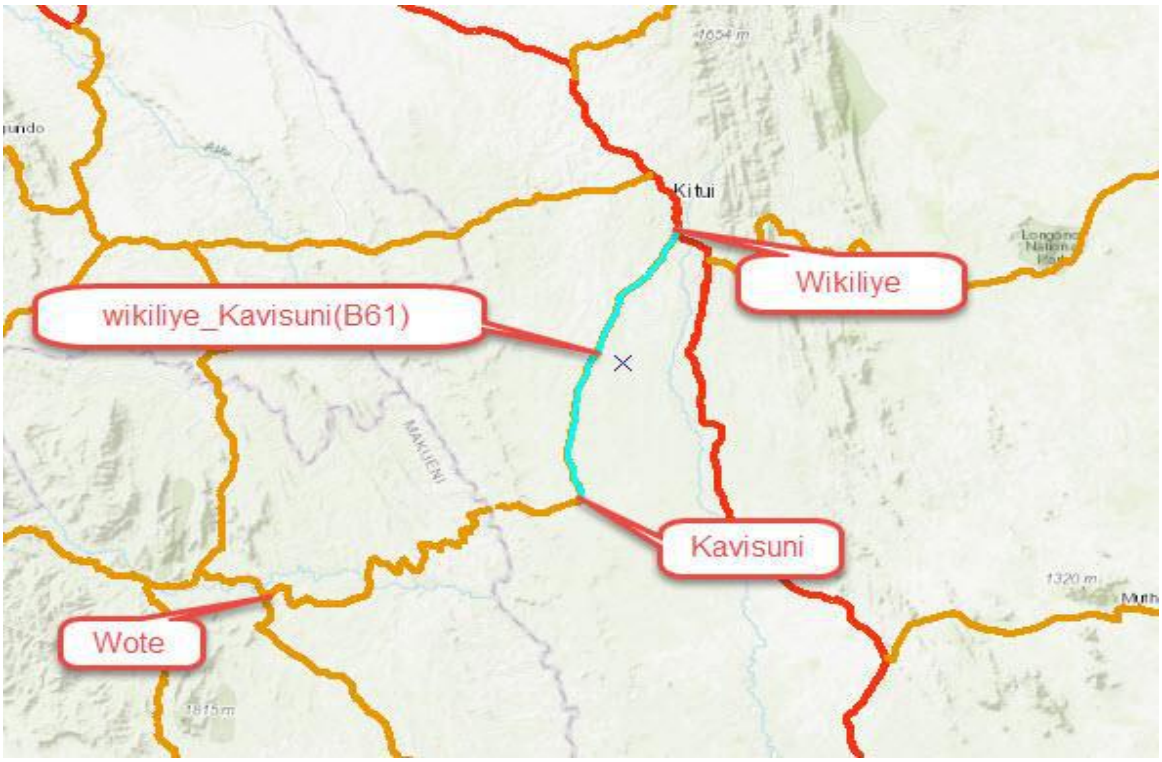
REPUBLIC OF KENYA

MINISTRY OF TRANSPORT, INFRASTRUCTURE, HOUSING AND URBAN DEVELOPMENT

Kenya National Highways Authority

Quality Highways, Better Connections

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED DUALLING OF WIKILILYE-KAVISUNI ROAD (B61)



April 2022

DECLARATION

TITLE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED WIKILILYE- KAVISUNI ROAD PROJECT

This ESIA study report has been prepared in accordance with the provisions and requirements of the Environmental Management and Coordination Act (EMCA) Cap 387 and subsidiary regulation -Environmental (Impact Assessment and Audit) Regulations, 2003.

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ABBREVIATIONS

ESIA	Environmental and Social Impact Assessment
EMCA	Environmental Management and coordination Act
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GoK	Government of Kenya
CoK	Constitution of Kenya
HIV/AIDs	Human Immunodeficiency Virus/ Acquired immune deficiency syndrome
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
Km	Kilometers
KFS	Kenya Forest Service
NEC	National Environment Council
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
RAP	Resettlement Action Plan
ToR	Terms of Reference
WRA	Water Resource Authority

EXECUTIVE SUMMARY

Introduction

Environmental and Social Impact Assessment (ESIA) study for development projects is specified in the Second Schedule of the Environmental Management and Co-ordination Act (EMCA 1999) amended. It is through this process that development projects of significant magnitudes must be environmentally acceptable, economically feasible and socially acceptable. It is against this background that Kenya National Highways Authority (KeNHA) had to carry out an assessment of the proposed road construction project as per the National Environment Management Authority (NEMA) requirements.

This Environmental Impact Assessment has identified both positive and negative impacts of the proposed road (Wikililye- Kavisuni) to the environment and proposes mitigation measures in the Environmental Management Plan (EMP) developed to address potential negative impacts, during the construction, operation and decommissioning phases of the project, for overall environmental sustainability.

The main aim of the project road is to improve connectivity, between Kitui County and Makueni County which will in turn improve economic and social welfare in the region. Upon completion, the project will give Kitui County a facelift and access to Makueni County, improve trade and business in the region with the linkages between Kitui and Makueni counties. People from Eastern Kenya will be able to connect easily to Coastal side of Kenya once the road is constructed.

Project Description

The proposed road project is part of the road intended to connect Kitui and Makueni Counties, which entails constructing a 32KM Class B road. The road is an important link of a road intended to connect Wote- Makindu (B60) with Kibwezi- Kitui (A7) Road. Wikililye- Kavisuni section of the road lies within Kitui County and it is gravel road classified as Road B61.

Policy, Legal and Regulatory Framework

Part II of the (EMCA 1999, Revised 2015) amended states that *"every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment".* Some of the legislations relevant to the proposed project includes the Constitution of Kenya, 2010, Environmental Management and Coordination Act (1999) amended, Explosives Act Cap 115 (1969, 1962), Traffic Act Cap. 403, Water Act Cap. 372, Public Health Act, Cap 242, Occupational Safety and Health Act, 2007, The Land Act 2012, The National Land Commission Act 2012, Sexual Offences Act No.3 of 2006 among others. Some of the relevant regulations for the project includes among others the: Waste Management Regulations (Legal Notice 121), Waste Management Regulations 2006, Water Quality Regulations 2006, and the Noise and Excessive Vibration Pollution Control Regulations 2009 (Legal Notice 61). The

legislative framework also includes the National and International Policies and Conventions.

Baseline Environmental and Socio-Economic Parameters

Administratively, the road project is located in Kitui County, Kitui Central Constituency.

Topography: Kitui County has a low-lying topography with an arid and semi-arid climate. Its rainfall distribution is erratic and unreliable. Kitui Central receives relatively high rainfall due to their altitudes; they receive more rain than other areas in the county and are the most productive. The topography of the county can be divided into hilly, rugged uplands and lowlands.

Geology and soils: Generally, soils are predominantly sandy to loamy sand texture; hence they are susceptible to erosion and are limited in their capacity to retain water and nutrients. The primary soil type of the proposed project area is lixisols (red loam soils). Alluvial deposits (fluvisols) occur in isolated patches along rivers and on hill slopes. The soils are generally poorly drained and easily eroded by runoff.

Climate: The climate of Kitui County is hot and dry with unreliable rainfall. The climate falls under two climatic zones, i.e., arid and semi-arid, with most of the County being classified as arid. The County experiences high temperatures throughout the year, ranging from 14°C to 34°C. The hot months are between September and October to January and February.

The rainfall pattern is bi-modal, with two rainy seasons annually. The long rains fall from March to May while the short rains, which form the second rainy season, fall between October and December, are more reliable. The rest of the year is dry, and the annual rainfall ranges between 250mm-1050 mm per annum, with 40% reliability for the long rains and 66% reliability for the short rains. Rainfall is highly unpredictable from year to year.

Surface and Ground Water Resources: According to the consultation with chiefs from the communities, they confirmed that groundwater is abundant in almost every village along with the project; hence water availability will not hinder construction from ongoing. The construction will negatively impact several water services within the project area, such as water pans along the road corridor and the borehole at Katulani boy's secondary school, which is likely to be demolished.

Flora and Fauna: Due to the limited amount of rainfall, the project area has scanty vegetation. The main vegetation cover is acacia, with pockets of drought-tolerant shrubs and grassland stretching along the road corridor. The alignment of the project road may lead to vegetation clearance within the road reserve to give the right of way in some areas. The main fauna of the region where the proposed road passes consist of domestic animals such as cattle, goats and donkeys. There was no notable wild animals' presence in the area during the survey.

Land Resources: The project road has essentially a rural disposition with the local population mainly engaged livestock farming with small sections practicing irrigation agriculture. Commercial properties along the project such as schools, churches and water tanks are likely to be affected by the construction of the road. Most walls of the properties will be demolished and

some of these are likely to be exposed to noise levels and dust due to their proximity to the project road.

Human population: The project area is mainly covered by Kamba ethnic community, who are traditionally long-distance traders. In the proposed project area, a high population is concentrated in Wikililye, Katulani and Kavisuni towns. Villages and pockets of isolated households characterize the sections between the three towns. Some of the villages are characterized by a high human population, while others have a low population. The villages lie along the proposed road corridor, and some are likely to be affected directly by the road construction works since there are housing structures within the road corridor.

Human settlement and urban centres: The population patterns and distribution in the County are primarily influenced by landholding and ownership, availability and accessibility of water, and fertility of soils. The current trend in the county is that more people tend to concentrate on foothills and plateaus where agriculture is possible. Other settlements are concentrated near towns due to the availability of reliable social amenities and employment opportunities.

There are several market centres along the proposed road, namely, Wikililye, Katulani, Maliku, Kwa Muli and Kavisuni. The proposed road project will mainly affect Katulani, Maliku, Kwa Muli and Kavisuni market centres. The market centres are characterized by a high concentration of human settlements with permanent and temporary structures likely to be demolished to pave for road construction.

Education: There are several schools, both primary and secondary schools, along the project corridor, some of which will be affected by the construction of the road. As observed during the assessment, most schools have structures well-set from the road, although some have boundary walls/gates close to the project road.

Religion: A large number of the population in the project area is Christians. During the study, it was observed that several churches had been stabled along the project corridor. Some of the churches are likely to be demolished as they are built within the project area.

Public participation:

Section 17-1 of The Environmental Impact Assessment and Audit Regulations, 2003 requires that an ESIA should *"seek the views of any person who may be affected by the project".* The aims of public consultation are disclosure of planned activities of the proposed project and impacts identified through the Environmental and Social Impact Assessment; identification of concerns and grievances from interested and affected people; harnessing of local expertise, needs and knowledge from interested and affected people and response to grievances and enquiries of affected people. A stakeholder engagement and public participation was undertaken along the route to capture the views and concerns of potentially interested and affected parties. The engagement process entailed one to one interview with several stakeholders and public meetings with the communities along the proposed road project.

The key stakeholders identified in this project were;

- Mrs. Shufaa O Mwijuma, DCC Katulani Sub-County
- Mr. Naftali Osoro, NEMA officer, Kitui County
- Mr. Julius Munyaka, chief of Maliku village
- Mr. Benard Dunda, chief of Kavisuni police post
- Mr. Felix Ozembo, Sub-chief of Kavisuni police post
- Community members at River Tiva

Potential Impacts and Mitigation Measures

The project will have both positive and negative impacts during construction, operation, and decommissioning phases.

Positive Impacts: Positive impacts of the road will accrue from provision of a functional road linkage between Kitui and Makueni County currently non-existent. The Wikililye- Kavisuni road will help ease movement of people connecting Kitui to Makueni and viceverser, as currently no road exists connecting the two counties. Upon completion, the road will improve the social and economic status of the area by opening up the area to goods and services, especially so far, the agricultural produce from neighboring counties. It is expected that the proposed project activities may create more water points especially where the contractor will drill boreholes that may act as water collection points.

Negative Impacts: In the construction phase, the excavations, demolitions, and transportation of building materials will result in the emissions of large amounts of dust within the project site and surrounding areas. Asphalt, concrete and batching plants and diversions are also possible sources of dust and air pollution within the project area. Solid waste materials will be generated during construction works and operations such as rock and soil materials, general solid waste from campsites; vegetation waste from the clearance of road reserves; and sediment and sludge from storm-water drainage system. The occupational health and safety issues associated with the construction and operation of the proposed road will include; physical hazards, chemical hazards and noise hazards. Potential impacts to biodiversity could arise due to the physical disturbance during the construction, contamination of the environment due to chemical/ oil spillage or leakage and inappropriate liquid and solid waste disposal mechanisms. There will be impact due to oil spillage, disposal practices of used oil, oil filters during the construction of the project. Possible impacts include: pollution of groundwater sources during construction phase (bridges construction work) interference with existing community water sources during construction phase, infiltration of contaminants from on-site activities into soils, pollution and degradation of water quality of underlying aquifer during earthwork, excavations, oil wastes from the camp/garage and impact to human health.

The extraction and transportation of materials will also result in the distortion of the ground structure, vegetation loss, dust emission, oil spills, noise and increase potential for accidents.as well as creating public health hazard when ponded. Other impacts will include: loss of and

productivity potential; Permanent loss of natural (material) resources; and increased susceptibility to soil erosion.

During the implementation of project activities, the local social service sector will be overwhelmed by the presence of project employees who may be in need of these services. If the project leads to in-migration, it will increase pressure on social service infrastructure like housing, health, water sources and sanitation facilities in the area when people move into the community in anticipation of employment opportunities. With an increase in the population of the area boosted by the project employees the social set up of the area will be affected. This change may be in the form of lost social norms and morality, an increase in school drop-out due to cheap labor, child labor, and increased incidences of HIV/AIDS and other communicable diseases

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Design and construction phase				
Topography and Geology	• Slope gradient maintenance and controlled borrow pits and quarry excavation to avoid vertical phases • Erosion control measures in excavated borrow pits areas and working sites along the road • Site reclamation or rehabilitation during decommissioning phase of the project	Contractor/KeNHA/Supervision Consultant	Continuous	-As appropriate
Noise Pollution and Vibrations	• Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used. • Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation. • Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections. • Ensure machines are switched off when not in use. • Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm).	Contractor/KeNHA/Supervision Consultant	Monthly	- As appropriate - - - -
Air Pollution due to Dust Generation and Air Emissions	• Sprinkling of water on dry and dusty surfaces regularly including the access roads. • Use of waste water to sprinkle at the construction site to reduce excessive	Contractor/KeNHA/Supervision Consultant	Monthly	As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	dust. • Adherence to personal protective clothing such as dust masks. • Enforce onsite speed limit regulations. • Ensure machines and vehicles are properly and regularly maintained. • Erection of speed calming measures near public institutions such as schools, hospitals and town centres			- - -
Solid Waste Generation	• Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base; • Incorporating recyclable materials to reduce the volume and cost of new asphalt and concrete mixes. • Contracting of an ordinary waste and hazardous waste handler to collect and appropriately dispose wastes from camp sites • Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines. • Provision of bottle and can recycling and trash disposal receptacles at parking lots to avoid littering along the road. • Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road	Contractor/KeNHA/Supervision Consultant	Monthly	- - As appropriate - As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Surface water quality	bed or other uses (Thika –Magumu-Njabini). Old, removed asphalt may contain tar and polycyclic aromatic hydrocarbons and may require management as a hazardous waste. • Develop and implement a Construction Waste Management Plan before start of the project. • Construct communal septic tank linked to a constructed wetland system. • Promote recycling of wastewater in construction activities. • Ensure wastewater is channeled and treated in sewerage plants or disposed in septic tanks • Ensure regular maintenance of plumbing system to avoid spillage of wastewater. • Discharge of partially treated sewage into septic tanks • Ensure regular maintenance of plumbing system and septic tanks to avoid spillage of raw sewage.	Contractor/KeNHA/Supervision Consultant	Monthly	As appropriate - - - - -
Water Abstraction and Consumption	• Install water conserving taps and toilets. • Drainage structures that will be constructed –cross culverts, at the river courses be at appropriate positions. • Stone pitching and side drains to cover meaningful lengths along the	Contractor/KeNHA/Supervision Consultant	Continuous	- As appropriate

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	prone protection areas. • Timing of the construction of proposed bridges to coincide with dry periods when water levels in the rivers are low to avoid possible water pollution. • Contractor to avoid dumping of waste materials within the riparian zones/ within the watercourses. • Bitumen trucks should be washed at designated areas only.			-
Soil Erosion	• Ensure surface runoff generated on impervious surface is not channeled directly to steep slopes. • Provide grassed water ways along the access roads. • Construct flow breaks on roadside drainage channels. • The contractor will source building materials such as gravel, sand, ballast and hard core at the project locality. • Consultation should be held with the community members and their representatives on the best sites to source materials and rehabilitation measures should be agreed • All exhausted quarries and borrow pits should be isolated, protected and rehabilitated to usable state before the contract closure.	Contractor/KeNHA/Supervision Consultant	Continuous	- - - -
Loss of Vegetation Cover and Biodiversity	• Siting roads and support facilities to avoid critical terrestrial habitat by utilizing existing transport corridors.	Contractor/KeNHA/Supervision Consultant/KFS/KWS	Monthly	-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	• Minimize clearing and disruption of riparian vegetation. • Provide adequate protection against scour and erosion and consider the onset of the rainy season with respect to construction schedules. • Minimize removal of indigenous plant species and replant indigenous plant species in disturbed areas. • Explore opportunities for habitat enhancement			- - As appropriate -
Health Aspect	• Develop a comprehensive STDS, HIV and AIDs awareness and control Programmes such as provision of condoms to workers both male and female. • Creation of awareness of STDs, HIV/AIDS in workers camps through trainings and installation of posters. • Adhere to and implement the Sexual Offences Act, 2006 and its amendment 2012.	Contractor/KeNHA/Supervision Consultant/County Governments	Monthly	As appropriate -
Road Safety	• Avoid long traffic diversion roads. • Water diversions to ensure dust is minimized hence easier visibility for drivers. • Ensure Installation and maintenance of all construction signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions. • Advance information on	Contractor/KeNHA/Supervision Consultant	Periodically	- As appropriate As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Occupational Health and Safety	communication systems will be an advantage to users. • Make Traffic circulation changes as per the Traffic Act Cap 403. • Development of a transportation management plan for road construction that includes measures to ensure work zone safety. • Establishment of work zones to separate workers on foot from traffic and equipment by routing of traffic to alternative roads. • Use protective barriers to shield workers from traffic vehicles, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of maximum vehicle speeds in work zones. • Training of workers in safety issues related to their activities. • Ensure safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space. • Barricade the area around which elevated work is taking place to prevent unauthorized access. • Use of the correct asphalt product for each specific application and ensuring application at the correct temperature to reduce the fuming of bitumen during normal handling.	Contractor/KeNHA/Supervision Consultant	Monthly	- - - - - - As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Disturbance to flora and fauna	• Training on correct PPE use and provision of adequate PPEs • Siting roads and support facilities to avoid critical terrestrial and aquatic habitat by utilizing existing transport corridors. • Avoidance or modification of construction activities during the breeding season and other sensitive seasons or times of day to account for potentially negative effects. • Minimize clearance and disruption of riparian vegetation. • Minimize removal of indigenous plant species, and replant indigenous plant species in disturbed areas. • Explore opportunities for habitat enhancement through reduced clearance to conserve or restore native species.	Contractor/KeNHA/Supervision Consultant/ KWS/KFS	Monthly	- - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Possible Displacement of People	• Relocate all facilities affected in consultations with various parties affected with respect to water, sewerage, pipelines, and electricity. • Involvement and continuous consultation of key stakeholders and community members with respect to water, pipelines, and electricity at all stages of the project cycle. • Use of an integrated approach in planning public utilities by sharing most transport corridors for roads, water, sewerage, electricity lines, etc. • Provision of employment in the project for the squatters where possible. • Put in place a grievance redress mechanism as discussed in chapter Seven (7) of this report.	Contractor/KeNHA/Supervision Consultant	Continuous	As appropriate
Material Sites and Material Haulage	• Environmental impact assessments (EIA) to be undertaken prior to extraction of materials from identified sites and approved by NEMA. • Operations of the materials sites to be guided by respective management plans established and approved under the ESIA, • Material extractions and delivery should only be done during the day.	Contractor/KeNHA/Supervision Consultant	Quarterly	As appropriate - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	• If borrow pits and quarries are operated, they be fenced off. • Proper handling and management of liquid effluent and used waste oil to forestall incidence of surface water bodies • Any abstraction of water from the existing river systems or from boreholes should be undertaken after acquisition of the prerequisite licenses, • Rehabilitation of materials sites to take place upon exhaustion (Contractors will provide appropriate rehabilitation plans for each material site). • If commercial material sources are adopted, the Contractor(s) should ensure due diligence process is followed by the suppliers at all times, • Material extraction and haulage should be done in dump conditions to keep dust low, especially if it is located within settled areas.			- - - - - -
Operational phase				
Noise Pollution and Excessive Vibrations	• Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation. • Install speed control measures in town areas and near public institutions	Contractor/KeNHA	Monthly	- As appropriate

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	• Install no hooting signs in sensitive areas such as near schools, etc.			PPC
Impacts on flora and Fauna biodiversity	• Liaise with KWS to ensure that important wildlife crossing corridors and dispersal areas are not affected • Maintenance of road signs at appropriate areas to warn drivers on wildlife crossing paths.	Contractor/ KeNHA/KFS/KWS	Continuous	- As appropriate -
Increased Generation of Storm Water	• Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration. • Regular inspection and maintenance of permanent erosion and runoff control features. • Use of vegetated swales, filter strips, terracing, check dams, detention ponds or basins, infiltration trenches and infiltration basins. • Repair works to be carried out in dry weather to prevent runoff of asphalt or cement materials.	Contractor/KeNHA	Continuous	- - - -
Loss of human and animal life due to increased road accidents	• Install speed calming measures next to public institutions , towns and settlement • Provide road signages all along the road • Conduct road safety sensitization programmes. • Carry out Risk Assessment to identify risk areas and provide	Contractor/KeNHA	Continuous	- - As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	appropriate prevention measures.			
Road Safety	• Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas. • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions. • Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross). • Prepare an emergency preparedness and response plan in coordination with the local community and local emergency responders. • Comply with OSHA 2007 requirements, they include; o Carrying out Safety Audits. o Implementing DOSHS improvement orders. o Carrying out EHS Risk Assessments.	Contractor/KeNHA	Continuous	As appropriate - - - - - - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	• Involve all the relevant stakeholders during the audit so as to incorporate suggested EHS measures into the report.			-
Increased Generation of Solid Waste	• Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base. • Incorporating recyclable materials to reduce the volume and cost of new asphalt and concrete mixes. • Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines. • Provision of bottle and can recycling and trash disposal receptacles at parking lots and bus stops to avoid littering along the road. • Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods. • Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics. • Management of all removed paint materials suspected or confirmed of containing lead as hazardous	Contractor/KeNHA	Continuous	- - - As appropriate - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	waste. • Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road bed or other uses. • Ensure implementation of the project's operation phase Waste Management Plan. • Comply with EMCA Cap 387 Waste Management Regulations, 2006.			-
Occupational Health and Safety	• When undertaking road repairs, use protective barriers to shield workers from traffic vehicles, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of maximum vehicle speeds in work zones. • Training of workers in safety issues related to road maintenance activities. • When undertaking road repairs, ensure safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination. • When repairing the road, use asphalt product of appropriate specification and ensure application at the correct temperature to reduce the fuming	Contractor/KeNHA	Continuous	- - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	of bitumen during normal handling. • Maintenance of work vehicles and machinery to minimize air emissions. • Reduction of engine idling time in construction sites; Use of extenders or other means to direct diesel exhaust away from the operator. • Ventilation of indoor areas where vehicles or engines are operated or use of exhaust extractor hose attachments to divert exhaust outside. • Carry out Safety Audits. • Implement DOSHS improvement orders.			- - - - -
Soil Quality Degradation	• Rehabilitate borrow areas. • Revegetate cleared areas. • Ensure proper drainage infrastructure along the road. • Used oil and spills should be disposed in an environmental friendly manner.	Contractor/KeNHA/Public	Continuous	As appropriate As appropriate - -
Risk of spread of invasive species	• Reduce open gaps in road reserves by planting appropriate tree species suitable for highway or road side tree planting • Monitor composition of species regenerating along road reserves and take prompt actions in case of emergence of invasive species • Carry out routine road reserves	Contractor/KeNHA/Public	Continuous	As appropriate

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	maintenance mainly to clear bushes that may harbor invasive species.			
DECOMMISSIONING PHASE				
Demolition waste	• Use of an integrated solid waste management system i.e. through a hierarchy of options: o Source reduction o Recycling o Composting and reuse o Combustion o Sanitary land filling. • All buildings, machinery, equipment, and others that will not be used for other purposes must be removed and recycled/reused as far as possible. • All foundations must be removed and recycled, reused or disposed of at a licensed disposal site. • Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site. • Donate reusable demolition waste to charitable organizations, individuals and institutions.	Contractor/KeNHA	at the time of decommissioning	- - - - - - - - -
Noise and Vibration	• Sensitize workforce including drivers of construction vehicles. • Install sound barriers for pile driving activity. • Install portable barriers to shield	Contractor/KeNHA	at the time of decommissioning	As appropriate As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	compressors and other small stationary equipment where necessary. • Proper maintenance of all equipment. • Workers near high level noise to wear safety and protective gear.			- -
Dust Emission	• Spray demolished piles of earth with water. • Avoid pouring dust materials from elevated areas to ground. • Cover all trucks hauling soil, sand and other loose materials. • Provide dust screen where necessary.	Contractor/KeNHA	at the time of decommissioning	As appropriate As appropriate As appropriate As appropriate
Site degradation	• Implement an appropriate re-vegetation programme to restore the site to its original status. • Consider use of indigenous plant species in revegetation.	Contractor/KeNHA	at the time of decommissioning	As appropriate -

Conclusion:

The ESIA Study Team concluded that the proposed improvement of Wikililye-Kavisuni Road would have substantial positive environmental, social and economic benefits. It will provide efficient transport to meet the current demands of the community to Makueni County. It will enhance economic growth at the local and national levels and lead to regional transport integration. Though some negative impacts on the environment will be significant, they can be effectively mitigated, as indicated in this report's Environmental and Social Management Plan (ESMP). Therefore, it is recommended that NEMA approve the project as per the 'Authority' discretion.

