological conditions

There are two main ecological zones in the county namely; the Upper Medium (UM) and the Lower Medium (LM). The Upper Medium covers the Central and Northern parts of the county such as Ikolomani, Lurambi, Malava, Navakholo and Shinyalu that practise intensive maize, tea, beans and horticultural production mainly on small scale; and Lugari and Likuyani where large scale farming is practised. The second ecological zone, the Lower Medium (LM), covers a major portion of the southern part of the county which includes Butere, Khwisero, Mumias East, Mumias West and Matungu. In this zone, the main economic activity is sugarcane production with some farmers practising maize, sweet potatoes, tea, ground nuts and cassava production.

4.7.2.3 Climatic conditions

The annual rainfall in the County ranges from 1280.1mm to 2214.1 mm per year. The rainfall pattern is evenly distributed all year round with March and July receiving heavy rains while

December and February receives light rains. The temperatures range from 18 0C to 29 0^C. January, February and March are the hottest months with other months having relatively similar temperatures except for July and August which have relatively cold spells. The county has an average humidity of 67 percent. Since the early 1960s both minimum (night) and maximum (day) temperatures have been on a warming trend throughout Kenya. Current projections indicate increases in temperature.

Recent trends show a marked increase in inter-annual variability and distribution of rains, with an increase in the number of consecutive dry days and shorter but more intense periods of rainfall resulting in an increase in frequency of floods. Future climate change may lead to a change in the frequency or severity of such extreme weather events, potentially worsening impacts. Increased average temperatures and changes in annual and seasonal rainfall will be felt across key economic sectors, such as agricultural production, health status, water availability, energy use, infrastructure, biodiversity and ecosystem services (including forestry and tourism). Impacts are likely to have disproportionateeffets on the poor as such groups have fewer resources to adapt to climatic change and vulnerability.

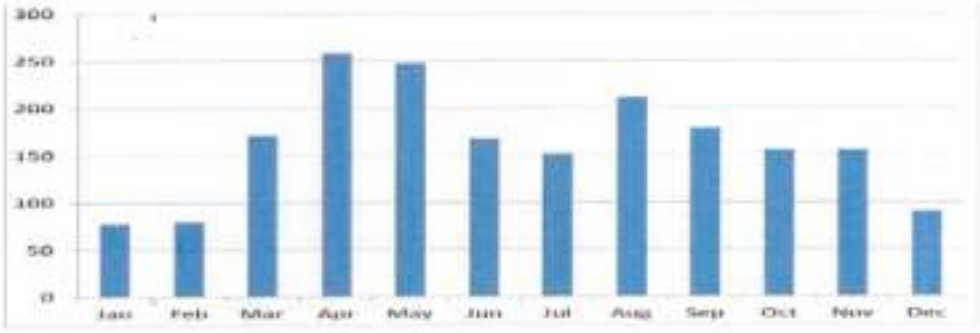

Figure 49: Kakamega Annual Rainfall Distribution

Source: Kenya Meteorological Department

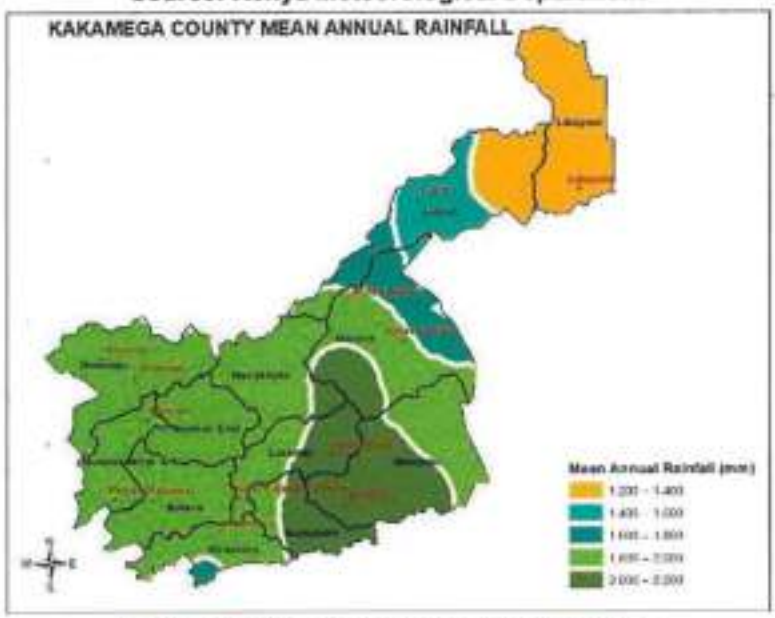

Figure 20: Rainfall variability by sub-county

Source: Kenya Meteorological Department

4.7.3 Administrative and Political Units

4.7.3.1 Administrative Subdivisions

The County comprises of twelve Sub-counties, sixty wards, one hundred and eighty seven Village Units and four hundred Community Areas. Map 2 below shows the County administrative units and their boundaries.

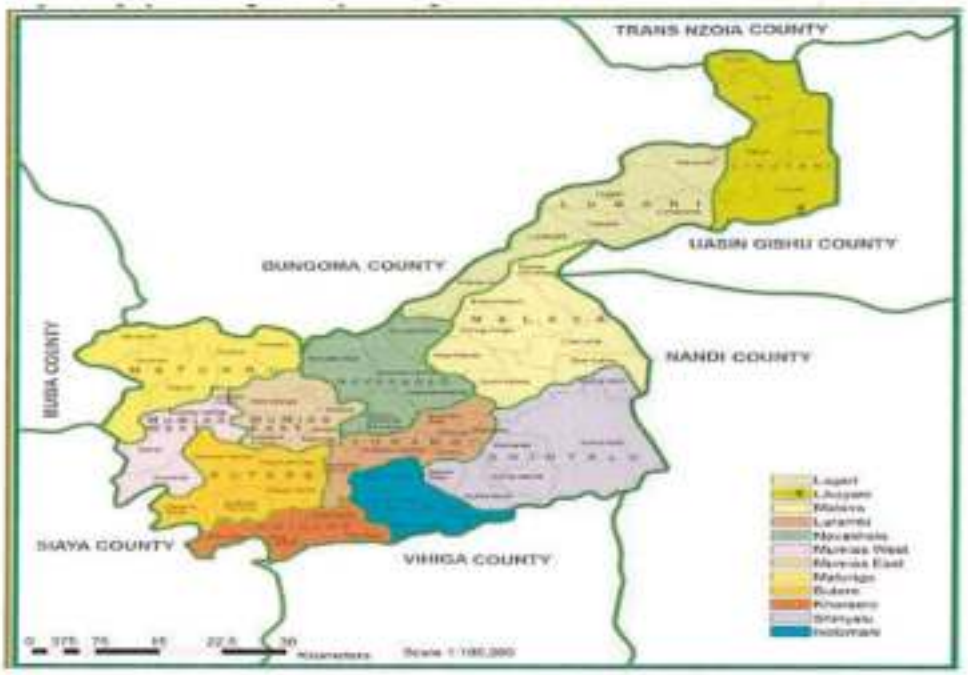

Figure 521: Map of Kakamega County showing the administrative Units

Source: Kakamega County Government

4.7.3 Political units

The County comprises of twelve constituencies with twelve elected Members of Parliament and sixty electoral wards with sixty elected Members of the County Assembly.

Table 13: Political units in Kakamega County

S/No.	Constituency	Wards	Number of wards
1	**Likuyani**	Likuyani	5
		Sango	
		Nzoia	
		Sinono	
		Kongoni	
2	**Lugari**	Lumakanda	6
		Mautuma	
		Lugari	
		Chekalini	
		Lwandeti	
		Chevaywa	
3	**Malava**	Manda-Shivanga	7
		Butali-Chegulo	

		Shirugu-Mugai	
		West Kabras	
		Chemuche	
		East Kabras	
		South Kabras	
4	**Navokholo**	Bunyala East	5
		Bunyala Central	
		Bunyala West	
		Ingotse/Matiha	
		Eshinoyi/Eshikomari/Esimeiyia	
5	**Lurambi**	Butsotso South	6
		Butsotso Central	
		Butsotso East	
		Shieywe	
		Mahiakalo	
		Shirere	
6	**Ikolomani**	Idakho North	4
		Idakho Central	
		Idakho South	
		Idakho East	
7	**Shinyalu**	Isukha West	6
		Isukha South	
		Murhanda	
		Isukha Central	
		Isukha North	
		Isukha East	
8	**Mumias East**	Malaha/Isongo/ Makunga	3
		Lusheya Lubinu	
		East Wanga	
9	**Mumias West**	Musanda	
		Etenje	
		Mumias Central	
		Mumias North	
10	**Matungu**	Mayoni	5
		Namamali	
		Koyonzo	
		Kholera	
		Khalaba	
11	**Butere**	Marama West	5
		Marama North	
		Shianda	
		Shianda	
		Marama Central	
12	**Khwisero**	Kisa Central	4
		Kisa West	
		Kisa East	
		Kisa North	
	Total		60

4.7.4 Infrastructure development

Infrastructure is an enabling environment for the county's socio-economic growth. The infrastructure facilities include road network, rail network, airports and airstrips, ICT, Housing and Water among others.

4.7.4.1 Road, Rail Network Road Network

Kenya Vision 2030 recognises the need for seamless road network connectivity to spur economic growth through infrastructure development. Despite the progress made in accelerating economic growth, the County still exhibits poor road network in terms of road condition, road expansion and road linkages thereby hindering effective access to the market and reducing mobility of factors of production. In a bid to enhance road connectivity, the county government is committed to improving road network by tarmacking and gravelling of major roads and ensuring frequent maintenance of the roads.

According to the Kenya Roads Board, KRB – RICS (Road inventory and Condition survey – 2015 report and the Kakamega county infrastructure status report (2016) the total inventory of roads in the County is at 4,451.3Km. This includes 2,236.17 Km for gravel, 1,308.90 Km for earth surface and 939.32 Km for narrow unpaved roads. The bitumen and gravel standard roads in the County stands at 307.5 Kilometres and 2,792.25 Kilometres respectively.

The county government has spearheaded the construction of 44.8 km and 1,700 km of bitumen and gravel roads respectively. In addition, a total of 589.5 km have been routinely maintained to ensure efficient road network. The ongoing construction of the Kisumu-Kakamega-Kitale road and the rehabilitated Kisumu – Ebuyangu - Mumias - Bungoma road by the National government will propel the county to a higher level of competitiveness leveraging on this opportunity for growth.

To further improve on road connectivity in its vast road network, the county has undertaken the construction of bridges on major rivers and culverts across river crossings that will render most of the roads passable. So far, 15 bridges and 12 box culverts have been constructed by the county government. For instance Khaunga Bridge which is 85-metre long and 10-metre wide connects Mumias East, Navakholo and Matungu Sub-counties has improved connectivity and ease movement of people and goods. It also links the County to Bungoma at Matungu thus boosting inter-county transport in a bid to accelerate growth of business.

4.7.4.2 Railway Network

The county has 35 km of railway line with two railway stations namely: Lugari and Butere. However, they are underutilized. There is need for collaboration with the Kenya Railways and other stakeholders to service and operationalize the railway to boost the county's economy.

4.7.4.3 Airport and airstrips

The county has two air strips, one in Kakamega and the other in Mumias. The strategic position of the county having proximity to the Kisumu and Eldoret International airports which

are 60 kilometers and 120 Kilometres respectively presents an opportunity for trade. There is need to upgrade and expand these airstrips.

4.7.5 Tourism and Wildlife

4.7.5.1 Main tourist attractions and activities

Kakamega County has one national park, no game reserve and two camping sites which are managed by the National government. The Kakamega Forest is also a big tourist attraction because of the large species of birds, butterflies and other animals' species. Kakamega County has a total area of 244.25 km^2 of Gazetted forest. Other tourism activities include bull fighting in Shinyalu and Ikolomani, cock fighting in Shinyalu, the dog market in Lubao, Malava, the crying stone in Ilesi, Lukova in Matete and Mawe Tatu in Likuyani. The county is also rich in cultural practices such as the existing Wanga Kingdom which attracts a number of people to the county. The county is in the process of identifying and gazetting all possible tourist attraction sites for development to make the county a tourist destination. This process targets six sites that have already been identified. There is need to Fast track gazettement process of these attraction sites such as the crying stone to improve access to these sites. Cultural Centres need to be established for bull fighting, Isukuti dances, wrestling and other cultural activities to attract tourists.

4.7.5.2 Main wildlife

The main wildlife in the county are monkeys, birds, snakes, baboons, hares, hippos, monitor lizards and colored butterflies. These animals are mainly found within Kakamega forest under the management of Kenya Wildlife service. There is need to establish a wild animal sanctuary to attract more tourists and protect rare species.

4.7.5.3 Wildlife conservation areas

The County has one national reserve and two camping sites. Kakamega Forest is also a big tourist attraction because of the large species of birds, butterflies and other animals' species the forest hosts. There is need to map out and explore other conservation areas in collaboration with the National wildlife service.

4.7.6 Forestry, Agro Forestry and Value addition

4.7.6.1 Main Forest types and size of forests

Forests are a major ecosystem found in Kakamega County. The County has two major types of forests namely planted and natural forests including the equatorial forest of Kakamega. The forests vary not only in composition but also cover as shown in the table 14.

Table 14: Gazetted forests in the County

Forest	Sub-County	Area(Ha)	Remarks
Kakamega Forest	Kakamega East	15,382.6	Natural Forest that was declared forest 1933
Kakamega Forest National Reserve	Kakamega East	3,984.9	It is natural forest under the management of

			KWS
Malava	Kakamega North	718.8	Natural Forest gazetted in 1933
Bunyala	Navokholo	825.6	Proclaimed forest in 1956
Lugari Forest Station	Lugari	2,163.0	Plantation forest Gazetted in 1977.
Turbo Forest Station	Lugari	9,534.0	Plantation forest gazetted in 1968 together with Nzoia Forest Station
Misango Hills	Khwisero	103.7	Gazetted on 28th February 2013. County Government supported Afforestation & Re-afforestation programmes

Kakamega County has a total of 32,712.6 hectares of gazetted forests. The natural forests are the richest in terms of plant and animal species. Kakamega forest for instance is not only rich in species but also harbor many endemic animals and species.

4.7.6.2 Ungazetted Forests

There are a few other un-gazetted forests on hill slopes/tops. These include Kambiri, Misango, Khuvasali and Ingolomosio. The County has intensified programmes to re-afforestate these critical areas which double as water catchment areas as well critical habitats.

4.7.7 Environment and Climate Change

4.7.7.1 Major degraded areas / hotspots and major contributions to environmental degradation

The major contributors to environmental degradation are poor waste management initiatives, lack of a designated waste disposal site, quarrying, poor land use practices, low degree of enforcement of the environmental laws and encroachment on the gazetted forest land, hill tops and slopes. Environmental degradation has had adverse effects on the lives of the people. This includes declining water volumes/ levels and drying of many springs and streams, unreliable weather patterns resulting in reduced farm yields, frequent flash floods and general rise in temperature,

4.7.7.2 Environmental threats

Kakamega County experiences a number of environmental sensitivities such as land degradation, heavy soil erosion, water pollution from sedimentation, eutrophication, industrial discharges, deforestation, illegal logging, and charcoal burning, water catchment destruction especially riparian lands, and landslides, loss of biodiversity and effects of climate change among others. Poor gold mining and sand harvesting technologies pose challenges in the areas of Ikolomani, Rosterman, Butere, Khwisero, Shinyalu and other areas. This results in large open pits left behind after the mining, sand harvesting and quarrying activities. Occasionally there is exposure to dust, noise in excessive levels in areas of quarrying. There is also poor management of waste material and garbage leading to physical problems with solid waste, water contamination and health hazards.

4.7.7.3 Environmental screening

The County government is fully committed to operationalizing the County Environment Committee that will help monitor environmental and social screening of development projects. The county will work very closely with the National Environment Management Authority (NEMA) on environment protection, promotion of environmental conservation, compliance, enforcement and monitoring. The department will ensure that major projects in the county undergo environmental impact assessments/audits and that the environmental monitoring plans are fully implemented.

The County will also ensure integration of climate change risks and renewable energy technologies into environmental assessments and county projects. The county will downscale and implement national policies on climate change to create resilience through adaptation, mitigation, policy and advocacy programmes to the residents. This will particularly be done in agriculture, transport, waste management, land use, water, energy, natural resource management and education sectors among others.

4.8. Laikipia County

Laikipia County is one of the 47 counties in the Republic of Kenya in the Central Rift Valley region. It is listed as county number 31. The County Headquarter is Rumuruti Town but it is temporarily hosted in Nanyuki since inception of devolution in 2013. Laikipia is a cosmopolitan County and largely rural in settlement. There are over 23 main communities settled in the county including Maasai, Samburu, Rendille, Somali, Pokots, Tugens, Asians, European, Meru, Kikuyu, and Turkana among others. "Laikipia" is a Maasai word equivalent to trees plain reflecting the large highland plateau.

4.8.1. Location and Size

Laikipia borders Samburu County to the North, Isiolo County to the North East, Meru County to the East, Nyeri County to the South East, Nyandarua County to the South, Nakuru County to the South West and Baringo County to the West. The County lies between latitudes 0^0 18" South and 0^0 51" North and between longitude 36^0 11" and 37^0 24' East. It covers an area of 9,462 km2 and ranks as the15th largest county in the country by land size. Map 1 shows the geographical position of Laikipia County in Kenya.

4.8.2. Population

The county's population was 518,560 in 2019 with 259,440 males and 259,102 females.

4.8.3. Physiography, climate & hydrology

The altitude of Laikipia County varies between 1,500 m above sea level at Ewaso Nyiro basin in the North to a maximum of 2,611 m above sea level around Marmanet forest. The other areas of high altitude include Mukogodo and Ol Daiga Forests in the eastern part of the county at 2,200 m above sea level. The County consists mainly of a plateau bordered by the Great Rift Valley to the West, the Aberdares mountain ridge to the South and Mt. Kenya to the South East.

The main drainage feature is Ewaso Nyiro North basin with its tributaries having their sources in the slopes of the Aberdares and Mt. Kenya. These tributaries include Nanyuki, Timau, Rongai, Burguret, Segera, Naromoru, Engare, Moyok, Ewaso Narok, Pesi and Ngobit rivers. The flow of these rivers matches the County's topography, which slopes gently from the highlands in the South to the lowlands in the North. The rivers determine to a large extent livelihood patterns in the county. In addition, there are two major swamps in the county namely; Marura Swamp which runs along the Moyot valley in Ol-Pajeta Ranch and the Ewaso Narok Swamp around Rumuruti town.

The South-western part of the county has the highest potential for forestry and mixed farming due to its favourable climatic conditions. The eastern and northern parts of the county are suitable for grazing while the plateau lying in the central and the northern parts of the county is suitable for ranching. The swamps have some agricultural potential if properly protected and managed. However, they are currently under pressure due to encroachment for human settlement and agricultural production.

The county experiences a relief type of rainfall due to its altitude and location. The annual average rainfall varies between 400mm and 750mm though higher annual rainfall totals are observed on the areas bordering the slopes of Mt. Kenya and the Aberdare Ranges. North Marmanet receives over 900mm of rainfall annually; while the drier parts of Mukogodo and Rumuruti receive slightly over 400mm annually. The Laikipia plateau receives about 500mm of rain annually, while Mukogodo Forest receives an average rainfall of about 706mm annually.

The long rains occur from March to May while the short rains are in October and November with slight variations of two to three weeks in some seasons. The parts neighbouring Aberdare Ranges and Mt. Kenya form an exception to this pattern as they receive conventional rainfall between June and August because of the influence of the trade winds. The annual mean temperature of the county ranges between 16^0 C and 26^0 C. This is as a result of relief and trade winds resulting to cooler conditions in eastern side which is near Mt. Kenya and hotter in the low-lying areas in the North. The western and southern parts of the county have cooler temperatures with the coolest month being April and the hottest month being February. The average duration of sunshine is between ten and twelve hours daily. The average wind velocity is in a general East to West direction.

4.8.4. Biodiversity

The county is endowed with pastureland, rangeland, forests, wildlife, undulating landscapes and rivers among others. The high and medium potential land constitutes 20.5 per cent of the total county's land area making it suitable for crop farming. The remaining 79.5 per cent is low potential and suitable for livestock and wildlife. The major soils in the county are mainly loam, sand and clay. Black cotton soil which has inherent fertility spreads in most parts of the plateau. The dark reddish brown to red friable soils and rocky soils are mainly found on the hillsides.

The county has gazetted forest area totalling to 580 Km2 comprising of both the indigenous and plantation forests. The indigenous forests include Mukogodo and Rumuruti while

plantation forests include Marmanet and Shamaneik. Laikipia County is richly endowed with wildlife widely distributed in most parts of the county extending to Aberdare, Samburu, Meru and Mt. Kenya wildlife corridors. Most of the wildlife is found in the large scale private ranches, which occupy over 50 per cent of the total area of the county. The rest is found in-group ranches predominantly owned by the Maasai, in the gazetted forests of Mukogodo, Rumuruti and Marmanet and other uninhabited tracts of land in the county.

Laikipia County has the greatest number of wildlife outside the gazetted protected areas in the country. The predominant species include: elephants, giraffes, burchelles zebras, rhinoceros, Thompson gazelles, impalas, buffaloes, lions, elands and grevy zebras and other smaller species also in abundance particularly the African wild dog and gazelles.

4.8.5. Economic sectors

The main economic activities are crop farming, livestock rearing, tourism, retail and wholesale trade. The County is a member of two proposed regional economic blocs namely Mt. Kenya and Aberdares. Laikipia has strong relationships with Amaya Triangle and Frontier Counties Development Council.

Laikipia County has estimated 13,600-licensed MSMEs and 52,400 unlicensed MSMEs totaling to 66,000. These are in agriculture and forestry, whole sale trade, retail trade, repair of motor vehicles, repair of motor cycles, accommodation and food services, construction, information and communication, arts and music, professional and technical services.

The main commodity markets in the county are in Nanyuki and Nyahururu whereas main livestock markets are at Rumuruti, Doldol and Kimanjo. Other market centers include Olmoran, Sipili, Wiyumiririe, Lamuria and Debatas.

Industrial zones are established with Nanyuki and Nyahururu towns. Rumuruti town has also planned industrial zone with no activities. There are seven jua kali associations with 344 artisans who are involved in welding, fabrication, carpentry among other activities.