Recommendations:

Therefore, the project will be implemented to ensure that identified mitigation measures are fully implemented, followed by careful monitoring and evaluation. The various socio-economic and environmental, health and safety policies and plans must be prepared, negotiated by the stakeholders and adopted to help guide the implementation of the identified mitigation measure**.**

CHAPTER 1.0: INTRODUCTION

1.1 Project Background

1.2 Objectives of the ESIA

The main objective of the ESIA study was to predict, assess, and analyze the possible positive and negative environmental and social impacts that are expected during the construction, operation and decommissioning phases of the project. This was done with the aim of proposing the possible mitigation measures for the highlighted negative impacts. This is in line with ensuring that the development does not impact negatively on the environment in terms of social, health, economic and physical (soil, water, plant and animals) state of the project site. The exercise was carried out in accordance with the Environmental Management and Co-ordination Act Cap 387 of Kenya (EMCA 1999, Revised 2015) and Environmental Impact Assessment and Audit Regulations of 2003 and international best practices.

The specific objectives were to:

- Identify all potential significant adverse environmental and social impacts of the proposed project and recommend mitigation measures;
- Ensure compliance with the environmental regulations and industry's standards;
- Generate baseline data for monitoring and evaluation of the success of the mitigation measures implemented during the project life cycle;
- Recommend cost effective measures to be implemented to mitigate against the expected impacts;
- Provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project;
- Prepare an environmental Impact Assessment Study report compliant to the Environmental Management and Coordination Act, EMCA Cap 387 and detailing findings and recommendations.

1.3 Project Background, Overview, Justification and Objectives

1.3.1 Project Background

1.3.2 Project Overview

The scope of the project shall be implemented under 3 No. phases as follows:

Phase 1: Detailed Design

- Review of the existing data on the proposed road project and social and economic activities in the project study area;
- Collection of social, environmental, and physical data that is necessary to assist in the design of the project road;
- Geological studies to inform on the ground conditions on the existing alignment on possible existence of fault lines and other tectonic plate movements;
- Detailed Materials Investigations for Pavement Design using design standards including preliminary costs estimates and implementation schedule;
- Detailed Engineering survey and design work for the optimum alignment and design standards including preliminary costs estimates and implementation schedule;
- Carrying out an environmental and social impact assessment study of the project area in relation to the proposed project.

Phase II: Works Supervision

- Review of the Contractor's work programmes and monitoring, on a day-to-day basis, of the Contractor's adherence to these programmes.
- Approval of the Contractor's proposed materials sites.
- Review and approval of the Contractor's traffic management plan
- Issuance of Site Instructions.
- Verification of quality of executed works and materials used.
- Verification of measurements and issuance of interim payment certificates.
- Monitoring contractor's work progress, Preparation of Progress Reports and advising the Engineer accordingly.
- Advising the Engineer on problems arising during the execution of the works.
- Arranging for the relocation of services.
- Monitoring of sound use of resources and protection of the environment.
- Requesting for assistance in HIV/AIDS awareness campaigns from the Ministry of Health.
- Co-ordinating with third parties, e.g. public utilities, traffic police.
- Analysis of any claims submitted by the contractor.
- Services at Taking Over of the works.

Phase III: Services during Maintenance Period

- Inspection of defect rectification works and maintenance.
- Services at End of Defects Liability of the works.
- Preparation of Final Completion Report, Final Accounts and As-built drawings.

1.3.3 Project Purpose and Objectives

The upgrading of the Wakililye- Kavisuni project road is being upgraded to meet the following objectives and service needs both during construction and operation phases of the project:

- Improve the region's road network,
- Reduce travel time along and across the roads,
- Enhance the operational efficiency of the road,
- Promote economic growth within the region,
- Improve safety and reliability for all road users,
- Attract diverted traffic that will foster regional growth,
- Provide employment opportunities to local inhabitants, among other benefits

1.4 Scope of the ESIA Study

In order to identify the potential environmental and social impacts, and to come up with the proper mitigation measures for the proposed upgrading of Wikililye- Kavisuni road, the team utilized both conventional and participatory approaches.

In conducting this exercise, the team undertook:

- The reviewing of preliminary designs and alignment for the proposed project to get acquainted with environmental issues in the project site vicinity.
- The planning and preparing of a time schedule for the activities to be undertaken for the ESIA.
- Visiting the project site, and widely consulting with the local communities at local leaders and other relevant key stakeholders within the three counties traversed by the road.
- Carrying out a comprehensive assessment ensuring all environmental concerns and views of all parties/persons likely to be affected by the project are taken into consideration.
- Developing an environmental and social management plan with mechanisms for monitoring and evaluating the compliance and environmental performance, which include the cost of mitigation measures and the timeframe of implementing the measures.
- Publicizing the project in the local dailies and public spaces such as churches and centres.
- Liaising with NEMA for compliance with all mandatory and regulatory requirements relating to the ESIA.

1.5 Data collection methods and procedures

The data collection was carried out in two phases: Phase one entailed scoping followed by detailed biophysical, socio-economic data collection and stakeholders mapping between September and October 2021. Stakeholder's consultations will be done, focusing on extensive public and stakeholder consultative engagements in the early months of the year 2022.

a. Environmental screening

This step was conducted through legal review and desktop studies to assess whether there will be a need for an environmental and social impact assessment, and what level of assessment is necessary. This was done using a screening checklist in reference to requirements of the EMCA Cap 387 specifically the second schedule. In line with the second schedule of the Environment Management Act EMCA Cap 387, all new roads including trunk roads are categorized as high-risk projects and require a TOR to be prepared and full ESIA Study be undertaken for submission to the National Environment Management Authority (NEMA) for approval.

b. Environmental scoping

The scoping process, through an ESIA scoping checklist, was conducted to help narrow down onto the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. It also included discussions with key stakeholders, managers and design engineers as well as interviews with local communities.

c. Desktop study

Desktop study included document review on the nature of the proposed activities, project documents, designs, policy and legislative framework as well as the environmental setting of the area among others. The key documents reviewed included the following: -

- Integrated Counties Plans.
- Proposed road alignment reconnaissance visit findings.
- Kenya National and County Laws.
- International Best Practices
- Applicable Multilateral Environmental Agreement (MEAs).

d. Site assessment

Reconnaissance surveys along the route of traverse were conducted by the study team to familiarize with the site conditions and identify transects for further detailed investigation. Selected sites were then subjected to further detailed investigations and screening to document baseline conditions as a basis for anticipating Project Impacts.

e. Public participation

This activity whose progress and outcomes are reported in Chapter Five of this report will be undertaken in fulfillment of the requirements of the Kenyan Constitution, 2010 and EMCA Cap 387 which require all project development to be proceeded by mandatory public consultation and stakeholder engagement as a measure of improving environmental and social sustainability of projects, enhancing project acceptance and making a significant contribution to successful project design and implementation. Public participation meetings will be conducted in various centres along the road project as Maliku, Katulani and Kavisuni.

To ensure adequate public participation in the ESIA process, questionnaires will be administered to the local communities, leaders, and the information gathered will subsequently synthesized and incorporated into the ESIA Study Report. Team will incorporate the concerns and views of all stakeholders and the affected people.

f. Data analysis, reporting and documentation

Upon data analysis, potential environmental impacts (both positive and adverse) were predicted based mainly on concerns raised by the public, stakeholders and expert observations on the ground and available tools. The magnitude, significance, and acceptability of predicted impacts were evaluated with a view to determining whether observed adverse impacts are significant enough to warrant mitigation. Impacts were further screened for occurrence and significance of residual (those which cannot be mitigated satisfactorily) and cumulative impacts with a view to providing a basis of making recommendations on the way forward for the project.

1.6 ESIA organization and structure

Based on the existing information, the ESIA study was carried out to full completion and processing is estimated to take another 45 days from the date of undertaking.

The ESIA study as proposed above culminated with production of this Study Report designed to ensure that the proposed development complies with the Environmental Management and Coordination Act (EMCA, Cap 387). The report is organized in 10 chapters as outlined below:

Chapter 1: Gives Background Information to the Study Describing the Objectives and the Terms of Reference.

Chapter 2: Project Description.

Chapter 3: Gives the Policy, Legal and Regulatory Framework Policy, Legal, Institutional and Administrative Framework. Study Area.

Chapter 4: Outlines the Baseline Information of the

Chapter 5: Summarizes the outcome of the Stakeholder Engagement and Public Consultations process.

Chapter 6: Project Alternatives to the Project.

Chapter 7: Grievance Redress Mechanism Identification of Potential Impacts of the Project.

Chapter 8: Analysis of Environmental Impacts

Chapter 9: Environmental and Social Management Plan (ESMP).

Chapter 10: Climate Change

Chapter 11: Concludes the findings and recaps the main recommendations.

Chapter 12 References

Appendixes

The implementation of ESMP is a core part of the project implementation from design to completion stage and is expected to be adopted by the contractor and supervising consultant with close monitoring on its adherence by KeNHA.

CHAPTER 2.0: PROJECT DESCRIPTION

2.1 Introduction

The government of Kenya (GOK) through its road agency, Kenya National Highways Authority (KeNHA) has embarked on a pivotal infrastructure project to improve the 32km Wikililye-Kavisuni road to bitumen standard. The project is located in Kitui County and it is part of the road that connects Wote- Makindu (B60) with Kibwezi- Kitui (A7) Road. The Wikililye-Kavisuni is 32km section of the road that starts from Wote town traversing agriculturally rich areas through several towns and market centres such as Bosnia (KM 4+ 100), Kikumini (KM9+700), Katangini (KM 16+100), Kathiani, Syongungi, Mutembuku, Kavisuni, Maliku, Kabumbuni, Nzukini, Malanga, Kithoto, Kwa Musyoka, Kwa Muli, Kangalu, Kathukini and Wikililye. The existing road surface is unpaved surfaced and in a poor condition with no drainage system and less culverts.

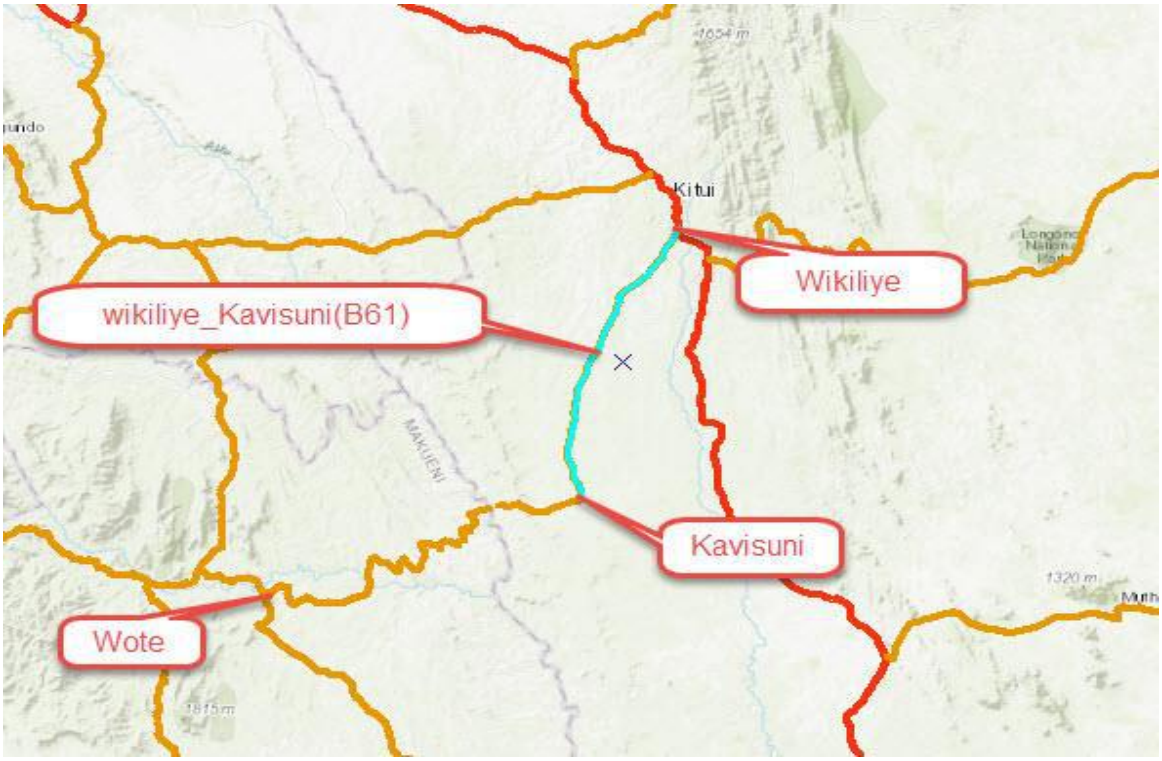

Figure 1 Map Showing road from Wikililye- Kavisuni

2.2 Project Objective

The objective of the assignment is to provide the Government of Kenya through the Kenya National Highways Authority (KeNHA) which is the implementing road agency, with sufficient information from studies, investigations, enquiries and designs presented in form of drawings, bills of quantities and reports to enable upgrading of Wikililye- Kavisuni (B61) Road to bitumen standards.

The upgrading of the road to bitumen standards is envisioned to open up a link from Kitui to Wote thereby reducing travel time and improved transport network as well as lead to growth of businesses.

2.3 Project Details

2.4 Project activities and processes

The project has **4** major phases:

i. Pre-construction (planning and design) phase.
ii. Construction phase.
iii. Operational phase.
iv. Decommissioning phase.

A. Planning and design phase

This is the initial phase of the whole road construction project. It involves the following activities:

i. Preliminary design

The preliminary design entails the following:

a. Review of the existing data on the proposed road project and social and economic activities in the project area.
b. Collection of social, environmental and physical data that is necessary to assist in the design of the project road.
c. Preliminary engineering survey and design work for the optimum alignment and design standards. These includes;
    - Topographical surveys
    - Hydrological and hydraulic studies
    - Sub-surface soil exploration
    - Material surveys (borrow sites, quarries and water sources) and
    - Field and laboratory soils and materials investigations
d. To carry out an Environmental Impact Assessment of the project area in relation to the proposed project.

ii. Detailed design

The detailed design entails:

a. Comprehensive field surveys.
b. Soils and material investigation.
c. Drainage and bridge site investigation.
d. Geometric designs.

CHAPTER 3.0: POLICY, LEGAL AND REGULATORY FRAMEWORK

3.1 Introduction

The Government's policy on road transport is to provide efficient and reliable road network to spur Socio-economic development and improve security. Under the administrative framework, the National Environment Management Authority (NEMA) is responsible for ensuring that Environmental Impact Assessments (EIAs) are carried out for new projects and environmental audits on existing facilities as per the requirements of the Environmental Management and Coordination Act (EMCA, Cap 387). Projects subject to this requirement are specified in the Second Schedule of the EMCA, Cap 387.

In Kenya, it is a legal requirement that any proposed project of the scale described in this report should undergo an Integrated Environmental and Social Impact Assessment. These requirements are stipulated in the Environmental Management and Coordination Act (EMCA, Cap 387) and EIA/EA Regulations 2003. This section outlines the Policy, Legal and Institutional framework pertaining to the proposed road development project.

3.2 Policy and institutional framework

3.2.1 The Constitution of Kenya of 2010

The Constitution of Kenya has taken onboard various issues that are related to environmental management. Article 42 of the Bill of Rights contained in the 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'.

Chapter 5 of the Constitution is dedicated to land and the environment. The Constitution requires that land be used and managed in a manner that is equitable, efficient, productive and sustainable. 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 provide encourages efforts towards sustainable of natural resources, increasing of the national forest cover public participation in the management, protection and conservation of the environment, protection of genetic resources and biodiversity, environmental impact assessment, environmental audit and monitoring of the environment, etc. The proposed project should ensure compliance with the constitutional requirements in as far as equitable sharing of the resources between various stakeholders is concerned on matters of sustainability of livelihoods and biological resources public participation Resettlement Action Plan among others.

The Kenyan constitution also gives prominence to public participation; as a general national value in environmental protection. Article 69(1) states that the State shall encourage public participation in the management, protection, and conservation of the environment.

3.2.2 National policy framework

The Republic of Kenya has a policy, legal and administrative framework for environmental management. The broad objectives of the national environmental policy in Kenya are: -

- To ensure optimal use of natural resources while improving environmental quality.
- To conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
- To develop awareness that inculcates environmental stewardship among the citizenship of the country.
- To integrate environmental conservation and socio-economic aspects in the development process.
- To ensure that national environmental goals contribute to international obligations on environmental management and social integrity.

To achieve the above policy objectives, it is a policy directive that appropriate reviews and evaluations of all forms of developmental project plans and operations are carried out to ensure compliance with the environmental policy and legal frameworks. The following section provides details on the relevant policies in the country.

a. Sessional Paper No. 10 of 2012 on Kenya Vision 2030

Kenya Vision 2030 is a comprehensive national development plan for period 2008 to 2030. The plan was developed following successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which ensured the country's economy was back on the path for realization of rapid economic growth since 2002. The county's GDP growth rose from 0.6% to 7% in 2007, but declined to 1.7% and 1.8% in 2008 and 2009, respectively. The objective of the Vision 2030 is to transform Kenya into a middle-income country with a consistent annual economic growth of 10 % by the year 2030. The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This goal is expected to be achieved by developing basic infrastructure services such as roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others while ensuring that the country has a clean, secure and sustainable environment by 2030 through reduction of pollution and improvement of waste management. The proposed road project will contribute to the realization of the goals of Vision 2030 through improvement of a reliable and efficient road infrastructure facility, provision of employment opportunities, and provision of faster and efficient mode of transport, among others.

b. Environment and Development (Sessional Paper No. 6 of 1999)

The Kenya's policy paper on the Environment and Development was formulated in 1999. The policy defined approaches that will be pursued by the Government in mainstreaming environment into development. The policy harmonized environmental and developmental objectives with the broad goal of achieving sustainable development. The policy paper also provided guidelines and strategies for government action regarding environment and development. In regard to wildlife, the policy reemphasized government's commitment towards involving local communities and other stakeholders in wildlife conservation and management, as well as developing mechanisms that allow them to benefit from the natural resources occurring in their areas. The policy also advocated for the establishment of zones that allow for the multiple use and management of wildlife. This policy is relevant to the proposed development project in view of the potential impacts on the environment and involvement of the public in project planning.

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

The policy seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support achievement of desired objectives and goals.

d. National Environmental Action Plan (NEAP) of 2009-2013

The 1992 Earth Summit held in Rio de Janeiro came up with various recommendations, among them Agenda 21, a Global Environmental Action Plan. The theme of the Summit focused on how nations could attain sustainable development. The Government of Kenya embraced this idea by developing the first National Environment Action Plan (NEAP) in 1994. The NEAP report addresses environmental issues from various sectors in an integrated manner and their significance in development planning. It proposed a strategy for achieving sustainable development in line with Kenya's quest to meet the Millennium Development Goals (MDGs), Vision 2030 and Medium-Term Plan (MTP). The report brings out several proposed interventions, legal and institutional framework to be incorporated into sectoral development plans and Programmes. Its implementation is monitored through the Annual State of the Environment Reporting.

e. The National Poverty Eradication Plan (NPEP) of 1999

The National Poverty Eradication Plan (NPEP) was formulated with an objective of reducing the high levels of poverty in Kenya by 50 percent by the year 2015, as well as to strengthen the capabilities of the poor and vulnerable groups to earn income. The plan also aimed at reducing gender and geographical disparities in order to create a healthy, better-educated and more productive population. The formulation of the plan was guided by the goals and commitments

agreed during the World Summit for Sustainable Development (WSSD) of 1995. The plan therefore focuses on the delivery of four WSSD themes of poverty eradication; reduction of unemployment; social integration of the disadvantaged people and creation of an enabling economic, political, and cultural environment through development of transport and communication sector. The plan is implemented by the Poverty Eradication Commission (PEC) that was established in collaboration with various Government Ministries, bilateral and multilateral donors, the private sector, Community Based Organizations (CBOs) and Non-Governmental Organizations (NGOs). The NPEP is relevant since the proposed road will create an enabling environment that will contribute immensely in the enhancement of economic growth in Kenya. The proposed project would also impact businesses, agricultural and tourism related activities that have great relevancy to poverty eradication in the country.

f. The Poverty Reduction Strategy Paper (PRSP) of 2000

The Poverty Reduction Strategy Paper (PRSP) for Kenya has the broad objective of reducing poverty and promoting economic growth. This policy articulates Kenya's commitment and approach to tackling endemic poverty through involvement of the poor communities in both rural and urban areas in various socio-economic development activities. The proposed project, during and after implementation will offer various employment opportunities to Kenyans and will therefore contribute directly towards the realization of the broad national goal of reducing poverty in the country. In addition, the project would stimulate economic development by creating an enabling environment for other key sectors of the economy to thrive.

g. The National Biodiversity Strategy of 2000

The National Biodiversity Strategy and Action Plan (NBSAP) was formulated to enable Kenya address national and international commitments defined in Article 6 of the Convention on Biological Diversity (CBD). The strategy is a national framework of action for ensuring that the present rate of biodiversity loss is reversed, and present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya's biodiversity; to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation. The proposed road project will need to comply with the requirements of this strategy since the project may lead to loss of biodiversity in some sections along the proposed route e.g. The Aberdares Forest Complex

h. Sessional Paper No. 3 of 2009 on National Land Policy

The Land Policy in Kenya is guided by the environmental management principles which are aimed at restoring the environmental integrity through introduction of incentives and encouragement of use of technology and scientific methods for soil conservation, among others. The policy further requires fragile ecosystems to be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. The

policy also requires zoning of catchment areas to protect them from degradation and establishment of participatory mechanisms for sustainable management of fragile ecosystems. The policy also called for development of procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and sharing of benefits with contiguous communities and individuals. Lastly, all national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems under the policy.

The policy recognizes that sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people, and between people and resources. To achieve an integrated approach to management of land-based natural resources, all policies, regulations and laws dealing with these resources need to be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA Cap 387).

The policy also addresses land management particularly in Section 3.4.3.2 on ecosystem protection (including wetlands). Measures for protection are required for fragile ecosystems. The policy also calls for the protection of watersheds, lakes, drainage basins and wetlands. The policy prohibits settlement and agricultural activities in water catchment areas and calls for identification, delineation and gazettement of all water courses and wetlands.

i. Forestry Policy of 2014

This policy of the government is intended to ensure forests in the country are protected from wanton destruction. The goal of the policy is to increase the area under forest to 10% of the total land area in the country. The proposed road project will therefore be required to be consistent with the Kenya's forest policy. Where clearance of forests or sections of forests is envisaged, it would be important to put in place appropriate mitigation measures such as those specified in the preliminary environmental management plan of this ESIA report.

j. Wildlife Policy of 2011

The wildlife policy is aimed at promoting protection and conservation of wildlife in Kenya, both in protected and non-protected areas. The policy is implemented by the Kenya Wildlife Service (KWS). The proposed road project will need to be consistent with this policy. Where wild animals will be disturbed during the construction and operation of the road, appropriate mitigation measures must be implemented to minimize disturbance to wildlife.

k. Wetlands Policy of 2013

The wetlands policy is intended to promote protection of wetlands in Kenya. The policy sets out strategic measures for the protection of existing wetlands in Kenya. The proposed road has potential of impacting some local wetlands. It would be important to undertake appropriate mitigation measures to minimize or avoid degradation of wetlands.

l. Physical Planning Policy

The current policy governs the development and approval all building plans as provided for in the Physical Planning Act (Cap 286). The proposed project will be subjected to the provisions of this policy and legislation.

m. Public Health Policy of 2014

The public health policy calls upon the project proponents to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. The workers camps must be provided with all amenities/utilities that are essential for safeguarding public health for all people using the facilities.

n. Occupational Health and Safety Policy of 2012

This policy is intended to protect safety and health of workers in work places. The proposed road project will provide employment opportunities to many workers at various categories. The contractor will be expected to comply with the requirements of this policy when engaging workers in various construction activities. The preliminary environmental management provides mitigation measures that can be undertaken to ensure compliance with the requirements of this policy.

o. HIV/AIDS Policy of 2009

The policy identifies HIV/AIDS as a global crisis that constitutes one of the most formidable challenges to development and social progress. The Pandemic heavily affects the Kenyan economy through loss of skilled and experienced manpower due to deaths, loss of man hours due to prolonged illnesses, absenteeism, reduced performance, increased stress, stigma, discrimination and loss of institutional memories, among others. Due to the large of number of workers who will be involved in the project and the associated social issues with projects of such as scale, HIV/AIDS has been considered as one of the proposed impacts, but adequate mitigation measures have also been proposed to that effect.

p. Kenya National Policy on Gender and Development (NPGD), 2000

The purpose of the Gender Policy is to institutionalize The Kenya National Policy on Gender and Development (NPGD), within Gender, Children and Social Development. It articulates the policy approach of gender mainstreaming and empowerment of women at the ministry level. The policy seeks a society where women, men, children and persons with disabilities enjoy equal rights, opportunities and a high quality of life. This report has in depth addressed matters to do with gender and development and in the concession period the entire project period the project shall be governed under this principle.

q. The Kenya National Climate Change Response Strategy of 2010

This strategy provides measures that the Government of Kenya is taking to address issues related to the impact of climate change on various sectors of the economy. The proposed road will need

to take onboard the effects of changing climate in the country and apply applied climate change mitigation measures. This is important because climate change will in future affect the operation of the road.

r. KeNHA's Environment and Social Safeguards Policy, 2018

The revised policy is set within KeNHA Vision of quality, safe and adequate National Trunk Roads network. It contains the actions KeNHA will take so as to ensure that the Authority activities don't negatively harm the environment and adversely affect the social fabric in communities where it works. Working in an environmentally and socially responsible and safe manner are conditions of employment of contractors for various projects. This policy is therefore targeting the contractors and other service providers.

3.2.3 Environmental Guidelines

In line with the Kenyan Constitution, NEMA has developed a number of guidelines which are part of a series of environmental management tools for environmental management in Kenya under the Environmental Management and Coordination Act, CAP 387 of the Laws of Kenya. Below is a highlight of the key project relevant guidelines;

a. **National Solid Waste Management Strategy, NEMA, 2014**.

NEMA developed the National Solid Waste Management Strategy in 2014 as a framework for implementing the Vision 2030 flagship project. The Strategy establishes a common platform for action between stakeholders to systematically improve waste management. It introduces a new approach for improved waste management in Kenya to create wealth, employment and reduce pollution of the environment.

The proposed road project is anticipated to produce waste; the proponent will be required to manage waste as guided by this strategy but in line with Waste Management regulations of 2006 and other relevant legislative frameworks. In general, the project proponent should ensure waste management activities are 7R oriented, by Reducing; Rethinking; Refusing; Recycling; Reusing; Repairing and Refilling waste.

b. Technical guidelines on the management of used oil and oil sludge in Kenya (NEMA, 2014)

The main objective of the guidelines is to ensure effective and efficient collection and transportation systems for used oil. These guidelines target government agencies (responsible for decision making, formulating policies and enforcing health and safety aspects of used oil and oil sludge management in the country), small generators, bulk generators of used oil and oil sludge, garages, used oil treatment plants, recycling and disposal facilities, and other interested stakeholders. The Proponent is envisioned to use heavy machinery which will require servicing hence producing used oil. These guidelines provide direction on safe management of used oil and oil sludge in Kenya and are a main regulatory reference material for management of used oil

in Kenya and hence will be used as a key reference point to create awareness on hazards associated with handling used oil and to provide guidance on infrastructure for management of used oil.

c. National sand harvesting guidelines, 2007

These Guidelines apply to all sand harvesting activities in Kenya. This is deemed key to ensure sustainable utilization of the sand resource and proper management of the environment. Since the road project will require use of sand, it is expected that the contractor's sand harvesting activities will be conducted in line with respective legal requirements and guided by these sand harvesting guidelines.

3.3 National environmental legal framework

The Republic of Kenya has numerous statutes that guide environmental management and conservation in the country. Most of these statutes are sector specific and cover a wide range of issues including public health, soil conservation, protected areas conservation, endangered species, public participation, water rights, water quality, air quality, excessive noise control, vibration control, land use, among others. The relevant legislations are described in the following sections.

3.3.1 Environmental Management and Coordination Act (EMCA, Cap 387)

The Section Part VI of EMCA, Cap 387 Part II states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. To achieve this goal, the projects listed under the Schedule No. 2 of EMCA must be subjected to Environmental Impact Assessment (EIA). The aim of EIA is to reduce negative environmental outcomes of the listed projects by implementing mitigation measures. The proposed project falls within the Second schedule and must therefore comply with EMCA requirements in as far as EIA is required. There are also several regulations that have been formulated within the framework of EMCA, Cap 387 that are applicable to the proposed project.

Under EMCA, Cap 387 NEMA has gazetted legal tools that govern conduct of EIAs and general environmental protection. The Proposed Road project has been screened against these tools with results outlined in the table 4.1 below. Detailed analysis of the trigger mechanism and modalities for mitigation are provided in Chapter 7 of this report.

Legal Tool	Status	Trigger mechanism/ Relevance to the project
Environmental Management and Co-ordination (Environmental Impact Assessment and Audit) Regulations, 2003	Triggered	ESIA Study must conform to these rules. The proposed project must comply with the requirements of the regulations that also include conducting continuous monitoring and annual audits on the proposed project.
Environmental Management and Co-ordination (Waste Management Regulations, 2006)	Triggered	Construction of the project will generate solid waste hence proper disposal of wastes will need to be observed by the contractor in key areas such as workers camps and the road works.
Environmental Management and Co-ordination (Water Quality) Regulations, 2006	Triggered	Water for construction will be drawn from Rivers and boreholes and there will also be work over rivers when constructing bridges and box culverts
Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations, 2006	Triggered	There will be use of vehicles, machinery and equipment that depend on fossil fuel as their source of energy hence contractor must comply with emission levels as highlighted by the regulations.
Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006	Triggered	The proposed road traverses' areas with diverse ecosystems which will need to be protected as per the requirements of this regulation.
Environmental Management and Coordination (Air Quality) Regulations 2014	Triggered	Construction activities, construction crew and facilities such as asphalt and concrete batching plants and quarries are likely to cause air pollution. The Proponent shall implement the mitigation measures proposed to comply with the provisions of these Regulations.
Environmental Management and Co-ordination (Controlled Substances) Regulations, 2007	Triggered	The project contractors will need to ensure that the requirements of this regulation are observed to ensure that equipment, machinery, vehicles and chemicals containing controlled substances are not imported into the country for use in the proposed project

Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	Triggered	The road crosses the wetlands, and river banks which are valuable water resources along the route. The contractor will need to employ measures for the preservation and conservation of these wetlands and river systems.
Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009	Triggered	The project will involve use of heavy earthmoving equipment and trucks which can generate excessive noise and vibrations. The contactor of the road will have to ensure that no excessive noise and vibrations are made during the construction of the road.

Specifications of these guidelines will be captured in the Contracts for Construction to ensure that contractors are legally bound to undertake mitigation alongside general construction work. The EMCA, Cap 387 regulations likely to be triggered and their relevance in the proposed construction of the road are further reviewed below.

a. Environmental Management and Co-ordination (Environmental Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations provides guidelines for conducting EIA studies. The regulations provide details on the parameters to be evaluated when undertaking an EIA study. It also provides guidelines on the conduct of environmental audits and development of project monitoring plans. The proposed project must comply with the requirements of the regulations that also include conducting continuous monitoring and annual audits on the proposed project. The project requires an EIA license from NEMA before commencement of any activity.

b. Environmental Management and Co-ordination (Water Quality) Regulations, 2006

The EMCA (Water Quality) Regulations, 2006 provide guidelines on the use and management of water sources to safeguard quality of water for domestic use and irrigation, among others. The proposed project will need to comply with the requirements of this regulation to ensure water sources along the route are protected from pollution and over abstraction. The project will also need to comply with the regulations that prohibit undertaking of development within a minimum of 6m from the highest ever recorded flood level of a river system. Section 4(2), 6 and Section 24 of the regulation prohibits pollution of water bodies and requires that all substances discharged into the water bodies should meet the standards set under the Third Schedule of the regulation.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA Cap 387). It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings. In response to the above, the project design team should be advised on the requirements of this regulation and appropriately incorporate the regulations in the project design document.

c. Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations, 2006

The EMCA (Fossil Fuel Emission Control) Regulations, 2006 aims at eliminating or reducing emissions emitted from internal combustion engines to acceptable levels. The regulation provides guidelines on use of clean fuels, use of catalysts and inspection procedures for engines and generators. This regulation is applicable to the proposed project since there would be use of vehicles, machinery and equipment that depend on fossil fuel as their source of energy. The requirements of the regulation must be implemented to eliminate or reduce air quality

degradation. Sections of the regulation citing the standards of recommended emission levels will be given to the contractor and or pinned at strategic points in the contractor's field offices.

d. Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

The EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006 provides that no person shall engage in any activity that may have an adverse impact on any ecosystem; may lead to the introduction of any exotic species or to unsustainable use of natural resources, without an Environmental Impact Assessment License issued by the Authority under the Act.

The regulation requires NEMA in consultation with the relevant lead agencies, to impose bans, restrictions or similar measures on the access and use of any threatened species to ensure its regeneration and maximum sustainable yield. The proposed road traverses' areas with diverse ecosystems which will need to be protected as per the requirements of this regulation.

e. Environmental Management and Co-ordination (Waste Management Regulations, 2006)

The Waste Management Regulations are basically aimed at streamlining the handling, transportation and disposal of various types of wastes. The broad goal of the regulations is to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source. The regulations have also classified various types of waste and recommended appropriate disposal methods for each waste type. Under the regulations, NEMA is supposed to licenses transporters, incinerators, landfills, composers, recyclers and transfer stations. Facilities to be licensed include local authorities, transporters and handlers of various types of waste. The licensing employs a risk-based approach by concentrating on facilities considered to pose a high risk to the environment. The regulations also provide an opportunity for investment in various aspects of waste management. During the construction of the proposed road, proper disposal of wastes will need to be observed by the contractor at the workers camps and the road works. This will ensure good hygiene and healthy working environment for workers. All waste collectors/ handlers will be required to have relevant permits/ licenses from NEMA.

f. Environmental Management and Co-ordination (Controlled Substances) Regulations, 2007

The EMCA (Controlled Substances) Regulation is aimed at controlling the production, consumption and, exports and imports of controlled substances. Controlled substances are grouped into three lists as indicated below:

- Group 1 list consists of halogenated flouro-chemicals with ozone depleting substances.
- Group 2 list consist of Hydrobromoflourocarbons with ozone depleting substances.

- Group 3 list consist of Bromochloromethane with ozone depleting substances.

Products containing controlled substances include air conditioners, air coolers, refrigerants, portable fire extinguishers, heat pump equipment, dehumidifiers, insulation boards, panels and pipe covers, pre-polymers, etc. The project contractors will need to ensure that the requirements of this regulation are observed to ensure that equipment, machinery, vehicles and chemicals containing such components are not imported into the country for use in the proposed project.

g. Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009

The Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009 applies to all wetlands in Kenya whether occurring in private or public land. The objectives of the regulations are to provide for the conservation and sustainable use of wetlands and their resources in Kenya and promote the integration of sustainable use of resources in wetlands into the local and national management of natural resources for socio-economic development. The act also aims at ensuring the conservation of water catchments and the control of floods and the sustainable use of wetlands for ecological and aesthetic purposes for the common good of all citizens. The act also makes provision for the protection of wetlands as habitats for species of fauna and flora. It also provides a framework for public participation in the management of wetlands.

The Act requires wetland resources to be utilized in a sustainable manner compatible with the continued presence of wetlands and their hydrological, ecological, social and economic functions and services. The Act requires special measures to be undertaken to preserve and maintain knowledge innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity in wetlands.

The regulation also calls for sustainable use of wetlands through integration into the national and local land use plans to ensure sustainable use of wetlands in the country. The proposed roads pass through numerous rivers which are valuable water resources along the route. The contractors will need to employ measures for the preservation and conservation of these wetlands and river systems.

h. Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009

The Noise and Excessive Vibration Pollution Control Regulations, 2009 prohibits excessive noise and vibration. It 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. The contactor of the road will have to ensure that no excessive noise and vibrations are made during the construction of the road. This is important since the construction of the new road will involve use of heavy earthmoving equipment and trucks which can generate excessive noise and vibrations. Motor

vehicles used during the construction of the proposed road should also adhere to the regulations which prohibit excessive noise. The provision of the act on motor vehicle states that no person shall operate a motor vehicle which produces any loud and unusual sound exceeding 84 dB(A) when accelerating. The Act also states that no person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Any person carrying out construction, demolition, mining or quarrying work should ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30metres from any moving source. Noise permits may be required in blasting areas.

i. Environmental Management and Coordination (Air Quality) Regulations, 2014

The objective of this regulation is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) as outlined in the Environmental Management and Coordination Act, Cap 387. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority.

Emission limits for various areas and facilities have been set. In specific, first schedule of the regulations sets the emission limits of particulate matter for persons operating construction equipment or handling construction material. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The Proponent for the road project shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document to comply with the provisions of these Regulations on abatement of air pollution.

3.3.2 The Wildlife Management and Conservation Act 2013

The Wildlife and Conservation Act deals with the conservation and management of wildlife in Kenya. The Act provides that wildlife should be conserved to yield optimum returns in terms of cultural, aesthetic, scientific and economic benefits. The Act requires that full account be taken of the inter-relationship between wildlife conservation and land use. The Act controls activities within the national parks, which may lead to the disturbance of wild animals. Unauthorized entry, residence, burning, damage to objects of scientific interest, introduction of plants and animals and damage to structure are prohibited under this law.

The proposed road traverses' next to an important wildlife area the Aberdares forest ranges. The road construction will need to make provisions for the free passage of wildlife. Passage provisions will need to be integrated into the design of the road. The contractor will also need to provide free wildlife passages such as culverts so that the road project does not affect wildlife negatively. KWS shall be consulted on the best road signage and infrastructure that may be required.

3.3.3 Forest Conservation and Management Act, 2016

The Forest Conservation and Management Act, 2016 gives effect to Article 69 of the Kenyan 2010 Constitution about forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio-economic development of the country and for connected purposes. The Act applies to all forests on public, community and private lands. The principles of the Act lay emphasis on (a) good governance in accordance with Article 10 of the Constitution; (b) public participation and community involvement in the management of forests; (c) consultation and co-operation between the national and county governments; (d) the values and principles of public service in accordance with Article 232 of the Constitution; (e) protection of indigenous knowledge and intellectual property rights of forests resources; and (f) international best practices in management and conservation of forests. 5. Public Forest Policy (1) The Cabinet Secretary shall, in consultation with the county government. Further, the act forms the baseline to develop a national forest policy and formulate a public forest strategy for the sustainable use of forests and forest resources. In addition, the Act, establishes the Kenya Forest Service to conserve, protect and manage all public forests in accordance with the provisions of this Act.

The road project traverses' patches of urban and farm forestry, it is therefore important to ensure community participation as provided for under the Act. The most appropriate would be initiation of participatory forest management in these forest sections so that the local community can have a significant input with Kenya Forest Service (KFS) office playing a coordination role. No trees along the route will be cut before necessary permits are obtained from KFS or county governments.

3.3.4 The Water Act 2016

The Water Act No. 43 of 2016 was assented to on 20th September 2016. The new Act repealed the water Act 2002. The enactment of this law aimed at aligning national water management and water services provision with the requirements of the Constitution of Kenya 2010 particularly on the clauses devolving water and sanitation services to the county governments. Consequently, the new law retained some and established other new institutional arrangements including, Ministry of Water and Irrigation as the sector coordinator, Water Services Regulatory Board (WASREB) for regulation of water services' providers, Water Resources Regulatory Authority (WRA formerly WRMA) for water resource use regulation, National Water Harvesting and Storage Authority for major water infrastructural development, Water Tribunal for dispute resolution, Water Sector Trust Fund for water services development towards the un-served and poor segments of the society in peri-urban and rural areas, Water Works Development Agencies to replace the Water Service Boards, and Basin Water Resources Committees to replace Catchment Advisory Committees (CAACs)

The Act vests provision of water and sanitation services with the county governments through Water Services Providers (WSPs) whose operations must be in accordance with a Service Agreement entered between each WSP and WASREB.

The Act stipulates that a permit shall be required in all cases of proposed diversion, abstraction, obstruction, storage or use of water, with minor exceptions relating to use for domestic purposes (Section.36). Under the Water Act (General) Rules, it is stated that any rights acquired under the permit are subject to the Public Health Act and the Malaria Prevention Act, in addition to the Water Act itself. The Public Health Act has wide-ranging provisions on pollutant discharges, which are set out below.

The Water Act (General) Rules make provision for discharges in a number of respects, as follows:

Effluent shall not be returned to any body of water unless it has been purified. Further, it must not contain poisonous or injurious matter or excess silt, gravel or boulders.

Water used for pulping, mulling or washing of coffee shall be efficiently screened.

In line with earlier Acts, Section 36 provides that a permit is required for regulation of water rights and works. A permit is therefore required for any of the following purposes;

(a) Any use of water from a water resource, except as provided by section 37;

(b) The drainage of any swamp or other land;

(c) The discharge of a pollutant into any water resource; and

(d) Any other purpose, to be carried out in or in relation to a water resource,

It is however notable that there are instances when a permit is not required. These include the same as before: (a). abstraction or use of water, without the employment of works; from any water resource for domestic purposes by any person having lawful access to the water resource; (b). abstraction of water in a spring which is situated wholly within the boundaries of the land owned by any one landholder and does not naturally discharge into a watercourse; abutting on or extending beyond the boundaries of that land; or (c). storage of water in, or the abstraction of water from a reservoir constructed for the purpose of such storage and which does not constitute a watercourse for the purposes of the Act.

The regulating authority may determine the potential prejudicial effects of the pollutant discharges and order the removal already made. It is an offence to allow effluent discharges, either domestic or industrial, if this would harm fish, and a fish warden may order its removal. Plans for rendering such effluent innocuous shall be submitted to and approved by the enforcing authority.

Additionally, the applicant for a water permit is required to outline the methods to be used for treating effluent before discharge (Form WAB 13, question 18). The permit would only be issued subject to satisfactory provision being made for the treatment of effluent. The Water Act, apart from the Rules, makes only limited provision for controlling water pollution. The provision is limited to the pollution of drinking water.

Under section 145, the water undertaker may make regulations to control polluting activities, which may threaten its source of water. It may itself construct the necessary works for intercepting, treating or disposing of foul water (s.149). Section 158 makes it an offence to pollute such waters. Similarly, under section 169, it is an offence to throw or convey polluting matter into a body of water. All project boreholes and direct extraction from the rivers will require permits from WARMA.

3.3.5 Agriculture, Fisheries and Food Authority Act of 2013

Agriculture, Fisheries and Food Authority Act, 2013 (No. 13 of 2013) provides for the establishment of the Agriculture, Fisheries and Food Authority, the administration of matters of agriculture and the preservation, utilization and development of agricultural land and related matters. "Agriculture" in this Act means cultivation of land and the use of land and water for any purpose of husbandry, aquaculture and food production and includes cultivation of crops and horticultural practice, breeding of aquatic animals and plants, the use of land, fish harvesting and (e) the use of land for agroforestry.

The Act requires the Authority in consultation with the county governments to among others promote best practices. The Cabinet Secretary is required under the Act with the advice of the Authority, and in consultation with the National Land Commission, to provide general guidelines applicable in respect of any category of agricultural land. These land development guidelines are to be implemented by the county governments. In a like manner, the Cabinet Secretary is given powers to make general rules for the preservation, utilization and development of agricultural land and aquatic resources and prescribe national guidelines for soil conservation. Each county government is required to keep a register of land development orders and land preservation orders, which they may issue under this Act. The Act also provides for participation by farmers. This law is important because the project cuts through livestock keeping/ pastoral areas.

3.3.6 Energy Act, 2006

This is an Act of Parliament to amend and consolidate the law relating to energy, to provide for the establishment, powers and functions of the Energy Regulatory Commission and the Rural Electrification Authority, and for connected purposes. The provisions of this Act apply to every person or body of persons importing, exporting, generating, transmitting, distributing, supplying or using electrical energy; importing, exporting, transporting, refining, storing and selling petroleum or petroleum products; producing, transporting, distributing and supplying of any other form of energy, and to all works or apparatus for any of these purposes. This Act is

relevant to the proposed road project due to the need to relocate some of the petrol stations situated along the route.

The Act establishes a Commission known as the Energy Regulatory Commission, that among other roles, is expected to regulate (i) importation, exportation, generation, transmission, distribution, supply and use of electrical energy, (ii) importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products; (iii) production, distribution, supply and use of renewable and other forms of energy.

3.3.7 Land Act, 2012.

The Land Act was enacted by Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources, and for connected purposes. The Act applies to all land declared as (a) public land under Article 62 of the Constitution; (b) private land under Article 64 of the Constitution; and (c) community land under Article 63 of the Constitution and any other written law relating to community land.

The Land Act guarantees security of tenure for land under (a) freehold; (b) leasehold; (c) such forms of partial interest as may be defined under the Act and other law, including but not limited to easements; and (d) customary land rights, where consistent with the Constitution and guarantees equal recognition and enforcement of land rights arising under all tenure systems and non-discrimination in ownership of, and access to land under all tenure systems.