4.8.6. Transport infrastructure

The total classified road network in the county is 1,038.1 Km out of which over 80 per cent are feeder roads. The bitumen, gravel, and earth surface stand at 207.3, 328.9 and 501.9 kilometres, respectively. The major transport routes serving the county are Nairobi-Isiolo-Marsabit (A102), Gilgil-Rumuruti (C55), Rumuruti-Mararal (A2) and Nakuru-Nyeri (B65). There exists an old railway network in covering 23 kilometres serving Nanyuki Town and a small stretch of about 2 Kilometres in Nyahururu Town. The county is served by 1 airstrip near Nanyuki Town. There are several landing grounds across the county majority of which are within main private ranches.

The county is served by four main post offices located at Dol Dol, Rumuruti, Nanyuki and Nyahururu and one substation at Kinamba. The percentage of households owning mobile as of projections in 2014 was 69.9 per cent. Households with access to internet based on 2009 population and housing census was 4.8 per cent. The length of the National Fibre Optic Back bone infrastructure in the county is estimated at 80 km serving Nanyuki, Nyahururu and

Rumuruti Towns. The courier services are mainly provided by G4S, EMS, Securicor, Wells Fargo and PSVs. Based on the 2009 population and housing census, radio ownership is estimated at over 78.7 per cent whereas television sets ownership is estimated at 31.7 per cent of total households. There is one Huduma Center based at Nanyuki.

The national power grid serves 156 trading centres and is yet to reach 24 centres. The households using electricity for lighting constitute 17.7 per cent of the total households. The Last Mile Connectivity Programme has helped upscale access for the rural households. The county has several learning institutions, health facilities and boreholes supported by solar energy .Being a semi-arid county, reliable sunshine throughout the year provides high potential for harnessing of solar energy. There are also opportunities of upscaling biogas and wind energy.

It is estimated that 66.5 per cent of the households own the homes they live in. Most of the population is sheltered in semi-permanent structures that consist of timber walls, earthen floors and corrugated iron-sheets roofs. Over 80 per cent of the shelters have corrugated iron sheets for roofs. Similarly, the largest percentage of walling material is wood recording 46 per cent of total households. Majority of the households have earthen floors as represented by the 65.7 per cent of the total households.

The mass of waste generated in Nanyuki and Nyahururu per person per day lies between 250g- 1000g with an average of 0.45 kg/person/day and its density varies from 100kg/cubic metres to 600kg/cubic meters. Nanyuki, Nyahururu and Rumuruti towns have established solid waste management system with designated dumpsites, refuse collection trucks and staff. On waste disposal 11,321 and 3,052 of the households and commercial entities respectively in the county, have their waste collected by the county government, about 59 per cent use waste pits whereas only about 15 per cent use crude damping. Only about 0.01 percent of the households use private waste collectors.

There are 507 small water clusters that provide services in market centres, institutions and Settlement schemes.

The health infrastructure consists of five sub county hospitals at Kimanjo, Ndindika, Lamuria, Doldol, Rumuruti and two County referral hospitals; Nanyuki and Nyahururu. The county has six public health centres and four FBO managed health centres. There are 64 public dispensaries, 12 FBO managed dispensaries, 10 NGO managed dispensaries and 36 private run clinics. In addition, there are four private hospitals, one nursing home; one private health centre, six private dispensaries and 35 private clinics. The County government has 425 nurses, 71 public health officers, 76 clinical officers, 13 nutritionists 111 Doctors and 51 laboratory technologists. The doctor-population ratio stands at 1:4432 while the nurse-population ratio is 1:1157.

4.9 Nyandarua County

4.9.1 Overview

Nyandarua County is located in the North-Western part of former Central Province of Kenya. The County is connected to Uganda and Tanzania by primary roads: Ol'Kalou-Miharati-Engineer Road (B20) and Ol'Kalou-Gilgil road (A4) that join the Nairobi-Nakuru Transnational Highway (A8) at Nakuru and Gilgil respectively. The highway then connects the County to Uganda via Eldoret, Webuye and Malaba and to Tanzania via road (A12) through Kisumu, Migori and Isebania. The locational advantage opens up vast trading and investment opportunities within East Africa due to an enlarged market and the ease of transporting raw materials as well as finished products.

4.9.2 Nyandarua County in the National Context

Nyandarua County lies in the central part of Kenya between latitude 0°8' North and 0°50' South and between Longitude 35° 13' East and 36°42' West. It is linked to the other counties through the major trunk roads. To Nairobi, it is connected via (A8) to Mombasa, and to Kisumu via (A12). Ol'Kalou, the County headquarters, is situated about 150 kilometres North West of Nairobi. Ol'Kalou town has strong economic ties with other regional towns such as Nyahururu, Gilgil, Naivasha, Kiambu, Embu, Nakuru and Nyeri. The major economic activities in the County include farming, quarrying and trade. Agriculture is the backbone of Nyandarua's economy due to the fertile soils and favourable climate. It is considered the food basket of Kenya because of its high production of potatoes, cabbages, carrots, peas and milk that are sold in Nairobi and most other towns in the country. The County is an aspiring member of the Mt Kenya and Aberdare Regional Economic Bloc being considered.

4.9.3 Nyandarua County in the Regional Context

Nyandarua borders Nyeri to the East, Laikipia to the North, Nakuru to the West, Murang'a to the South East and Kiambu to the South. The County is mainly linked to the major town centres in the region (Nakuru, Nyeri and Nyahururu) by road, the dominant mode of transport. The Ol'Kalou-Miharati-Engineer Road, class (B20) traverses the entire County of Nyandarua, from Dundori to Njabini. It connects to the Nakuru-Nairobi (A8) Highway to Nakuru (via Dundori) as well as the capital city, Nairobi. The County is linked to Nyahururu and Gilgil (in Nakuru County) by the (A4) road which then connects to the Nyahururu-Nyeri Road; class B21. The C487 road connects Ol'Joro Orok to Dundori through Charagita centre. Road D1323 links Engineer and Naivasha facilitating movement from Nyandarua to Nakuru County. The airstrip in Ol'Joro Orok Sub-County links the County to surrounding air transport facilities. The railway line connects the County to Nyahururu and Gilgil towns which is currently under rehabilitation.

Nyandarua County covers an area of 3,245.2 Square Km lying between latitude 0°8'to the North and 0°50'to South and between 35° 13'East and 36°42' West. Nyandarua County is divided into five Sub-Counties namely: Ol'Kalou, Kinangop, Kipipiri, Ndaragwa and Ol'Joro Orok and further into twenty five Wards. Kinangop is the biggest Sub-County with eight Wards. Kipipiri, Ol'Kalou and Ol'Joro Orok have four Wards each, whereas Ndaragwa has five Wards. The major urban centres in the County are Ol'Kalou, Njabini, Engineer and Mairo Inya. Other vibrant centres include Ndunyu Njeru and Miharati.

4.9.4 Physiographic and Natural Conditions

4.9.4.1 Physical and Topographic Features

The topography of Nyandarua County is a mixture of plateaus and hilly areas. The County's physiography was a result of volcanism and faulting that created the major land forms namely: the Great Rift Valley to the west and the Aberdare ranges to the east. The highest point of the Aberdare Ranges is about 3,999 metres above sea level. The lowest parts include Lake Ol'Bolossat, Leshau and the northern part of Central Ward, lower Kaimbaga and the western parts of Kipipiri, Githioro and Murungaru Wards. The flat areas include Kinangop and Ol'Kalou/Ol'Joro Orok plateaus.

Over time, rock weathering has transformed the Aberdare ranges, which dissected the slopes into shallow valleys and the gorges with deep and well-drained soils. As they approach Ol'Kalou and Kinangop plateaus, these valleys flatten with only a few gorges draining river water down the escarpment and onto the floor of the Rift Valley. Ol'Kalou Salient Plateau in the north and Kinangop Plateau to the south stretch north-south between the Aberdare ranges and a system of fault scarps which form the escarpment. Dundori Hills represent a high weathering resistant block of scarp. The two plateaus extend to about 80 km from north to south and about 40 km wide north of Ol'Kalou town.

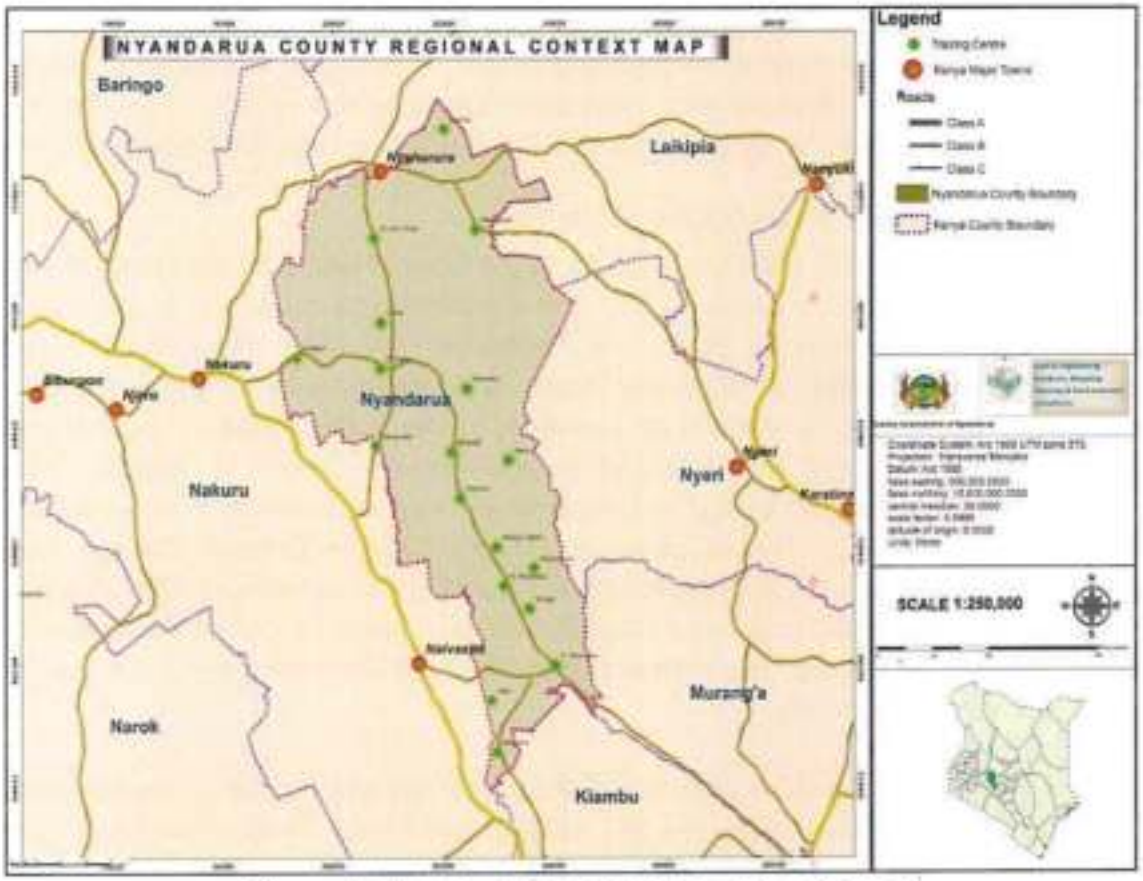

Figure 22: Regional Context of Nyandarua County

Gentle slopes interrupted by low hills flatten into marshlands and swamps. The rest of the land is well-drained and has fertile soils. The soils in the County are of volcanic origin and

vary in both fed distribution. Soils in the Kinangop and Ol'Kalou plateau are poorly drained clay loams. However, Ndaragwa, northern part of Ol'Joro Orok and Ol'Kalou has well drained clay loams. These soils have different crop production potentials.The plateaus contain the key settlement zones where development in the County is carried out.There are eight permanent rivers; Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi and Kitiri. Lake Ol'Bolosat which is the largest water mass in the County is fed by streams and underground water seepage from the Aberdare and Dundori hills. Human activities and clearing of the catchments areas for settlement has affected its natural refilling system and its existence is threatened.

The Aberdare Ranges are one of the country's major water catchment areas. Moreover, the Aberdare ecosystem constitutes of a dense forest with several animal species including elephants, baboons, Columbus monkeys, tree and ground squirrels, porcupines and many bird species. On the slopes of the Aberdare ranges are also the Mau Mau caves in Geta and Kimathi. The ranges offer great potential for local and foreign tourism in the County as they border the Aberdare National Park to the east and can be developed as nature trails and for mountain climbing.

4.9.4.2 Ecological Conditions

Some areas in the County are in the highland savannah zone, characterised by scattered trees with expansive grass cover. In elevated areas, tree cover increases forming thick forests with thick undergrowth. However, most of the natural vegetation has been cleared leading to environmental hazards such as environmental degradation which has claimed large portions of arable land. This has had some negative effects such as reduced rainfall, soil erosion, reduced soil fertility, poor health and reduced food production.

4.9.4.3 Climatic Conditions

4.9.4.3.1 Rainfall

Nyandarua County has a cool and temperate climate with reliable rainfall which is generally well distributed throughout the year. In a typical year, the County experiences two rainy seasons: long rains from March to May with a maximum rainfall of 1,600 mm and short rains from September to December with a maximum rainfall of 700 mm. The average annual rainfall of the County is 1,500 mm. The major relief features which consist of Kinangop plateau, the Ol'Kalou Salient Plateau, the Aberdare Ranges and the Dundori Hills influence rainfall distribution in the area, with areas like Njabini and South Kinangop receiving higher amounts of rainfall while areas of Ndaragwa and Ol'Kalou receive comparatively low rainfall. Areas near the Aberdare slopes receive sufficient rainfall with the plateau receiving scanty and erratic rainfall.The average monthly rainfall in selected centres within Nyandarua County is shown in the table below.

Table 15: Rainfall in Selected Centres in Nyandarua County

	Average Rainfall (mm)											
Station	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Ol'Kalau	26	23	46	108	103	83	100	116	68	68	83	35
Ol'Joro	29	30	52	121	11	90	130	148	74	59	87	57

Orok												
Engineer	53	64	108	221	184	73	59	75	67	117	143	84
Njabini	66	84	146	309	257	83	60	70	67	141	194	96
Miharati	35	39	70	156	125	68	73	91	62	89	109	61
Ndaragwa	33	35	59	115	81	66	101	111	53	57	95	69

Source: https:en.climate-data.org, 2017

Winds in Nyandarua generally blow from East to West. The average speed is about five knots. Frost also occurs in the wee hours of the morning and its effects are felt more in zones bordering the Aberdare Ranges.

4.9.4.3.2 Temperature

The County has a moderate temperature. High temperatures, which are low by national average, are experienced between December and March with the lowest temperatures occurring in July. The highest temperature in December has a mean average of 21.5 degrees centigrade while the lowest in July have a mean average of 7.1 degrees centigrade. Variation of the temperature has adverse effects especially on maize cultivation; when cold air during clear nights on the moorlands of the Aberdare Ranges flows down the Kinangop and Ol'Kalou Plateaus it causes night frost almost monthly. These temperatures range between 1o C and 2o C and last a few hours before sunrise (Nyandarua District evelopment Plan, 2001).

4.9.5 Administrative and Political Units

4.9.5.1 Administrative Sub-division

The County is divided into five Sub-Counties (constituencies) namely Kinangop, Kipipiri, Ol'Kalou, Ol'Joro Orok and Ndaragwa. Table 13 shows the County administrative units in terms of constituencies, Sub-Counties and Wards. Kinangop is the largest Sub-County covering 822 km^2 with 8 electoral Wards is the largest. The other Sub-Counties are Kipipiri with 4 Wards, Ol'Kalou with 5 Wards and Ndaragwa with 4 Wards. Ol'Joro Orok Sub-County covering 389.1 mm^2 with 4 Wards is the smallest.

Table 16: Area of the County by Sub-Counties and Ward

Constituency	Sub-County	No. of Wards	Area(km^2)	Total population	Population density
Kinangop	Kinangop	8	822.0	229,911	245
Kipipiri	Kipipiri	4	543.7	113,938	209
Ol'Kalau	Ol'Kalau	5	586.7	143,748	215
Ol'Joro Orok	Ol'Joro Orok	4	389.1	114,302	261
Ndaragwa	Ndaragwa	4	653.6	110,697	17
	Aberdare Forest		250.1		
Total			**3,245.2**	**712,596**	**947**

Source: County Commissioner's Office, Nyandarua County, 2018

4.9.6 Demographic Features

4.9.6.1 Population Size and Composition

The population of the County at the last population census of 2009 was 596,268 persons, comprising 292,155 (49%) males and 304,113 females (51%) (Kenya National Population

and Housing Census, 2009). The projected population in 2018 is 712,596 persons; comprising 349,152 males and 363,443 females as shown in Table 1.4 below. At the projected population growth rate of 2% annually, the population is expected to grow to 771,336 persons by 2022 with 43 % of the population being below 15 years and over 69% of the population below 30 years. The County has a total number of 143,879 households. Kinangop Sub-County has the highest number of households with a population of 192,379 persons whereas Ol'Joro Orok has the least number, with 85,825 persons in 22,071 households. Kinangop Sub-County was formerly divided into Kinangop North and Kinangop South divisions.

4.9.7 Infrastructure Development

Infrastructure is the main backbone of an economy. It facilitates access to markets impacting on agriculture and utilities such as health, among others. Infrastructure facilitates efficient and effective resource utilisation and distribution of goods and services within and outside the geographic zone. Proper infrastructure stimulates growth and development and improves the living standards of the citizenry.

Efficient and reliable infrastructure is required to stimulate economic activities in Nyandarua. Expansion of the infrastructure by building new ones as well as repairing existing ones; and ensuring regular maintenance of roads, telecommunication facilities and electricity are essential for sustainable development.Unlike other counties in central region of Kenya, Nyandarua is a settlement area. After independence, the former White Highlands were opened up and Africans were settled largely through the Settlement Fund Trustee (SFT) and to a lesser extent, through land buying companies. While other counties benefited from an elaborate road classification, Nyandarua did not because it was under the SFT.

About 680.8 km of all County roads, representing 54.7 per cent of all classes of roads, fall under this category. These roads serve a large portion of the population but received very little from previous Governments. The Government's settlement roads construction programme collapsed in 1980 and the department of public works took over these roads for routine maintenance. However, allocation per kilometre was very low as these were considered minor roads.

4.9.7.1 Air transport

The County has a paved airstrip at Gatimu owned by the Government which operates for strategic purposes only and currently has no commercial importance. The airstrip is inadequately serviced and has minimal operations. Ways of revitalising this airstrip to extend its activities for commercial and tourism use should be explored.

4.9.7.2 Railway transport

There is a 60 kms long metre gauge rail connecting Gilgil to Nyahururu that passes through the Nyandarua County with stations in Ol'Kalou and Ol'Joro Orok. Currently, the railway line, which was constructed in 1927, is in disuse and some of its infrastructure have been vandalised. It was constructed to transport milk, livestock, wool and cereals from Nyandarua and Laikipia to the rest of Kenya. The railway line collapsed due to the failure of KCC as the

Nyahururu plant used to be the main client; increased tariffs and low turn-around period has diverted clients to use roads; and inbreeding of sheep resulted in a decline in wool production.

4.9.8 Tourism and Wildlife

4.9.8.1 Main Tourist Attractions and Activities

Although the County is within the Mt Kenya and Aberdare Ranges tourist circuits, tourism remains undeveloped. The County is richly endowed with abundant game for tourist attraction. The main tourist attraction sites include: the Aberdare National Park which has abundant wildlife and recreational activities including mountain climbing and nature trails; Lake Ol'Bolosat which is ideal for bird and hippos watching, boating, water surfing activities and sport fishing; pre-colonial and colonial times settlements where there exist "White Mischief Happy Valley Homes" at the foot of the Aberdare forest where the colonialists lived; the Mau Mau caves at Geta and Kimathi which some Community Based Organisations have endeavoured to preserve; and other attractions including scenic terrains, waterfalls, rivers and forests.

4.9.8.2 Main Wildlife

The wildlife in the County is mainly found in the park, forests and at lake Ol'Bolosat. The Aberdare National Park has abundant wildlife which include elephants, hippopotamus, cheetahs, lions, leopards, monkeys, wild pigs, baboons, water bucks, Thompson's gazelles, zebras and hyenas. Lake Ol'Bolosat has hippopotamus in addition to a large population of bird species, in particular the Sharpe's long claw eagle, one of the threatened bird species, can also be found here.

4.9.8.3 Wildlife Conservation Area

The County wildlife conservation areas include the Aberdare National Park and forest which covers an area of 767 square km^2 and Lake Ol'Bolosat covering about 33 km^2. The gazettement of Lake Ol'Bolosat as a protected area is currently in progress. The Aberdare National Park is managed by the Kenya Wildlife Service (KWS).

4.9.8.4 Total Number of Tourists Visiting Attraction Sites Annually

An estimated 6,000 visitors visit the Aberdare National Park and Lake Ol'Bolosat. These visitors are estimated to generate Kshs.100 million in terms of revenue. It is projected that the County will receive 9,000 and 12,000 visitors annually by 2020 and 2022 respectively. The projected earnings from these visits are expected to hit Kshs.180m and 240m annually in 2020 and 2022 respectively.

4.9.9 Forestry and Agroforestry and Value Addition

4.9.9.1 Main Forest Types and Size of Forests (Gazetted and Un-gazetted Forests)

Total gazetted forest area in the County is 49,916.2 km^2 which is concentrated in the western side of the Aberdare Ranges. The main forest areas include four forests, namely Ndaragwa (13,233.5 ha), Lake Ol'Bolosat (3,326.9 ha), Geta (19,884.3 ha), North Kinangop (6,811.5

ha) and South Kinangop (6,660 ha). The gazetted forest areas also include Lake Ol'Bolosat wetland which covers 33.3 sq. km. Out of the total gazetted forests, plantation type of forest covers 84.3 sq. km, natural forests area 21.2 sq. km, grassland 39.4 sq.km, bush land 84.35 sq.km and bamboo 77.01 sq.km.There are non-gazetted forests in the County namely Muruai, Kirima, Kaimbaga Extension, Mawingu, Salient and Malewa Tree Nursery as well as two presidential tree parks within Ol'Kalou urban centre.

4.9.9.2 Main Forest Products: Gazetted and Un-gazetted forests

The main forest products are livestock fodder (grass), timber, poles and fuel wood. These are both from gazetted and non-gazetted forests. As many households in the County use firewood and charcoal as cooking fuel, there is a need to explore more sustainable sources of energy in order to sustain and increase the County's forest cover.