Under the Lands Act 2012, The Wayleaves Act, Cap 292 and The Land Acquisition Act, Cap. 295 have been revoked but Sections 8 and 9 allow for Compulsory Acquisition as an option in acquiring land for public utility.

3.3.8 The Land Registration Act, 2012

This is an Act of Parliament that revises, consolidates and rationalizes the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. The Act requires that there is proper marking and maintenance of boundaries. An interested person who has made an application to the Registrar for his/her boundaries to be ascertained, the Registrar shall give notice to the owners and occupiers of the land adjoining the boundaries in question of the intention to ascertain and fix the boundaries. With regard to the maintenance of boundaries, the Act requires every proprietor of land to maintain in good order the fences, hedges, stones, pillars, beacons, walls and other features that demarcate the boundaries, pursuant to the requirements of any written law.

3.3.9 The National Land Commission Act, 2012 (No. 5 of 2012)

The National Land Commission of Kenya is an independent government commission whose establishment was provided for by the Constitution of Kenya to, amongst other duties, manage public land on behalf of the national and county governments, initiate investigations into present

or historical land injustices, recommend appropriate redress, monitor and have oversight responsibilities over land use planning throughout the country. It was officially established under The National Land Commission Act, 2012. The mandate of the National Land Commission is drawn from the National Land Policy of 2009, Constitution of Kenya 2010, National Land Commission Act, 2012, the Land Act 2012 and the Land Registration Act of 2012. Under the National Land Commission Act, the Commission shall among other duties monitor the registration of all rights and interests in land and ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations. Also, the commission is required to manage and administer all unregistered trust land and unregistered community land on behalf of the county government and develop and encourage alternative dispute resolution mechanisms in land dispute handling and management. The Commission is also required in consultation and cooperation with the national and county governments, to establish county land management boards for the purposes of managing public land.

3.3.9 Community Land Act 2016

The Community Land Act, No. 27 of 2016 (the Act) came into force on 21 September 2016. The Act aims at: 1. Giving effect to Article 63 of the Constitution of Kenya, 2010 (the Constitution) which provides for a classification of land known as community land. To this end, the Constitution provides that community land shall vest in and be held by communities. 2. Providing for;

- The recognition, protection and registration of community land rights.
- The management and administration of community land.
- The role of county governments in relation to unregistered community land and related matters.

The Act repeals the Land (Group Representatives) Act (Chapter 287 of the Laws of Kenya) and the Trust Lands Act (Chapter 288 of the Laws of Kenya). This project shall uphold the requirement of all the relevant land legislations, involving key administrative stakeholders and the affected parties (i.e. the community) facilitating in coexistence with the surrounding community. Most of the land within the project route is community land. Community consultations and consent will be critical during project construction period.

3.3.10The Environment and Land Court Act, 2011

This is an Act of Parliament to give effect to Article 162(2) (b) of the Constitution to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of land. The Environment and Land Court is one of the Courts contemplated by article 162(2). It is a Superior Court and has the same status as the High Court. The court is established under section 4 of the Environment and Land Court Act No. 19 of 2011. It has jurisdiction to hear any other dispute relating to environment and land. The jurisdiction of the

court is provided under section 13 of the Act. The Court has original and appellate jurisdiction to hear and determine all disputes in accordance with Article 162(2) (*b*) of the Constitution and with the provisions of the Act or any other written law relating to environment and land. The court has powers to deal with disputes relating to land administration and management. The court is also empowered to hear cases relating to public, private and community land and contracts or other instruments granting any enforceable interests in land. The court also exercises appellate jurisdiction over the decisions of subordinate courts or local tribunals in respect of matters falling within the jurisdiction of the Court. The court further exercises supervisory jurisdiction over the subordinate courts, local tribunals, persons or authorities in accordance with Article 165(6) of the Constitution.

3.3.11 The County Governments Act 2012

This is an Act of parliament to give effect to Chapter Eleven of the Kenyan Constitution; to provide for County government's powers, functions and responsibilities to deliver services and for connected purposes. Section 113 of the Act makes public participation in County planning processes compulsory.

3.3.12 Occupational Safety and Health Act 2007

The Occupational Safety and Health Act 2007applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of the act is to secure the safety, health and welfare of persons at work and protect persons other than persons at work against risks to safety and health arising out of, or regarding, the activities of persons at work. Section 19 of the Act provides that an occupier of any premises likely to emit poisonous, harmful, injurious or offensive substances, into the atmosphere shall use the best practicable means to prevent such emissions into the atmosphere and render harmless and inoffensive the substances which may be emitted.

Section 16 provides that no person shall engage in any improper activity or behavior at the workplace, which might create or constitute a hazard to that person or any other person. It is thus recommended that all Sections of the Act related to this project, such as provision of protective clothing, clean water, and insurance cover are observed to protect all from work related to injuries or other health hazards. The project shall be registered as a work place for regular inspections from DOSH inspectors. A healthy and safety committee shall be established to undertake implementation of all the provisions of the law.

3.3.13 The Public Health Act (Chapter 242) of Revised Edition 2012

The Public Health Act (Chapter 242) is an Act of Parliament that provides for securing and maintaining good health of citizens. The Act contains directives that are focused on ensuring protection of human health. There are provisions within the Act that deal with water, air and noise quality as they pertain to human health. An environmental nuisance includes the emission from premises of waste waters, gases and smoke which could be regarded as injurious to health.

The owner and/or occupier of premises responsible for such nuisances are liable to prosecution under the Act. The construction of the proposed road has potential pollution risks related to water and air. The contractor will need to ensure that air and water pollution is controlled and does not affect people living along the road and even workers residing in various construction camps established all along the route

3.3.14 The Valuers Act (Cap 532), 1985

The revised edition 1985 of the Valuers Act Cap 532 makes provisions for the relevant charges and conducts of Valuers in relation to valuation of assets. The Act also provides the relevant regulations and guidelines in the undertaking of the valuation works. The Act requires that adequate valuation is carried out to help meet the actual compensation measures and the market rates and reduce any acts of malice in the exercise. A competent valuer will have to be deployed to site to carry out the professional valuation of assets for compensation.

3.3.15 Physical Planning Act (Cap. 286)

This Physical Planning Act, Cap. 286 provides for the preparation and implementation of physical development plans. Section 36 of the Act provides for environmental impact assessments and states that 'if in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development 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 proponent and contractors of the proposed road will need to comply with the requirements of this Act

3.3.16 The Penal Code (Cap. 63)

The Penal Code (Cap. 63) chapter on "Offences against Health and Conveniences" strictly prohibits the release of foul air into the environment, which affects the health of other persons. Any person who voluntarily violates the atmosphere at any place, to make it noxious to health of persons in general dwelling or carrying out business in the neighborhood or passing along public ways is guilty of misdemeanor and shall be subjected to imprisonment not exceeding two years with no option of fine. Under this code, any person who for trade or otherwise makes loud noise or offensive awful smell in such places and circumstances as to annoy any considerable number of persons in the exercise of their rights, commits an offence, and is liable to be punished for a common nuisance, i.e. imprisonment not exceeding one year with no option of fine. The contractor of the proposed road will therefore need to ensure that all emissions are controlled during the construction phase of the project to avoid interference on health of the local communities and the workers.

3.3.17 The Employment Act, 2007

The Employment Act, 2007 defines the fundamental rights of employees including the basic conditions of employment of workers. It also regulates employment of children. The contractor

on site will have to employ casual labourers probably from the communities where the road traverses during construction.

The basic conditions of employees should be observed to avoid unnecessary conflicts during the construction works. The Contractor shall pay the entire amount of the wages earned by or payable to the workers. Payment of such wages should be done at the end of a working day at or near the place of work. The Contractor shall also ensure that all statutory deductions are submitted without delay to appropriate government agencies e.g. Kenya Revenue Authority, NSSF, NHIF, among others.

3.3.18 Work Injury Compensation Benefit Act (WIBA) 2007

The Work Injury Compensation Benefit Act 2007 provides guideline for compensating employees on work-related injuries and diseases contacted during employment. The Act also requires provision of compulsory insurance for all employees. The Act defines an employee as any worker on contract of service with employer. It will be important for the Contractor of the proposed project to ensure that all workers contracted during the project implementation phase are provided with appropriate insurance covers so that they can be compensated in case they get injured while working.

3.3.19 Public Roads and Roads of Access Act Cap 399

The Public Roads and Roads of Access Act Cap.399 Act states that a public road is any road which the public has a right to use immediately before the commencement of this Act, or all proclaimed or reserved roads and thoroughfares being or existing on any land sold or leased or otherwise held under the East Africa Land Regulations, 1897, the Crown Lands Ordinance,1902, or the Government Lands Act at any time before the commencement of this Act and all roads and thoroughfares hereafter reserved for public use. The construction of the proposed road will need to take note of the provisions of this Act.

3.3.20 The Traffic Act Cap 403

The Traffic Act reserves the use of the road corridor for road facilities only. Any vegetation grown to protect the road edges should not cause problems during maintenance. Encroachment along the road corridor will have to be checked especially during the operational phase of the project. The Act also spells out conditions for use of roads by motorists, among others. The contractor's vehicles shall comply with all the traffic rules in Kenya.

3.3.21 Building Code 2009

This by-law recognizes the county governments as the leading planning agencies. It compels potential developers to submit development applications for the approval. The county governments are hence empowered to approve or disapprove any plans if they do or don't comply with the law, respectively. Any developer who intends to erect a building must give the respective local authority a notice of inspection before the erection of the structure. On

completion of the structure, a notice of completion shall be issued by the local authority to facilitate final inspection and approval. No person therefore shall occupy a building whose certificate of completion has not been issued by the county government.

Section 214 of the by law requires that any public building where the floor is more than 20 feet above the ground level should be provided with firefighting equipment that may include one or more of the following; hydrants, hose reels and fire appliances, external conations portable fire appliances, water storage tanks, dry risers, sprinkler, drencher and water spray spring protector system.

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer and all the waste water must be discharged to the sewers. Finally, section 196 provides that the county government may refuse to admit to sewer any trade waste or any other effluent unless it has been treated in an approved manner. In this regard, the county government may cause the occupier of the premise to construct an approved manhole connected to the pipe conveying such effluent. In the development of the project, the proponent will have to comply with the provisions of this Act by complying to the Building code provisions.

3.3.22 The Kenya Roads Act, 2007

This is an Act of Parliament that provided for the establishment of Kenya Road Agencies i.e. Kenya National Highway Authority (KeNHA), the Kenya Urban Roads Authority (KURA) and the Kenya Rural Roads Authority (KeRRA), and provided powers and functions of the authorities.

KeNHA is mandated to manage, develop, rehabilitate and maintain all national roads. Other function vested to this authority relevant to the proposed project are: controlling national roads and road reserves and access to roadside developments; implementing road policies in relation to national roads; ensuring adherence to the rules and guidelines on axle load control prescribed under the Traffic Act (Cap. 403) and under any regulations under this Act; ensuring that the quality of road works is in accordance with such standards; in collaboration with the Ministry responsible for Transport and the Police Department, overseeing the management of traffic and road safety on national roads; collecting and collating all such data related to the use of national roads as may be necessary for efficient forward planning under this Act; monitoring and evaluating the use of national roads; planning the development and maintenance of national roads and liaising and coordinating with other road authorities in planning and on operations in respect of roads.

3.3.23 The Kenya Roads Board Act, 1999

The Act was assented in January 2000. Establishing a board to oversee the road network in Kenya and thereby coordinate its development, rehabilitation and maintenance and to be the principal adviser to the Government on all matters related to Road Development.

The Standard Specifications for Road and Bridge construction has guidelines on environmental protection and mitigation. Standard Specification Clauses 116,117,125,135,137 specifically address protection of the environment, with regard to water, health, safety and accidents, water supply, maintenance of the engineers' staff houses, offices, laboratories, and attendance upon the engineer and his staff. The provisions of these standards and codes must not be contravened during project implementation. These provisions are largely supportive of EMCA, Cap 387 and forms part of the legal basis for environmental mitigation, avoidance, prevention, compensation, restoration and enhancement.

3.3.24 HIV / AIDS Act, 2006

Section 3 of The Act indicated the purpose of the legislation including public awareness and rights to people living with HIV/AIDS. Public awareness shall be achieved through education, public campaigns even at workplaces. This Act's provisions then give the guidelines unto which the project shall follow in educating workers and staff and providing of incentives to combat HIV/AIDs.

3.3.25 Urban Areas and Cities Act No 13 of 2011

This is an Act of Parliament to give effect to Article 184 of the Constitution, to provide for the classification, governance and management of urban areas and cities and to provide for the criteria of establishing urban areas. The Act also provide for the principle of governance and participation of residents of towns and cities. Under the Act a town is an urban area with a population of at least ten thousand residents. Also, under the Act the management of a city and municipality is vested in the county governments. The County Governments may impose such fees, levies and charges for delivery of services by the municipality or the city

3.3.26 The National Gender and Equality Act, 2011

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

Gender mainstreaming in road projects ensures that the concerns of women and men form an integral dimension of the project design, implementation, operation and the monitoring and evaluation ensures that women and men benefit equally, and that inequality is not perpetuated.

3.3.27 The Sexual Offences Act, 2006 and its amendment 2012

Observing a standard work ethic is recommended to ensure persons from both genders are not subjected to sexual offences. Ample working environment should prevail in all work places in the project, to be enhanced through implementation of a Sexual Misconduct Policy.

3.3.28 Persons with Disability Act, Chapter 133

This act protects the rights of people with disabilities ensuring they are not marginalized and that they enjoy all the necessities of life without discrimination. The act guarantees that (1) No person shall deny a person with a disability access to opportunities for suitable employment. (2) A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees. (3) An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment.

A person with disability is entitled to exemptions which apply with respect to exemptions and deductions as described in Schedule 42 subsection (2) of the act, among other provisions within this act that should be complied with all parties involved.

3.3.29 Security Laws (Amendment) Act, 2014

This act entails a legal framework and jurisdiction on security matters. It is a constitutional entitlement to live and feel secure from agents that may compromise ones' life and safety. Security measures are vital in this project following past terrorist experiences reported in the area; the contractor shall embark on a community policing program to be executed by a competent security firm. It is recommended that the government takes keen in providing adequate support to enhance the security of persons involved in this project and the community at large, which will translate to provision of critical intelligence that will trigger a review of the existing security measures and tactics, among other advantages such as security expertise and artillery.

3.4 National institutional / Administrative framework for the proposed project

There are various national institutions that are important in road project matters related to environmental management in Kenya. These are described in the following sections.

3.4.1 The National Environment Management Authority

The National Environmental Management Authority (NEMA) exercises general supervision and, co-ordination of all matters relating to the environment. NEMA is also the principal instrument of the government in the implementation of all policies relating to the environment. The Authority reviews EIA project and study reports for the proposed projects, visits the project sites to verify information provided in the report and issues EIA licenses if it considers that all the issues relevant to proposed projects have been identified and mitigation measures to manage them have been proposed.

3.4.2 The County and Sub-County Environment Committees

The County and Sub-County Environmental Committees contribute to decentralization of activities undertaken by NEMA. This has enabled local communities to have greater access to environmental management information. It has also enabled the County and Sub-County Environment Committees to conduct quick site visits and review of reports of proposed projects. Since the proposed project traverses through several Counties, the review of the report will be done at a National level for issuance of EIA license. However, it is also recommended that the EIA report should also be reviewed in each of the counties to create awareness and obtain ownership at county level. In fact, it is a practice and legal requirement that the review at County level be done before the ESIA Report is approved to NEMA.

3.4.3 Ministry of Transport, Infrastructure, Housing and Urban Development (MoTIHUD)

MoTIHUD is charged with the responsibility of providing basic infrastructure facilities to the public. These infrastructure facilities include development, rehabilitation and maintenance of the road network in the country. The Ministry will provide funding mechanisms and general guiding policies for this project.

3.4.4 The Kenya Roads Board

The Kenya Roads Board was established in 2000 through an Act of Parliament (The Kenya Roads Board, 1999, No. 7) and mandated to do these functions, among others, to: co-ordinate the implementation of all policies relating to the development, rehabilitation and maintenance of the road network; co-ordinate the development, rehabilitation and maintenance of the road network with a view to achieving efficiency, cost effectiveness and safety; administer the funds derived from the fuel levy and any other funds that may accrue to it; monitor the operations or activities undertaken by road agencies in the development, rehabilitation and maintenance of roads and evaluate, by means of technical, financial and performance audits, the delivery of works and many other.

3.4.5 Kenya National Highways Authority (KeNHA)

The Kenya National Highways Authority (KeNHA) is a State Corporation established under the Kenya Roads Act, 2007 with the responsibility for management, development, rehabilitation and maintenance of national roads of class A, B and C. The proposed road will be managed by KeNHA since it's classified as Class A.

KeNHA has an established Environmental and Social Management Department to facilitate compliance of road projects with the requirements of environmental laws and regulations. This office advises KeNHA projects on various compliance issues. The office also has established linkages with NEMA. Projects contracts should be reviewed by this office directly or through the environment supervisor. Regarding the implementation of the social and economic aspects of the ESMP, it is proposed that the Resident Engineer works closely with the Environmental and Social Manager of KeNHA to ensure compliance to national policies and guidelines.

3.4.6 Directorate of Occupational Safety and Health Services (DOSHS)

The Directorate of Occupational Safety and Health Services (DOSHS) is one of departments within the Ministry of Labour and East African Community Affairs, whose primary objective is to ensure safety, health and welfare of all workers in all workplaces. Unsafe and unhealthy work environment causes accidents, diseases, disasters and environmental pollution that occasion huge economic and social burdens to individuals and enterprises thereby stifling economic and social growth. DOSHS will provide OSH permits for workplaces of the project including campsites and quarries.

3.4.7 Kenya Wildlife Service (KWS)

KWS is a state corporation that was established with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. It undertakes conservation and management of wildlife resources across all protected and unprotected areas systems in collaboration with stakeholders. KWS will guide and monitor road construction through animal migratory routes.

3.4.8 Water Resources Authority (WRA)

Water Resources Authority (WRA) is a state corporation established under Section 11 of the Water Act, 2016. Pursuant to Section 6 of the Act, the Authority is an Agent of the National Government responsible for regulating the management and use of water resources. The Water Act, 2016 makes extensive provisions on the Authority's role in regulating the use and management of water resources. WRA was operationalized on 21st of April, 2017 vide Gazette Notice No. 59. However, the Authority has been in existence for 12 years following its establishment under the Water Act, 2002 as Water Resources Management Authority (WRMA). WRA will provide the necessary borehole and water extraction permits from local streams.

3.4.9 Kenya Forest Service (KFS)

KFS is a corporate body established under the Forest Conservation and Management Act of 2016. The Act which was operationalized on 31st March 2017, gave the Service's mandate as "to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country and for connected purposes". The revegetation of areas cleared for the project and material sites will be guided by regional KFS officers, especially in terms of the best tree species.

3.4.10 The National Museums of Kenya (NMK)

Is a state corporation established by an Act of Parliament, the National Museums and Heritage Act, 2006 no. 6 of 2006. NMK is a multi-disciplinary institution whose role is to collect, preserve, study, document and present Kenya's past and present cultural and natural heritage.

This is for the purposes of enhancing knowledge, appreciation, respect and sustainable utilization of these resources for the benefit of Kenya and the world, for now and posterity. NMK will provide guidelines in case any discoveries or existing cultural and natural heritage resources within the project area.

3.4.11 National Land Commission (NCL)

NLC manages public land on behalf of the national and county governments, initiates investigations into present or historical land injustices and recommend appropriate redress, and monitor and have oversight responsibilities over land use planning throughout the country. It will undertake a key role in delivering land acquired through compulsory acquisition for the project.

3.5 International conventions and guidelines

There are number Multi-Lateral Environmental Agreements (MEAs) that are relevant to the proposed project. These are described in the following section.

3.5.1 Vienna Convention on the Protection of the Ozone Layer

This was an Intergovernmental negotiation for an international agreement to phase out ozone depleting substances concluded in March 1985 which saw the adoption of the Vienna Convention for the Protection of the Ozone Layer. This Convention encourages intergovernmental cooperation on research, systematic observation of the ozone layer, monitoring of CFC production, and the exchange of information.

3.5.2 United Nations Convention on Biological Diversity (UNCBD)

The purpose of this convention is to ensure the conservation and sustainable use of biodiversity. Kenya signed the convention on 5th June 1992 and ratified the same on 26th July 1992. The National Environment Management Authority (NEMA) is the National Focal Point to this Convention. The provisions of this Convention have been integrated in many laws of Kenya.

3.5.3 African Convention on the Conservation of Nature and Natural Resources

This convention reaffirms the importance of natural resources both renewable and non-renewable, particularly the soil, water, flora and fauna. The main objective is to facilitate sustainable use of the above resources. The convention was adopted in Algiers on 15th September 1968 and came into force on 16th June 1969.

3.5.4 Convention on International Trade in Endangered Species

This Convention was adopted on 3rd March 1973 and came into force on 1st July 1975. The purpose of the Convention is to regulate the international trade in wild plants and animals that are at risk of extinction because of trade. The Convention seeks to control trade not only in live species but also in dead specimen and their derivatives. The Kenya Government ratified CITES on 13th December 1978. The lead agency for the CITES in Kenya is the Kenya Wildlife Service (KWS).

3.5.5 The World Commission on Environment and Development (The Brundtland Commission of 1987)

The Commission in its 1987 report dubbed "Our Common Future" focused on the environmental aspects of development, the emphasis on sustainable development that produces no lasting damage to the biosphere and to ecosystems. In addition to environmental sustainability is economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainable development is development that maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement. The key aspect of sustainability is the interdependence of generations.

3.5.6 The Ramsar Convention for the conservation and sustainable utilization of wetlands

The Ramsar Convention (formally known as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. Appropriate mitigation measures will need to be implemented as detailed in the Environmental Management Plan.

3.5.7 United Nations Convention to Combat Desertification (UNCCD)

The above Convention was adopted on 17th June 1994 in Paris and came into force on 26th December 1996.Kenya ratified the Convention in 24th June 1997. The purpose of the UNCCD is to address the problem of the degradation of land by desertification and the impact of drought particularly in arid and dry semi-humid areas. NEMA is the focal point for the Convention.

3.5.8 The 1992 United Nations Framework Convention on Climate Change (UNFCCC)

The primary purpose of the convention is to establish methods to minimize global warming and the emission of the greenhouse gases. The UNFCCC was adopted on 9th May 1992 and came into force on 21st March 1994. The Convention has been ratified by 189 states. Kenya ratified the Convention on 30th August1994. NEMA is the focal point for the Convention.

3.5.9 The Paris Agreement

This agreement was adopted on 12th December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris; it then came into force on 4th November 2016 after meeting the ratification threshold. The Agreement provides the framework to address climate change for a safer and sustainable future; it has an objective of preventing a global temperature increase above 1.5 degrees Celsius relative to pre-industrial levels by reduction of Greenhouse gas emissions. Kenya ratified the Paris Agreement and welcomed it into force on 28th December 2016. As at now a total of 171 parties out of 197 have ratified the agreement.

3.5.10 Rio Declaration on Environment and Development

The Rio Declaration on Environment and Development, often shortened to Rio Declaration, was a short document produced at the 1992 United Nations "Conference on Environment and Development" (UNCED), informally known as the Earth Summit. The declaration aimed at establishing a new and equitable global partnership through the creation of new levels of co-operation among States, key sectors of societies and people, working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system, recognizing the integral and interdependent nature of the Earth, our home. The Rio Declaration consisted of 27 principles intended to guide countries in future sustainable development. It was signed by over 170 countries.

Principle 17 of the Rio Declaration provides key relevance to the proposed project; the principle denotes that environmental impact assessment as a national instrument shall be undertaken for proposed activities that are likely to have a significant impact on the environment and are subject to a decision of a competent national authority.

3.5.11 Earth Summit on Sustainable Development Agenda 21

Agenda 21 is a non-binding, voluntarily implemented action plan of the United Nations regarding sustainable development. It is a product of the Earth Summit (UN Conference on Environment and Development) held in Rio de Janeiro, Brazil, in 1992. It is also regarded as an action agenda for the UN, other multilateral organizations, and individual governments around the world that can be executed at local, national, and global levels. The "21" in Agenda 21 refers to the 21st Century. Agenda 21 Section I on Social and Economic Dimensions is directed toward combating poverty, especially in developing countries, changing consumption patterns, promoting health, achieving a more sustainable population, and sustainable settlement in decision making.

Section II on Conservation and Management of Resources for Development Includes atmospheric protection, combating deforestation, protecting fragile environments, conservation of biological diversity (biodiversity), control of pollution and the management of biotechnology, and radioactive wastes.

Section III focuses on strengthening the Role of Major Groups including the roles of children and youth, women, NGOs, local authorities, business and industry, and workers; and strengthening the role of indigenous peoples, their communities, and farmers. Kenya continues to implement Agenda 21 to support sustainable development through the integration of environmental concerns into the national development policies, plans, and programmes. Also relevant is the implementation of Agenda 17. The proposed project would need to be consistent with the objectives of Agenda 21.

3.5.12 Convention on the Rights of the Child

The Convention on the Rights of the Child (CRC), 1989 is the most comprehensive compilation of international legal standards for the protection of the human rights of children. The CRC is also the most widely ratified international human rights treaty, ratified by all countries in the world, apart from two.

The Convention acknowledges children as individuals with rights and responsibilities according to their age and development (rather than the property of their parents or as victims), as well as members of a family and community. Underlying the Convention are four main principles: non-discrimination, the best interests of the child, the right to life, survival and development and the right to participation.

3.5.13 Convention on the Elimination of all forms of Discrimination against Women

The Convention on the Elimination of all forms of Discrimination against Women (CEDAW) places explicit obligations on states to protect women and girls from sexual exploitation and abuse. Universal Declaration of Human Rights (Article 7), the UN Charter (Articles 1, 13, 55, and 76) and the International Covenant on Civil and Political Rights (Article 24) reaffirm the freedoms and rights of all children, including internally displaced children.

3.5.14International Labour Organization

The International Labour Organization (ILO) is built on the constitutional principle that universal and lasting peace can be established only if it is based upon social justice. The ILO has generated such hallmarks of industrial society as the eight-hour working day, maternity protection, child-labour laws, and a range of policies which promote workplace safety and peaceful industrial relations.

The ILO has four principal strategic objectives:

- To promote and realize standards, and fundamental principles and rights at work.
- To create greater opportunities for women and men to secure decent employment.
- To enhance the coverage and effectiveness of social protection for all.
- To strengthen tri-parties and social dialogue.

The key ILO Conventions applicable to the proposed road project include:

- Equal Remuneration Convention (1951) (No. 100) - Calls for equal pay and benefits for men and women for work of equal value.
- Discrimination (Employment and Occupation) Convention (1958) (No. 111) - Calls for a national policy to eliminate discrimination in access to employment, training, and working conditions, on grounds of race, colour, sex, religion, political opinion, national extraction or social origin, and to promote equality of opportunity and treatment.

- Minimum Age Convention (1973) (No. 138) - Aims at the abolition of child labour, stipulating that the minimum age for admission to employment shall not be less than the age of completion of compulsory schooling.
- Worst Forms of Child Labour Convention (1999) (No. 182) - Calls for immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour which include slavery and similar practices, forced recruitment for use in armed conflict, use in prostitution and pornography, any illicit activity, as well as work which is likely to harm the health, safety, and morals of children.

3.5.15 Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years. The SDGs include 17 Sustainable Development Goals and 169 targets. The 17 sustainable development goals (SDGs) include

GOAL 1: No Poverty
GOAL 2: Zero Hunger
GOAL 3: Good Health and Well-being
GOAL 4: Quality Education
GOAL 5: Gender Equality
GOAL 6: Clean Water and Sanitation
GOAL 7: Affordable and Clean Energy
GOAL 8: Decent Work and Economic Growth
GOAL 9: Industry, Innovation and Infrastructure
GOAL 10: Reduced Inequality
GOAL 11: Sustainable Cities and Communities
GOAL 12: Responsible Consumption and Production
GOAL 13: Climate Action
GOAL 14: Life Below Water
GOAL 15: Life on Land
GOAL 16: Peace and Justice Strong Institutions
GOAL 17: Partnerships to achieve the Goal

The GOALs seek to build on the Millennium Development Goals that expired in 2015. Most notably SDGs are integrated, indivisible and balance the three dimensions of sustainable development: the economic, social and environmental. This road project is expected to cut-across the three dimensions of sustainable development hence making SDGs a key reference point. The SDGs are also linked to several Kenyan legal frameworks such as Water Act, Forestry Act, and EMCA Cap 387.

CHAPTER 4.0: BASELINE ENVIRONMENTAL AND SOCIO-ECONOMIC PARAMETERS

4.1 Introduction

This chapter examines the baseline environmental, ecological, socio-economic and cultural characteristics of the route through which the proposed Wikililye-Kavisuni road will pass. Information concerning the existing environmental conditions and the respective areas that are under the project's area of influence is detailed herein. The objective is to document the status quo for establishing and assessing the impacts of the project in future. The road is situated in Kitui County. The project road passes through rural section with a medium population, dominated with shrubs and trees and dry land with high potential for livestock and agriculture.

4.1.1 Administrative Setting

The road project is located in Kitui County. The County is divided into eight (8) sub-counties namely; Kitui Central, Kitui West, Kitui East, Kitui South, Kitui Rural, Mwingi North, Mwingi Central and Mwingi West. It is further subdivided into forty (40) wards. There are 247 County villages established through the Kitui County Villages Act, 2015.

The sub-counties are administrated by the Sub-County Administrators and the Wards by the Ward Administrators. The Village is the lowest level of the County Administrative Units. A Village Administrator is responsible for overall co-ordination and management of County affairs at the village.

Table 1 Administrative units (Area by Sub-County and ward)

Sub-County/ Constituency	No. of Wards	Wards	
Kitui Central	5	Miambani, Kitui Township, Kyangwithya West, Mulango, Kyangwithya East	30
Kitui West	4	Mutonguni, Kauwi, Matinyani, Kwamutonga/Kithumula	23
Kitui East	6	Zombe/Mwitika, Nzambani, Mutitu/Kaliku, Chuluni, Voo/Kyamatu, Endau/Malalani	33
Kitui South	6	Ikanga/Kyatune, Mutomo, Kanziko, AthiMutha, Ikutha,	41
Kitui Rural	4	Kisasi, Mbitini, Kwavonza/Yatta, Kanyangi.	25
Mwingi North	5	Ngomeni, Kyuso, Mumoni, Tseikuru, Tharaka	34
Mwingi West	4	Kyome/Thaana, Nguutani, Migwani, Kiomo/Kyethani	26
Mwingi Central	6	Kivou, Nguni, Nuu, Mui, Waita, Mwingi	35
TOTAL	40		247

Mwingi Central, Kitui East and Kitui South sub counties / constituencies have the highest number of County assembly wards (six), while Mwingi West, Mwingi North, Kitui West and Kitui Rural have the lowest number (four). The number of Villages ranges from 23 in Kitui West to 41 in Kitui South.

4.2 Project Biophysical Description

4.2.1 Topography

Kitui County has a low lying topography with arid and semi-arid climate. Its rainfall distribution is erratic and unreliable. The highlands namely, Migwani, Mumoni, Kitui Central, Mui, Mutitu Hills and Yatta plateau receive relatively high rainfall compared with lowlands of Nguni, Kyuso and Tseikuru. Due to their altitudes, they receive more rainfall than other areas in the county and are the most productive areas. The topography of the county can be divided into hilly rugged uplands and lowlands. The general landscape is flat with a plain that gently rolls down towards the east and northeast where altitudes are as low as 400 metres. The altitude of the Kitui county ranges between 400m and 1800m above sea level. The central part of the county is characterised by hilly ridges separated by wide low lying areas and has slightly lower elevation of between 600m and 900m above sea level to the eastern side of the county. To the western side of the county, the main relief feature is the Yatta Plateau, which stretches from the north to the south of the county and lies between Rivers Athi and Tiva. The plateau is characterised by plain wide shallow spaced valleys. At the neighbourhood of the proposed project area, Thatha hilltop stands prominently amidst the predominantly flat terrain.

Apart from the Yatta Plateau and the range of hills in the central part of the county, the topography is undulating, and gives way to plains toward the east. A few hills rise as inselbergs in the plains rising to an altitude of 1,747 metres above sea level. These isolated hills usually affect communication within the county. The generally flat relief of the Kitui County provides an opportunity for low cost of installing/building of infrastructure such as roads and power lines. It also means putting up buildings is relatively cheaper due to low landscaping costs as compared to counties that have steep slopes and unstable soils.

4.2.2 Geology and Soils

Generally, soils are predominantly sandy to loamy sand texture, hence they are susceptible to erosion and are limited in their capacity to retain water and nutrients. The major soil type of the proposed project area is lixisols (red soils). Alluvial deposits (fluvisols) occur in isolated patches along rivers and on hill slopes. The soils are generally poorly drained and easily eroded by runoff (Borst and De Haas, 2006).

4.2.3 Climate

The climate of the Kitui County is hot and dry with unreliable rainfall. The climate falls under two climatic zones i.e., arid and semi-arid with most of the County being classified as arid. The County experiences high temperatures throughout the year, ranging from 14°C to 34°C. The hot months are between September and October to January and February. The maximum mean annual temperature ranges between 26°C and 34°C whereas the minimum mean annual

temperature ranges between 14°C and 22°C. July is the coldest month with temperatures falling to a low of 14°C while the month of September is normally the hottest with temperature rising to a high of 34°C. Due to the high temperatures experienced in the county throughout the year the rate of evaporation is high with a mean annual potential evaporation in the central and northwestern regions of the county ranging between 1800 to 2000mm while in eastern and northeastern regions, the range is from 2200 to 2400mm. The bulk of the County falls within 1800 to 2200mm range. The rainfall pattern is bi-modal with two rainy seasons annually. The long rains fall in the months of March to May. These are usually very erratic and unreliable. The short rains which form the second rainy season fall between October and December and are more reliable. The rest of the year is dry and the annual rainfall ranges between 250mm-1050 mm per annum with 40% reliability for the long rains and 66% reliability for the short rains. Rainfall is highly unpredictable from year to year.

4.2.4 Surface and Ground Water Resources

Kitui County current water supply and demand using an average consumption of 50 liters per person in urban and 25 liters per person in rural areas stands at 32,176 cubic meters and 12,586 cubic meters respectively. The shortage in urban areas is even worse than in rural with access to piped water standing at 36.1 % urban and 41.1 % rural. Water management in Kitui is under KITWASCO which is primarily in charge of Kitui sub-counties and KIMWASCO Companies in charge of Mwingi sub-counties. KITWASCO is in charge of managing water supplies from the Masinga-Kitui water which is an inter-county project while KIMWASCO is in charge of the Inter Sub-County project of Kiambere-Mwingi. Other water points producing between 10 and 100 cubic meters daily are managed by Community Management Committees or the Community themselves. To increase accessibility of water to the residents of Kitui the water companies have the following plans to increase piping network and rehabilitate old ones which will cost Ksh1.8 billion. The County has two sets of borehole drilling rigs. Excavators and other machineries for dam excavation and desilting are done using AMS machines and equipment. The desilting of dams and wells as well as boreholes will be done by the water services department and through private procurement as the department does not have adequate capacity to carry out all the work. The County will also examine its own processes in this area to determine how they can improve efficiency as the turnaround time is much slower than those achieved by private companies. While the management of these companies is supposed to be self-funding there are challenges particularly in managing water losses and in collecting revenues. The community managed water points are also self-financing, and a few have financial problems rendering the water source in operational. Development expenditure on piping will come from the County resources.

The National authority in charge of water supplies to Machakos County and Kitui is called TanaAthi. Its plans include the Thwake Dam which will produce about 18MW of power, increase water supply to both Makueni and Kitui and irrigate about 3,175 HA in Kitui.

According to the consultation with chiefs from the communities, they confirmed that groundwater is abundant in almost every village along the project hence water availability will not hinder construction from ongoing. During the field survey several water sources as water pans and boreholes, were noted along the proposed road corridor The construction will have a

negative impact on several water services that are within the project area such as borehole at Katulani boy's secondary school which is likely to be demolished.

Plate 1 Borehole along the proposed Wikililye- Kavisuni road

Plate 2 Seasonal River Tiva near Kavisuni market centre

Plate 3 Community members extracting water from River Tiva

Plate 4 Water pan along the proposed road corridor

The construction of the proposed road will consume large quantities of water that will be mainly sourced from boreholes which will be drilled within the project area as the sources of water. However, water from River Tiva might be used as an alternative water source during the rainy

season. Regarding water quality, the interaction with the local people at River Tiva indicates that groundwater is fresh for consumption.

4.2.6 Noise and Vibration

Noise and vibration will be a key feature in the construction activities of the proposed project due to machinery and equipment's that will be deployed. Heavy construction equipment frequently creates loud noise level. Moving machines and incoming vehicles delivering construction materials are the potential sources of noise. High noise level may distract concentration, cause difficulties in speech communication and increase the risk of accidents. Long term exposure to excessive noise may cause permanent hearing damage.

4.2.7 Flora and Fauna

Flora

Due to the limited amount of rainfall, the project area has scanty vegetation. The main vegetation cover is acacia, with pockets of drought-tolerant shrubs and grassland stretching along the road corridor. The alignment of the project road may lead to vegetation clearance within the road reserve to give the right of way in some areas.

Plate 5 Vegetation dominated by acacia spp along the proposed road

Fauna

The main fauna of the region where the proposed road passes consist of domestic animals such as cattle, goats and donkeys. There was no notable wild animals' presence in the area during the survey.

4.3 SOCIAL-ECONOMIC BASELINE SURVEY

4.3.1 Population and Demography

Population dynamics form an integral part of socio-economic and cultural development for the county. The county's population was 1,012,709 according to the population and household census report of 2009. The report showed that 531,427 were females while 481,282 were males and this was projected to grow to 1,065,330 by 2013. The population growth rate of the county at 2.1% is slightly lower than the national rate of 2.6%. High population exerts pressure on social and natural resources, and it is imperative for the county to develop strategies in addressing the population growth rate.

The county has a high population of children, as shown in the 2009 census report, where the population between the ages of 0-14 years, was 238,928 male and 232,820 females which represented 46.6% of the total population. The population between 65-80 years was 23,391 males and 29,449 females translating to 5.2% of the entire population. This implies a higher dependency of children between 0-14 years than elderly population between 65-80 years. The county should take note of this because it means that there are more people to feed, more schools to build and pressure to create more employment opportunities.

The census shows that there were 81,525 males and 79,977 females in the age cohort 0-4 years, 32,655 males and 40,691 females in the age cohort 20-24 years. This implies that transition from infant to teenage is higher for females than males and thus there is higher mortality for males than females in the county. These statistics tally with normal demographic structures. This also means that the county health authorities should focus on the causes of infant mortality to ensure that male children transition to teenage is improved.

The project area is mainly covered by Kamba ethnic community, who are traditionally long-distance traders. In the proposed project area, a high population is concentrated in Wikililye, Katulani and Kavisuni towns. Villages and pockets of isolated households characterize the sections between the three towns. Some of the villages are characterized by a high human population, while others have a low population. The villages lie along the proposed road corridor, and some are likely to be affected directly by the road construction works since there are housing structures within the road corridor.

4.3.2 Human Settlement

The population patterns and distribution in the County are largely influenced by landholding and ownership, availability and accessibility of water, and fertility of soils. The current trend in the county is that more people tend to concentrate on foot hills and plateaus where agriculture is possible. Other settlements are concentrated near towns due to the availability of reliable social amenities and employment opportunities.

Climatic conditions have also influenced the settlement patterns, and the majority of people live in scattered settlements with only 5% living in an urban environment. The most densely

populated area is Kitui Central with 208 persons per km2 and the lowest is Kitui East with 25 persons per km2. The county average is 44 persons per km2. With the exception of the areas bordering the Tana River County, which experience cattle rustling and banditry the rest of the County does not have any major human conflicts.

There are several market centres along the proposed road, namely, Wikililye, Katulani, Maliku, Kwa Muli and Kavisuni. The proposed road project will mainly affect Katulani, Maliku, Kwa Muli and Kavisuni market centres. The market centres are characterized by a high concentration of human settlements with permanent and temporary structures likely to be demolished to pave for road construction.

Plate 6 Permanent and temporary structures at Kavisuni market centre

4.3.3 Health Settings

Kitui County has several hospitals and health centers to meet the health needs of residents, among them Kitui County Referral Hospital, Mwingi Sub-County General Hospital, Kitui Nursing Home, Neema Hospital, Jordan Hospital, mission-run hospitals such as Muthale Mission hospital and some private health centers. Kitui County has commissioned 23 new health facilities to reduce the distance, time and cost to accessing healthcare services.

There are 240 functional public health facilities in the County, accounting for 6% of the country's 4, 000 public health facilities. This exceeds the national average of 85 health facilities per County by 145 (63%) facilities. However, a health facility distribution analysis conducted by the former Commission for Implementation of the Constitution (CIC) showed that the 230 health facilities were unevenly and inequitably distributed in the County. In three Sub-Counties, Kitui

Central, Kitui West and Mwingi West, over 95% of the residents live within an average distance of 5 kilometers from their homes to the nearest health facility.

Similarly, due to terrain and condition of the roads, it takes people in these three Sub-Counties less than 30 minutes to reach health facilities in their areas as recommended by World Health Organization (WHO). In some areas of the under-served Sub-Counties, people travel distances of between 15-25 kilometers to access existing health facilities.

4.3.4 Infrastructure and Access

Roads

The County has one Class A road passing through the County, the A3 Thika-Garissa road. The Kibwezi Kitui-Mwingi Road is being upgraded to be completed by 2020. There are other roads proposed in the Road Sub-Sector Investment Programme (RISP) 2010-2024 including: D478-Kola to A3-Nguni; B6-Kitui to A3-Ngooni; D507-Nuu to A3-Nguni; D507-Voo to B7-Ikutha; B7-Chuluni to D507-Mwitika; and E731-Miambani to D509-Mikuyuni. The County has Class E earth road network covering about 1,172.20 Kms.

Currently the road is unpaved, therefore upgrading to all-weather status will enhance connectivity and open the region for businesses and economic opportunities.

Plate 7 A section of the Wikililye- Kavisuni

Information, Communication Technology

The County Government recognizes the potential of ICT as an enabler of social economic development through delivery of public services and governance. The County is served by mobile telephone service providers by Safaricom, Airtel, and Telecom but the quality of coverage varies with the location. The County is served by 12 post offices run by the Postal Corporation of Kenya (PCK) which oversees mail and parcel delivery as well as offering data communication services. Kitui County has fibre optic connection, but it is yet to be extended to serve all key departments in the County.

Energy access

The main sources of energy for lighting are paraffin lantern, paraffin tin lamp, electricity connection from mains, solar energy and battery lamp. About 33.4 percent of households use paraffin lanterns compared to a national average of about 15.7 percent. Electricity connections remain below the national average.

In terms of cooking energy, 79.5 percent of the households using firewood compared to the national average of 54.6 percent. The use of Liquefied Petroleum Gas (LPG), Kerosene and charcoal for cooking is low in the County compared to the national average. At the County, nationally, 76.4 percent of the households use traditional stone fire as a primary cooking appliance, compared to a national average of 46.4 per cent.

Plate 8 Power lines along the proposed project route

Plate 9 Power lines at Kavisuni town

The road upgrade will improve the access to energy sources as use of LPG gas and reduce reliance on fire wood as LPG companies will be able to transport their products easily to the area leading to conservation of the forest vegetation. It will also make access of the rural electrification program easier as connections to households within the project area.

4.3.4 Religion

A large number of the population in the project area are Christians. During the rapid assessment, it was observed that several churches had been established along the project corridor. Some of the churches are likely to be demolished as they are built within the project area.

Plate 10 ACK, St Andrews Kavoko Parish at Kwa Muli along the proposed road

4.3.5 Education

Kitui has several primary, secondary schools, colleges and polytechnics Kathungi Secondary School, which is also found in Kitui County, is famous for its football championship in the country. Kathungi were the 2013 national silver medalists. Alongside the national champions Upper Hill, they represented Kenya in East Africa Secondary School games held in Lira, Uganda. South Eastern Kenya University is a public university located in Kitui with the Main Campus at Kwa Vonza and other campuses at Mwingi and Kitui towns. Kenyatta University has a campus at Kwa Vonza while Moi University has a campus at Kyuso in Mwingi North sub-county. University of Nairobi also has a campus in Kitui town. Kenya Medical Training College has campuses in Kitui and Mwingi.

There are many schools along the project corridor, such as Kathukini primary school, Kikumini primary school, Katulani boy's secondary school, and Maliku girls' secondary school, which will be affected by the construction of the road. As observed during the assessment, most schools have structures well-set from the road, although some have boundary walls/gates close to the project area.

Plate 11 Kathukini primary school along the proposed road project

Plate 12 Kikumini primary school along the proposed road

4.3.6 Economic Activities

The proposed road traverses through areas with varying economic activities dictated by climatic conditions, trade opportunities and availability of resources. Cattle, sheep, goats and donkeys are the primary livestock reared in the area. Other economic activities in the project area include irrigated agriculture, small scale farming, poultry farming and water trading. As a result of water scarcity, the area has attracted water selling businesses along the project corridor.

4.3.7 Land and Land Use

Mean Holding Size

The county has a total area of 30,496.4 km2 of which; 6,369 km2 of the County land consists of the Tsavo East National Park and is not available for agriculture, 14,137.2 km2 is arable agricultural land and 6,364.4 km2 non-arable land. Over 85% of the County's population lives in rural areas. The average population density is 44 persons/km2 which is generally sparse. The average size of land holding in the County is 0.12 km2 per person (12 ha per person).

Plate 13 Maize growing in a farm along the project corridor

Percentage of Land with Title Deeds

Over 46% of the County land falls in the arable category with 83% of the inhabitants lacking title deeds because most of the land has not been adjudicated. Only about 17% of land owners in the County have title deeds. The process of land adjudication and registration has been particularly slow. Without titles, land owners are constrained with regards to securing investment loans from banks and Micro Finance Institutions (MFIs).The County Ministry of Lands, Infrastructure and Urban Development has started the process of land adjudication so as to fast track the issuance of title deeds to land owners in the county.

Land within the proposed area is used for residential, agricultural farming, grazing livestock and many others. Different crops such as maize and green grams are grown along the proposed road. Various recreation facilities are located in the project-affected villages, such as schools, churches, and water tanks. During the study, it was observed that there were different types of livestock, such as cattle and goats, which were being grazed along the proposed road in some of the villages.

4.3.8 Trade

The proposed road project will be a significant link to the neighboring counties as it will ease the movement of people. Currently, no road connects Kitui County and Makueni County; therefore, the proposed road is a strategic regional route that will open up the two counties. The movement of traders within the counties will be easier without going through Machakos County. People coming from Mombasa destined to Isiolo, Meru and Embu will move quickly without using the Mombasa- Nairobi Highway, thus increasing trading activities along the route. Kavisuni town and Wote are two strategic trading zones in the proposed project region. Main trading activities include livestock auction markets, large and small-scale businesses, and agricultural products trade. Small scale trading activities exist in the villages along the road alignment. Upgrading the road to bitumen standards will significantly open the area and promote trading activities.