4.9.9.3 Agroforestry

One of the Governor's undertakings in the manifesto is engaging friendly forest communities in reforestation, commercial agro forestry and developing cottage industries for forest products.

(a) Income generating activities including farm forests

A number of farmers and institutions have been able to establish woodlots in their farms. The total area under farm forestry is estimated to be 97.36 Km2 and is increasing. Most of the trees planted on farms provide a source of income when they are sold to saw millers. For instance, under plantations, the County has 27.95 sq.km of cypress, 11.2 sq.km of pine and 6.6 sq.km of eucalyptus. Some of these are sold to the Kenya Power and Lighting Company.

(b) Protection of water catchment areas

The activities on protection of water catchment areas include riverine tree planting, sensitisation of Community Forest Associations (CFA) on Forest Protection for sustained benefits from the Forest, enforcing conservation efforts by arresting and prosecuting offenders, involving all other stakeholders and relevant arms of Government as well as adequate facilitation of the responsible officers.

(c) Prevention of soil erosion

In addition to riverine tree planting, degraded sites in farmlands need to be rehabilitated and steep slopes in river banks continuously planted with indigenous trees while gazetting steep slopes and hilltops as conservation areas.

4.9.10 Environment and Climate Change

4.9.10.1 Major Degraded Areas/Hotspots and Contributors to Environmental Degradation

There are several contributors to environment degradation in the County. These include: degradation of Lake Ol'Bolosat due to encroachment and pollution from human settlements and agricultural activities; increased quarrying activities which have caused loss of

vegetation cover and topsoil making topsoil vulnerable to erosion; threats to forests due to excessive logging, charcoal production, cultivation, settlement, and forest fires; blocking of natural waterways by farmers resulting in increased volumes of water in fewer waterways leading to increased erosion and flooding; and poor waste management, both liquid and solid waste.

4.9.10.2 Environmental Threats

There are environmentally-sensitive areas which play a critical role in nature where they serve as habitats to a wide range of species. They also aid in absorption of natural pollution, i.e., carbon sinks. Such areas are invaluable and require conservation. They include: riparian reserves, lakes, wetlands, forests and open/green spaces in urban areas. The main ecologically sensitive areas in Nyandarua County are: Lake Ol'Bolosat, The Malewa river ecosystem, Kinja River, Nyairoko River (which has a wetland along its course), Aberdare Forest and Ndaragwa Forest. Other forests are Ol'Bolosat, Geta, North Kinangop and South Kinangop.

Threats facing ecological areas in Nyandarua include: tree species like blue gum that dry up the wetlands; encroachment on riparian reserves; encroachment and pollution of Lake Ol'Bolosat from human settlements and agricultural activities; increase in unregulated quarrying activities (especially in Ol'Kalou, Kipipiri and Kinangop) and sand harvesting in Miharati; silting of dams and rivers; deforestation particularly in Ndaragwa and areas close to the Aberdare Ranges; uncontrolled logging/burning of charcoal causing air pollution, degradation of the forest and wild fires; and over-reliance on wood fuel: 77.6% of households use firewood, 19.4% use charcoal for cooking.

4.9.11 High Spatial and Temporal Variability of Rainfall

The County has witnessed a change in climate over the years. The weather patterns have changed. Previously, the County experienced rainfall throughout the year but nowadays there are two distinct rainy seasons with the long rains in March to May and short rains from September to December. This change in weather patterns has also changed the farming patterns in the County as some areas such as Ndaragwa experience some periods of drought and famine. Cases of crop failure have also been common due to extremely low temperatures at night leading to frost bite. Livestock farming has also been affected leading to reduced productivity especially for dairy and beef products. Cases of disease incidences, e.g. malaria is now common unlike in the past when the County was considered a malaria free zone.

4.9.12 Solid Waste Management Facilities

Solid Waste Management in Nyandarua is characterised by: Low implementation of environmental laws; Poor practices such as indiscriminate dumping and lack of waste segregation. The main waste include: domestic, industrial and medical waste. To comply with National Solid Waste Management Strategy Standards, the County will need to zone off waste collection areas; ensure timely and regular collection of all wastes and provide waste collection facilities; ensure that collected waste is transported to designated sites for waste disposal; gazette a County dumpsite and accelerate the process of purchasing land for

dumpsites in Ndunyu Njeru and Engineer Market and increase the number of garbage collection trucks.Urban areas are the largest generators of liquid waste. However, all the urban areas in the County luck sewerage networks posing a risk of contamination and ill-health. The major sources of liquid waste are households, institutions, commercial establishments and light industries. The wastes mainly include blackwater, sullage and waste from industrial processes. Most of the households, 84.1%, rely on pit latrines for sewage disposal. A majority of the households, close to 74.2%, pour waste water in their compounds.

4.9.13 Climate Change Mitigation Measures and Adaptation Strategies

The County Government in collabouration with other stakeholders will need to enhance mechanisms for: enforcing the laws and regulations regarding encroachment of river banks, forests, wetlands and other riparian reserves; repossessing of illegally acquired forests, riverbanks and wetlands where they have been grabbed; gazettement and de-silting of the lake to enhance retention of the lake and reduce human wildlife conflict; promote tree planting both at the farm level and public land; promote the carbon credit trading programmes; development of alternative sources of energy including biogas, solar, electricity, energy saving jikos; encouraging farmers to move from range management of livestock to zero grazing; promote greenhouse farming for enhanced productivity; encourage farmers in the drier areas of Ndaragwa, Kipipiri and Ol'Kalou to adopt high value drought resistant crops and irrigation farming; and construction of multipurpose dams for farming, livestock watering and power generation.

Strategies employed by the County Government to curb deforestation include: Establishment of plantation forests in gazetted forest areas; provision of advisory information to tree growers; promotion of the establishment of commercial woodlots; urban and roadside tree planting and beautification; and promotion of efficient wood and energy utilisation technologies.

4.9.14 Water and Sanitation

4.9.14.1 Water Resources and Quality

The County is categorised as water scarce. The situation has been aggravated by degradation of water catchments leading to reduced ground water recharge. As a result, boreholes have medium to low yields. The main source of water in the County is rainwater which ends up in dams and rivers. A total of 22 rivers flow through Nyandarua County, of which eight are permanent, namely Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi and Kitiri.Lake Ol'Bolosat, which is the only lake and the largest water mass in the County, is fed by streams and groundwater seepage from the Aberdare and Dundori hills. Human activities and clearance of the catchment areas for settlement have affected its natural replenishment system.The major rivers within the County originate in the Aberdare forest and drain to the Ewaso Ng'iro, Rift Va lley, Tana and Athi catchments.The County experiences two rainy seasons with the long rainy season from March to May, with a maximum rainfall of 1,600 mm and short rainy season from September to December, with a maximum rainfall of 700 mm.Rainfall intensity varies according to the location. Areas near

the Aberdare slopes receive sufficient rainfall, whereas rainfall in the lower parts of Ndaragwa and the plateau is scanty and erratic.The County has one lake, about 222 small dams, 280 boreholes, 6,244 shallow wells and 96 springs. Main source of water for domestic use is small dams and shallow wells. Most of the water used is untreated which poses a health risk to the population.

4.9.14.2 Water Resources Management

There are two registered water companies in the County, namely Nyandarua Water and Sanitation Company and the Ol'kalou Water and Sanitation Company, in addition there are several community managed water supply schemes. However some areas in the County are not covered by these schemes and therefore remain unserved. The water supply schemes are unreliable requiring augmentation and rehabilitation to increase the number of households with access to piped water.

4.9.14.3 Water Sources and Access

About 46,400 households have access to piped water. Most of the households depend on water from shallow wells, dams, springs, roof catchment and rivers.

4.9.14.4 Sanitation

Sanitation encompasses maintenance of personal hygiene, safe disposal of liquid and solid waste, control of disease vectors, provision of safe drinking water and provision of hygienic shelter. The main form of disposal of human waste is pit latrines, 92 % of the households have latrines, 3% have flush toilets and there is no sewerage system in the County. On the other hand, 32.8% of Nyandarua's households dispose of their solid waste at garbage pits while 28% of households burn their waste and 25% dispose it in their gardens. The County Government collects garbage for only 2% of the households.There is need to develop sewerage systems for the major urban centres of Ol'Kalou, Mairo-Inya, Engineer and Njabini and provide regular and adequate systems for the disposal of waste for other urban centres and at individual household level

Chapter 5: Stakeholder Consultation and Public Participation (CPP)

5.1. Introduction

Public participation is basically concerned with involving, informing and consulting the public in planning, management implementation and other decision-making activities. Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. It encompasses the public actively sharing in the decisions that government and other agencies make in their search for solutions to issues of public interest. Stakeholder engagement activities have been undertaken in compliance with the Kenyan environmental law (EMCA, 1999 and EIA/EA Regulations 2003) and related World Bank guidelines. (ESS10). The legal and regulatory framework makes adequate provisions for public consultation and disclosure. The legal requirements provide the entry points for effective stakeholder engagement throughout the ESIA process and subsequent Project implementation

5.2. Aims of Public Participation/consultation:

- Public Participation Forms Collaborating with the public to develop decision criteria and alternatives and identify the preferred solution;
- Involving the public to ensure their concerns are considered throughout the decision process, particularly in the development of decision criteria and options;
- Consulting with the public to obtain their feedback on alternatives or decisions;
- Informing the public by providing information to help them understand the issues, options and solutions.

5.3. Approach to Stakeholder Consultation and Public Participation

The Environmental Management and Coordination Act (EMCA, 2015) and its subsequent Environmental Impact Assessment and Audit Regulations, 2003 underscores the need for stakeholder participation in the ESIA process. Residents of a proposed project have to live with the project if implemented. They have the most to gain if the project impacts are beneficial to them. Conversely, they have the most at stake if the project goes awry. Not just residents but for projects whose impacts have a wide geographical spread, distant communities need to be involved. Stakeholder input is thus vital at the earliest stage possible in project development and should continue throughout the project cycle.

The approach was based on five key principles:

i. **Inform** - information dissemination about the proposed road construction and expansion geared towards authenticity, unbiased and timely passage of information to the public and all interested parties. The approach was achieved through public notices, invitation letters, public meetings, print media, announcement, websites and workshops.

ii. **Involve** - the need to include all stakeholders in decision making through consensus building and forums. This provided a platform to understand and prioritize their concerns.

iii. **Consult** - a consultation process that solicited stakeholders' feedback about the project life cycle as well as their inputs on the initial stages of the proposed activities, analysis of impacts and identification of priorities.

iv. **Collaborate** - to enhance consensus building as collaboration brings the stakeholders together, creating opportunities, sharing agreements/disagreements and understandings

v. **Empower** - integrating stakeholders into governance structures, committees and board members of the proposed project. To give them first-hand information on and enhancing opportunities to participate in crucial decision making, this principle is expected to be followed up on later stages of the project.

Plate 1: Members of Ol joro Orok community representatives discuss the project at the chief's office Ol Joro Orok

5.4 Identification of Stakeholders

Like in all civil works projects, the core stakeholders comprise people to be directly served by the proposed project and then comprise residents along the MGR line corridor, motorists, businessmen and service providers who rely on the railway station, etc. This is the group that is likely to benefit or be affected by the proposed development.

This study also identified a second category of stakeholders comprised of government officers (proponent) in charge of diverse sectors, which are likely to be impacted by the CRS project. This category was also consulted as key informants on sectoral policy and to advise this ESIA team on mitigation measures to be put in place so as to minimize adverse impacts in respective sectors. Each category of stakeholders called for a different approach to consultation.

5.5. Modalities of Stakeholder Consultation and Public Participation

i. **Interviews** It details face to face meeting to solicit information on impacts and mitigation measures. It targets key institutional actors.
ii. **Survey/Questionnaires-** This include open ended questions on various issues. The objective is to solicit information on impacts and mitigation measures
iii. **Public consultation and meeting-** A minimum of 2 public meetings at strategic locations
iv. **Public notices and announcements-** These are printed notices and posters in strategic location. The objective is to inform on the project and public meeting details
v. **Letters-** These were one on one letters directed to a variety of actors e.g. County government, public utility companies. These were to inform on the project and the details of the public meeting i.e. aim, venue, location
vi. **Radio announcements-** These were adverts aired on radio stations to inform the locals on the proposed development and communicate the meeting venues/dates. The objective is to inform the public and project interested persons of the public meetings.
vii. Other modalities include: online & social media, email correspondence, telephone and meetings.

A total of seven (7) numbers of meetings was conducted. They include meeting at Ol Joro Orok, Gilgil, Nakuru, Kipkelion, Muhoroni, Kanyakwar (Kisumu) and Butere. Minutes were taken for each meeting and attendance register signed. Minutes for each meeting attached Annex 4. Due to the prevailing controlled assembly of people conditions in Kenya arising from COVID 19 management, stakeholders and public consultation forums was undertaken restrictedly for this study. All members who were present for the meetings had their face masks on during the meetings. Also the durations for the meetings were shortened to a maximum of two hours or less. All the containment measures were strictly adhered to as per the MOH directives including adherence to social distance.

Table 17: Stakeholder Engagement Meeting venues and dates

No	Area/ Location	Venue	Date	Time
1.	Gilgil	Gilgil Railway Station	25/08/2021	0900Hrs
2.	Nakuru	Nakuru Locoshed	27/08/2021	1100Hrs
3.	Nyahururu	Ol Joro Orok Chief's office	30/08/2021	1000Hrs
4.	Kericho	Chief's Office Kipkelion	01/09/2021	1100Hrs
5.	Muhoroni	Muhoroni township Chief's office	01/09/2021	1500Hrs
6.	Kisumu	Road over Rail Bridge near Kanyakwar Chief's Office	03/10/2021	0900Hrs
7.	Butere	Butere Township-Chief's office	03/10/2021	1400Hrs

Plate 2: Members of Kipkelion community representatives discuss the project at the chief's office Kipkelion

Plate 3: Members of Gilgil community representatives discuss the project at Gilgil Railway Station

Plate 4: Public consultation meeting progress at Nakuru Locoshed

Plate 5: Members of Muhoroni community representatives discuss the project at the chief's office Muhoroni

Plate 6: Members of Kanyakwar location community representatives discuss the project -Kisumu

Plate 7: Members of Kanyakwar location community representatives discuss the project -Kisumu

Plate 3: Members of Township location community representatives discuss the project -Butere

5.6 Analysis of Findings in the Consultations

5.6.1 Positive Impacts

Project affected persons that participated in the public consultation pointed out that the project will have several positive impacts. The reported positive impacts were ranked and the results are presented in Figure 4 below. Reducing road congestion (63%) followed by creation of Employment/ jobs (57%) followed by ease goods movement (51%), improved local /national economy (46%), reduced overall emission (25%) and reduce road maintenance(14%).

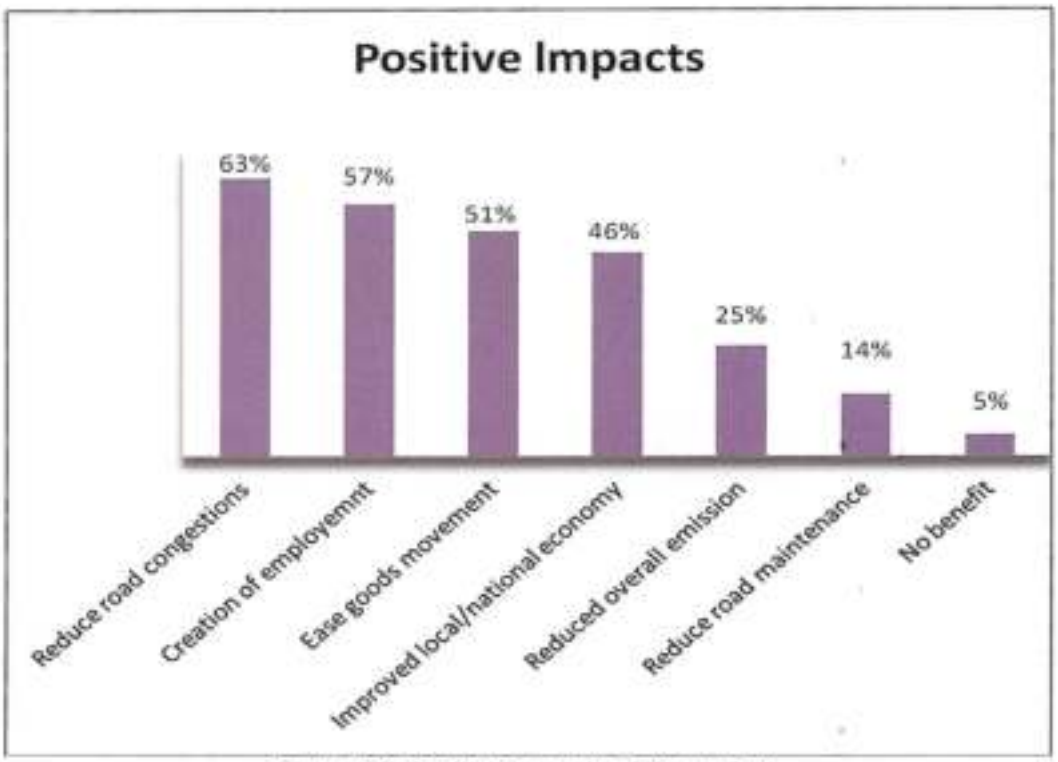

Figure 23: Positive impacts of the project

5.6.2. Negative impacts

Participants during public consultation believed that the project will have negative impacts to the physical, biological and socio-economic environment. These issues were analysed and are presented in Figure 15 below. Among these impacts, Employment not for locals ranked highest (68%), followed by loss of livelihood and incone (57%), Possible resstlement (46), Increased waste generation (31%), increased traffic movement (24%), Noise and dust at 19% and 16% respectively.

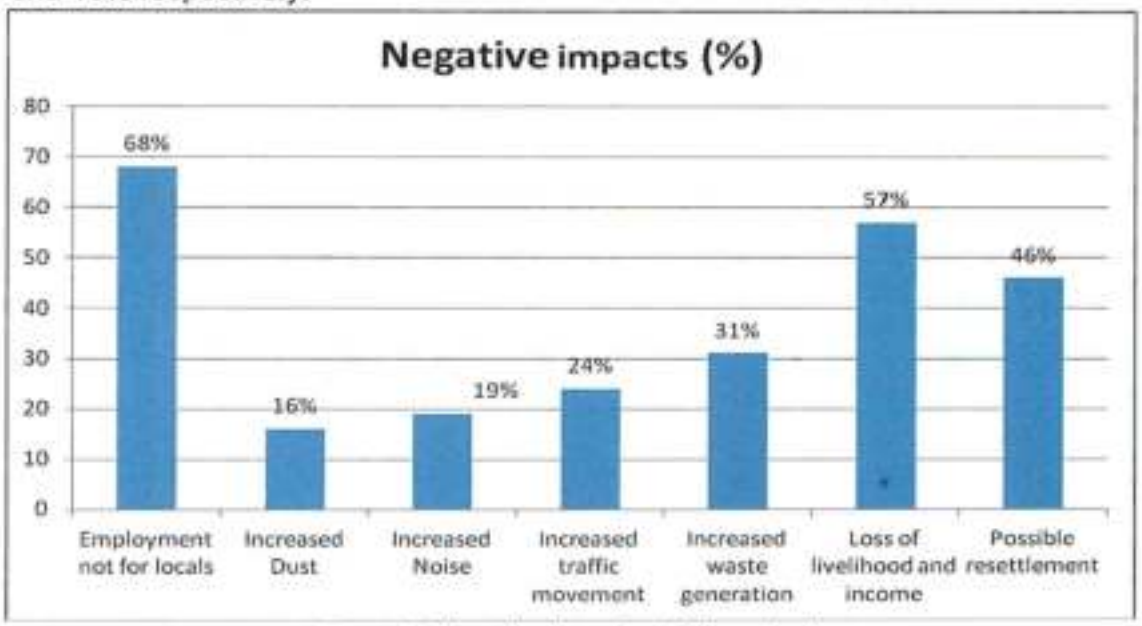

Figure 24: Negative Impacts of the project

5.6.3. Other Comments/Emerging issues

Participants during public consultation believed that the project will have negative impacts to the physical, biological and socio-economic environment. These issues were analysed and are presented in Figure 16 below. Among these impacts, Cultivation within KR land (92%), employ locals (82%), provide more crossing (73%), Will the trains be modern or only the old engines (68%), safety awareness campaign (62%), cost of passenger travel (46%), Add more trains daily (39%), beginning of operations (36%), is KDF taking over KR operations (35%), build classrooms (16%), build dispensary (14%), compensation after train accident (13%), upgrade roads (13%), build Bodaboda stage (9%) and build dispensary (9%).