Plate 14 Kavisuni market centre

4.3.9 Crop and Livestock Production

The economy of the County is dependent on agriculture, which contributes to rural employment, food production and rural incomes. The level of food self-sufficiency in the County is 51%, however approximately 10 percent of the entire population is absolutely food insecure. The sector plays a major role by contributing about 87.3% of income earned by the rural population. The main food crops grown in the County include cereals such as maize, sorghum, and millets; pulses such as green grams (Ndengu), cowpeas and pigeon peas; root crops such as cassava,

sweet potatoes and arrow roots; industrial crops such as cotton, sisal and sunflower, and horticultural crops represented mainly by fruits such as mangoes, pawpaw, and water melons as well as vegetables such as tomatoes, kales, onions and bullet chilies. The total annual average crop production is 80,680MT for cereals valued at Kshs. 4.24 billion, 771MT for industrial crops valued at Kshs. 29.04 million and 36,950MT for horticultural crops valued at Kshs. 990 million. County crops are grown as sources of food and income and production is mainly dependent on rain. Rainfall in the County is not only inadequate but erratic thus necessitating the use of irrigation to augment food production.

The main livestock types kept in the County are cattle (beef and dairy), goats (meat and dairy), sheep and poultry (indigenous and exotic). Farmers have also ventured into apiculture. Livestock cushions farmers against adverse condition especially in times of drought. The sector largely contributes to income generation and food security in main livestock zones. In LM4, LM5, IL5 and IL6 it contributes approximately 40-50% of total household incomes while in UM3 and UM4 it contributes 20-30% of household incomes. The County annual average production levels for various livestock enterprise products are as follows; 3,077 tonnes of beef, 1466.6 tonnes of goat meat (Chevon) and 70 million eggs, 4.2 million liters of milk and 960 tonnes of honey against the estimated potential annual local demand of 32,120 tonnes of meat, 100.4 million liters of milk and 171.6 million eggs. Rangeland and pastures occupy about 1,048,728 hectares, which is about 80% of the County. The livestock carrying capacity is approximately 4.4 hectares per Livestock unit (LU). The Zebu constitutes 97% of breed kept while Boran and Sahiwal account for 3%. Over 55% of beef cattle are found in AEZ IL6 and 40% in UM 4 and IL5. The balance of 5% is found in UM3 and UM4. The preferred dairy breeds are Ayrshire, Friesian, Guernsey and Jersey and their crosses in that order. The main goat meat breeds are the Small East African, Gala and their crosses, whereas the main dairy goat breed is the Toggenburg (95%) and a few German Alpine (5%). Poultry includes domestic fowl, ducks, quails, turkeys, Guinea fowl, and geese. The most common poultry kept is indigenous chicken which is integrated in farming by over 90% households in the County. Farmers in the suburbs of major urban centers rear exotic breeds of poultry for egg and meat

4.3.10 Gender and Inequality

The enrolment rates for both primary and secondary school show higher figures for girls than those of boys. From the ground surveys, it was evident that the dropout rate of boys was higher than that of girls. This is due to the communities' water scarcity, as most boys were noted to have ventured into the water-selling businesses and dropped out of school. These constraints the economic empowerment of men and increase poverty levels within the region as education levels have an impact on the economy. Therefore, the county government of Kitui should try to bridge the gender gap by sensitizing the importance of education to both the male and female gender.

4.3.11 HIV/AIDS

Kitui County has approximately 1600 annual new HIV infections and plans to reduce the incidences by 50 percent by 2022. This will be achieved through channeling of resources to interventions like early infant diagnosis, behavioral changes and communication, counselling and testing, good referrals and linkages to care and treatment.

Women have been more vulnerable to HIV than men hence the proportions of women living with HIV are higher compared to men. Anti-retroviral drugs can substantially reduce AIDS deaths if used properly and they can also reduce HIV transmission. The County will embark on improving access to rehabilitative services. The sector is committed to improving the health of all women of reproductive age. The County places a strong emphasis on safe delivery, improved family planning uptake, reduction of maternal and perinatal deaths and provision of free maternity services and deliveries under skilled attendance.

The contractor's strategies that will be incorporated within the project include increasing public awareness/education at all levels, strengthening voluntary counseling services promote the use of condoms by improving its supply and access to the community encouraging voluntary testing, among others.

CHAPTER 5.0: STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION

5.1 Introduction

This chapter describes the process of public consultation and participation that were followed to identify the key issues and impacts of the proposed project. Stakeholder Engagement and Public Participation Process is an integral aspect of successful decision making in the ESIA processes for major developments. Public participation is a key requirement as stipulated in Article 69 Section 1 of the Kenyan Constitution, 2010, Legal Notice 101 of the Environmental Management and Coordination Act (EMCA), Cap 387 Section 58, for achieving the fundamental principles of sustainable development in ESIA, Section 3 of the EIA/EA regulations, 2003 and Section 87 & 113 of the County Governments Act, 2012.

It is an important process through which stakeholders including beneficiaries and members of public living in project areas (both public and private), are given an opportunity to contribute to the overall project design by making recommendations and raising concerns projects before they are implemented. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation.

5.2 Objectives for consultation and public participation

The general objectives of the consultation and public participation were to:

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

5.3 Methodology used in the Consultation and public participation

The public consultation and participation were conducted through;

1. Household socio-economic survey
2. Key stakeholder engagement
3. Public Meetings

The procedures used for each of the above are outlined below;

5.3.1 Household socio-economic survey

Household socio-economic surveys were conducted during the field visits. This was done using structured questionnaires (Sample Questionnaire attached in Appendix) to assess the socio-economic status of the project area.

5.3.2 Key Stakeholder Consultation

Key stakeholder consultative meetings were conducted on 18th January 2022. The key stakeholder engagements were conducted to foster better and mutual understanding of public concerns as well as incorporate key stakeholders' opinions to this report.
The following stakeholders were consulted:

- Deputy County Commissioner, Katulani Sub-County
- County Director of Environment
- Sub- County Children's officer
- Sub-County Social Development officer
- Sub- County Director of Education officer
- Mulango Ward Administrator
- Chief Katulani
- Assistant chief Katulani

The plates below show photos of the key stakeholders meeting that was held on 18th January 2022 at the DCC's Office- Katulani Sub-County.

Plate 15 KeNHA official pre- briefing The DCC and the MCA on the agenda before the consultations

Plate 16 DCC Katulani Sub-County, Mrs. Shujaa Mwijuma addressing the stakeholders

Plate 17 KeNHA Senior Environmentalist engaging the Key stakeholders

Plate 18 Eng. Ken Kamangu briefing the stakeholders about the road project

5.3.5 Public meetings

Three public participation meetings were conducted at chief's camps within the proposed project site i.e., Wikililye, Katulani and Kavisuni. The local chief was used to mobilize the public to attend the meetings, at least more than 50 community members were present at each meeting. Below is summary of the number of people targeted as well as photos from some of the meetings held.

S/No.	Venue	Number of Participants	Date of Meeting
1.	Kathukini Chief's camp	148	17th Jan 2022
2.	Katulani DCC's office	16	18th Jan 2022
3.	Katulani Chief's camp	203	18th Jan 2022
4.	Kavisuni Chief's camp	62	19th Jan 2022
Total number of participants		429	

Plate 19 Public consultation at Wikililye, Kathukini Chief's camp

Plate 20 Public consultation at Kathukini Chief's camp at Wikililye

Plate 21 A man raising his concerns about the proposed road project

Plate 22 Public Consultation meeting at Katulani Chief's camp

Plate 23 MCA, Mr. Peter Kimanthi raising his views about the project

Plate 24 Public participation meeting at Kavisuni Chief's camp

5.4 Issues Emerged from the Consultations

The Construction of the 32KM Road Project was received with mixed reactions by the community as they anticipated numerous impacts both negative and positive alike. The local community members and major stakeholders independently gave their views, opinions, and suggestions as in the best of their interest.

5.4.1 Positive impacts

5.4.1.1 Employment to local youths and the community

Community members were quick to ask whether they would be employed as both skilled and unskilled workers during construction and how policies in relation to equality would be met. They were informed that there would be thorough follow up and engagement with the contractor to ensure labour equality is adhered to. A committee will be formed from the DCC's office to ensure that thoroughly implemented local employment policy. It was further clarified that the employment would include youths from the villages who will be given priority. Employment opportunities were said to arise as soon as construction began. During the construction phase, the local youths will be employed as casual labourers to earn a living, thus improving living standards. The food vendors (especially women) are likely to benefit from the construction workers, thus creating indirect employment opportunities.

5.4.1.2 Benefits to local institutions

The locals wanted the assurance that the proposed development would prioritize benefiting the neighbouring schools, dispensaries and hospitals. Community members had a request for the contractor to construct boreholes in the hospitals along the project road, such as Katulani level 4 Hospital, so that the community would benefit after construction. They requested the contractor not to demolish boreholes used during construction but instead be left for the community. The chiefs along the proposed road requested if the roads to the offices would be tarmacked for easy entry to their camps. The team assured the locals that the contractor's boreholes used as water sources would not be demolished. Depending on the availability of funding, the Proponent will carry out some social infrastructural projects in the area on the community's priority.

5.4.1.3 Provision of market for local construction materials

The local community enquired about creating opportunities for local suppliers to supply raw materials for the project construction. They were informed that the project would require construction materials such as gravel, stone, and cement, most of which will be sourced locally.

5.4.1.4 Cheap and Faster Means of Transport

The respondents were optimistic that the proposed road would provide a faster and cheaper transport for cargo trucks, passengers and personal cars from Kitui County to Makueni County. This will therefore improve the current transport situation along the road.

5.4.1.5 Easy and Fast Movement of People

The public was optimistic that the road would reduce travel time within the two counties and beyond. They also said that the road would lead to an increased number of bus and matatu operators, making transportation easy.

5.4.1.6 Easy and Fast Movement of Goods

The public said that the road would improve the transportation of goods to and from the area. Since the area practised livestock farming and poultry farming, they stated that they would reach the market on time. They also stated that farm produce would be delivered efficiently and timely.

5.4.1.7 Growth of Towns

The locals were confident that the road would lead to the development of the existing centres as Katulani, Wikililye, and Kavisuni will expand to accommodate the workers working in the project. This will lead to infrastructure development, especially housing within the area.

5.4.1.8 Potential for increased economic activities

The residents indicated that during the construction and operation, the project would provide more business opportunities to the community at the centres near the project site, which include: Wikililye, Katulani, Maliku, Kwa Muli and Kavisuni, thereby improving their livelihoods. The new road will lead to the expansion of various businesses in various towns located along the road. There is an exceptionally high possibility of expanding petrol stations, hotels and restaurants, shopping malls, etc., due to the increased number of motor vehicles and people using the route.

5.4.2 Negative Impacts

5.4.2.1 Displacement of Project Affected Persons

Community members needed clarification on how the displacement of persons residing along the road will be addressed, including those who use the land for businesses and homesteads. The public was assured that as the situation is currently not acquiring any land, displacement has not been identified as the corridor was sufficient, and construction will only be done along the road reserve.

5.4.2.2 Increase Traffic

The residents were concerned that the proposed development would cause an increase in traffic, especially during the construction phase, because of the movement of trucks carrying construction materials to the site. It was explained that the proponent would undertake traffic assessments around the proposed site to identify potential impacts and provide technical recommendations for mitigating the potential traffic impacts.

5.4.2.3 Loss of trees/vegetation

The local community had concern that the proposed project location site has indigenous trees which will be cleared for the construction of the road project. Consequently, being a semi-arid area, the trees are valuable in the area. They were informed that the trees will be considered and incase of being affected will be mitigated by the proponent through a revegetation exercise while in consultation with key stakeholders.

5.4.2.4 Destruction of Public Utilities

The public stated that there were concerned that the project would lead to the destruction of boreholes and water systems built along the project corridor. They were assured that before excavation is done, the proponent would conduct a proper ground survey and engineering techniques to prevent destruction. If need be, the contractor will make realignment.

5.4.2.5 Road Accidents

Upgrading the road may lead to increased accident due to the improved state of the road. Therefore, speedbumps and rumble strips should be erected near settlements, public institutions

and town centers. Proper signage should be provided and guard's rails installed on river crossing throughout the road.

5.4.2.6 Dust Generation

The public expressed concerns over possibility of generation of large amounts of dust within the project site and surrounding areas as a result of demolition, excavation works and transportation of building materials. The proponent will thus need to ensure that dust levels at the site are minimized as much as possible through sprinkling water in areas being excavated and on the access roads used by the transport trucks within the site. Additional mitigation measures presented in this report will need to be fully implemented to minimize the impacts of dust generation.

5.4.2.7 Water Management

The communities living around the proposed project site needed clarification on how the proponent will draw water from River Tiva during construction since the river is the primary source of water for the communities. It was clarified that the contractor would drill boreholes as their primary water source as no drilling would be done at the river source and water from River Tiva might be used as an alternative water source during the rainy season.

5.4.2.8 Spread of diseases such as HIV/AIDS

The residents along the proposed road corridor expressed concern that there would be an increase in incidences of sexually transmitted diseases, including HIV and AIDS, especially during the construction of the road due to increased population. The project proponent will need to work jointly with appropriate county and national government public health agencies to develop a comprehensive STD, HIV and AIDs control programme during the construction and operational phases of the project. It is good that through these consultations, communities were also reminded to look further into ways they should manage their families and prepare to face such issues should these arise.

5.5 Summary of Recommendations made by the Public

The following suggestions were made during the consultations: -

- The proponent should consider employing locals as casuals during construction activities.
- The Resident Engineer's office to be built at Katulani for easier access for the public to air their issues and concerns about the project.
- The environment and health of the public should be protected from degradation.
- The contractor should come up with a proper drainage mechanism along the road.
- Entrances of the DCC's office and chief's camp tarmacked.
- Borehole to be drilled at Katulani Level 4 hospital and Kavisuni dispensary so as to benefit the communities after construction is completed.
- Provide signages along the road corridor especially near schools to inform drivers and motorists.

- Initiate a feeding programme for school- going children within the project area.

CHAPTER 6: ANALYSIS OF PROJECT ALTERNATIVES

6.1 Introduction

This section analyses the project alternatives in terms of site, transport alternatives, materials and technology scale, solid waste and wastewater management options and shall involve studying design alternatives and analyzing them based the environmental costs and benefits this shall involve studying the technology, design, capital investments, operation and maintenance requirements among others.

6.2 No-Construct/No Project Alternative

The 'No Project Alternative': assumes that the implementation of the project does not go ahead, implying a continuation of the current situation leaving the socio-economic prospects of the area dormant and inhibition of free flow of traffic within project area and the periphery. This is not a preferred option by either the road users, communities bordering the project road or the country in general since it has economic, social and environmental implications.

Under the No action alternative, no improvements will be undertaken; the resultant socio-economic benefits of the developments would be foregone. The anticipated environmental and social impacts resulting from construction and operation of the development would not occur.

6.3 Alternative mode of transportation

There are no viable alternatives to this road that fulfil the functions of providing relatively fast, cheap land transportation. Air, rail, and water transport are unlikely to either complement or to substitute for roads or highways in the project area leaving the road as the most important link between the counties transversed by the proposed roads. The proposed project road is an existing murram road and it's upgrading which will involve some significant realignment to meet its dual nature.

6.4 Analysis of Alternative Route/Realignment

Currently, there exist no other alternative routes that could be constructed economically since the proposed road earmarked for upgrade is usable and only tarmacking is required to improve its standards.

6.5 Upgrading of the road

Since road transport is the major form of transport in the region, upgrading the road to bitumen standards will enhance movement of goods and people. The project is on an existing alignment implying lower construction costs and lower environmental and social impacts compared to developing a new alignment. Upgrading of the road has the following potential implications:

- Increased traffic that will impact on the fauna, towns, public institution, schools and residential dwellings

- The improvement will affect environmental features i.e. biological and physical features.
- Possible displacement/ relocation of people and demolition of structures; especially business premises and institutions incase additional space is required for construction

Upgrading of the road will enhance traffic flow, save travel time, reduce travel cost thus improve accessibility, enhance mobility and improve welfares. This is perhaps the most preferred option.

6.5 Alternative Road Building Technologies

a. Concrete Paving

Concrete is typically only used for local roads in urban areas. Concrete is more long lasting than asphalt and significantly stronger as well, but is quite expensive to lay and maintain.

b. Asphalt Paving

Asphalt paving is one of the most common type of construction technique. Advantages of this form of road construction are that the pavement produces relatively little noise, its relative low cost compared to other materials, and that is relatively easy to repair and maintain as well. However, asphalt is significantly less durable. This is perhaps the most preferred option for this project considering the location and cost implications.

CHAPTER 7.0: GRIEVANCE REDRESS MECHANISM

7.1 Background

This section describes the Project's Grievance Redress Mechanism to be adopted. The overall objective of the GRM is to establish an effective communication channel among the stakeholders for providing a timely and efficient two-way feedback mechanism to address any grievances and complaints against the project from multiple stakeholders and Project Affected. This GRM complies with the Law of Kenya and international best practices. In the course of upgrading the Wikililye- Kavisuni road project, grievances, complaints as well as disputes are expected to arise from several stages of the project including design and implementation phase.

7.3 Proposed Procedure

For avoidance of doubt, the Chief Grievance Handling Officer will be the Resident Officer. Everybody else will acts on RE's behalf and reports to him/her.

Anyone will be able to submit a grievance to the project, if they believe any practice by the project is having a detrimental impact on the community, the environment, or on their quality of life. They may also submit comments and suggestions on how such issues can be handled or prevented.

Stakeholder sensitization on the GRM will be undertaken during community and stakeholder meetings scheduled under the project's SEP. Instruments for grievance redress mechanism, complaint registration form and grievance resolution form are attached in **Appendices**. The steps taken for receiving and handling grievances is as follows:

Step 1: Submitting a Complaint

A complaint can be submitted to the Contractor's Social and Environment Officer (SEO) the Consultant's SS Expert or the Community Liaison Officer (CLO) in the following ways:

- During regular public meetings held with the communities;
- Through Consultative Forums with stakeholders;
- During any informal meetings;

- Through communication directly with management – for example a letter addressed to site management, or other operational offices;
- By telephone including use of text messages / short message service (SMS) from cell phones;
- Placing a comment in the community suggestion boxes at the site office; and
- By registering a complaint in the Grievance Log Form at the contractor or consultant's office.

Regardless of the form of submission, the contractor's or consultant's SS Expert/ Community Liaison Officer will be responsible for ensuring that all complaints are logged in a **Grievance Form.** Where necessary, the specific SS Expert will arrange for a meeting with the concerned parties so as to document the grievance.

All grievances reported to the Consultant will be filed in a dedicated **file stored in the RE's Office**.

The Consultant's SS Experts will also track resolution of grievances filed with the Contractor through regular inspection of the **Contractor's Grievance File and Grievance Log**.

The summary of all complaints (from both the Contractor and Consultant's Grievance File) must also be logged in the **Grievance Register** upon logging for tracking of the resolution process.

The Register will also be stored in the RE's Office.

All resolutions will be communicated to the affected parties in writing and a copy of the **signed acceptance / rejection of the ruling** by the complainant stored in the Grievance File.

Step 2a: Assess and Assign

On receiving the complaint, the Contractor's Social Safeguard Expert/Community Liaison Officer will carry out the following steps;

i. Verify and establish the communication channels of the grievances by identify mode of communication to be used to communicate feedback and responses.
ii. Contact the concerned aggrieved and complainant parties and initiated communication on way forward to commence investigation.
iii. Determine the mode and different ways of commencing assessment process.
iv. Ensure confidentiality is upheld in most levels of assessment process.
v. Carry out assessment process by identify and reaching out key parties involved in grievances.

vi. Cross examine by triangulating issues raised and determine the key factors wanting redress.
vii. Assign key informants to specific task during assessment process ensure credibility of information is up to required standard.
viii. Ensure documentation of all data and information is secured and protected.
ix. Ensure each party commit to their words by signing the documents and assessment materials for authentication process.
x. With each party, carry out validation process of information to ensure acceptance and commitment of each party in assessment process.

Step 2b: Providing the Response /Acknowledgement

For general grievances, a resolution must be communicated to the complainant within 5 working days of logging of the grievance. However, grievances will first be categorized for resolution based on validity and priority level by the SS Expert with full knowledge of the RE, as below:

- High-Resolved / Actioned within 2 working days;
- Medium-resolved / Actioned within 4 working days;
- Low-Resolved / Actioned within 5 working days.

Prioritization will be based on the risks as determined by the environmental and social safeguards for the project as defined in the ESMP, the project license, Kenyan EHS policies and other best practices.

Where no immediate corrective action[1] is possible, the complainant will be notified in writing within two working days of logging of the grievance on what the next steps are.

Step 2c: Investigating the Grievance

If the grievance has to be investigated, then the SS Expert will aim to complete investigation within one week after the grievance first log-in. Depending on the nature of the grievance, the approach and personnel involved in the investigation will vary.

With the full involvement of the RE, the SS Expert will then co-ordinate the constitution of the investigative team and the participants of the grievance hearing. The Investigation Report will at a minimum outline the approach taken, the participants, evidence collected and recommendations of the investigations.

A hearing will then be held within two working days of the submission of the investigation report and a resolution given.

Step 3: For Unresolved Grievances

If resolution is not met, it will be escalated to relevant external parties such as the officers of the Deputy County Commissioner on the ground, or any other relevant authority. However, in such a case, KeNHA will be notified prior to involvement of these external parties for a no-objection.
In accordance with the laws of Kenya, parties have the right to go to the court system including the Land and Environment Court. This will be the next option if all else fails.

However, the main principle of this mechanism is to deal with complaints as soon as is practicable, expeditiously and in a transparent manner so as to avoid complainants deferring to the justice System.

7.4 Management of Grievances under the project RAP

The grievance mechanism for the resettlement process was developed during the ESIA and RAP Studies. The key aspects of the mechanisms are presented below:

Table 2 Proposed grievance framework

Proposed Grievance Framework
Grievances related to the construction of the proposed Wikililye- Kavisuni Road Project will be handled through negotiations, which will be aimed at achieving consensus following the proposed procedures outlined below: 1. Grievances will be filed by the person affected by the project with the Local Grievance Committee, who in consultation with the relevant Local Compensation Committee and the consultant's representative (in all likelihood, the socioeconomic survey valuer), will act within 15 days after receipt of the grievance. 2. If no understanding or amicable solution can be reached, or if the affected person does not receive a response from the Local Grievance Committee within 15 days after receipt of the grievance, s/he can appeal to the Commissioner of Lands through the auspices of the local Ministry of Lands officer who is to act on the grievance within 15 days of its filing. 3. If the affected person is not satisfied with the decision of the Commissioner of Lands (or his delegate), s/he, as a last resort, may submit the complaint to a court of law. All grievances received in writing (or written when received verbally) will be documented.

CHAPTER 8.0 ANALYSIS OF ENVIRONMENTAL IMPACTS

8.1 Definition and classification of impacts

An impact in this context refers to any change that is likely to cause change in the environmental or socio-economic setting. The impacts can be either negative or positive. The impacts may also be direct or indirect, localised dispersed or cumulative if they add to the already existing impacts. They may also occur immediately or may be delayed in their timing. Another description used is if the impacts are permanent in their persistence or temporary. The impacts are also described using the phase that they occur in i.e. planning, operation or construction.

The baseline biophysical and social environmental parameters established in **Chapter 4** are critically examined in this section in relation to the potential environmental and socio-economic impacts of the proposed road upgrading project. In addition to adhering to the mitigations below, the contractor needs to comply with the requisite national legislation and regulations that are outlined in **Chapter 3** of this report.

This Chapter identifies the potential environmental and social impacts of the proposed project, based on the components of the explained data collection methods and procedures mentioned in Chapter 1 sub chapter 1.5, in the context of the baseline conditions that have been established in Chapter 4, and with due regard to applicable legislation described in Chapter 3. The predicted impacts are then assessed using the Leopold matrix as explained below.

8.2 The Leopold matrix

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

8.3 Impact identification and evaluation

The Leopold matrix is an effective method of predicting impacts quantitatively. Quantification means using numbers to indicate the impact. It is helpful in presenting information in summary form to give readers an overview of the impact characteristics of the Project and the alternatives to it.

Once the list of impacts or changes on the different elements of the medium has been established they are characterized using the following features and criteria:

- Sign (Nature)
- Type
- Intensity.

- Extension.
- Time.
- Reversibility
- Recoverability
- Persistence.

Table 3 Description of words used

Sign /Nature of the impact	**Alludes to the beneficial nature (+), bad (-)**
Intensity	It refers to the degree of impact on the factor, in the specific area in which it operates. Ranked from 1 to 3. The three expressed as an almost total destruction of the factor in the area in which the effect occurs
Type	Refers to the nature of the impact, direct (3) indirect (2) or cumulative (1)
Extension/Location	An area of influence covered by the impact in relation to the project environment. In this sense, if the action produces a much localized effect within the space, it is considered that the impact is low (1). If, however, the effect does not support a precise location within the project environment, having a pervasive influence beyond the project footprint, the impact will be large (3). Intermediate situations are considered as partial (2).
Timing	Refers to the moment of occurrence, the time lag between the onset of action and effect on the appearance of the corresponding factor. We consider three categories according to this time period is zero, up to 2 years, or more than two years, which are called respectively as immediately (3), medium term (2), and long term (1).
Reversibility	It refers to the possibility of reconstructing the initial conditions once the effect. Can be characterized as short-term (1), medium term (2) and impossible (3).
Recoverability	It refers to the possibility of providing or not the

	corrective measures to avoid or minimize impact. For impacts with positive sign will not express their recoverability
Duration/ Persistence	Refers to the time that supposedly stays the effect, from the onset of the action in question. Two situations are considered, depending on whether the action produces a temporary effect (1) or permanent (3). It is therefore this generic characterization because spaces are not discrete time course associated with these categories and because in any case, it is very difficult, in the limit, to discern on temporary or permanent effects.

A logical and systematic approach was taken for impact identification. The aim was to take into account all the important environmental/project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are not inadvertently omitted. Individual environmental issue were also viewed in respect to the different facets of the project.

The rating evaluation will be as follows:

Table 4 key of the rating parameters

EVALUATION PARAMETER	RATING	RATING
Nature of impact (NI)	-Positive -Negative -Uncertain	+ - -/+
Type of impact (TI)	-Direct -Indirect -Cumulative	3 2 1
Extent(EXT)	-Disperse -Medium -Localized	3 2 1
Intensity (IT)	-Major -Medium -Minor	3 2 1

Reversibility (R)	-Short term, easily reversible -Long term, partially reversible -Not reversible	1 2 3
Timing (TM)	-Immediate -Medium -Delayed, long term	3 2 1
Persistence (PI)	-Temporary effect -Permanent effect	1 3
Phase	-O -C	Operational period Construction period

8.5 Impact magnitude Indicators

As pointed in *LEGAL NOTICE No. 101 THE ENVIRONMENTAL (IMPACT AND AUDIT) REGULATIONS, 2003 ARRANGEMENT OF REGULATIONS, SECOND SCHEDULE* the following issues may, among others, be considered in the making of environmental impact assessments.

- Impacts on the Physical Environment
- Impact on the Biological Environment
- Impact on socio-economic environment

The Magnitude or Importance impact represents the entity or significance of the effect, includes the degree of incidence and the "form" of that effect, represented by other attributes. Its value is clear from taking the attributes described by the following formula.

Imp = Sign (3Iij + 2Eij +Tmij + Pij + Rij),

Where:

Imp: Importance or magnitude of the impact generated by the action on the project I j element of themedium

Ii: Intensity of the impact generated by the action on the project I j element of the medium.

Ei: Extent of the impact generated by the action on the project I j element of the medium.

Tmi: Timing, the moment of impact generated by the action on the project I j element of themedium.

Pi: persistence of effect, from the onset of the action in question.

Ri: Possibility of reversibility.

In this study only two impact characterization parameters included in the matrix are not considered in the impact magnitude valuation formula, these are the “type” and “recoverability” (WB methodology, 1995).

Table 5 Environmental Impact matrix

Topic	Element	Action	Impacts	TI	EX	IT	R	TM	PI	Phase	MG
Vegetation	*Ground cover*	*Project foot print*	Extent of vegetation clearance required	3	1	2	2	3	1	C/O	14
	Plant species	*Clearance to create space*	Loss of mature indigenous/ medicinal species	2	1	1	2	3	1	C/O	11
		Clearance to meet increased energy requirement	Accelerated degradation of vegetation	2	1	2	2	2	3	C/O	15
Soil Resources	*Soil physical properties*	*Civil and general works*	Loss of top soil hence alterations of soil profile	2	1	1	2	1	1	C/O	9
	Soil contamination	*Civil and general works*	Activities likely to lead to soil pollution	2	1	2	2	1	1	C	12
	Soil Erosion	*Civil and general works*	Exposure to erosion agents	3	2	2	1	2	1	C/O	14
Water Resources	*Water Quality*	*Civil and general works*	Contamination of downstream surface water	2	3	1	2	1	1	C	13
	Water Quality	*Civil and general works*	Contamination of ground water sources	2	3	2	2	1	1	C/O	16
	Water Quantity	*Water channeling*	Increased surface runoff and resulting soil erosion from channeled water	2	1	2	1	2	1	C/O	12
	Water Quantity	*Water abstraction for construction*	Alteration of water supply as a result of abstraction	2	3	1	1	1	1	C	12
Air Quality	*Air pollution*	*Civil and general works*	Dust and/or smoke generation during works	3	1	2	1	3	1	C	13
	Air pollution	*Traffic during*	Increased CO2 emission	1	1	1	2	1	3	O	11

		operation	from use of fossil fuel								
Aesthetics	*Impact on the landscape*	*Civil and general works*	Change of visual of visual impacts (features, vegetation removal)	2	1	2	1	3	1	C	13
Noise and Vibrations	*Excessive vibration above ambient*	*Civil and general works and operation*	Consider machine type and extent of vibration during construction	3	1	2	1	3	1	C/O	13
Waste management	*Solid waste*	*waste generation and handling*	Ingestion by livestock and wildlife	1	3	2	2	2	1	C/O	17
			Reduction in aesthetics	2	2	2	1	3	1	C/O	15
Invasive weed	*Invasive weed species*	*Civil and general works*	Activities likely to aid in proliferation of the weed	2	3	2	2	1	1	C	16
Topography	*Material sites*	*Civil and general works and project footprint*	Extent of vegetation clearance associated with quarries	3	1	2	1	3	1	C	13
Occupational safety and health	*Disease, accidents and injuries*	*Civil and general works*	Accidents, injury and exposure to diseases for the workers and road users	3	1	2	2	2	1	C/O	13
Social disruptions	*Works across trading centres*	*Civil and general works*	Impacts on trade and movement	2	1	2	1	1	1	C	11
	Resettlement	*Civil and general works*	Family disruptions and relocation of business premises	2	3	1	2	1	2	C/O	14

The impacts have been rated in the table 3 above. The impact rating quantitative figures range from 10-17. These have been categorised into

High 18 and above

Medium 17 - 15

Low to insignificant 14 and below

Rating	Element	Action	Impacts
MEDIUM	*Solid waste*	*waste generation and handling*	Ingestion by livestock and wildlife
	Water Quality	*Civil and general works*	Contamination of ground water sources
	Invasive weed species	*Civil and general works*	Activities likely to aid in proliferation of the weed
	Vegetation	*Clearance to meet increased energy requirement*	Accelerated degradation of vegetation
	Solid waste	*waste generation and handling*	Reduction in aesthetics
	Ground cover	*Project foot print*	Extent of vegetation clearance required
	Soil Erosion	*Civil and general works*	Exposure to erosion agents
	Resettlement	*Civil and general works*	Family disruptions and relocation of business premises
LOW	*Water Quality*	*Civil and general works*	Contamination of downstream surface water
	Air pollution	*Civil and general works*	Dust and/or smoke generation during works
	Impact on the landscape	*Civil and general works*	Change of visual of visual impacts (features, vegetation removal)
	Excessive vibration above ambient	*Civil and general works and operation*	Consider machine type and extent of vibration during construction
	Material sites	*Civil and general works and project footprint*	Extent of vegetation clearance associated with quarries
	Disease, accidents and injuries	*Civil and general works*	Accidents, injury and exposure to diseases for the workers and road users
	Soil contamination	*Civil and general works*	Activities likely to lead to soil pollution
	Water Quantity	*Water channelling*	Increased surface runoff and resulting soil erosion from channeled water

	Water Quantity	*Water abstraction for construction*	Alteration of water supply as a result of abstraction
		Clearance to create space	Loss of mature indigenous/ medicinal species
	Air pollution	*Traffic during operation*	Increased CO^2 emission from use of fossil fuel
	Works across trading centres	*Civil and general works*	Impacts on trade and movement
	Soil Physical properties	*Civil and general works*	Loss of top soil hence alterations of soil profile

8.6 Potential environmental and social impacts

8.6.1 Potential Construction Phase Positive Impacts

8.6.1.1 Gains in the local and national economy

Through the provision of employment to the locals, income from the salaries and wages will improve the economy of the town centres and the county at large. The contractor is also expected to purchase most of his materials from the project area and as such contribute positively to the local and national economy. The materials for construction will also be sourced from other areas within the nation hence positively affecting the national economy.

8.6.1.2 Transfer of skills

During construction of the road, many people from within and outside the area will be employed to provide different services. As such, the local people will learn new skills from the civil engineers, welders, masons and other employees that come from outside.

8.6.2 Potential Operation Phase Positive Impacts

8.6.2.1 Creation of Employment Opportunities and Improvement of Local Socio-Economy

Both direct and indirect employment opportunities will emerge during the operation phase. For the direct employment, there is a possibility of employment opportunities for the local people for the maintenance of the road upon completion of construction works.

Indirectly, the road will increase business opportunities for the farmers as there will be easy access to markets for their agricultural products. There will be growth of roadside businesses ranging from shops to utilities as petrol stations and hotels thus strengthening the local economy. Livestock trading within the area will also improve due to enhanced transportation and opening of link between Kitui and Wote.

8.6.2.2 Improved Road Safety

Road projects can lead to reduction in accidents when they involve significant improvements in vertical and horizontal alignments, improved carriageway width, junction layout or greater separation of pedestrians, non-motorized traffic and motor vehicles. There will be street signs, lighting, formal crossing, better enforcement of vehicle speeds and traffic management therefore reduction in accidents.

8.6.2.4 Improved aesthetics

The existing road is unpaved and dusty that affect visibility of drivers and motorists, and reduce ambient air for schools and churches along the road corridor. The upgrading of the road to bitumen standards will reduce levels of dust in these areas which are coating residential and commercial properties as well as roadside vegetation.

8.6.2.5 Urbanization

There is possibility of re-vitalization of the market centres (Kwa Muli, Kavisuni, Katulani and Maliku) existing along the route of the proposed road. The local employees who live in these villages will be employed during the construction works. The businesses which will rise during construction will revitalize these market centres to grow. This in turn will contribute in increasing trade and business opportunities in these towns.

8.6.3 Negative Impacts and Mitigation Measures

8.6.3.1 Topography and Geology

Impacts

- Destabilization of terrain stability during earthwork, excavations
- Alteration of baseline landforms during excavations, earthworks
- Accelerated erosion after earthworks
- Development of pits at material sites (quarries and borrow pits)

Mitigation Measures

- Slope gradient maintenance and controlled borrow pits and quarry excavation to ensure gentle phases
- Erosion control measures in excavated borrow pits areas and working sites along the road
- Site reclamation or rehabilitation during decommissioning phase of the project.

Residual Impacts*: (Magnitude, Geographic Extent, Duration, Significance, Reversibility)*

- During the construction phase the noted impacts will have a medium magnitude, with a localized geographical extent. Their duration will be short-term during earth works and not reversible. The impacts will have localized major significance.
- During decommissioning stage, noted impacts, earthwork related impacts will be reversed through rehabilitation process, which will include slopes protection, rehabilitation of material sites and borrow pits.

Recommendations

Contractor to adhere to the ESMP

8.6.3.2 Air Pollution

Impacts

In the construction phase, the excavations, demolitions, and transportation of building materials will result in the emissions of large amounts of dust within the project site and surrounding areas. Asphalt, concrete and batching plants are also possible sources of dust and air pollution within the project area. The diversion of traffic in the construction phase will also contribute to dust emissions.

Mitigation Measures

- Sprinkling of water on dry and dusty surfaces regularly including the access roads and diversion tracks.
- Add suitable soil stabilizers on access roads or pave access roads to control dust.
- Erection of dust screens around buildings under construction especially at the workers' camps. Dust control measures should be adopted at concrete batching plants, providing adequate PPE to staffs, canopying loading points and erecting

dust screens around the plant.

- The contractor is expected to conduct separate ESIAs for the batching plants and monitor the dust levels periodically
- Collecting storm water and use to de-dust the construction site and the all-weather access roads if volumes stored are sufficient.
- Comply with personal protective clothing requirement for dusty areas such as dust masks and protective glasses.
- Enforce onsite speed limit regulations.
- Re-vegetating exposed areas during the operation phase of the project.
- Sprinkling water along the diversion routes or earth along the road section.
- Slowing the speed of traffic by using bumps and/ or clearly marked road signs may contribute to reducing dust levels.
- Haulage routes will need to be identified and maintained by watering to minimize the impact of dust.
- Dust control mechanisms at the gravel borrow sites through extraction in wet conditions and transport in covered trucks.
- Implement dust control measures at the quarry sites and aggregate crushing sites.
- Covering heaps and berms of soil.
- Adhere to the Environmental Management and Co-ordination (Air Quality) Regulations, 2014.

To mitigate exhaust emissions, it will be mandatory to:

- Procure machines, equipment and vehicles which are environmental friendly.
- Ensure machines and vehicles are properly and regularly maintained.
- Discourage plant operators and drivers of construction vehicles from unnecessary revving and idling.
- Limit construction traffic movement and operations to the most necessary activities through adequate planning.
- Sensitize construction drivers and machinery operators to switch off engines when not being used.
- Ensuring that the construction machines, equipment and vehicles have the requisite inspection certificate.
- Control the speed of the traffic movement by through adequate policing and monitoring.
- Adhere to the Environmental Management and Co-ordination, Fossil Fuel Emission Control Regulations 2006.

Residual Impacts *(Nature of Impact, Geographic Scale, Significance)*
Negligible; Temporary, Local, Minor. Only to be experienced within the construction sites, quarries and during material haulage.

Recommendations
Contractor to adhere to the ESMP

8.6.3.3 Noise and Vibrations

Impacts

Because of excavation, construction and demolition works, there will be high noise and vibration levels in the project area. Noise and vibrations will emanate from transportation vehicles, construction machinery, metal grinding and cutting equipment, and among others. Excavation works will also cause vibration and noise. Quarries and borrow pits that will be used for sourcing of road construction material will also result to noise emissions.

Mitigation Measures

- Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used.
- Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation.
- Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections.
- Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm).
- Acquire Noise and Excessive Vibrations Pollution Control Permit and comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009.
- Support facilities such as hard rock quarries should adopt controlled blasting techniques, preventing flying rock debris and high intensity vibrations.
- The management should equally observe relevant explosives use and blasting permits provided by the Inspector of Mines and Geology.
- Blasting activities along the road corridor and associated quarries should adhere to the provisions of the blasting Act and the NEMA Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009.

Residual Impacts*(Nature of Impact, Geographic Scale, Significance)*
The nature of impact is negligible. The impacts geographical scale will mainly be localized to construction sites only and impacts significance will be negligible.

Recommendations

Contractor to comply with the ESMP

8.6.3.4 Waste Management

Impacts

Volumes of solid wastes will be produced during the construction phases of the project development. Solid waste materials will be generated during earthworks as well as from various packaging materials. Solid waste generation during operation and maintenance activities will include road resurfacing waste (e.g. removal of road litter, illegally dumped waste, or general solid waste from campsites; vegetation waste from the clearance of road reserves; and sediment and sludge from storm-water drainage system.)

Mitigation Measures

- Incorporating recyclable materials (e.g. glass, scrap tires, certain types of slag and

ashes) to reduce the volume and cost of new asphalt and concrete mixes.

- Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines and Waste Management Regulations, 2006.
- Provision of bottle and can trash disposal receptacles at parking lots to avoid littering along the road.
- Obsolete products should be managed as a hazardous waste as described in the General EHS Guidelines.
- Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods.
- Composting of vegetation waste for reuse as a landscaping fertilizer.
- Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics.
- Management of all removed paint materials suspected or confirmed of containing lead as a hazardous waste.
- Develop and implement a Construction Waste Management Plan before start of the project.
- Sub-contract a licensed waste handling firm to collect solid wastes on regular basis and dispose off in approved dumping sites.
- Drainage outfalls should be properly constructed to reduce the erosion from surface runoff and storm water.
- Comply with provisions of the Environmental Management and Co-ordination, Waste Management Regulations 2006.

Residual Impacts

The residual impacts are as follows:

- The impact of excavation waste is expected to be slight, negative and for short-term.
- The impact of construction waste is expected to be imperceptible.
- The impact of operational waste is expected to be imperceptible.

Recommendations

Contractor to comply with the ESMP

8.6.3.5 Road Safety

Impacts

While the upgrading of the Wikililye- Kavisuni road is expected to improve road safety, there is likelihood of new numbers of incidents arising from potential high speeds and vandalism of road furniture such as guard rails that contribute to road safety. Other impacts include;

- Possible interference with the normal flow of traffic during construction will

have potential effects on travel times.

- Generation of dust and gaseous emissions from machinery may have potential implications to public health.
- Potential disruption of drainage systems leading to possible ponding and hence attracting vectors breeding.
- Potential risks to road safety from trucks transporting construction materials to the road sections.
- Possible health risks from elevated noise levels, especially for any night time construction activities.
- Risks to pedestrians and wildlife moving within the road corridor during the works (pedestrian – traffic conflicts, slips and falls into drains and embankments, etc.).

Mitigation Measures

- Before commencement of construction activities, the contractor, shall be required to come up with Traffic Management Plan to aid traffic movements at sites;
- The contractor will be required to place trained traffic marshals strategically at operations sites;
- Installation and maintenance of appropriate road safety provisions (road furniture, speed controls etc.) before commissioning as well as during the operation of the project.

Residual Impacts *(Nature of Impact, Geographic Scale, Significance)*

- During construction phase, the nature of impact is negligible. The impacts geographical scale will mainly be localized to construction sites only and impacts significance will be of major significance.
- During operation phase, the impacts will be localized and significant.

Recommendations

Contractor to adhere to the ESMP

8.6.3.6 Material Sites and Material Haulage

Impacts

The impacts anticipated from materials extractions and haulage such as to include the following;

- Potential elevated noise emanating from materials extraction activities and delivery trucks to the immediate residents.
- Vibrations from the material extraction machinery have a potential to cause cracking of buildings.
- Over-abstraction of water for construction from public sources of water could compromise on availability of the same for basic social needs.
- Emission of dust and gaseous discharges from material abstraction machinery will create potential aesthetic pollution, air pollution and risks to health.
- Removal of vegetation cover and top soils affects the land soil quality.
- Borrow pits left open have potential health and safety risks to the local communities, children and their animals.
- Sources of sand mainly outside the project area have potential risks to damage the river beds.

Mitigation Measures

- Environmental impact assessments (EIA) to be undertaken prior to extraction of materials from identified sites and approved by NEMA.
- Operations of the materials sites to be guided by respective management plans established and approved under the ESIA,
- Material extractions and delivery should only be done during the day.
- If borrow pits and quarries are operated, they be fenced off.
- Proper handling and management of liquid effluent and used waste oil to forestall incidence of surface water bodies
- Any abstraction of water from the existing river systems or from boreholes should be undertaken after acquisition of the prerequisite licenses,
- Rehabilitation of materials sites to take place upon exhaustion (Contractors will provide appropriate rehabilitation plans for each material site).
- If commercial material sources are adopted, the Contractor(s) should ensure due diligence process is followed by the suppliers at all times,
- Material extraction and haulage should be done in dump conditions to keep dust low, especially if it is located within settled areas.

Residual Impacts *(Nature of Impact, Geographic Scale, Significance)*

- During the construction phase the noted impacts will have a medium magnitude, with a localized geographical extent. Their duration will be short-term during earth works and not reversible. The impacts will have localized major significance.
- During decommissioning stage, noted impacts, earthwork related impacts will be reversed through rehabilitation process, which will include slopes protection, rehabilitation of material sites and borrow pits.

Recommendations

Contractor to adhere to the ESMP

8.6.3.7 Health Aspects

Impacts There is the possibility of increasing incidences of sexually transmitted diseases, including HIV and AIDS, especially during the construction of the road because of increased prostitution.
Mitigation Measures • Develop a comprehensive STDS, HIV and AIDs awareness and control programmes such as provision of condoms to workers both male and female. • Provision of STDs, HIV and AIDS prevention measures to workers. • Creation of awareness of STDs, HIV/AIDS in workers camps through trainings and installation of posters. • Adhere to and implement the Sexual Offences Act, 2006 and its amendment 2012.

8.6.3.8 Occupational Health and Safety Impacts

Impacts The Occupational safety and health issues associated with the construction and operation of the proposed road will include; physical hazards, chemical hazards and noise hazards. Chemical hazards in road construction, operations, and maintenance activities will principally be associated with exposures to road construction materials, dust during construction; exhaust emissions from heavy equipment and motor vehicles during all construction activities. Road construction and maintenance personnel can be exposed to a variety of physical hazards from operating machinery and moving vehicles but also working at elevation on bridges and overpasses. Other physical hazards include exposure to weather elements, noise, work in confined spaces, trenching, contact with overhead power lines, falls from machinery or structures, and risk of falling objects. There is also a possibility of accidents when transporting workers to the construction sites and social ills.
Mitigation Measures • Develop and enforce a fleet management plan for road construction that includes measures to ensure work zone safety for construction workers and the travelling public. • Establishment of work zones to separate pedestrians and livestock travelling by foot from vehicular traffic and equipment by routing of traffic to alternative

roads where possible.

- Regular issuance of appropriate PPEs and regular trainings on proper use and maintenance of PPEs
- Conduct basic Occupational Health Training programs to construction workers during construction phase.
- Ensure workers are oriented to the specific hazards of individual work assignment.
- Conduct toolbox talks focusing on relevant health and safety issues.
- HIV/AIDS, STDs awareness, training and prevention services to be offered throughout the project period.
- A Code of Conduct should be distributed to all workers, and health personnel should reinforce their efforts to combat diseases during the construction period.
- Workers to be sensitized on the consequences of social ills and promiscuous behaviour (over consumption of alcohol, STDs, HIV /AIDS etc.).
- Contractor to establish mobile clinic within the construction sites
- Use protective barriers to shield the public from vehicular traffic, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of vehicle speeds in work zones.
- Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles.
- Issuance of permits to work when undertaking hazardous tasks
- Ensure safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).
- Barricade the area around which elevated work is taking place to prevent unauthorized access. Working under personnel on elevated structures should be avoided.
- Hoisting and lifting equipment should be rated and properly maintained, and operators trained in their use.
- Elevating platforms should be maintained and operated according to established safety procedures including use of fall protection measures (e.g. railings).
- Use of the correct asphalt product for each specific application and ensuring application at the correct temperature to reduce the fuming of bitumen during normal handling.
- Maintenance of work vehicles and machinery to minimize air emissions.
- Reduction of engine idling time in construction sites; Use of extenders or other means to direct diesel exhaust away from the operator;
- Ventilation of indoor areas where vehicles or engines are operated or use of exhaust extractor hose attachments to divert exhaust outside.

Residual Impacts *(Nature of Impact, Geographic Scale, Significance)*

- During construction phase: Negligible; Temporary, Local, Minor. Only to be experienced within the construction sites, quarries and during material haulage.
- During operational phase: Negligible nature of impacts which will be temporary, localized and of minor significance.