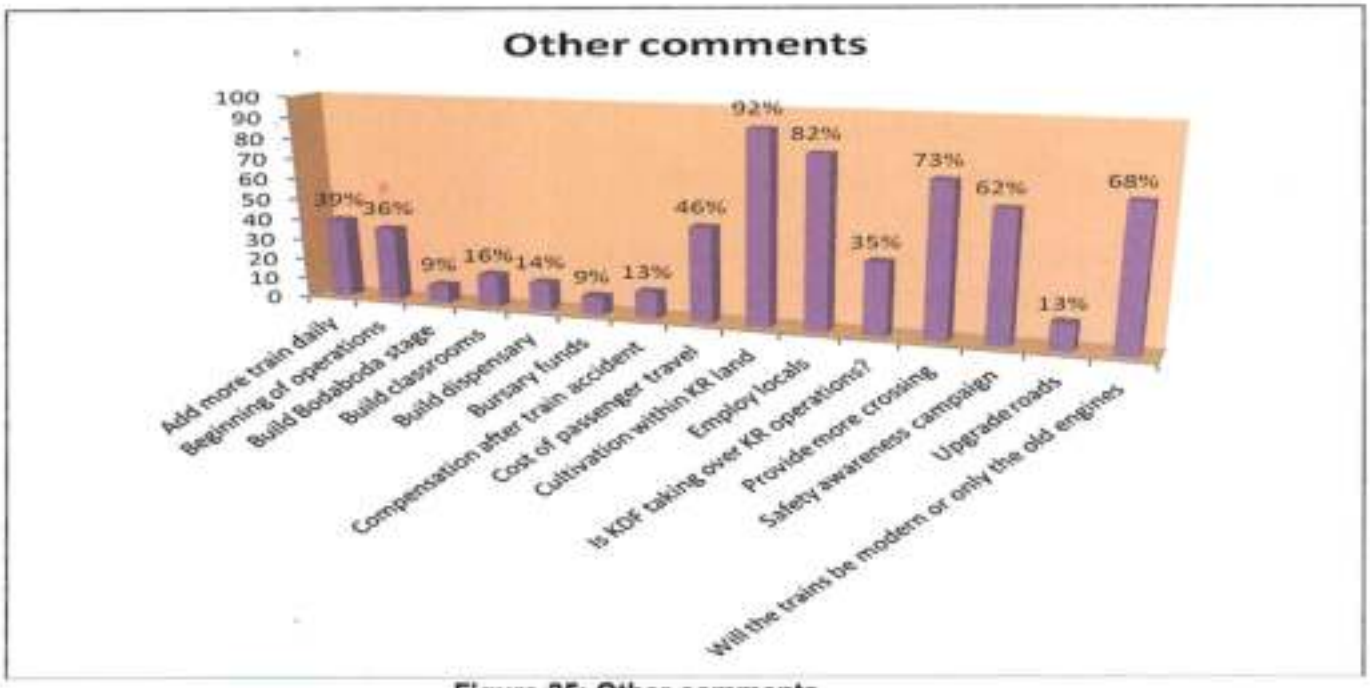

Figure 25: Other comments

Chapter 6: Analysis of Project Alternatives

Introduction Regulation 18(1) of Legal Notice 101 specifies the basic content of an Environmental Impact Assessment Study Report subsequent to which, subsection (i) requires an analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies. This section analyses the project alternatives in terms of site, technology and waste management options.

The following alternatives have been identified and have been discussed with the proponent with a view of reducing environmental effects: These are considered as:

- Alternative 1: Repair & Upgrade of the existing railway lines and railway stations only
- The "No-Action" Alternative
- Development of an Alternative route

5.1. Alternative 1: Repair & Upgrade of the existing railway line and renovation of station buildings only

- Replacement of all rails and sleepers;
- Re-conditioning of the ballast layer and replacement / addition of ballast as necessary;
- Repair of the formation level, where necessary;
- Track geometry correction;
- Repair and replacement of manually operated switches with Self normalising switches/ points;
- Repair and maintenance of existing drainage culverts, and addition new culverts if required;
- Repair and strengthening of structural steel bridges,
- Grade of railway conditions to allow for maximum acceptable speed
- Renovate the station buildings
- Fencing of the stations area

It is envisaged that works will entail completely replacing a sections of the rails and sleepers. The work will involve removing the existing worn-out rails and sleepers, and then lifting, cleaning and re-setting the ballast layer. New ballast will be added. The formation layer (under the ballast layer) will also be repaired and re-compacted where necessary.

This report has identified social, physical and economic impacts for this proposal. This project will have minimal impacts on the physical environment and has considered the necessary measures to almost eliminate the identified issues of interference with traffic, noise, solid and sewerage management and disposal. Secondly, most of the structures to be rehabilitated are in existence and thus are best suited for the proposal, at the same time the rehabilitation and revamping project will cost the government less as compared to initiating a new project.

As proposed, however, the environmental experts have identified mitigation measures for traffic congestion, solid and liquid waste management. The experts therefore propose that the KR to provide road signs to direct traffic and ample parking slots will be provided on various sites. The proposed ESMP in the report could efficiently manage the impacts identified for this project.

5.2. No Action Alternative

The no-action alternative on the physical environment, should not generate any potential impacts on flora and fauna identified in the study area, this is however not a guarantee. If the area is not developed, damage and interference with flora and fauna may still occur in its present state.

In terms of the social and economic environment, the "no-action" alternative would eliminate the spill over benefits and associated benefits related to the project and explicitly discussed in various chapters in this ESIA report.

The No- Action Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of the Kenyans and the local people of Western and Nyanza region will remain unchanged.
- Increased emissions due to increased trucks transporting goods
- The price of goods will still remain high
- The local skills would remain underutilized.
- Lack of business opportunities in Western and Nyanza Region.
- Reduced interaction both at local, county, national and international levels.
- No employment opportunities will be created for Kenyans who will work in the proposed project area during and after rehabilitation of the facilities.
- Increased urban poverty and crime in the region in particular

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, Kenyans, and the government of Kenya.

5.3. Development of an Alternative route

There is no alternative site that has been identified by the proponent, but cost implications will much higher considering that the proponent would have to conduct compulsory land acquisition that will be costly and lead to loss of properties and businesses to local communities for the new route.

Unlike Alternative 1, Alternative 3 would result in significant environmental and social impacts for any one of the major re-alignments/ re-routing of the railway line. Furthermore, the cost of any one of the major re-alignments would be very expensive without any significant reduction in travel time resulting.

5.4. Overview of Alternative Analysis

Based on the above, the most environmentally sound alternative is that the project should be done in the described location. The proposal will put in place good practices for managing solid and liquid waste water and other related impacts.

Therefore **Alternative 1** was the recommended alternative for the reasons stated above since all work is to occur with the existing servitude boundaries, and only existing roads and the existing infrastructure will be utilized for the transport of construction machinery and materials.

1.2. No Project Alternative 'ZERO'

The no-project alternative is often defined by the baseline information and is crucial in the assessment of impact because other alternatives are weighed with reference to it. From the qualitative analysis and the summary of the proposed site for the project, there will not be any significant negative effect on either the bio-physical or the socio-cultural environment of the proposed project

While the 'no project alternative' may ensure non-interference and preservation of the status environment and social conditions, without the rehabilitation of the railway projects the challenges associated with transport will persist. The transportation of cargo from Mombasa to western region will continue to suffer as a result of traffic congestion and delays. This will worsen as future demands (as a factor of increased imports, population growth and other key considerations) will exceed capacity of the current road, resulting in significant congestion.

The "No Action Alternative" should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the Environmental and Social Management and Monitoring Plan (ESMMP) developed in this report.

The No Project alternative is therefore not a viable alternative as the proposed rehabilitation of MGR lines project will relieve the Railway Transport problems people within the Nairobi Metropolitan Region in general.

Chapter 7: Environmental and Social Impact

7.1. Project Linkages

ESIA is a tool used to guide environmentally sustainable decisions. It helps to identify, predict and quantify where possible the magnitude of impacts, evaluate and assess the importance of the identified changes and formulate plans to monitor and mitigate the actual changes. Prediction of impacts technically characterizes the causes and effects of impacts, and their secondary and synergistic consequences to the environment and the local community.

This chapter focuses on the potential positive and negative environmental impacts that are likely to occur as a result of the proposed construction of the Nairobi Commuter Railway project, and their relative significance. These were identified according to the proposed project phases namely

i. Pre- construction (planning, design, preparation),
ii. Construction,
iii. Decommissioning
iv. Post-construction (operation and maintenance phase), and

The proposed rehabilitation of the Nakuru-Kisumu; Kisumu –Butere and Gilgil-Nyahururu MGR lines is envisaged to generate social and environmental impacts which could be positive or negative, direct or indirect, local, regional, reversible or irreversible and hence the necessity to subject the proposed project to an ESIA process. Most of the positive benefits and negative impacts will take place during construction and operation phases.

The process of determining the various impacts was done through stakeholder participation, discussion with proponent's technical team, site visits, technical studies (e.g. noise and air quality studies), review of the facility specifications etc. The prediction and analysis of the environmental impacts of the proposed project is also based on Compliance with the relevant Kenyan legislation and standards on environment, health and safety and the World Bank Safeguards as well as World Bank's Environment, Health and Safety guidelines and professional judgment.

7.2. Environmental Linkages

The proposed rehabilitation of the Nakuru-Kisumu; Kisumu –Butere and Gilgil-Nyahururu MGR lines development works has notable environmental linkages to environment arising from the physical location as a transition across the Rift Valley towards the western region. In as much as the project existed over decades ago, existing drainage culverts might not be adequate considering the change in climatic conditions, infrastructure developments and population increase. This, therefore, requires an integrated and collaborative approach to

the works planning to ensure minimal conflicts with environment. Among the key environmental and ecological aspects likely to be affected by the project works include:

i. Loss of vegetation cover (grass and acacia trees),
ii. Disruption of surface drainage system from the catchment and downstream outfalls channels during and after the construction works,
iii. Waste disposal plans during construction including spoil dumping, dry vegetation matter, construction debris and hydrocarbon residuals,
iv. Sharing of services and amenities with the neighbouring communities including water supply, power supply and access roads during the construction period and post construction phases arising from additional demand for the facility,
v. Sensitive environmental areas including wildlife migratory areas and habitats,
vi. Conflicts at the construction materials sources (damages top access roads, road safety, dust generation, noise and vibrations, land degradation, etc.)

Other environmental linkages include:

i. Scrap oil and grease at workshops and parking areas,
ii. Energy sources and management during and post construction phases,
iii. Effects of increased traffic at the project site during construction and post construction
iv. Ecological implications from wildlife movements and characteristics
v. Drainage characteristics and interaction

Social-Economic Linkages

Among the socio-economic aspects observed include

i. Eviction of encroachers from Railway corridor/land
ii. The rehabilitation of the railway lines and stations will attract human population through provision of labour and supply of goods and services.
iii. The anticipated increase population in the area will exert pressure on the immediate natural resources and infrastructure,
iv. Potential for disruption of public services and amenities including access roads, water sources and power supply,
v. Increased demand for accommodation provisions especially in towns where MGR stations will be rehabilitated
vi. Potential high risks to safety and health arising for higher levels of noise and vibrations, dust and emissions as well as security aspects.

In addition, it is worth noting that all prediction techniques of environmental impacts, by their nature, involve some degree of uncertainty. The assessment criteria of the significant impacts are as shown in table 18 below:

Table 18: Criteria for Assessing Significant Impacts

Key	Type of impact	Key	Type of Impact
++	Major positive impact	+	Minor positive impact
--	Major negative impact	-	Minor negative impact
0	Negligible/zero impact	NC	No change
Sp	Specific/localized	W	Widespread
R	Reversible	Ir	Irreversible
Sh	Short term	L	Long term
T	Temporary	P	Permanent

On the basis of information gathered, the potential positive and negative environmental impacts are tabulated below:

7.3. Summary of Anticipated Project Impacts

Table 19: Potential issues associated with the rail rehabilitation

Potential Impact	Measures required to minimise impact
Transportation of materials	Selection of means of transportation which requires minimal disturbance or clearance of vegetation.
Access to track	Pre work site inspection,
	Identify side of formation to be used for access,
	Identify entrance and exit routes for transport and machinery (Access only available from Public Road crossings and some Occupational crossings)
	Identify & mark vegetation for clearance within Activity Zone.
Permanent and temporary Service Sites	Select, mark and carry out pre-work inspection of Service Sites and locate outside areas of native vegetation
Stockpiles and waste Management	Ensure that materials (sleepers new/ life-expired) remain within the Clear Zone or defined service sites at all times
	Assess contaminant levels of waste materials and dispose of, or recycle in accordance with NEMA requirements
Vegetation Clearance	Site inspection with environmentalist
	Marking of vegetation for removal,
	Flag species or areas of conservation significance

	Identify stockpile sites for mulch and timber
Fire management	Identify areas for clearance (long grass), Develop a fire management plan.
Erosion control	Implement necessary erosion and silt trap controls when undertaking rehabilitation works
Clean up	Identify and remove waste materials Obtain waste material deliver logs Post-work site inspection and sign-off.
Rehabilitation	Pre-work site inspection Identify sites within the work area suitable for rehabilitation Spread mulch from vegetation clearance to stabilise/ rehabilitate disturbed areas

7.3.1. Potential Positives Impacts (Implementation Phase)

7.3.1.1. Creation of employment opportunities

The rehabilitation/ construction phase of the railway infrastructure will create employment opportunities for semi-skilled and unskilled people, mostly local youths. More skilled employees will be recruited as mechanical engineers and support staff at the port and equipment operators. Others will be employed as truck drivers for the material transportation. Skilled & unskilled labour would be in form of site watchmen and supervisors.

7.3.1.2. Creating business and income opportunities

Many job opportunities will be available for construction workers during the construction phase of the project. Employment opportunities are a benefit both in economic and social sense. For the construction development non-skilled labour, from the local community, will be hired. Although only during the duration of the project, several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site during the construction. Additionally, the project will require supply of large quantities of construction materials which will increase revenue for local businesses along the MGR corridor, such as cement, steel, and other miscellaneous materials required for construction that can be sourced locally.

7.3.1.3. Technology and skills transfer

The construction and operation of the proposed MGR rehabilitation projects will involve a variety of disciplines, for example, geological survey, mechanical and civil engineering, environmental science, social, project management, health and safety, supply and management among others. The project presents an opportunity for young people in college and those currently employed to hone their skills by participating in various aspects of the project design implementation. The knowledge received can be applied elsewhere in the country

7.3.1.4. Revenue to national and local governments

Through payment of relevant taxes, rates and fees to the government and the local authority, the project will contribute towards the national and local revenue earnings from those using the improved facilities, and any increase from economic activities brought about by the improved station.

7.3.1.5. Optimal use of idle resources

The proposed rehabilitation of Nakuru-Kisumu, Gilgil-Nyahururu and Kisumu-Butere MGR Projects are expected to put the idle resources into optimal use for the benefit of the local and national economy.

7.3.1.6. Provision of construction materials

The project will require supply of large quantities of construction materials most of which will be sourced locally within the project surrounding areas. This will provide ready market to the suppliers such as companies and individuals with such materials.

7.3.1.7. Landscaping

As the construction/ rehabilitation works progresses, the developer will also be carrying out landscaping activities not only at the corridor but also on areas to be occupied by station offices. This will add aesthetic value especially in currently degraded areas.

7.3.2. Potential Positives Impacts (Operation Phase)

During the operation phase the following positive impacts are foreseen:

7.3.2.1. Creation of employment opportunities

The rehabilitation/ construction phase of the railway infrastructure will create employment opportunities for semi-skilled and unskilled people, mostly local youths. More skilled employees will be recruited as mechanical engineers and support staff at the port and equipment operators. Unskilled labour would be in form of security guards and supervisors

7.3.2.2. Enhanced delivery of services

This is a long-term impact due to the opening of the railways under Nakuru-Kisumu, Gilgil-Nyahururu and Kisumu-Butere Project, consisting in improving access to social services e.g. health facilities.

7.3.2.3. Improved transport efficiency for people and cargo

The opening of the railways under Nakuru-Kisumu, Gilgil-Nyahururu and Kisumu-Butere Projects will improve efficiency of transportation of people, delivery of imported goods from Mombasa via Naivasha ICD and agricultural products to market centers. It will also boost seamless connectivity within the western region and across border toUganda, Rwand and West African countries.

7.3.2.4. Attraction of new investors in the area:

The improvement of the railway station means all stations under Nakuru-Kisumu, Gilgil-Nyahururu and Kisumu-Butere MGR lines will be easily accessible, thereby attracting new investors and traders in the area. This translates to economic growth in the area near the railway stations. Increase in investors has the potential to increase in land value for property owners near the railway station's area of influence.

7.3.2.5. Improved trade

The trade from and to the stations and towns near railway stations will be improved and this will also give an opportunity of opening up the area around the project sites to trade. More to opening up the trade centers, the delivery of farm produce, like vegetables, fruits livestock to market centers will be more efficient. Livestock and crop trade is expected to increase because of the ease of transportation coupled with the reduced cost and time of travel.

7.3.2.6. Reduction of air pollution from vehicle emissions

One of the aims of this project is to decongest the highways, and decrease the car circulation in the western region through an efficient railway transport. Reduction and decongestions of vehicles on the highways translate to reduction of air pollution brought about by emissions from vehicles.

7.3.2.7. Aesthetic quality

The rehabilitated railway lines, railway stations and the new railway station, with its associated access road and other amenities will improve the aesthetics of the project area, better than its current situation.

7.3.2.8. Revenue to national and local governments

Through payment of relevant taxes, rates and fees to the government and the local authority, the project will contribute towards the national and local revenue earnings from those using the improved facilities, and any increase from economic activities brought about by the improved station.

7.3.2.9. Improved Drainage

One of the key enhancements of the railway stations is the drainage system in the areas that has been causing floods during heavy rains. The rehabilitated railway stations, culverts and bridges will improve the drainage, through proper channeling of the stream nearby and flood waters thus reducing flood damage and potential soil erosion in the area.

7.3.2.10. Improved Security

The access road to the railway stations and its amenities such as pedestrian footpaths, street and flood lights will enhance the security in the area, which is currently lacking for commuters accessing the station. This will encourage more commuters served by the station and the surrounding areas to use the railway transport

7.4. Specific Negative Impacts (Construction Phase)

While appreciating the positive impacts and benefits associated with the proposed rehabilitation of Nakuru-Kisumu, Gilgil-Nyahururu and Kisumu-Butere MGR Lines, anticipated negative impacts during construction/rehabilitation and operations activities should be identified and mitigated. Mitigation measures will be adopted through the project implementation to ensure that the Nakuru-Kisumu, Gilgil-Nyahururu and Kisumu-Butere Projects are acceptable. Specific impacts and associated mitigation measures are briefly described below;

7.4.1. Noise and Vibration

Construction of new railway station, rehabilitation of dilapidated existing stations and railway lines and quarrying material sites are usually associated with some degree of noise and vibration. A typical excavation works usually generate a significant amount of disturbance in terms of vibrations and noise. Some incremental level of noise can be expected from increased traffic that will be transporting construction materials from site to the railway line and from the machineries used. This kind of impact is particularly major in neighbourhood that are very serene and quiet or that have sensitive receptors such as schools, health facilities, settlements and places of worship. For this project, this impact will be minimal and confined at the project site.

Mitigation Measures

- ✓ *The Contractor to ensure compliance to established noise guidelines under EMCA Regulations,*
- ✓ *Observance of strict working hours (8am to 5pm)*
- ✓ *Limited blasting for hard stone quarries shall only be done after approval by the relevant authorities and also effective public information,*
- ✓ *Provide all construction workers with relevant safety gear including earmuffs at all times while at work and enforce application,*
- ✓ *Timely repair and maintenance of construction machinery and equipment,*

7.4.2. Waste Management

Volumes of waste will be produced during construction phase. Solid waste materials including spoil from earth works, construction debris, scrap metals, wood and packaging materials will be generated from construction activities. Oil and grease spills, engine filters, obsolete machines parts and paints are also anticipated from construction activities. In addition, domestic wastes (garbage) from food residuals will be generated at the work areas. The associated impacts include the following;

i. Clogging of the drainage systems within and around the site,
ii. Potential pollution of environment and water resources (oil spills and organic)

iii. Aesthetic degradation and public nuisance at spoil disposal sites
iv. Potential breeding of vectors and pests from accumulation of solid materials (garbage) within project sites

Mitigation Measures

- ✓ *Use an integrated solid waste management system through the following options: i) waste source reduction, ii) material reuse and recycling, and, iii) combustion*
- ✓ *Dispose waste more responsibly in appropriate designated dumping sites*
- ✓ *Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste*
- ✓ *Provide waste collection sites and facilities within the site*
- ✓ *All hazardous materials such as oils/grease, to be stored in a clearly marked site's store, in the contractor's yard for safe removal and disposal,*
- ✓ *Ensure waste holding points are far from surface storm water drains*

7.4.3. Liquid Waste

Liquid waste generation during construction will mainly be within the work areas. Waste water generation will include sewerage and wash water from the camp site and run off from carwash at the work areas. The associated liquid waste impacts will include the following;

(i) Air quality challenges from inefficient effluent management facility leading to foul smell,
(ii) Potential ground and surface water pollution from sewerage spills and wastewater overflows
(iii) Public health challenges from sewerage spills and sewerage handling by workers

Mitigation Measures

- ✓ *All wastewater will be confined within a sewerage handling facility (septic tanks) for soakage and removal of septage*
- ✓ *The Proponent needs to put all the necessary measures to prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies*
- ✓ *Extra care should be taken during entire works to limit water pollution from any other sources.*
- ✓ *No changing of engine oils, handling of fuels and any other potential pollutants next to the water bodies*
- ✓ *Provide wastewater handling workers with PPEs.*

7.4.4. Air Quality

Emissions in forms of dust, particulate matter, fugitive emission and, exhaustion from project machines and equipment are anticipated during the project construction phases. Construction activities and vehicles can also increase dust emission in the area. These emissions emanating from construction equipment and vehicles, and dust are known to have adverse impact on the environment, plant and human health including effect on the upper to lower respiratory infections and silicosis condition.

- Activities likely to generate dust include: cement production and use, excavation of dry grounds excavation, construction, leveling works, and to a small extent, transport vehicles delivering materials.
- Activities likely to generate particulate matter include loose material transportation, vehicle and machines exhaust emissions, operations at the batching plant, stone crushing machines, fire among others. Some of the particulate matter to be generated include sand, soot, cement, gravel and murram, among others;
- Exhaust emissions likely to be generated include smoke, hydrocarbons and nitrogenous gases among others pollutants from vehicles, machinery and equipment exhausts. Such emissions can lead to several environmental impacts including global warming and health impacts.

Mitigation Measures

- ✓ *Undertake earthworks under dump conditions (watering) to reduce dusty conditions,*
- ✓ *Ensure construction equipment is well maintained to minimize or eliminate emissions,*
- ✓ *Limit speed for the construction trucks along the access roads to reduced dust*

7.4.5. Health and Safety

Construction workers will be exposed to risks of accidents and injuries during construction activities. Such injuries can result from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of objects and risk of vehicular accidents. Other injuries or fatalities may result from workers operating equipment without adequate training or with lack of PPE, or extended exposure to outdoor weather resulting in heat related lethargy. Additionally, there will be a potential pollution risks to the general environment and neighbouring communities .This is considered a short-term impact that has potential long-term implications. Risks of injuries and accidents may also happen to local people if the site is not well secured through falls at excavated areas and by construction vehicles.

Mitigation Measures

- ✓ *All workers should be provided with appropriate safety gear and ensure application all times*
- ✓ *Provide safe drinking water for the construction workers acceptable sanitation and hygiene facilities and eating sheds,*

- ✓ *Ensure safe and healthy work environment for the construction workers including noise level, dust level, safe movement corridors and access to medical services*
- ✓ *The public should be kept off the construction areas for their safety.*
- ✓ *Provide necessary safety signage and information as well as isolation barriers at sections with high population and vulnerable groups,*
- ✓ *Ensure supervised removal of waste dumps where necessary for safe handling and disposal,*
  - *Provide education and sensitization of the workers and public on the project impacts*
  - *Provide and maintain fully stocked first aid kits on sites and provide first aid training to the key staff.*
  - *Ensure a functional incident register that will capture any issues associated with the workers while at work*

7.4.6. Handling of Asbestos Containing Material

The following steps will be necessary for the main contractor to ensure, as far as is practicable, the prevention of contamination by asbestos from the site and also to ensure that asbestos containing materials are stored, labeled and disposed of appropriately.

The following precautions shall be observed when removing asbestos materials from the buildings:

- ✓ *Secure the site to prevent unauthorized persons and to restrict movement*
- ✓ *Wet the asbestos sheets before removal. If asbestos sheets should begin to crack or crumble, immediately wet the cracked or broken areas with the pintsize spray bottle or garden pump sprayer.*
- ✓ *Remove pieces of asbestos sheets by pulling any fasteners (nails, screws, rivets) or cutting fastener heads so as to minimize breakage. If necessary, carefully lift asbestos sheets with pry tools to expose the fasteners' heads.*
- ✓ *Do not slide asbestos sheets over each other.*
- ✓ *Carefully lower removed asbestos sheets to the ground. Do not throw or drop it.*
- ✓ *Care should be taken not to stand or sit on the asbestos sheets to avoid breakage.*
- ✓ *The workers removing the asbestos must have the appropriate Personal Protective Equipment, which must be removed as they enter the shower room immediately after removal of the asbestos.*

7.4.6.1. Temporary Storage

If the asbestos must be stored in containers before disposal, it must be ensured that the containers are secured from accidental or deliberate damage, access by staff and the general public.

- ✓ *Temporary storage refers to the time between removal and final disposal of asbestos waste. The duration for temporary storage of asbestos waste should not exceed thirty (30) days from the time of removal.*
- ✓ *The temporary site should be within the premises where the asbestos materials are being removed.*
- ✓ *The removed bulky asbestos, such as roofing sheets, beams, joists, and studs, should be stacked and wrapped, into stacks which can be easily loaded into the transportation vessel, in a plastic sheet of a minimum of 500 gauge double wrapped and secured with tape and labeled*

Any debris (broken pieces) should be collected in a sealed polythene woven bag or any other airtight container. The bags should then be wrapped, into stacks, which can be easily loaded into the transportation vessel, in a polythene sheet awaiting final disposal.

- ✓ *The bags should be considered full when half full and should be tightly sealed or when filled up to a level where the open neck can be twisted tightly, folded over into a "gooseneck," and the ends sealed to the side of the bag with heavy plastic tape such as duct tape.*
- ✓ *Care should be taken to ensure that sharp pieces do not puncher the bags/ wrappers*
- ✓ *Removed asbestos sheets should not be allowed to lie about the site where they may be further broken or crashed by machinery or site traffic.*
- ✓ *The storage area must have restricted entrance and locked or secured on a 24 hour basis.*
- ✓ *Warning label ("Asbestos hazard area, keep off") and danger signs should be affixed to each wrapped stack or storage area using English, Swahili and local language.*

NOTE: KR intends to temporarily store the asbestos removed from the roofs in the asbestos holding area within its premises before disposal. This area contains asbestos roof materials which have been stored for between 1-2 months. The asbestos will be covered in an impermeable plastic material temporarily before final disposal approved by NEMA.

The contractor shall therefore be required to strictly adhere to the above storage procedures.

7.4.6.2. Preparation for Transportation

Material containing asbestos or contaminated with asbestos must be viewed as hazardous and packaged to keep fibers from getting into the air. Containers used for packaging may be hard or flexible and must seal airtight. The following are some of the precautions that should be observed in the packaging.

- ✓ *The waste transporting vessel must be lined with a 500 gauge double wrapped plastic sheet with every seam sealed with a tape and covered.*

- ✓ *The transportation vessel should be labeled "Danger - Contains Asbestos Fibers. Cancers and Lung Disease Hazard "and contain the following information: (i) the identity of the hazardous waste. (ii) the name, physical address and telephone contact of the generator of waste*
- ✓ *The bags and stacks should be gently loaded into transportation vessel.*
- ✓ *The goosenecks should not be used as handles for carrying the bags, because that might unseal the ends or tear the bags. Tossing the bags into a waste transporting vessel must be avoided because of the risk of rupture.*
- ✓ *The asbestos waste should be transported by NEMA accredited transporter of such hazardous materials to a prepared disposal site that is authorized by NEMA.*

7.4.6.3. Transportation

The vehicle transporting the asbestos waste should be licensed as per the EMCA (Waste Management) Regulations, 2006 and must be accompanied by a tracking document. The waste shall be transported to the disposal site in an enclosed vehicle or container, capable of being washed without lodgment of debris and fibers, and secure from escape of fibers to the atmosphere.

KRC should ensure that all persons involved in handling and disposal of asbestos are trained in emergency operating procedures. These procedures shall include how the waste is to be handled, services to be contacted during such an exposure, and additional personal protective equipment's

7.4.6.4. Disposal Site

Disposal of asbestos must be at a site;

- ✓ *Designated by the County Government and licensed by NEMA;*
- ✓ *Privately owned disposal facility licensed by NEMA;*
- ✓ *Designated by the waste generator (on-site disposal).*

Where a designated site by the local authorities or privately-owned facility does not exist the waste generator shall identify an appropriate site.

The disposal site should be as per specifications in the EIA report. However, the following minimum conditions must be observed:

- ✓ *The optimal distance of the disposal pit shall be as far as practicable from the nearest human settlement and as it shall be determined by the Ministry of Public Health and Sanitation.*
- ✓ *A lined pit that does not reach the water table or according to other standards that maybe approved by NEMA.*
- ✓ *Disposed material to be one meter below ground level.*
- ✓ *Disposal site should be fenced off appropriately and the gate locked.*

7.4.6.5. Disposal Operation

The waste generator shall ensure that the following precautions are observed when disposing asbestos wastes:

- ✓ *The waste generator shall notify the Authority on commencement of disposal activities.*
- ✓ *Asbestos materials must not be reused or offered for sale.*
- ✓ *All asbestos sheets and the debris should be wrapped before it is hauled to the disposal site or transfer station in a covered vehicle.*
- ✓ *Asbestos waste must be disposed of at approved disposal sites only*
- ✓ *The depth of the disposal pit shall be as deep as practically possible to accommodate more asbestos waste but at least one (1) meter above water table.*
- ✓ *The asbestos should be lowered gently into the disposal site and should not be dropped from any height to avoid breakage.*
- ✓ *When all available asbestos has been lowered into the pit, cover with polythene paper followed by 15cm layer of soil. Continue doing this until the pit is full or the waste is finished.*
- ✓ *The pit shall be considered full when the asbestos waste is 100cmbelow the ground level or the asbestos waste is exhausted.*
- ✓ *After the pit is full, cover with 500 gauges double wrapped polythene sheet and fill the pit with layer of soil up to the ground level.*
- ✓ *Disposal site should be completely fenced off with at least chain link and a lockable gate which shall be locked at all times. The fence should be at least one (1) meter from the edge of the pit.*
- ✓ *Warning notices stating "Asbestos hazard area, keep out" shall be placed at the disposal site. These signs, with lettering of minimum 150mm in height, are to be placed so that they are clearly visible.*

7.4.6.6. Post-Disposal

All transportation vessels, re-useable containers or any other similar article which have been in contact with asbestos waste shall be cleaned at the disposal site.

- The disposal site should be maintained including the warning signs, the fence, the gate among others to prevent vandalism and interference.
- Human activities which might interfere with the buried asbestos waste such as construction and pitting should not be allowed at the disposal site.
- The waste generator shall notify the Authority in writing on completion of disposal of asbestos waste.

7.4.7. Vegetation Clearing and Soil Loss

Currently, some of the proposed project area has vegetation cover. The project will clear any vegetation present in the area to pave way for the rehabilitation of railway

line and construction of new stations. However, utmost care shall be taken to ensure that vegetation loss is kept to a minimum.

Mitigation measures

- ✓ *Except to the extent necessary for establishing the operation site and carrying out the excavation works, vegetation shall not be removed, damaged or disturbed nor should any unauthorized cutting of vegetation take place*
- ✓ *The clearance of the site for any other purposes shall be kept to a minimum. The use of existing cleared or disturbed areas, stockpiling of materials etc. shall be encouraged*
- ✓ *Areas to be cleared should be agreed and demarcated before the start of the clearing operations*
- ✓ *Clearing and removal of vegetation, must be carried out in such a way that damage to adjacent areas is prevented or minimized*
- ✓ *Rehabilitation and re-vegetation of the site with native species where possible is highly recommended*

7.4.8. HIV/AIDS and Covid-19

Construction projects are associated with an increase in sexually transmitted diseases such as STIs and, HIV/AIDS due to the influx of immigrant workmen interacting with the local people. Construction teams, as well as the greater number of drivers, who are expected to pass through the trade centres and settlements, can also cause social upheaval among communities near the sites.

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus is caused by the virus SARS-CoV-2. WHO continues to collaborate with experts, Member States and other partners to identify gaps and research priorities for the control of COVID-19, and provide advice to countries and individuals on prevention measures.

Mitigation Measures

- ✓ *The Contractor will be required to develop a health and safety policy and procedures and educate all workers on the policy and the procedure Health authorities should conduct a biannual audit of occupational health and safety within all premises of the contractors and at sites of works as required by law:*

Workers will be informed about diseases that are prevalent in the project area, and how they can minimize their exposure to, and the transmission of, such diseases;

- ✓ *KR will mount regular HIV-AIDS awareness campaigns and Provision of Male or Female Condoms for all Site staff and labour as appropriate.*
- ✓ *Staff to be screened for high fever*
- ✓ *KR to provide staff with hand washing facilities or sanitizers at specific points*

of entry

- ✓ *KR to provide face masks*
- ✓ *KR to ensure social distancing is enforced while at work*

7.4.9. Vehicular Traffic

Activities related to construction works will undoubtedly induce uncharacteristic levels of additional vehicular traffic at the site and roads leading to the site. Related issues of vehicle congestion and reckless driving by truck drivers delivering construction materials to the site will be sources of potential accidents to road users and pedestrians, disturbance of normal living conditions to the local population, dust pollution, etc. during the construction phase.
Traffic management challenges will be experienced during the construction phase from vehicles accessing the project site for materials deliveries as well as construction equipment. Among the impacts related to this situation will include;

Mitigation Measures

- ✓ *Appropriate signage and information should be provided at the junction and access* road.
- ✓ Deploy a traffic marshal to manage traffic at the junction and entry to the site,
- ✓ Provide time schedule for material delivery especially when traffic is low.

7.4.10. Public Disruptions

There is potential for a few disruptions of public utilities, especially the electric power and some water lines, especially the ones that might be located along the access road to the station. Although minimal, disruption of electric power will occur during connection of power to the station. During the process of relocation, the responsible authority should communicate; giving considerable notice, of any intended disruption of the services to enable the people to prepare for alternatives and pollution incidences should be immediately reported.

Mitigation Measures

- ✓ *Ensure minimal disruption of the public movement,*
- ✓ *Ensure no delays in restoration of the access road,*

7.4.11. Loss of property and assets

Apart from land, a number of other properties and assets will be affected along the proposed railway line because of several reasons, which include;

- Encroachment on railway reserves for both human settlement and commercial purposes
- Private developers with property on or close to the rail corridor several properties will be affected.

7.4.12. Construction Camp Site

Construction camp site has potential limited but localised land degradation arising from site clearance of vegetation, spills of oil/grease, solid wastes dumping, wastewater disposal leading to environmental pollution and risks to public health.

Mitigation Measures

- ✓ *Undertake Environmental impact assessment for the construction site and prepare a restoration plan.*
- ✓ *Ensure no spillage of oil, lubricants and detergent in the storage area and it so ensure*
- ✓ *Comply with public health and sanitation regulations.*
- ✓ *Ensure proper solid waste management mechanism (3Rs) around the camp site.*

7.5. Potential Negative Impacts (Operation Phase)

The negative impacts anticipated during the Nairobi Commuter Railway Operations activities have been identified and mitigation measures established as outlined under the following sections.

7.5.1. Loss of employment opportunities

The project will therefore ensure a seamless movement of cargo from Mombasa port through Naivasha ICD to Kisumu, Butere and Nyahururu. This will in turn reduce the number of long distance trucks plying the Nairobi-Malaba highway; Nakuru-Kisumu and Kisumu –Busia Roads in the long-term hence loss of jobs for truck drivers, reduced revenue for truck owners and mechanics. Workers in related businesses like mechanics, oil recyclers, hotels, shops etc. along the main road will also be affected adversely.

Mitigation measures

- ✓ *Consider employing locals in job allocations especially for activities requiring unskilled labour*

7.5.2. Hazardous Materials and Oil Spills

It is anticipated that once the MGRlineas are operational, spills are anticipated as a result of accidents, equipment failure and improper handling of hazardous materials during storage and transfer.

Mitigation Measures

- ✓ *Provision of designated area for storage and handling of Hazardous materials*
- ✓ *There should be oil and grease traps installed at the vehicle and equipment maintenance sheds and have proper oil and grease handling e.g. use of drums*
- ✓ *Cargo handling equipment should be well maintained to avoid leaks*

- ✓ *Engage services of certified hazardous waste handlers to collect and dispose of used oils and grease.*

7.5.3. Increased Solid and Liquid Waste Generation

Domestic waste from offices can lead to land pollution. Pollution risks may arise from dumping of these waste materials which in turn may lead to surface and ground water pollution. KRC should ensure full compliance with the EMCA (Waste Management) Regulations, 2006 as well as the following measures:-

Mitigation Measures

- ✓ *Use an integrated solid waste management system through the following options: i) waste source reduction, ii) material reuse and recycling, and, iii) combustion*
- ✓ *Dispose waste more responsibly in appropriate designated dumping sites*
- ✓ *Provide waste holding bins and skips for temporarily holding wastes generated facilities within the site*
- ✓ *Regularly and appropriately dispose the wastes collected*

7.5.4. Pollution of water resources

Pollution of water resources would have to coincide with rainy season when the runoffs and floodwaters carry the disturbed soils to the water body, oil spills during change of lubricants, cleaning and repair processes in the maintenance of locomotives.

Mitigation measures

- ✓ *The Proponent would need to put all the necessary oil spill containment measures to prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies*
- ✓ *No changing of engine oils, handling of fuels and any other potential pollutants next to the water body*
- ✓ *General kit contents could include: oil absorbent pads; absorbent socks; granular absorbents; and protective equipment such as gloves, goggles and protective suits. All kits will be stored in a visible location, and in appropriate weather-resistant containers. Regular inspections of the kits will be performed to ensure that they are complete and all materials remain functional.*
- ✓ *The collected oil should be collected for proper disposal by licensed waste collectors*

7.5.5. Noise pollution

Sources for noise pollution will include rolling noise generated by the contact between wheel and rail during normal movement and braking; aerodynamic noise generated by the train pushing air (particularly for high speed trains); and traction noise generated by the engine and cooling fans.

Specifically during the operation phase, main noise sources along the railway, exerting certain impact on acoustic environment of the area within 200m to both sides of the railway line, are train running and whistling, shunting at the railway stations, departing, arriving and locomotive servicing work.

Mitigation Measures

- ✓ *Personal Protective Equipment (PPE), reasonable working hours and good working conditions and facilities.*
- ✓ *Develop and implement in-house manual/ guard lines on Health and Safety (H&S)*
- ✓ *Adhering to the provisions of Noise Prevention and Control Rules 2005, Legal Notice no. 24 regarding noise limits at the workplace as well as NEMA Noise and Excessive Vibration Pollution Control Regulations, 2000*

7.5.6. Loss of vegetation cover

Regular maintenance of vegetation within rail track alignment is necessary to avoid interference with train operations and track maintenance. Unchecked growth of trees and plants can disrupt signals, fall onto the tracks and overhead power lines, and prevent workers from getting to places of safety when trains are passing. Regular maintenance of the way leave to control vegetation may involve the use of mechanical methods (for example mowing), manual methods (such as hand pruning), and use of herbicides. Vegetation maintenance beyond that which is necessary for safety may remove unnecessary amounts of vegetation, resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.

Mitigation measures

- ✓ *The way leave clearance shall be kept to a minimum. The use of existing cleared or disturbed areas, stockpiling of materials etc. shall be encouraged*
- ✓ *Areas to be cleared should be agreed and demarcated before the start of the clearing operations*
- ✓ *Clearing and removal of vegetation, must be carried out in such a way that damage to adjacent areas is prevented or minimized*

7.5.7. Increased risks of train accidents to the public and accidental spills

The most significant safety issues for any railway operation are derailments, collisions, fires and explosions (including sabotage/terrorism), falls from the trains, collision with road

transport and people at level-crossings, the risks associated with stationary sources of pollution (like fuelling stations), accidental spillages and so on.

Mitigation measures

- ✓ *Need for traffic controls like speed restrictions and traffic signs limiting speed when approaching sensitive areas (near villages and other populated areas)*
- ✓ *Public awareness, informing the community of the potential dangers*
- ✓ *Mark the area with warning signs at various level crossings with st. Andrews mark*
- ✓ *Use of tank cars and other rolling stock that meet national and international standards (e.g. thermal protection and puncture resistance) appropriate for the cargo being carried, and implementing a preventive maintenance program*
- ✓ *Develop a Spill Prevention and Response Plan (SPRP) will be developed for use by Kenya Railways based on an analysis of hazards, including the nature, consequence, and probability of accidents.*
- ✓ *All spills occurring on the project site will be responded to in a way that will uphold the following priorities: protection of human life and health; protection of the environment; protection of property; and minimized disruption to operational activities. At all times, applicable regulations will be used to guide response and cleanup activities.*
- ✓ *Have appropriate Spill response kits will be located at material handling and storage locations. The contents of the kits will be based on the potential risk associated with the material, volume of material, and environmental sensitivity of the area.*
- ✓ *General kit contents could include: oil absorbent pads; absorbent socks; granular absorbents; and protective equipment such as gloves, goggles and protective suits. All kits will be stored in a visible location, and in appropriate weather-resistant containers.) Regular inspections of the kits will be performed to ensure that they are complete and all materials remain functional.*
- ✓ *Construction of protective barriers and other technical measures (e.g. drainage / receptacle provisions) at sensitive locations (e.g. water resources and settlements)*
- ✓ *Dissemination of emergency preparedness and response information to the potentially affected communities (e.g. emergency notification systems and evacuation procedures);*
- ✓ *Implementation of a hazardous material security plan and security awareness training, including provisions for personnel security, prevention of unauthorized access, and measures to reduce risks during storage and transport of hazardous materials;*
- ✓ *Use of standardized fuel spill prevention system for locomotive fueling, including automatic shut-off systems.*

7.5.8. Hazards to staff Occupational health and safety issues

Noise levels from vehicles are about 65 dB. Also fire risk at the port. Occupational health hazards may also be promoted by lack of procedures that mitigate negligence at work, fatigue due to understaffing and long working hours, employing wrong people

on particular jobs (e.g. employing an unskilled person to handle dynamite explosives), lack of protective gear, low morale, etc.

Mitigation Measures

- ✓ *Performance Standards and regulations on health and safety requirements.*
- ✓ *Personal Protective Equipment (PPE), reasonable working hours and good working conditions and facilities.*
- ✓ *Develop and implement in-house manual/ guard lines on Health and Safety (H&S)*
- ✓ *Enforcement of security*
- ✓ *Screening of security personnel*
- ✓ *Prohibition of alcohol and drugs at the workplace*

Chapter 8: Environmental and Social Management Plan

8.1. ESMP Overview

The project is geared towards enhancing social and economic benefits through the rehabilitation of MGR lines. The project would be expected to comply with the environmental conservation requirements in accordance with the established Kenyan laws and regulations. To realize these goals, acceptability by a majority of the stakeholders and minimal effects to the physical environment will require to be ensured through participation in the project and continuous consultations, evaluations and review of the design aspects throughout project implementation cycles.

It is also recommended that the environmental management guiding principles specific to this project improvement and water resources management be established to allow integration of environmental management considerations during construction and operations.
Among the factors that need to be considered in this particular project implementation will include:

- Enhancing integration of environmental, social and economic functions in the project implementation.
- Compensation of any land or property that may be affected by the project in accordance to the laid down regulations,
- The contractors and other players in the project activities be prevailed upon to implement the ESMP through a sustained supervision and continuous consultation
- Contractor to prepare Construction environmental and Social Management Plan (CESMP)

8.2 Significance of ESMMP

The purpose of the Environmental/Social Management & Monitoring Plan is to provide a summary of the mitigation measures identified in the ESIA, identifying to which stage (design construction operation) they are relevant, who is responsible for ensuring that the actions are taken, and what the broad costs associated with the delivery of the items is predicted to be.
The ESMMP outlined below will address the identified potential negative impacts and mitigation measures on the following project stages:

- Pre-construction
- Construction Phases
- Operation Phase
- Decommissioning Phase.

Table 20: Environmental, Social Management and Monitoring Plan (ESMMP)

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
Loss of vegetation	**CONSTRUCTION PHASE** • Minimize clearing of unnecessary areas at the construction site • Replant vegetation through landscaping upon completion **OPERATION PHASE** • Replenish vegetation at the open areas of the stations area regularly Proper maintenance of trees and other vegetation at the stations area	Design Engineer, Project Engineer /KR	(c) check and follow specifications in the drawings and plans (c) Minimal clearance of vegetation and soil stripping (c&o) Net change in vegetation types at the project site; (c&o) Net change in fauna at the project site	Continuous during construction & operation phases	No direct costs (integrated construction costs)
Soil erosion	**CONSTRUCTION PHASE** • Construct efficient drainage structures (culverts, mitre drains, scour checks etc.) • Control earthworks through cascading gabions and distribution channels for storm water • Protect excavated sections of the route of storm water during heavy rains • Design to incorporate existing drainage pattern and avoid disturbing the same **OPERATION PHASE** • Regular cleaning and proper maintenance/repair of drainage structures	Project Engineer /KR	(c&o) Soil erosion levels	During rainy seasons	No direct costs (integrated construction costs) Normal maintenance budget of the railway line during operation

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (a) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
Disruption of Public Utilities	**DESIGN and CONSTRUCTION PHASE** • Design to incorporate existing public utilities and avoid disturbing the same • Contractor to generate utility management plan • Contractor to minimize damage to public utilities	Project Engineer/KR Utilities providers	(c) Down time of utilities affected • Complaints from the local residents • No of disruptions	(c) daily	Budget under provisional sums of Utilities
Air Pollution	**CONSTRUCTION PHASE** • Speed control of vehicles accessing the site • Construction of bumps along the road near the railway lines/construction sites • Regular watering of access roads and work sites • Proper maintenance of construction equipment per the manufacturer requirements • Adhere to provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace as well as NEMA Noise and Excessive Vibration Pollution Control Regulations, 2000 **OPERATION PHASE** • Use of fuel-efficient and less pollution trains • Use of modern, fuel-efficient, low emission locomotives • Maximizing cargo and passenger space	Project Engineer/KR KR	(c) inspection / observation Dust levels (particulate matter) should be within the limits set out in the First Schedule of EMC (Air Quality) Regulations, 2014. Exhaust fumes from the vehicles- the emission levels should not exceed the levels prescribed under Kenya Standards (KS1515:2000 on vehicular emission) e.g. CO shall not exceed 0.5 per cent volume and hydrocarbons (HC) concentrations shall not exceed 0.12 per cent volume (1200ppm) Maintenance levels of plant and equipment.	daily/random Annually	Equipment - costs build in the planning and administration costs Allow KShs. 500,000.00 annually for air and noise sampling and measurements

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	utilization within safety standards to minimize specific fuel consumption • Air quality monitoring along the viaduct and its immediate environs				
Noise pollution	**CONSTRUCTION PHASE** • Regular Sensitization of workforce and residents on potential noise levels • Controlled operation of construction plant and equipment • No blasting shall be done on site **OPERATION PHASE** • Strengthen control of locomotive whistle noise • Controlling random whistle noise is very positive and effective to better the sound, environment around railway station. • Use suitable train braking technology, bogie technology tend to reduce wear and tear as well as noise • Ensure the use of the appropriate wheel and rail conditions of the ve hicles and line to reduce the degree of vibration • Noise pollution monitoring along the viaduct and its immediate environs	Project Engineer /KR KR	Inspection / observation • Construction noise and vibration levels at the construction site should be within the limits prescribed in EMC (Noise and Excessive Vibration Pollution (Control) Regulations 2009. Minimize disturbance of communities due to noise and vibrations Ensure the operation of technology of railway equipment Ensure the use of the appropriate wheel and rail conditions of the ve hicles and line to reduce the degree of vibration	Daily/random	Costs build in the planning and administration costs Allow KShs. 500,000.00 annually for air and noise sampling and measurements
Water Resources Usage	**CONSTRUCTION PHASE** • Develop water abstraction plan to minimize conflict with local residents • Manage use of piped water and other	Project Engineer /KR/WARMA	Inspection /method of waste collection • Complaints from the neighbouring communities	(c) monthly	Costs build in the planning and administration costs

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) – operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	water sources mainly used by local people • Abstraction licenses should be obtained from the required authority (WARMA) **OPERATION PHASE** • Monitor water wastage and usage during operational stages of the Railway lines • Install pressure taps that minimize and lime usage • Repair damaged taps and toilets to minimize waste	Inspection • Amount of water used • Repairs and damaged water facilities •	or the authorities Amount of water abstracted	(o) monthly	Normal maintenance budget
Water Pollution	**DESIGN and CONSTRUCTION PHASE** • Incorporate erosion control measures during construction at the site • No oils and fuels should be stored on the construction site – small works • Maintenance, re-fueling and cleaning of equipment should NOT be done at construction site by the contractor – but in a licensed garages outside the site area • The design will incorporate oil sumps at the parking areas to isolate oil spills from parked vehicles that might spill to the storm drains • No solid waste, fuels or oils shall be discharged on land surface, into drains or streams **OPERATION PHASE** • Monitor oil spills and other leakages at	Project Engineer/KR Sub-County Health & Environmental Officer, NEMA, WARMA KR	Inspection • Discharge into drainage channels • Complaints from the neighbouring communities or the authorities	(c) daily (o) regularly	Costs build in the planning and administration costs & Maintenance costs of the railway line and the stations

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	the at garages, parking lots, and delivery areas • Regular cleaning of oil sumps and storm water drains				
Traffic safety	Contractor to prepare a Traffic Management Plan for approval to address the following issues; • Initiation of a safety program and measures by creating awareness and educational campaigns for workers and local communities • Installation of appropriate road signage, speed signs, and other warning signs at the site and access roads • Copies of insurance policies for the contractor's drivers and vehicles should be provided to the Supervision Consultant. • The contractor's vehicles and equipment must be in proper working condition and have registration plates, and numbering. • The contractor ensures proper driving discipline by its employees, and sanctions those in breach. • Excavated sites, embankments, and dangerous locations are protected with proper safety barriers, tape and warning signs. • Maintain a log detailing every violation and accident on site or associated with the project work activities, including the	Project Engineer/KR/Local Police,	Inspection and accident reports (c) & (o) - No of accidents (c) & (o) - Complaints from the local people (c) Adherence of insurance and traffic Act requirements	Monthly	Costs build in the planning and administration costs

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	nature and circumstances, location, date, time, precise vehicles and persons involved, and follow-up actions with the police, insurance, families, community leaders, etc. (including during operation stages)				
Social Issues - employment	**CONSTRUCTION PHASE** • Utilization of local skilled and unskilled workers **OPERATION PHASE** • Employment of locals and considerations in job allocations especially for activities requiring unskilled labor • Re-training of directly affected person into railway related careers • Commissioning of other potential income generating activities along the rail line, e.g. revitalization of large scale agricultural activities, livestock farming, tourism, etc.	Project Engineer/KR KR	(c) observation /reports • Number/percentage of local workers from the local communities • Complaints from local residents • To minimize the negative socio-economic associated with the transfer of cargo transport through key roads and market centres	Monthly	No direct costs to ESMMP, costs build in the planning and administration costs
Workers health and sanitation	• Contractor to provide clean and adequate sanitation facilities for the workers at all times • Contractor shall also provide clean drinking water at the construction site for his workers at all times **OPERATION PHASE** • Project proponent to provide clean and adequate sanitation facilities for the	Project Engineer/KR	Inspection/observation/ reports • Number of sanitation facilities • Sanitation facilities cleanliness • Number of disease outbreaks	Daily Monthly reports	No direct costs to ESMMP, costs build in the planning and Administration costs & Normal maintenance costs during operation

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	commuters				
HIV/AIDS, STDs	**CONSTRUCTION PHASE** • Initiate a sensitization and awareness campaign on HIV/AIDS and STDs to be done to workers and local community; • Reduce risk of transfer through provision of male and female condoms for all workers; • Provide free STI and HIV/AIDS screening, diagnosis, counselling for workers and local people near the site **OPERATION PHASE** • Maintain a continuous awareness program on health issues related to STDs and HIV/AIDS at the stations e.g. installing posters at the stations	Project Engineer/KR Sub-county Health & Environmental Officer, local sub-county authorities • No of testing, counselling provided • Prevalence of prostitution, HIV/AIDS and STDs in the area during construction period	observation / reports • No of HIV/AIDs programs conducted by the contractor observation / reports • Information flow, dissemination and awareness on HIV/AIDs • No of posters at the station building	Monthly Continuous • Response to HIV/AIDS issues	a) HIV/AIDS awareness campaign b) HIV/AIDS prevention campaign Ksh 1,500,000
Solid Waste	**CONSTRUCTION PHASE** • Establish a well-planned method of solid disposal of debris/ garbage at the camp site and stations area	Project Engineer/KR	Inspection • Disposal methods of solid waste from the site and stations areas • Complaints on health and safety aspects related to construction activities	Weekly	Costs build in the planning and administration costs

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	OPERATION PHASE • Provision of disposal bins at designated areas at the station area • Regular collection and disposal of garbage by the project proponent • Clean storm water drains to minimize clogging • Provision of separate collection bins for biodegradable and non-biodegradable waste at the new facility. • All the collection bins and collection points/stations shall be properly maintained on regular basis	KR	• Site cleanliness • Amount of waste/debris on site Inspection • Accumulation of garbage at the stations area • Complaints by commuters (target=0) • Number of drainage areas clogged • Facilities cleanliness	Daily	Allow KShs. 400,000.00 on waste management
Occupational Health and Safety	The contractor to prepare a Health and Safety Plan that will include consideration of the following; **CONSTRUCTION PHASE** • Provide medical and insurance cover for all workers • Provide adequate and right safety tools, and enforce use of PPEs to all workers • Appoint a fulltime OHS personnel • Ensure provisions of first aid for staff , insurance, and access to ambulance service at all worksites, and arrangement to access local hospital/dispensary with qualified medical staff by workers	Project Engineer/KR	Inspection • HSE instructions and PPE available • Workers OHS compliance (use and adequacy) • Number of construction activities related accidents • Recording of violations and corrective measures Workplace risk assessment undertaken before start of operations	Monthly	Standard conditions of contract for Insurance Costs build in the planning and administration costs Allow KShs. 500,000.00 on Public Safety measures

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Ksha)
	• The site shall be fenced off and provided with security at the access gates to reduce potential accidents and injuries to the public				
Asbestos Roof Removal	• Dispose all Asbestos Containing Materials according to WBG/IFC EHS Guidelines NEMA Guidelines/ requirements • Use recommended PPE • Conduct Risk Assessment before removal of ACMs • Keep an updated inventory of all ACMs in the work place • Notify the authority by filling in the notification form (Annex 2) • Ensure that all asbestos containing materials are clearly marked and visible. • Develop safe work procedures • Instruct all workers who would be exposed • Ensure that work is carried under the supervision of experienced and qualified personnel • Keep accurate and complete records regarding asbestos management	Project Engineer/KR	Inspection • HSE instructions and PPE available • Workers OHS compliance (use and adequacy) • Number of construction activities related accidents • Recording of violations and corrective measures Workplace risk assessment undertaken before start of operations	Daily	Standard conditions of contract for Insurance Costs build in the planning and administration costs

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
Gender equity and Sexual harassment	<u>CONSTRUCTION PHASE</u> • Contractor to prepare and enforce a No Sexual Harassment Policy in accordance with national law where applicable • Contractor to prepare and enforce a No Sexual Harassment Policy in accordance with national law where applicable • Contractor and implementing agency to prepare and implement a Gender Action plan to include at minimum, in conformance with local laws and customs, equal opportunity employment, gender sensitization • Provision of gender disaggregated bathing, changing, sanitation facilities • Grievance redress mechanisms including non-retaliation	Project Engineer/KR	observation /reports Number of incidences reported (target=0)	monthly	No direct costs to EMMP, costs build in the planning and administration costs
Loss of life, injury, or damage to people and private property	<u>CONSTRUCTION PHASE</u> • Contractor shall maintain records and making reports concerning health, safety and welfare of persons, and damage to property, as the RE may reasonably require • Insuring against liability for any loss, damage, death or bodily injury which may occur to any physical property or to any person which may arise out of the contractor's performance of the contract • Insuring against liability for claims, damages, losses and expenses (including legal fees and expenses)	Project Engineer/KR	Number of incidences reported (target=0)	Monthly	No direct costs to EMMP, costs build in the planning and administration costs Schedules, BOQ

Project Environmental and Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and monitoring during design, construction and defects liability period	Parameters for Monitoring/ Indicators (c) – construction (o) - operations	Timing - Recommended frequency of monitoring	Estimated Mitigation & Monitoring costs to be included in the BoQ (Kshs)
	arising from injury, sickness, disease or death of any person employed by the contractor or any other of the contractor's personnel. • The construction site shall be fenced off to prevent access to members of the public				
Child protection	<u>CONSTRUCTION PHASE</u> • The contractor to have and enforce 'Child Protection Code of Conduct' • Ensure no children are employed on site in accordance with national labour laws • Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police	Project Engineer/KR	observation /reports/random checks • Inspection of employees working at the site • Labour Records by the contractor	Regularly	No Direct costs

Chapter 9: Grievance redress Mechanisms (GRM)

8.1 Overview

Proper and strong Grievance mechanisms are very important in ensuring the stakeholders grievances and issues as they relate to the proposed project are addressed in a timely and appropriate manner, to enhance the relationship between the project proponent, contractor, and the stakeholders. It is therefore recommended that the project proponent should therefore put in place a GRM for the project to ensure any issues raised by stakeholders related to the project safeguards are addressed.

It is important to emphasize that grievance redress mechanisms are for all aspects of a project, not just environmental and social safeguards. The implementing agency should prepare and disseminate grievance redress guidelines for the project, including a hierarchy of reporting levels for redress, roles, and responsibilities. Public information about grievance redress should be posted in visible locations in project area of influence. Where needed, Grievance Redress Committees (GRCs) should be established, with the necessary authority, training and resources. Entities involved in grievance redress should keep proper records and logs. Project budgets should include resources for the establishment and operation of the Grievance Redress System. The implementing agency should on regular occasions review the GRM and verify that they are working properly.

A sample grievance process has been provided in Annex 5 of this report.

Chapter 10: Conclusions and Recommendations

9.1. Conclusion

The Government of Kenya (GoK) has in the past two decades embarked on a historically most ambitious and revolutionary endeavour in infrastructural development. It has invested heavily in word class infrastructure, to tap into the potential of Kenya's economic growth and to reduce economic loss associated with traffic snarl ups. In this light, the proposed revitalization of the Nakuru-Kisumu Metre Gauge Railway (MGR), the Kisumu-Butere Metre Gauge Railway (MGR) and the Gilgil-Nyahururu will act as the main transhipment point between the SGR and Road for freight traffic that is destined for areas beyond ICD Naivasha. In the interim, the line will serve freight destined for Uganda, Southern Sudan, Democratic Republic of Congo, Rwanda and Burundi as Mombasa – Nairobi – Malaba SGR project is being implemented to completion. This will supplement and reduce congestion along Nairobi – Malaba highway (A104/A8) and support Nairobi Inland Container Depot (ICD) which is currently in operation.

Additionally, the revival of Gilgil-Nyahururu railway will create jobs and improve the economy of the area. Among the economic benefits to be achieved, is the resumption of transportation of agricultural products from Nyandarua and livestock from Laikipia at reasonable cost. Additionally, in Nyandarua, potato processing plant and cold storage are being constructed hence the railway will be an efficient means of transportation of finished products and also required materials. The rail, which cuts across three counties of Nakuru, Nyandarua and Laikipia, is also expected to bring down the cost for transporting building materials in the region. On the other hand, Kisumu-Butere railway line will facilitate ease of doing business as well as increasing competitiveness of locally produced goods in the region through provision of efficient, reliable and cost effective logistic and value chain haulage services.

The study established that administratively, Project Area is traverses through divided into eight (8) counties in accordance with the extent of land development and magnitude of socio-economic activities.

- Nakuru County;
- Kericho County;
- Kisumu County;
- Siaya County;
- Vihiga County;
- Kakamega County
- Laikipia County and
- Nyandarua County

This Environmental and Social Impact Assessment report has identified the environmental and social issues that are likely to be significant (scoping) and thereafter undertaken their assessment in detail. It has also reviewed the Environmental and Social policies, legislation and regulations relevant to the project, outlining the pertinent regulations and standards governing Environmental and Social quality, safety and health, protection of sensitive areas, protection of endangered species, and land use control at the national and local levels. As a key component of the full study, several key studies and tests were done including noise and air quality.

Since the project routes provides the optimal route, the consideration of alternatives recommended that the "No Action Alternative" should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the environmental management plan developed in this report.

In this screening and scoping process it has been determined that the project meets a threshold requirement of a Finding of Significant Impacts (FOSI) under established environmental examination procedures, and as stipulated under EMCA (1999) EIA procedures (2003). This environmental examination process has identified the significant positive environmental and social impacts including local revenue generation, increase in property value, improved area aesthetics, ease in congestion once the Commuter Rail is operational, and employment creation where skilled, semi and unskilled workers will be able to get jobs.

It should be noted that this a rehabilitation of an existing project and most of the impacts are short and medium-term or temporary in nature and can be readily addressed by some embedded control measures in the engineering design of the Project as well as additional mitigation measures as suggested in the Environmental and Social Management Plan. The Project received favourable support from local people and other stakeholders during consultations. Stakeholders appreciated that in revitalization of the MGR lines in addition to improving the state of the railway lines and the railway stations in the western region railway network, the Project will have several other benefits such as supporting economic growth by opening avenues for further development, employment (direct and indirect) and improving local infrastructure. The critical importance of the proposed project involve construction of new station and rehabilitating and upgrading the existing stations so as to develop a strong freight and commuter rail service in the western region that will serve the high demand of freight and commuters. Additionally, with the completion and operation of the ICD Naivasha, cargo will conveniently be transferred from the Port of Mombasa to Kenya border Malaba and to East Africa and beyond landlocked countries. Further, completion of the project will lead to road traffic decongestion. As such, the project in itself is already an activity in mitigation of an existing concern and this is the prime justification of the proposed investment.

During the construction phase of the Project, the key environmental issues are noise and

dust generation. Drainage, contamination of soil, groundwater could occur also result from accidental spills and leaks of hazardous materials (e.g. oil) during handling, transportation, and storage at the site. The adverse impacts identified are generally manageable through good housekeeping and a diligent implementation of the ESMP by the Proponent.

The assessment also found that the Project is unlikely to cause any major social impacts. The Project does not involve any physical and economic displacement of families. Since there were encroachments of railway corridor, adequate notices were issued for encroachers and sensitization exercise undertaken by the proponent for settlers to vacate.

The positive social impacts identified include employment and business opportunities for the local people, reduction of travel time and comfort, improved security, decongestion of already congested roads within the project area and Nairobi metropolitan area, thereby reducing air emissions from vehicles, increased trade in the area translating to increased revenue generation to national and local governments, among others.

On the other hand, the possible negative impacts include conflicts and social concerns such as: employment, informal settlement along the railway line and stations, disruption of public utilities, potential spreading of STIs and HIV/AIDs, risks of injuries and accidents to workers and members of the public, among others. Most of the adverse impacts are short-term or temporary and will be more felt during the construction phase of the project. However, most of them can be mitigated with appropriate mitigation measures built in as part of the Project planning process

9.2. Recommendation

Environmental monitoring is essential to track and sustain the effectiveness of the mitigation measures proposed in this report. An environmental monitoring plan has been prepared as part of the ESMP. The focus areas of monitoring cover air, noise, traffic management, Water and energy resources, occupational health and safety, as well as local employment and economic impact of the project during construction and operations. The burden of mitigation measures largely lies with the Proponent. Key observations are that most adverse impacts are short-term and will disappear once civil works ends. The core monitoring strategy for this project will be through site meetings, in which case, it is recommended that the County Environmental Officers be invited to such meetings. Other stakeholders such as the County Labour Officer should also attend such meetings to ascertain that measures towards securing the health and safety of workers have been put in place.

It is the duty of the Proponent to carry out annual environmental audits once it has been commissioned. This will be in compliance with the Environmental Management and

Coordination Act, EMCA of 1999 and the Environmental Impact Assessment and Audit Regulations, Legal Notice No. 101 of 2003.

It is the responsibility of the project proponent to allocate this budget to facilitate diligent implementation of the mitigation measures and minimize potential negative impacts at construction and operational phases of the project. The following is recommended for effective implementation of the mitigation measures for the project:

i. All mitigation measures need to be specified in tender and contract documents, and must be included in the Engineering Drawings, Specifications and Bills of Quantities.
ii. Diligence on the part of the contractor and proper supervision by the Project Engineer during construction and the initial operation phase is crucial for mitigating impacts.
iii. Periodic environmental and social monitoring is required by the project proponent to ensure that mitigation measures have been implemented in order to prevent or avert any negative impacts of the project.
iv. The implementing agency should set up proper and applicable Grievance Redress Mechanism (GRM) for the project to deal with grievances and issues on the project.
v. Reporting of the implementation of safeguards should be incorporated in the monthly reporting of the project

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17. Kisumu County Integrated Development plan II (2018-2022).
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19. Vihiga County Integrated Development plan II (2018-2022).
20. Nyandarua County Integrated Development plan II (2018-2022).
21. Laikipia County Integrated Development plan II (2018-2022).
22. Siaya County Integrated Development plan II (2018-2022).

Annex 1: Experts License

FORM 7

(r.15(2))

nema

mazingira yetu | ulinzi 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/14586

Application Reference No: NEMA/EIA/EL/19102

M/S **Stellah Cherop Ndiwa**
(individual or firm) of address

P.O. Box 2162-80100, Mombasa

is licensed to practice in the

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

registration number **10011**

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

Issued Date: **3/24/2021**

Expiry Date: **12/31/2021**

Signature…..

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

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/14588

Application Reference No: NEMA/EIA/EL/19785

M/S **Naftal M. Moibi**
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registration number **2110**

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

Issued Date: **3/24/2021**

Expiry Date: **12/31/2021**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

Annex 2: Land Ownership

Annex 3: Eviction notices

Annex 4: Station Building Plan/Layout

Annex 5: Public Participation Meeting Minutes

MINUTES OF THE PUBLIC CONSULTATION MEETING HELD AT GILGIL RAILWAY STATION ON 25TH AUGUST 2021 FOR REHABILITATION PROJECT OF NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS

Venue: Gilgil Railway Station

Agenda

1. Opening prayer
2. Welcoming Remarks
3. Introductions
4. Project description
5. Social /Environmental Impacts
6. Questions and Answers session

MIN	ITEM	ACTION/REMARKS
	The meeting was held at Gilgil Railway Station premises comprising of the representatives of community members representing the wider Gilgil Town area.	
	The community representatives present adhered to COVID-19 strict protocols/ containment measures including wearing mask, observing social distance and sanitizing.	-COVID-19 Protocols
1.Opening Prayer	The meeting was called to order by the Chief Mr John K. Thuku, who invited a volunteer to lead in a word of prayer at 09:20 am.	
2.Welcoming Remarks	The area Chief welcomed all members present to the meeting. The chief gave his opening remarks and informed those present that the meeting had been initiated by Kenya Railway in connection to the ongoing project for the rehabilitation of the Nakuru-Kisumu, Kisumu-Butere and Gilgil – Nyahururu MGR	
3.Introductions	A brief introduction was done between KR team and the participants.	
4.Project Description	Naftal Moibi gave an explanation for the public participation process as a requirement by EMCA 1999 and that Public participation is concerned with involving, informing and consulting the public in planning, management and other decision making activities. He reiterated that Public participation ensures that	

5.Environmental and Social Impacts	due consideration is given to public values, concerns and preferences when decisions are made. He went on ahead to give the project description stating the scope of works and then highlighting the major project activities. The works to be undertaken include but not limited to: **Works** a. allast Screening b. allasting c. djustment of track curves d. eplacing of all rotten timber sleepers e. enovation of turnouts f. evel crossing overhauls g. ridges-Viaducts will be repaired and strengthened h. tation areas will be fenced off for safety and security i. ainting and renovation for all station buildings j. ater reconnection and sanitation facilities k. sbestos removal He also presented the possible environmental impacts likely to occur and the ways in which the corporation/ contractor was planning to mitigate those impacts. **Operations Benefits** a. mployment Opportunities b. eamless movement of cargo c. ecrease in GHG emissions	-Provision of waste segregation Bins and dispose as per the waste Regulations -Energy management -Have a spill management plan

6.Questions	d. educed road traffic congestion e. educed cost of transportation of goods and Passengers. f. educed road maintenance costs g. ncreased National Economic status h. eduction of road accidents caused by HCVs **Negative effects** a. olid waste generation, b. ncreased electricity, diesel, water consumption c. ccidental Spillages, Dangerous goods **Social Negative Impacts** a. IV /AIDs and Sexually Transmitted Diseases b. arly teenage pregnancies c. nsecurity d. rugs and Substance abuse **Questions** **Mr. James Kariuki,** *Chairman nyumba kumi:-* Why are all jobs being given to foreigners when there are jobless youths in Gilgil Town. **Mr. Moses Karanja:-** what will be done to improve safety at the level crossings in Gilgil since the barriers that were initially there have since been vandalised. He was concerned that the number of vehicles and motor bikes has increased over the recent past. **Grace Wambui:-** Do we have the police patrolling at night to guard against theft of	-Community sensitization, campaigns and programmes - Contractor shall be requested to give priority for employment of the locals for unskilled tasks. -For safety reasons the barriers and level crossing signages will be replaced during this rehabilitation exercise. -The station is manned by Railway Police and private security guards. -Contractor shall be compelled to give priority for employment of the locals for unskilled tasks. - The community can write a formal request for an agreed project that they need through the Chief's office to KR for consideration. KR to review and discuss with the community the request. -The diamond is legally Railway land and will be protected as such. He was advised to fill the boundary verification forms through which he will be shown his rightful boundary by the KR

MINUTES OF THE PUBLIC CONSULTATION MEETING HELD AT RAILWAYS LOCOSHED GROUNDS ON 27TH AUGUST 2021 FOR REHABILITATION PROJECT OF NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS

Venue: Nakuru (Railways Locoshed Grounds)

Agenda

1. Opening prayer
2. Welcoming Remarks
3. Introductions
4. Project description
5. Social /Environmental Impacts
6. Questions and Answers session

MIN	ITEM	ACTION/REMARKS
	The meeting was held at Railway Locoshed Grounds Chief's office comprising of the representatives of community members representing the wider Nakuru Town area.	
	The community representatives present adhered to COVID-19 strict protocols/ containment measures including wearing mask, observing social distance and sanitizing.	-COVID-19 Protocols
1.Opening Prayer	The meeting was called to order by the area Chief Mr Joel Atuti, who invited the pastor to lead in a word of prayer at 11:40 am.	
2.Welcoming Remarks	The area Chief welcomed all members present to the meeting. The chief gave his opening remarks and informed those present that the meeting had been initiated by Kenya Railway in connection to the ongoing project for the Rehabilitation Project of Nakuru-Kisumu, Kisumu-Butere and Gilgil – Nyahururu MGR Rehabilitation Projects	
3.Introductions	The area Chief then invited the Yard Master, Mary, to chair the meeting. Mary thanked those in attendance for attending the meeting; she said she was glad with the outcome since all sectors had been well represented.	
	The Yard master invited all those present to introduce themselves.	
	A brief introduction was done between KR	

	team and the participants.	
4.Project Description	Pauline Kiarie explained the purpose of the meeting and the requirement that as stakeholders they have a say in the project. She also reminded the participants that due to the COVID-19 pandemic, the meeting will be brief reminding all present to keep their masks on throughout the meeting. She then invited Naftal Moibi to give the project details and the reasons for the conducting public participation in the ESIA process Naftal Moibi gave an explanation for the public participation process as a requirement by EMCA 1999 and that Public participation is concerned with involving, informing and consulting the public in planning, management and other decision making activities. He reiterated that Public participation ensures that due consideration is given to public values, concerns and preferences when decisions are made. He went on ahead to give the project description stating the scope of works and then highlighting the major project activities. The works to be undertaken include but not limited to: **Works** a. allast Screening b. allasting c. djustment of track curves d. eplacing of all rotten timber sleepers e. enovation of turnouts f. evel crossing overhauls g. ridges-Viaducts will be repaired and strengthened h. tation areas will be fenced off for safety and security i. ainting and renovation for all station	
5.Environmental and Social Impacts		

6.Questions	buildings j. ater reconnection and sanitation facilities k. sbestos removal He also presented the possible environmental impacts likely to occur and the ways in which the corporation/ contractor was planning to mitigate those impacts. **Operations Benefits** a. mployment Opportunities b. eamless movement of cargo c. ecrease in GHG emissions d. educed road traffic congestion e. educed cost of transportation of goods and Passengers. f. educed road maintenance costs g. ncreased National Economic status h. eduction of road accidents caused by HCVs **Negative effects** a. olid waste generation, b. ncreased electricity, diesel, water consumption c. ccidental Spillages, Dangerous goods **Social Negative Impacts** a. IV /AIDs and Sexually Transmitted Diseases b. arly teenage pregnancies c. nsecurity	-Provision of waste segregation Bins and dispose as per the waste Regulations -Energy management -Have a spill management plan -Community sensitization, campaigns and programmes -Notices shall be issued before renovation of the residential houses commence -For safety reasons the houses have to be vacant for renovation to be undertaken -KR to liaise with NAWASCO and engage them to overhaul the current sewerage system -Contractor shall be compelled to give priority for employment of the locals for unskilled tasks. -Once fencing is complete, gates shall be erected -Risk Assessment to be done

	d. rugs and Substance abuse **Questions** Maurice;- How will renovation of the residential houses be done. Are we going to move out or they will be renovated while we are still in? Chief Atuti, How can the sewerage system be improved to contain the current high volumes due to the population growth? Karen Achieng;- how can the residents benefit from employment opportunities arising during and after the project period. Will the gates be erected to improve security? The railway yard is very dark at night, can flood lights be installed? Dickson was happy with the renovation, and return of train services, he wanted to know if those who have rented will be given priority after renovations. Corporate Social Responsibility The community members requested that during project construction, the contractor can be requested to put up for them a security office. They decried that since the matatu terminus was moved from town, the railways yard had been subjected to security threats. Chief Atuti requested for seedlings for the KR yard, most trees were old and pose a threat during heavy rainfall hence need to be cut. The Health officer in attendance was given an opportunity to sensitize the public on COVID-	to ascertain the number and position of floodlights needed -No one shall be evicted from the houses if they have a valid agreement with KR -The community to write a letter addressed to KR's MD inform of a proposal to have the security office near the matatu terminus. -KR to organise for new young tree seedlings -COVID-19 Containment Measures -Members of the public to be vaccinated
7.A.O.B		

	19. He reminded members of the public to go for vaccination as this will give them a better fighting chance should they be infected by the virus. He encouraged all to continue observing all the Ministry of Health guidelines even after vaccination. There being no other business the meeting was closed at 13:15hrs with a word of prayer.	

7. A.O.B

MINUTES OF THE PUBLIC STAKEHOLDERS ENGAGEMENT MEETING FOR ESIA ON NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS

1. **NYAHURURU (Ol Joro Orok meeting at Chiefs office on 30/08/2021)**

Agenda

1. Opening prayer
2. Welcoming remarks
3. Project description
4. Social /Environmental Impacts
5. Questions and Answers session
6. AOB

MIN	ITEM	ACTION/REMARKS
	The meeting was held at the Ol Joro Orok Chief's administrative office comprising of the selected community members representing the wider Ol Joro Orok and Nyahururu Town areas. The community representatives followed directives regarding COVID 19 measures including wearing mask, observing social distance and sanitizing.	
Opening prayer	The meeting was called to order by the area Madam Chief. She there after invited the pastor among the participants to lead in the opening prayer at 10.00 am.	
Welcoming remarks	Madam chief gave a welcoming remark by stating that the meeting has been initiated by Kenya Railways in connection to the ongoing rehabilitation of Gilgil-Nyahururu MGR line. She urged all members to be open minded and as objective as possible bearing in mind that the railway transport in one way or another will impact on their lives. A brief introduction was done between KR team and the participants.	
Project	After the introductory remarks, The lead KR EIA expert gave details of the proposed project and	

Description	explained the reason why it is necessary to do an Environmental Impact Assessment and seek NEMA approval before any project is implemented. She further explained that the scope of the subject project was big hence calling for the carrying of an EIA. She explained that the public participation is a requirement by EMCA 1999 and that Public participation is concerned with involving, informing and consulting the public in planning, management and other decision making activities. She concluded that Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. She further gave a brief on details of the ongoing works coupled with real or perceived positive and negative environmental and social impacts. She went ahead to highlight how KR would mitigate on the negative impacts. She stated that the rehabilitation will revitalize trade and boost region's economy; ease the cost of transporting agricultural produce in the region and enhance intercounty connectivity (Nakuru, Laikipia and Nyahururu). She added that KR will embark on an extensive marketing and safety awareness campaign to lure firms and create awareness on the railway operations. She concluded that the ongoing works is solely being undertaken by the Government of Kenya with KR team jointly with Kenya Defense Forces (KDF) Civil Engineers and National Youth Service (NYS) KR Sociology expert also gave a historical background saying that the MGR line was first built by the British in pre-colonial period and has not been in use for a number of years. As such, there are some social amenities and facilities like schools, churches and hospitals that have sprang up which would need more level crossings, culverts. He urged the local community to own the project, work hand in hand with KR for peaceful coexistence	

Concerns/ Questions and Answers	ACC Oljororok Sub-County Mr. Geofrey Tarogon lamented that A.H.I.T.I college had made a formal request to KR to make a provision for a level crossing for easy access to the institution. He stated that KR should give due consideration for such requests without expecting the community/local leadership to shoulder the expenses. He requested that KR should consider reviewing all the available level crossings and community requests on merit.	*KR to review and discuss with tl community the requests of lev crossings along the Gilg Nyahururu MGR lines*
	A member was concerned that the distance between one level crossing and the other is too far and requested for one to be added.	*KR to review and discuss with th community the requests of lev crossings along the Gigi Nyahururu MGR line*
		The community can further writ a formal request through th Chie's office to KR fc consideration
	A member asked if KR gives eviction notices as those who were affected were caught unawares. However the community lamented that some of the eviction notices were given to lease owners some of whom did not pass the information to their tenants	*KR gave eviction notices to all owners of properties within KR land. Additionally, sensitization through the County Commissioner's office/ administration and media was adequately done.*
	A member was concerned that the locals are not part of the employees offered jobs on the ground.	*He was told that KR engages technical personnel from KDF engineers with KR engineers for the construction and rehabilitation of culverts, viaducts and bridges. However, unskilled labor was being sourced from the local community.*
	A representative from the community sorted to know whether KR would allow them to continue cultivating and whether small businesses will be allowed back within KR land.	*No business or persons will be allowed to construct/erect any structures within the railway corridor/ station. Additionally, unless otherwise, no further cultivation will be allowed within KR reserve. Additionally, station areas will be fenced off.*

A.O.B	Another speaker concerned with the effects of unblocking the culverts and bridges considering that there has been increased built ups of residential, business and schools along the area and some have been constructed right at the culvert location. An example being St. Teresa of the Child Jesus Catholic Church where a culvert has been discharging water to its compound.	*KR informed the gathering that KR engineering team have reviewed all the culverts and bridges and its outfalls and will ensure that adequate measures are put in place to ensure that overflow does not affect properties.*
	Another speaker asked whether the presence of KDF means that KR and its operations will be taken up by the military.	*It was clarified that KR and its operation will not be militarized and that the GOK sought technical expertise from KDF to support KR team in a bid to cut costs and use the available technical*
	There being no other business, the meeting ended with a word of prayer at 12.30pm	

MINUTES OF THE PUBLIC STAKEHOLDERS ENGAGEMENT MEETING FOR ESIA ON NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS AND THE CONSTRUCTION OF NEW RAILWAY STATION (KISUMU)

KIPKELION (Kipkelion meeting at Chief's office on 01/09/2021)

MIN	ITEM	ACTION
1. Opening prayer. Project brief	The area Chief Kipchoria Location Mr. Francis Maritim called the meeting to order and welcomed the members to the meeting. The opening prayer was offered by one of the participants at 11.30 am. The area Chief said that he was born on the railway and all his life from childhood revolve around the railway. He said that by reviving the railway transport, the economy of the region would be boosted by opening markets for both local raw material and finished products and to the area. After that, a brief introduction was conducted between KR staff and the participants. The Chief then gave KR team to make their presentations. The lead KR EIA expert gave details of the proposed project and explained the reason why it is necessary to do an Environmental Impact Assessment and seek NEMA approval before any project is implemented. She further explained that the scope of the subject project was big hence calling for the carrying of an EIA. She explained that the public participation is a requirement by EMCA 1999 and that Public participation is concerned with involving, informing and consulting the public in planning, management and other decision making activities. She concluded that Public	

	participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. She further gave a brief on details of the ongoing works coupled with real or perceived positive and negative environmental and social impacts. She went ahead to highlight how KR would mitigate on the negative impacts. She stated that the rehabilitation will revitalize trade and boost region's economy; ease the cost of transporting agricultural produce in the region and enhance intercounty connectivity (Nakuru, Kericho and Kisumu). She added that KR will embark on an extensive marketing and safety awareness campaign to lure firms and create awareness on the railway operations. She concluded that the ongoing works is solely being undertaken by the Government of Kenya with KR team jointly with Kenya Defense Forces (KDF) Civil Engineers and National Youth Service (NYS) KR social expert gave a narration of the project and how it will positively impact on the community like offering employment, opening the economy, lowering the cost of transport, reduction of road accidents and maintenance. He also gave a brief on the ongoing works as follows: i) Renovation and painting of buildings ii) Fencing off station areas iii) Building of bridges, culverts and viaducts iv) Loss of vegetation cover occasioned by bush clearing v) Management of drainage channels He also cautioned the team of the risks that may pose danger to the locals during operations like i) Accidents at unauthorised crossing points ii) Solid waste generation	

	iii) Risk of fire accidents in case of oil spillage He also highlighted the team on some of the social impacts of the projects i) Culture shock (military culture) ii) Family members alienated from the community due to employment hence HIV/AIDS and other STIs. iii) Lack of free movement as some areas will be fenced off iv) More uptake of alcohol and drug abuse due to increased income v) Family breakages	
Concerns/Questions and Answer Session	The area Chief Mr. Francis Maritim raised the need for additional level crossings for animals to access watering points and children to access schools across the railway. He noted the two century old level crossings are far apart and more need to be done.	*KR to review and discuss with the community the requests of level crossings along the Nakuru-Kisumu MGR lines*
	He also noted that it is very expensive for electricity connectivity across the railway as the charges are far above the normal rates. The Chief also raised a concern that KR does not allow water pipes cross the railway through the culverts which has denied them access to piped water.	*Through application, KR grants wayleave across its rail reserve. Community through Chief's office advised to make such application and request*
	Mr. Maritim also questioned why the old draconian colonial trespass laws are still in force. He said that the laws should be reviewed to boost good relations and restore confidence of the community to KR in general.	*KR will continue to advocate for a peaceful coexistence between the project/its infrastructure and the community surrounding the railway. There should be project ownership for longevity*
	A member asked if there can be an arrangement of growing crops along the railway line within the corridor and maintain the railway or the community be employed to maintain the railway line.	*No business or persons will be allowed to construct/erect any structures within the railway corridor/ station. Additionally, unless otherwise, no further cultivation will be allowed within KR reserve. Additionally, station areas will*

		be fenced off.
	A member asked if KR can come up with CSR project like provision of water to the community, sponsoring needy students and building of schools.	*All request for CSI consideration be addresse through the loc administration to KR MD office. Whenever funds ar available KR will conside implementing*
	A member asked why locals from Kipchorian Location are not employed on the ongoing rehabilitation project.	*In the ongoing rehabilitatio works locals have bee considered for both skille and unskilled labor. Follow-u to be done to ascertain an improve on the matter.*
	A member complained of double standards as some people are allowed to graze animals at the station area while others are denied.	*The station area will be fece off hence hence no trespas in any form will be allowed*
	A member questioned why if a train hits an animal the owner is fined and not vice vasa	*Compensation will only b done following fu investigation of the matte. Community urged to repo such incidences as soon a they occur.*
	A member raised a concern of putting in place wire mesh guards on the railway bridges as a safety measure.	*Engineering team will b brought up to speed on th request*
	A member asked for the revival of water pipes along the railway that used to originate from River Kipchorian by way of gravity. This used to be a dependable source of water supply to the community.	
AOB	There being no other business, the meeting ended with a word of prayer at 1300Hrs	

MINUTES OF THE PUBLIC STAKEHOLDERS ENGAGEMENT MEETING FOR ESIA ON NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS AND THE CONSTRUCTION OF NEW RAILWAY STATION (KISUMU)

MUHORONI (Meeting at Chief's office on 01/09/2021)

MIN	ITEM	ACTION
Opening prayer	The area chief Mr. Rey gave a welcoming remark and called the meeting to order after which he requested one of the participants to offer a word of prayer at 2.30 pm. The chief there after took the opportunity to conduct introduction of members present according to the area they represent. He later welcomed KR staff to also introduce themselves and table agenda to the meeting.	
Project Brief	After the introductory remarks, The lead KR EIA expert gave details of the proposed project and explained the reason why it is necessary to do an Environmental Impact Assessment and seek NEMA approval before any project is implemented. She further explained that the scope of the subject project was big hence calling for the carrying of an EIA. She explained that the public participation is a requirement by EMCA 1999 and that Public participation is concerned with involving, informing and consulting the public in planning, management and other decision making activities. She concluded that Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. She further gave a brief on details of the ongoing works coupled with real or perceived positive and negative	

	environmental and social impacts. She went ahead to highlight how KR would mitigate on the negative impacts.	
Concerns/Questions and Answer Session	EIA Team Sociologist gave a brief description of the project and stated that the 217km Nakuru-Kisumu and the 69.5 km Kisumu Butere line currently being rehabilitated will make economic breakthrough in the region. The works are going to upgrade the lines from 50 pound rail to 80 pound to enhance bigger engines that will haul more coaches and wagons. The activities being undertaken include the followings: i) Renovation of station buildings ii) The building of bridges, viaducts and culverts iii) Fencing off stations and iv) Bush Clearing	
	A member asked to know if Muhoroni-Songo Road (D311) which is claimed to be within the railway corridor will be closed during the operation.	*It was responded that no roa will be closed without provisio of an alternative. Additionally a inter-agency team comprising o KR and Road Authorities wi discuss and deliberate on th way forward.*
	A member also asked why there was no demolition notice given which resulted into eviction and destruction of property.	*KR gave eviction notices to all owners of properties within KR land. Additionally, sensitization through the County Commissioner's office/ administration and media was adequately done.*
	There was a concern from a member why there are so many trenches at the Muhoroni railway station causing storm water spill over hence affecting the community.	*The PWI in charge of Fo Ternan-Chemelil Mr. Jaco gave a response that th trenches will be redone as th station is still under renovation.*
	A member also asked whether there will be lease agreements with the community after the renovations	*The community members wer informed that KR will condu marketing after the renovation after which KR Busines Department elaborate clear*

		the terms and conditions for the leases if any.
	A member enquired if the former railway employees who were retrenched will be reinstated but the PWI responded that at the onset of the ongoing revitalization of the MGR line, all former employees were recalled including retirees but some opted not to go back. He gave an example of a former employ among the participants who opted not to do so.	*Before commence of the rehabilitation KR gave opportunity for former KR employees especially with technical expertise to be re-engaged and be part of the rehabilitation*
	A member also asked if the Project will offer employment to the youth.	*During rehabilitation, KR will consider local community for both skilled and unskilled labor. KR will give equal opportunity for all during the operation.*
	A member asked if there can be an arrangement of growing crops along the railway line within the corridor and maintain the railway or the community be employed to maintain the railway line.	*No business or persons will be allowed to construct/erect any structures within the railway corridor/ station. Additionally, unless otherwise, no further cultivation will be allowed within KR reserve. Additionally, station areas will be fenced off.*
A.O.B	There being no other business, the area Chief requested one member to give a vote of thanks after which another member offered a closing prayer to end the meeting at 5.15pm	

MINUTES OF THE PUBLIC STAKEHOLDERS ENGAGEMENT MEETING FOR ESIA ON NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS AND THE CONSTRUCTION OF NEW RAILWAY STATION (KISUMU)

KISUMU Meeting (Open field near Kanyakwar Chief's Office on 03/09/2021)

MIN	ITEM	ACTION
Opening prayer	The Ag. area chief who is also the Asst. Chief Kanyakwar Sub Location Mr. Maurice Ojwang called the meeting to order and gave opening remarks. He there after requested one participant to offer an opening prayer at 9.30 am. After the opening prayer, he introduced the participants according to their areas of representation. KR staff present then introduced themselves. After the introduction, the area Chief welcomed KR staff to bring the agenda to floor for discussion.	
Project Brief	After the introductory remarks, The lead KR EIA expert gave details of the proposed project and explained the reason why it is necessary to do an Environmental Impact Assessment and seek NEMA approval before any project is implemented. She further explained that the scope of the subject project was big hence calling for the carrying of an EIA. She explained that the public participation is a requirement by EMCA 1999 and that Public participation is concerned with involving, informing and consulting the public in planning, management and other decision making activities. She concluded that Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. She further gave a brief on details of the ongoing works coupled with real or perceived	

	positive and negative environmental and social impacts. She went ahead to highlight how KR would mitigate on the negative impacts. She stated that the rehabilitation will revitalize trade and boost region's economy; ease the cost of transporting agricultural produce in the region and enhance intercounty connectivity (Nakuru, Laikipia and Nyahururu). She added that KR will embark on an extensive marketing and safety awareness campaign to lure firms and create awareness on the railway operations. She concluded that the ongoing works is solely being undertaken by the Government of Kenya with KR team jointly with Kenya Defense Forces (KDF) Civil Engineers and National Youth Service (NYS) i) The revitalization of the Nakuru Kisumu MGR line will in essence create employment opportunities, boost the economy of the region and open bilateral trade between Kenya and Uganda across Lake Victoria through the wagon Ferry MV Uhuru. ii) That the works going include and not limited to the following: a) Bush clearing b) Bridges, culverts and viaduct rehabilitation c) Renovation of the station d) Painting of buildings	
	A member requested for a level crossing to be provided in front of Kudho Primary school for easy access to the school as there is heavy human traffic in front of the school by students, teachers and the parents.	*KR to review and discuss with the community the requests of level crossings along the Nakuru-Kisumu MGR lines*
	A member also requested for a CSR by Kenya Railways in terms of building class rooms in the above school, sponsoring bright and needy students from the locality, providing medical camps and fencing the school.	*All request for CSR consideration be addressed through the local administration to KR MDs office. Whenever funds are available KR wil*

Concerns/Questions and Answer Session	A member asked if a border fence can be built along the corridor next to markets, schools, residential areas or where there are more human traffic to avoid accidents by way of pedestrians being knocked by the train	*consider implementing*
	A member requested for employment opportunities for the locals in areas of skilled and semi-skilled man power.	*During rehabilitation, KR will consider local community for both skilled and unskilled labor. KR will give equal opportunity for all during the operation.*
	One member appreciated the return of railway operations as it will reduce road accidents and promote the economy of Kisumu town.	
	One member requested that Obunga Mbuta fish market should not be relocated from the current site next to the railway line.	*No business or persons will be allowed to construct/erect any structures within the railway corridor/ station. Additionally, unless otherwise, no further cultivation will be allowed within KR reserve. Additionally, station areas will be fenced off.*
	Another member also asked if the business community who were relocated from the site along the railway be brought back.	
	A member also requested for the sensitization of border- border riders on safety measures especially at the level crossing as they are prone to accidents.	*Sensitization exercise will be conducted by KR prior to operation commencement*
	A member requested for warning signs and barriers to be put in place for safety purposes.	*Adequate signage will be provided. The EMP will tackle such matter*
	A member asked if FB 2000 fish factory a tenant	

	of KR will be allowed to continue operations without interruptions as it offers employment opportunities to the community.	
	A member asked if sustainability of the revived railway operations is guaranteed bearing in mind that for many years, railway operation has been dormant.	*The community members were informed that KR will conduct marketing after the renovations after which KR Business Department elaborate clearly the terms and conditions for the leases if any.*
	One member asked if noise pollution will be reduced.	*Nowadays we have diesel engine with internal fuel combustion with reduced noise a part from the pioneer steam engines that produced more noise*
	A member requested for an establishment of a market with stalls at the new Kisumu MGR railway station.	
	One member asked why there was no compensation for those who were relocated from railway facilities loss of livelihood some of whom were having genuine leases from KR.	*No compensation will be done to those who have encroached KR land reserve*
A.O.B	There being no other business, the meeting ended after a word of prayer at 11.00 am	

MINUTES OF THE PUBLIC STAKEHOLDERS ENGAGEMENT MEETING FOR ESIA ON NAKURU-KISUMU, KISUMU-BUTERE AND GILGIL – NYAHURURU MGR REHABILITATION PROJECTS AND THE CONSTRUCTION OF NEW RAILWAY STATION (KISUMU)

BUTERE TOWNSHIP (Meeting held at Chief's office on 03/09/2021)

MIN	ITEM	ACTION
Opening prayer	The area Chief called the meeting to order and an opening prayer was offered at 10.00 am by one of the participants. The area Chief gave opening remarks and said that the railway line which reached Butere in 1931 made the place to be referred to us *mwisho wa reli* (end of railway) in the then Western Province. He reiterated that those days Butere was a beehive of activities and made the railway station a tourist destination. The Chief went on to introduce the participants according to their areas of representation. KR staff also introduced themselves. After the introduction, the area Chief requested KR staff to take the floor and lead the discussion.	
Project Brief	ESIA Team gave the background of the project as follows: i) The Government of Kenya through Kenya Railways is in the process of rehabilitating the Nakuru Kisumu ; Kisumu-Butere MGR lines by upgrading it from 50 pound rail to 80 pound rail. This will mean introduction of heavy engines that will pull more wagons and coaches hence boost trade in the region. i) The project will also create employment both directly and indirectly	

	through trade and direct employment. ii) The railway transport will complement road transport which is currently overburdened with traffic jams, accidents and dangerous emissions. iii) The railway will reduce the cost of transport for the business community. iv) The project will also impact on their lives negatively like separation of families due to employment hence more prone to HIV/AIDS and STIs and teenage pregnancies, v) The works being undertaken include a) Renovation of station buildings b) Painting of railway houses and facilities c) Repair of bridges, culverts and viaducts d) Dealing with drainage.	
Concerns/Questions and Answer Session	A member asked if the train schedules will resume as before	*Train schedule will be shared once the rehabilitation works are completed. KR will put train schedules according to the market demands*
	A member also sought to know why farming along the railway corridor was halted as this used to be an arrangement where the community would also own the project and take care of the line as well.	*No farming, business or persons will be allowed to construct/erect any structures within the railway corridor/ station. Additionally, unless otherwise, no further cultivation will be allowed within KR reserve. Besides, station areas will be fenced off.*
	A member also asked if the strict trespass laws will still be in force.	*No trespass will be allowed within KR land; all station area will be fenced off.*

	A member asked what KR will do to restore the good relations between the community and railways after the strained relations due to strict trespass laws and the fact that graves were exhumed in the area to pave way for the railway line. The person was told that being that the MGR line is more than a century old, those who buried the departed relatives and might have been exhumed were treated as encroachers.	*KR will continue to advocate for a peaceful coexistence between the project/its infrastructure and the community surrounding the railway. There should be project ownership for longevity*
	One member said that the two level crossings available in the area are prone to accidents as there are no signages and the community also need to be sensitized prior to the resumption of operations.	*KR to review and discuss with the community the requests of level crossings along the Kisumu-Butere MGR line*
	One member asked if KR will restore a nursery school at the station which used to be there and where many prominent people in the region began their education in their formative years.	*The community can further write a formal request through the Chief's office to KR for consideration*
	One member also asked if KR will put a provision for water as a CSR project to the community.	*All request for CSR consideration be addressed through the local administration to KR MDs office. Whenever funds are available KR will consider implementing*
	A member questioned if KR will offer employment opportunities both skilled and unskilled to the community.	*During rehabilitation, KR will consider local community for both skilled and unskilled labor. KR will give equal opportunity for all during the operation.*
	A member asked KR to come up with a true demarcation of the boundary to the railway as recently the surveyors who came on the ground put the demarcation beyond where the beacons used to be.	*All boundaries were remarked by KR Survey team. In case of any queries or complaint, KR survey team will address through site visit and meeting*
A.O.B	There being no other business, the meeting ended with a word of prayer at 1.30 pm	

GILGIL

ATTENDANCE REGISTER

DATE: 25/8/2021

SUBJECT: PUBLIC STAKEHOLDER ENGAGEMENT AT GILGIL HELD AT GILGIL RAILWAY STATION

S/No.	Name	Organization	Email address	Phone number	Signature
1.	Paulnie Kuarie	KRC - AGM	pkuarie@krc.co.ke	0721970163	
2.	Naftal Mwai	KRC - AGM			
3.	Susan Emitundo	KRC - AGM	Semitundo@krc.co.ke	0722286912	
4.	[illegible]	KRC	[illegible]@gmail.com		
5.	JOHN K THUKU	CHIEF			
6.	JOSEPH M. MWANURA	ASS/CHIEF	Josephmwanura@gmail.com		
7.	BONIFACE M. MBAGE	ASS/CHIEF	Mbagebon@gmail.com	0723514344	
8.	ANN NJOROGE	ASS/CHIEF	awamantha@gmail.com	0712984454	

KENYA RAILWAYS

ATTENDANCE REGISTER

GILGIL

DATE: 25/8/2021

SUBJECT:

S/No.	Name	Organization	Email address	Phone number	Signature
9.	Nancy Mwenja	Teacher	nancymwenja45@gmail.com	0722927617	
10.	Grace Ndiritu	Nyumba Kumi	grace.ndiritu855@gmail.com	0799006866	
11.	Pst. Muirui	Deliverance church	pastormuirui@yahoo.com		
12.	JAMES KARIUKI	Chair Nyumba Kumi gilgil	NO	0725719096	
13.	purity Karanja	Nyumba Kumi / CPC	puritykaranja960@gmail.com	0722645462	
14.	MOSES KARANJA	Nyumba Kumi CPC Secretary.	N/A	0720934351	
15.	MARION WAMBUI	Chief's Secretary	[illegible]@gmail.com	[illegible]	
16.	NICHOLAS N. MWAURA	Citizen		0715231[illegible]	
17.					

ATTENDANCE REGISTER

DATE: 25/8/2021

SUBJECT:

S/No.	Name	Organization	Email address	Phone number	Signature
18.	Doreas Wanjiku	Nyumba Kumi		0724479457	
19.	JULIAH WAMUYU			0726898611	
20.	EDWARD THIONGO			0714569595	
21.	MARY WATHU	Residence	Marysambage2018@gmail.com	0793901363	
22.	Josphine Mbogu	RESIDENCE		0110092764	
23.	Monica Wacheke	Teacher		0720693543	
24.					

KENYA RAILWAYS

ATTENDANCE REGISTER

DATE: 27/8/2021

SUBJECT: Public stakeholder engagement at Nakuru Railway Yard

S/No.	Name	Organization	Email address	Phone number	Signature
9.	GRACE WAITHERA	Railways MKR		0706 618649	
10.	CARREN KWAMBOKA	Railways (teacher)	carren88@gmail.com	0721549530	
11.	ELMELDAH MANYI	Business lady	emeldaman498@gmail.com	0711143810	
12.	ROSE MAMANYI	Business/Railways		0715217257	
13.	FAITH TUIT	Residence Nakuru	faytuit@gmail.com	0713630857	
14.	Mercy Jelagat	Residence Nakuru	JelagatMercy648@gmail.com	0742062255	
15.	EMILY OWINO	Residence Kisii		07 23327620	
16.	ELIZABETH NALIAKA	Residence MKR.		0706586389	
17.	ESTHER AMBALO	Residence MKR	estherambalo@gmail.com	0714776586	

ATTENDANCE REGISTER

DATE: 27/8/2021

SUBJECT: Public stakeholder engagement at Nakuru Railway Yard

S/No.	Name	Organization	Email address	Phone number	Signature
18.	CAREN ACHIENG DUDA	HAKURU RAILWAYS RESIDENT	Dudacaren@gmail.com	0722275116	
19.	Faith Ngatia Wanja	NAKURU RAILWAYS Resident	Ngatiafai@gmail.com	0700504223	
20.	ESTHER NJERI	NAKURU Railways resident		0725796353	
21.	JULIUS L. JAIKA	RETIRED KR EMPLOYEE	Jaikajj@gmail.com	0725 478086	
22.	DICKSON AMARIATI	NAKURU RAILWAYS		0718436659	
23.	ZAKARIA MWANGI	SOCIAL WORKER	Njuguna-zakaria1992@gmail.com	0729973616	
24.					

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT: ESIA Public Participation, Chief's Office - Ol Jor Orok **DATE:** 31/08/2021

S/No.	Name	Organization/Community Position	Email address	Phone number	Signature
1.	FELISHINA KAMAU	CHIEF	felishinak.@gmail.com		[signature]
2.	JOHN N. NGANGA FELISHINA	ASST. CHIEF	Johnndugire3@gmail.com.		[signature]
3.	Joseph M. Ndiangui	elder kisima	Josephndiangui77@gmail.com	0721207791	[signature]
4.	Eunice W. Mugi	Secretary C.V. Estate	eunicemugi.19@gmail.com	0723555282	[signature]
5.	Teresa Muthoni	Treasurer C.V. Estate	Muthoniteresa@gmail.com	0729036156	[signature]
6.	Mary wangui	Muhinda Nyumba kumi		0727095043	[signature]
7.	Peter Muniru	Madaraka Elder		0721148207	[signature]
8.	ROBERT K. MURAYA	Opinion Leader Madaraka	murayark@gmail.com	0721274225	[signature]
9.	Joseph Kahia Kinyua	Muhindi West		0722305596	[signature]
10.					

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT:

DATE:

S/No.	Name	Organization	Email address	Phone number	Signature
11.	Kithinji V.M.	Acc-Clatitau	viviejunior@gmail.com	0723 42 3316	[signature]
12.	Irene Muhache	Enumerator	muhache@yahoo.com	072437 [illegible]	[signature]
13.	Stellah Ndiwa	KR	sndiwa@krc.co.ke	0722032981	[signature]
14.	[illegible]	Kr	[illegible]	[illegible]	[signature]
15.					
16.					
17.					
18.					
19.					

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT:

DATE:

S/No.	Name	Organization	Email address Phone number	Signature
20.	GIBSON WANJOHI	Youth Rector	gibsonwanjohi@gmail.com 0700419961	
21.	PAUL MURIITHI NYAGA	Railway/Lavington Security company	PMNbebs@gmail.com	
22.	JOSHUA CHEGE GICHUHI	VILLAGE ELDER	0727140781	
23.	Jane Nyoki Muiruri	Village Elder	0720558143	
24.	Hannah Wairinga Gitau	Village Elder	0721109852	
25.	IBRAHIM KARIUKI	Village Elder	0724384323	
26.	George Mburu	Equator	0720803196	
27.	Lucy Wanjiku Gakuru	Kisima	0758846230	

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT: **DATE:**

S/No.	Name	Organization	Email address	Phone number	Signature
28.					
29.					
30.					
31.					
32.					

ATTENDANCE REGISTER

SUBJECT: ESIA study public participation - Chief's Office - Kipkelion **DATE:** 1/9/2021

S/No.	Name	Organization	Email address	Phone number	Signature
1.	Erastus K. Marisim	SKR Chief		0720888862	[signature]
2.	Richard K. Chirchir	Assistant Chief Kipkelion North		0725076198	[signature]
3.	John Mauru	Mnini Kipkelion		0720900577	[signature]
4.	David K. Korir	Asst Chief Kipkelion Twn	0725335238	~~0725335288~~	[signature]
5.	Samwel K Langat	Elder Lower Bluehill	0726443437		[signature]
6.	Musa K. Sigilai	Ndarug Nyando Rep	0728017014		[signature]
7.	Duncan Kiprui	Lower Blue hills Rep	0740418057		[signature]
8.	Grace Keter	Upper Mongete Rep	0727821983		[signature]
9.	Janet Chepkemoi	Lower Bluehills	0713666166		[signature]
10.	Rebecca Towni	Township A.T.C	0721562187		[signature]

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT:

DATE:

S/No.	Name	Organization	Email address Phone number	Signature
11.	Haron Anyula	ELDER	0724646280	[illegible]
12.	Joseph Ngene	ELDER	0725565292	[illegible]
13.	JONATHAN KIARIE	VILLAGE REP.	0721697830	
14.	CHRISTINE CHEPKWONY	VILLAGE REP	0706074778	[illegible]
15.	Patrick Lumumba	ELDER	0711379898	[illegible]
16.	Samwel K. Rotich	ELDER	0721519462	[illegible]
17.	IRENE MUHACHE	ENUMERATOR	muhach@yahoo.com 072437 749C	[illegible]
18.	Stellah Ndiwa	SEO	sndiwa@krc.co.ke	[illegible]
19.	Elias Rantiji	JS	erantiji@krc.co.ke	[illegible]

ATTENDANCE REGISTER

SUBJECT: ESIA Public participation, Chiefs Office Muhoroni **DATE:** 1/9/2021

S/No.	Name	Organization	Email address	Phone number	Signature
1.	HBOGA. C. RATHOD	NGAO	crajmo37@gmail.	0723813133	[signature]
2.	PETER. OTIENO OCHIENG.	NGAO	Pechieg@gmail.com	0726977924.	[signature]
3.	IBRAHIM MOHAMED	RESIDENCE		0726786511	[signature]
4.	JOSEPH OUMA MWENDE	BUSINESS		0723 155 054	[signature]
5.	REBECCA AKINYI	Residence		0772 1411 57	[signature]
6.	Ruth Wanoli	Residence		0768618528	[signature]
7.	Phanice ominde	Residence		0726261732	[signature]
8.	JOSEPH ORIKO	RESidence		0712574495	[signature]
9.	PETERS O ODONGO	RESIDENCE		0716820100	[signature]
10.	MILTONE OTIENO OPILE	RESIDENCE		0727663953	[signature]

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT: **DATE:**

S/No.	Name	Organization	Email address Phone number	Signature
11.	ASHA A OKOLA	RESIDENCE	0718190715	
12.	ISAAC CHITTI	RESIDENT	0713137195	
13.	PETER NAWERU	RESIDENT	0725669461	
14.	[illegible]	[illegible]	[illegible]	
15.	JACOB ODUDA	KENYA RAILWAYS	0721993557	
16.	VINCENT OTIENO	PASTOR	0725673885	
17.	OUMA YINCENT/ISDAC OWUOR	YOUTH REP/ RESIDENT	0717892821/0735503503	
18.	IRENE [illegible]	[illegible]	[illegible]	
19.	Stellah Ndiwa	SEO	Sndiwa@krc.co.ke	

KENYA RAILWAYS

ATTENDANCE REGISTER

DATE:

SUBJECT:

S/No.	Name	Organization	Email address	Phone number	Signature
18.	ELIAS RANDIKA	JJ	[illegible]	0700253098	
19.					
20.					
21.					
22.					
23.					
24.					

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT: ESIA public participation - Kanyakwar - Kisumu **DATE:** 3/9/2021

S/No.	Name	Organization	Email address Phone number	Signature
1.	MAURICE O. NYANGA	CHIEF ~~[illegible]~~	ojwangmaurice.8@gmail.com	[signature]
2.	NASHON O. OPIYO	ASST CHIEF	[illegible]@gmail.com	[signature]
3.	RICHARD O. OSIDRO	OBUNGA FISH MARKET	0720922346	[signature]
4.	BARACK O. AGALLO	PASTOR	barrackagallo@yahoo.com	[signature]
5.	STANLEY [illegible]	HELDER	0728654176	[signature]
6.	JOHN O. OKELLO	OBUNGA RESIDENCE	0724 224015	[signature]
7.	ODINGA ODERO	RESIDENCE	0723629547	[signature]
8.	RAPHAEL O. OLOO	OBUNGA RESIDENCE	[illegible]@gmail.com 0723368875	[signature]
9.	Lilian Atieno	Community Leader ~~OBUNGA RESIDENCE~~	0723049942	[signature]
10.				

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT:

DATE:

S/No.	Name	Organization	Email address	Phone number	Signature
	GEORGE ODIYO	WOMEN	—	0743556020	[signature]
11.	SUSANA ATIENO OUMA	WOMEN REP	—	0797219370	[signature]
12.	AEMEAH ODUOR OTIENO	YOUTH REP	-	0710998717	[signature]
13.	LEONARD OMONDI OMOLO	YOUTH REP		0711475755	[signature]
14.	AHMED A JUMA	ELDER		0718905272	[signature]
15.	Benard Odhiambo	BODA BODA REP.		0700239891	[signature]
16.	Jared Odongo Ogutu	"		0725294807	[signature]
17.	TAZAN HAYO ODHIAMBO	CHIEF'S OFFICE		0700745587	[signature]
18.	[illegible]	ENUMERATOR	[illegible]@yahoo.com	0724373412	[signature]
19.	Stellah Ndiwa	SEO	cndiwa@krc.co.ke		[signature]

KENYA RAILWAYS

ATTENDANCE REGISTER

DATE:

SUBJECT:

S/No.	Name	Organization	Email address	Phone number	Signature
18.	ELIAS RANDIGA	SJ	erandiga@krc.co.ke	0700253198	[signature]
19.					
20.					
21.					
22.					
23.					
24.					

KENYA RAILWAYS

ATTENDANCE REGISTER

SUBJECT: ESIA public Participation- Butere Chief's Office - Township **DATE:** 3/9/2021

S/No.	Name	~~Organization~~ Location	Email address	Phone number	Signature
1.	ZABLON B OPANDA	TOWNSHIP	opandezablon@gmail.com	0712535947	
2.	TRUPHINE OMUKANDA	SHIADSA	trukoradc@yahoo.com	0725984420	
3.	JACKSON AMBAY	EBWITENDE		0706190[illegible]	
4.	OPANDA ~~[illegible]~~	SHITAHA		0710[illegible]	
5.	VICEI AGALA	ESHITAHA		0726424985	
6.	RUTH OKWOMI	ESHITAHA		0711185949	
7.	JOSEPH ALIARI	Shitaha		0716015619	
8.	PAUL ANDALO	Shitaha		0725553622	
9.	AGNETA KHAKAYI	SOFIA		0716667234	
10.	Samuel A. Walumwa	Shitaha		0722216109	

ATTENDANCE REGISTER

SUBJECT:

DATE:

S/No.	Name	Organization	Email address	Phone number	Signature
11.	Beatrice Iramwenya	Shitaha		0721511657	
12.	Joram Mukwatsi	Ebutenzo		0715334173	
13.	CHRISS. O. Ashubi	Ebutendo.		0700556853	
14.	Charles Murungu	Shitaha		0712228760	
15.	CHIMI OKWAYU	ESHITAHA		0737601977	
16.	MOSE. C. ODANDA	SHITAHA		0723143770	
17.	Johnstone Osito	ESHIBAKAKALWE		0718737669	
18.	MICKDAD KITSUMUM [illegible]	ESHITAHA [illegible]		[illegible]	
19.	[illegible]	[illegible]	[illegible]	[illegible]	

ATTENDANCE REGISTER

DATE:

SUBJECT:

S/No.	Name	Organization	Email address	Phone number	Signature
~~18.~~ 20	Stellah Ndiwa	KR	sndiwa@krc.co.ke	0792532981	
~~19.~~ 21	ELIAS RANDIGA	KR	erandiga@krc.co.ke	0700253088	
20.					
21.					
22.					
23.					
24.					

Annex 8: Copy of Approved Terms of Reference