Recommendations

Contractor to adhere to the ESMP

8.6.3.9 Loss of Biodiversity

Impacts

Potential impacts to biodiversity could arise due to the physical disturbance during the construction, contamination of the environment due to chemical/ oil spillage or leakage and inappropriate liquid and solid waste disposal mechanisms. Removal of vegetation and topsoil during the construction and also creation of deviations and other ancillary facilities will lead to impacts such as a loss of wildlife habitat, reduction in plant diversity, potential for increased erosion, and potential for the introduction of invasive flora species. Indirect impacts to vegetation would include increased deposition of dust, spread of invasive and noxious species, aquatic pollution, water quality deterioration, and the increased potential for wildfires. Dust settling on vegetation may alter or limit plants' abilities to photosynthesize and/or reproduce. These processes may lead to the reduction in habitat, food and nutrient supplies and breeding areas.

Mitigation Measures

- Separate EIAs should be conducted for camps, borrow pits, quarries, boreholes (if any) and other ancillary facilities.
- Minimize clearing and disruption of riparian vegetation.
- Provide adequate protection against scour and erosion; and consider the onset of the rainy season with respect to construction schedules.
- Minimize clearing of indigenous plant species and replanting of indigenous plant species in disturbed areas.
- Explore opportunities for habitat enhancement through reduced clearance to conserve or restoration native species.
- Employ vegetation rehabilitation techniques to recover lost plant cover such as Reforestation and Afforestation.
- The contractor is expected to comply with the National Sand Harvesting Guidelines provided by NEMA and the County Governments
- Undertake an inventory/ Review existing information on species and habitats in the project area. Contact appropriate agencies early in the planning process to identify potentially sensitive ecological resources that may be present in the project area.
- Conduct pre-disturbance surveys in order to locate site facilities away from important ecological resources (e.g., wetlands, important upland habitats, sensitive species populations).
- Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance.

- Install proper signages and speed calming measures in areas that are known to be fauna dispersal areas.

Residual Impacts: (*Value/Sensitivity, Magnitude of Impact, Significance)*

- Impacts of High Sensitivity value:
- Their magnitude is minor
- Their significance is adverse

Recommendations

Comply with recommendations in the ESMP.

8.6.3.10 Impacts on surface water quality

Impacts

There will be an increase in the generation of wastewater and sewage during the construction phase of the project. The increases will take place at construction camp

sites and in various towns located along the road. This is attributed to increased activities in these towns. There will be impact due to oil spillage, disposal practices of used oil, oil filters during the construction of the project. Possible impacts include: pollution of groundwater sources during construction phase (bridges construction work) interference with existing community water sources during construction phase, infiltration of contaminants from on-site activities into soils, pollution and degradation of water quality of underlying aquifer during earthwork, excavations, oil wastes from the camp/garage and impact to human health.

Mitigation Measures

- Drainage structures that will be constructed –cross culverts, at the river courses be at appropriate positions.
- Stone pitching and side drains to cover meaningful lengths along the prone protection areas.
- Timing of the construction of proposed bridges to coincide with dry periods when water levels in the rivers are low to avoid possible water pollution.
- Contractor to avoid dumping of waste materials within the riparian zones/ within the watercourses.
- Bitumen trucks should be washed at designated areas only.

Residual Impacts*(Nature of Impact, Geographic Scale, Significance)*

- During construction phase the noted impacts have low significance since they are site based and localized to construction sites only. They have minimal significance due to their limited site specific geographical scale.
- During operational phase, the listed impacts will have low magnitude of impacts along the 417.5km road project (extent).

Recommendations

Contractor to adhere to the ESMP

8.6.3.11 Land Resources

Impacts

The construction of the proposed road project requires substantial quantities of materials that will be sourced from either existing or new borrow pits and quarries. This will impact in areas where such materials will be obtained from and hence a recommendation that those sites should undertake site specific EIAs before authorization of quarrying activities. The extraction and transportation of these materials will also result in the distortion of the ground structure, vegetation loss, dust emission, oil spills, noise and increase potential for accidents. Such sites if artisanal in nature may pose safety issues to the public due to possible falls. Further, the quarries and borrow pits associated with

extraction of raw materials may collect water which will form ponds especially during rainy seasons. Such stagnant water is highly suitable breeding grounds for mosquitoes and other diseases vectors thereby bringing about water borne diseases such as malaria, cholera, and typhoid. Other impacts will include: Loss of and productivity potential; Permanent loss of natural (material) resources; and increased susceptibility to soil erosion.

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Mitigation Measures

- The materials should be sourced from an approved site after ESIA/ EIAs are done per borrow site or quarry;
- There should be adequate re-use of the excavated waste materials;
- Temporary nuisance should be addressed by organizing a public "baraza" where the public can be made aware of the impending road works;
- Blasting should take place at designated times and the affected public within approximately 5km radius duly informed;
- The borrow pits should be clearly indicated on a plan and approved by the relevant authorities such as County Departments and Department of Mines and Geology;
- Where compensation and relocation are required, land value should be determined by independent surveyor/ valuer or other component body such as the Ministry of Lands;
- The explosives should not be kept on the sites; instead they should be delivered to the site as and when necessary from special storehouses managed by the contractor;
- There should be adequate landscaping, backfilling and draining of the depressed areas to prevent breeding grounds for disease vectors, this should be ascertained by KeNHA or NEMA County Directors;
- The borrow pits and quarries should be located more than 500 metres from the watercourses and in a position that should facilitate the prevention of storm water run-off to prevent run off from the site entering the water course; Adequate notice should be given in advance to the nearby communities of the intention to excavate the borrow pits and quarries.

Residual Impacts: (*Value/Sensitivity, Magnitude of Impact, Significance)*
The noted impacts have high significance in relation to respective site specific land use. The impacts have minimal significance due to their limited site specific geographical scale.

Recommendations

The Contractor to comply with ESMP requirements

8.6.3.12 Increased rate of soil erosion

Impacts

Construction of the road will involve creation of a large impervious surface that restricts the infiltration of rainwater. This leads to high generation of surface runoff that flows on the sides of the road in drainage ditches. Where the surface runoff is channeled directly to bare steep slopes with loose soil, it can lead to serious soil erosion problems. This can undermine the stability of the road including associated facilities such as bridges. Sediment and erosion from construction activities and storm water runoff may also increase turbidity of surface waters.

Mitigation Measures

- Cut and fill areas: Road design activities should aim at balancing and fill activities to reduce the net quantities of soil either for disposal or borrowing. All cut, and fill sites will be replanted with sod grass to complete cover while the edge of the road reserve will be marked with a row of locally adapted tree species.
- Project will avoid opening new materials borrow sites: In as much as possible, hard rock will be sourced from existing quarries. However, there may be need to open up new quarries in some areas. Such opening will be followed by rehabilitation of the quarry site prior to closure of the contract. An Environmental Management and social Plan is expected to be developed and cleared for each of the material site opened under the project.
- Rehabilitation of borrow areas: During quarrying and other works involving removal of top soil, each layer not required should be stockpiled separately for re-use to reinstate quarries and other material sources after exhaustion. Towards mitigation of craters left behind after material extraction, all land acquired for material extraction will be backfilled and re-instated. Where the top soil does not fill the pit, water draining tunnels will be constructed to prevent /minimize stagnation of water.
- The contractor will source building materials such as gravel, sand, ballast and hard core at the project locality. Consultation should be held with the community members and their representatives on the best sites to source materials and rehabilitation measures should be agreed.
- It is recommended that environmental impact monitoring should be conducted for such activities or in consultation with County Director to ensure environmental conservation and rehabilitation after use. The contractor should ensure application of acceptable environmental performance standards and that the negative impacts of their activities at the extraction sites are considerably well mitigated.
- To reduce the negative impacts on availability and to ensure sustainability of the

materials, the contractor should only extract what will be required through accurate budgeting and estimation of actual construction requirements. This shall ensure that materials are not extracted or purchased in excessive quantities. Moreover, the contractor will ensure that wastage, damage or loss (through run-off, wind, etc.) of materials at the construction site is minimal, as these would lead to additional demand for and extraction or purchase of the materials.

- In addition to the above measures, the contractor should consider reuse of excavated materials and use of recycled materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.
- All exhausted quarries and borrow pits should be isolated, protected and rehabilitated to usable state before the contract closure.

Residual Impact *(Magnitude, Geographic Extent, Duration, Significance, Reversibility)*

- During Construction phase the impacts' magnitude will be low and localized within the construction sites only. Impacts duration will be intermittent and short term over rainy weeks/months during the construction. Their significance will be minor and not reversible in case they occur.

Recommendations

The Contractor to comply with the ESMP during construction

8.6.3.13 Soil contamination

Impacts: The analysis of the potential project impact discussed in this section is related to the possibility that during the implementation of the proposed road project activities, poor waste management, and oil/fuel and chemical leaks will contaminate the soil, thus affecting its quality.

Pollution of soil may result from discharge of fuel, chemicals and construction material spillage onto soil. Biodegradable and non-biodegradable wastes will be generated during the construction phase. These will include stones, sand, steel (metallic bars), insulators and other construction materials. Plastic wastes such as mineral water bottles, polythene bags, jerry cans, and other plastic accessories may also be generated at the camps and in the fields. Organic wastes such as foodstuff and human waste will also be generated at the camps and work centres. Accidental spillages of oil and grease from the garage, workshops, asphalt plant, fueling station, crusher site, fuel off-loading sections and construction machineries may also result in soil contamination.

These wastes, if not well managed, have the potential to contaminate the surrounding soil and alter both its chemical and physical properties thus affecting its productivity. The impact is only envisaged during construction phase.

Mitigation Measures

- The Contractor shall ensure that all wastes generated during construction activities such as conductors, steel and metallic bars, insulators and other accessories are collected and disposed of appropriately at designated sites;
- All plastic waste generated (at campsites and in the course of undertaking works)

such as mineral water bottles, polythene bags, jerry cans, will be collected preferably in mobile vans and handed over to a licensed waste collector or re used;

- Soil and gravel should be shaped and compacted immediately after transport to its destination. Spoil from the earthworks should be dumped in a central place and covered
- Maintain spill kits at the contractor's garage, workshops and those areas experiencing spillages.
- Storage of oil and tar drums should be done on concrete floors to prevent exposure of soil to contamination
- Construction activities should be carried out during the warm seasons. This will aid in compaction of the surface material and reduce the loss of soil and gravel by storm water runoff
- Re-vegetation of excavated areas to ensure ground stability.
- Scour checks and stone pitching should be done on steep sections of the road to minimize erosion
- The waste management hierarchy will be followed during the construction phase. According to this hierarchy, source reduction of waste will be the first option and disposal of unavoidable waste as option of the last resort;
- Undertake routine preventive maintenance of motorised equipment to avoid any fuel leakage and spills;
- Storage of fuels and oils should be undertaken in a manner that does not allow leakage to the soil as the fuel can readily infiltrate the soils polluting the soils, ground and surface water; and Collect and dispose of all waste generated from project activities in accordance with EMCA (Waste Management) Regulations 2006 and international best practice

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Residual Impact *(Magnitude, Geographic Extent, Duration, Significance, Reversibility)*
The impacts' magnitude will be low and localized within the construction sites only. Impacts duration will be intermittent and short term over weeks/months within the construction sites only. Their significance will be minor and not reversible in case they occur.

Recommendations
The Contractor to comply with the ESMP during construction

8.6.3.14 Social Impacts

Impacts
During the implementation of project activities, the local social service sector will be overwhelmed by the presence of project employees who may be in need of these services. If the project leads to in-migration, it will increase pressure on social service infrastructure like housing, health, water sources and sanitation facilities in the area when people move into the community in anticipation of employment opportunities. With an increase in the population of the area boosted by the project employees the social set up of the area will be affected. This change may be in the form of lost social norms and morality, an increase in school drop-out due to cheap labor, child labor, and increased incidences of HIV/AIDS and other

communicable diseases.

Mitigation Measures

- The contractor should develop and implement labour influx plan, an employee code of conduct and child protection strategy during the project implementation phase.
- The project is located in areas that are settled therefore most of the workers may end up renting accommodation in the towns and from home owners. For those who may reside in cams provided by the contractor, the camps camp will have the necessary social service amenities like health, water and sanitation facilities for the workers.

Residual Impacts *(Nature of Impact, Geographic Scale, Significance)*
The nature of impacts (will be negligible along proposed project road. The impacts geographical scale will mainly be localized to construction sites only and impacts significance will be negligible.

Recommendations
Contractor to comply with the ESMP

8.6.3.15 Displacement of People

Impacts
Despite the fact that the proposed road will pass through the existing alignment, there might be areas that more land be required as guided by the project design. In such an eventuality, a comprehensive Resettlement Action Plan (RAP) shall be developed in order to take care of the project affect persons. The design concept of the entire project is to utilize the existing 20m-25m corridor to fit in the carriage way, road shoulders, drainage and road furniture while maintaining the quality of the road asset.

Mitigation Measures

- Relocate all facilities affected in consultations with various parties affected with respect to water, sewerage, pipelines, and electricity.
- Involvement and continuous consultation of key stakeholders and community members with respect to water, pipelines, and electricity at all stages of the project cycle.
- Use of an integrated approach in planning public utilities by sharing most transport corridors for roads, water, sewerage, electricity lines, etc.
- Provision of employment in the project for the squatters where possible.
- Put in place a grievance redress mechanism as discussed in chapter Seven (7) of this report.

Residual Impacts *(Nature of Impact, Geographic Scale, Significance)*
The nature of impacts will be negligible. The impacts geographical scale will mainly be localized to construction sites only and impacts significance will be negligible.

Recommendations
Contractor to comply with the ESMP

8.6.4 Cumulative Impacts

Cumulative impacts are the impacts, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

There will be no impact to fauna due to the limited spatial scale and short temporal duration of the project, in relation to the present human and environmental pressures that they are exposed to. No threatened species of flora was identified in the area during the field surveys, while there exist faunal species within the dispersals of the road traverse.

In the context of previous road construction projects that have been completed all over the county no significant environmental impacts have been recorded, therefore the proposed project is expected to register a very insignificant impact. In this regard, the cumulative impacts on the soils, vegetation, habitat and biodiversity of the area are considered insignificant.

Due to the spatially restricted scale of the project, any inadvertent pollution arising from the operations would be localised and mostly site-specific, but it is expected that such incidents will not arise on the basis of the proposed mitigations. The scale of fugitive particulate material and the generation gaseous emissions and their impacts on the surrounding environment will be negligible on account of the scale of the operation, its temporary nature, and the mitigations that have been proposed.

CHAPTER 9.0: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Introduction

Environmental and Social Management Plan (ESMP) is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced. Environmental and Social Management Plan (ESMP) involves the protection, conservation and sustainable use of the various social and environment elements or components. The ESMP for the proposed project provides all the details of project activities, potential impacts, suggested mitigation measures, desired outcomes, objective indicators, responsibilities and commitments proposed to minimize environmental impacts of activities, including, monitoring and evaluation during implementation and decommissioning phases of the project.

The tool for achieving this is the incorporation of an Environmental and Social Management Plan (ESMP) into the ESIA to ensure adherence and future compliance with legislation, good environmental performance, and integration of environmental and social issues into the project decision. The ESMP provides the means of assessing the accuracy of the predicted project impacts and the monitoring of the effectiveness of the proposed mitigation measures contained in the ESIA study report. The ESMP should therefore indicate how the environmental concerns highlighted in the ESIA would be managed.

9.2 Objectives of the ESMP

The objectives of the ESMP are to:

- Adhere and address necessary legal frameworks and other requirements;
- Promote environmental management and communicate the aims and goals of the project ESMP to all stakeholders;
- Incorporate environmental management into project design and operating procedures;
- Ensure all workers, contractors, sub-contractors and others involved in the project meet all legal and institutional requirements with regard to environmental management;
- Provide a framework for implementing commitments of the project (i.e. mitigation measures identified in the EIA);
- Prepare and maintain records of project environmental performance (i.e. monitoring, audits and compliance rating); and
- Prepare an environmental monitoring plan whose aim is to ensure that the negative environmental impacts identified in Chapter 7 of this EIA report are effectively mitigated by way of design, construction, operational and decommissioning stages of the project.
- Respond to unforeseen events and
- Provide feedback for continual improvement in environmental performance

9.3 Cost of implementation of the ESMPs

For effective implementation of the ESMPs, the project must establish an Environment, Health and Safety (EHS) unit that will be responsible for *Project environmental Monitoring and Evaluation to ensure compliance to NEMA.* The project contractor will be required to produce periodic reports on project environment monitoring to be sent to the concerned agencies for information and supervision. The contractor will be responsible for all costs of implementing the project's EIA license conditions, including the ESMPs and the actual costs of public involvement in the ESIA process. Hence all costs proposed in the ESMPs below will be incurred by the project contractor. The costs outlined are current costs mainly for project environmental monitoring and evaluation to ensure compliance to NEMA. To estimate future costs, an increase to cover annual inflation should be applied. The costs for actual activities should be included in the main bill of quantities of the project.

Table 6 Environmental and Social Management Plan- Design, Construction, Operation and Decommissioning phases

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Design and construction phase				
Topography and Geology	• Slope gradient maintenance and controlled borrow pits and quarry excavation to avoid vertical phases • Erosion control measures in excavated borrow pits areas and working sites along the road • Site reclamation or rehabilitation during decommissioning phase of the project	Contractor/KeNHA/Supervision Consultant	Continuous	-As appropriate
Noise Pollution and Vibrations	• Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used. • Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation. • Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections. • Ensure machines are switched off when not in use. • Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am	Contractor/KeNHA/Supervision Consultant	Monthly	- As appropriate - - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	and 5.00 pm).			
Air Pollution due to Dust Generation and Air Emissions	• Sprinkling of water on dry and dusty surfaces regularly including the access roads. • Use of waste water to sprinkle at the construction site to reduce excessive dust. • Adherence to personal protective clothing such as dust masks. • Enforce onsite speed limit regulations. • Ensure machines and vehicles are properly and regularly maintained. • Erection of speed calming measures near public institutions such as schools, hospitals and town centres	Contractor/KeNHA/Supervision Consultant	Monthly	As appropriate - - - -
Solid Waste Generation	• Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base; • Incorporating recyclable materials to reduce the volume and cost of new asphalt and concrete mixes. • Contracting of an ordinary waste and hazardous waste handler to collect and appropriately dispose wastes from camp sites • Collecting road litter or illegally dumped waste and managing it according to the recommendations	Contractor/KeNHA/Supervision Consultant	Monthly	- - As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	in the General EHS Guidelines. • Provision of bottle and can recycling and trash disposal receptacles at parking lots to avoid littering along the road. • Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road bed or other uses (Thika –Magumu-Njabini). Old, removed asphalt may contain tar and polycyclic aromatic hydrocarbons and may require management as a hazardous waste. • Develop and implement a Construction Waste Management Plan before start of the project.			As appropriate -
Surface water quality	• Construct communal septic tank linked to a constructed wetland system. • Promote recycling of wastewater in construction activities. • Ensure wastewater is channeled and treated in sewerage plants or disposed in septic tanks • Ensure regular maintenance of plumbing system to avoid spillage of wastewater. • Discharge of partially treated sewage into septic tanks • Ensure regular maintenance of plumbing system and septic tanks to	Contractor/KeNHA/Supervision Consultant	Monthly	As appropriate - - - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	avoid spillage of raw sewage.			
Water Abstraction and Consumption	• Install water conserving taps and toilets. • Drainage structures that will be constructed –cross culverts, at the river courses be at appropriate positions. • Stone pitching and side drains to cover meaningful lengths along the prone protection areas. • Timing of the construction of proposed bridges to coincide with dry periods when water levels in the rivers are low to avoid possible water pollution. • Contractor to avoid dumping of waste materials within the riparian zones/ within the watercourses. • Bitumen trucks should be washed at designated areas only.	Contractor/KeNHA/Supervision Consultant	Continuous	- As appropriate -
Soil Erosion	• Ensure surface runoff generated on impervious surface is not channeled directly to steep slopes. • Provide grassed water ways along the access roads. • Construct flow breaks on roadside drainage channels. • The contractor will source building materials such as gravel, sand, ballast and hard core at the project locality. • Consultation should be held with the	Contractor/KeNHA/Supervision Consultant	continuous	- - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	community members and their representatives on the best sites to source materials and rehabilitation measures should be agreed • All exhausted quarries and borrow pits should be isolated, protected and rehabilitated to usable state before the contract closure.			-
Loss of Vegetation Cover and Biodiversity	• Siting roads and support facilities to avoid critical terrestrial habitat by utilizing existing transport corridors. • Minimize clearing and disruption of riparian vegetation. • Provide adequate protection against scour and erosion and consider the onset of the rainy season with respect to construction schedules. • Minimize removal of indigenous plant species and replant indigenous plant species in disturbed areas. • Explore opportunities for habitat enhancement	Contractor/KeNHA/Supervision Consultant/KFS/KWS	Monthly	- - - As appropriate -
Health Aspect	• Develop a comprehensive STDS, HIV and AIDs awareness and control Programmes such as provision of condoms to workers both male and female. • Creation of awareness of STDs, HIV/AIDS in workers camps through trainings and installation of posters. • Adhere to and implement the Sexual Offences Act, 2006 and its	Contractor/KeNHA/Supervision Consultant/County Governments	Monthly	As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	amendment 2012.			
Road Safety	• Avoid long traffic diversion roads. • Water diversions to ensure dust is minimized hence easier visibility for drivers. • Ensure Installation and maintenance of all construction signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions. • Advance information on communication systems will be an advantage to users. • Make Traffic circulation changes as per the Traffic Act Cap 403. • Development of a transportation management plan for road construction that includes measures to ensure work zone safety.	Contractor/KeNHA/Supervision Consultant	Periodically	- As appropriate As appropriate -
				-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Occupational Health and Safety	• Establishment of work zones to separate workers on foot from traffic and equipment by routing of traffic to alternative roads. • Use protective barriers to shield workers from traffic vehicles, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of maximum vehicle speeds in work zones. • Training of workers in safety issues related to their activities. • Ensure safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space. • Barricade the area around which elevated work is taking place to prevent unauthorized access. • Use of the correct asphalt product for each specific application and ensuring application at the correct	Contractor/KeNHA/Supervision Consultant	Monthly	- - - - - As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	temperature to reduce the fuming of bitumen during normal handling. • Training on correct PPE use and provision of adequate PPEs			
Disturbance to flora and fauna	• Siting roads and support facilities to avoid critical terrestrial and aquatic habitat by utilizing existing transport corridors. • Avoidance or modification of construction activities during the breeding season and other sensitive seasons or times of day to account for potentially negative effects. • Minimize clearance and disruption of riparian vegetation. • Minimize removal of indigenous plant species, and replant indigenous plant species in disturbed areas. • Explore opportunities for habitat enhancement through reduced clearance to conserve or restore native species.	Contractor/KeNHA/Supervision Consultant/ KWS/KFS	Monthly	- - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Possible Displacement of People	• Relocate all facilities affected in consultations with various parties affected with respect to water, sewerage, pipelines, and electricity. • Involvement and continuous consultation of key stakeholders and community members with respect to water, pipelines, and electricity at all stages of the project cycle. • Use of an integrated approach in planning public utilities by sharing most transport corridors for roads, water, sewerage, electricity lines, etc. • Provision of employment in the project for the squatters where possible. • Put in place a grievance redress mechanism as discussed in chapter Seven (7) of this report.	Contractor/KeNHA/Supervision Consultant	Continuous	As appropriate
Material Sites and Material Haulage	• Environmental impact assessments (EIA) to be undertaken prior to extraction of materials from identified sites and approved by NEMA. • Operations of the materials sites to be guided by respective management plans established and approved under the ESIA,	Contractor/KeNHA/Supervision Consultant	Quarterly	As appropriate -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	• Material extractions and delivery should only be done during the day. • If borrow pits and quarries are operated, they be fenced off. • Proper handling and management of liquid effluent and used waste oil to forestall incidence of surface water bodies • Any abstraction of water from the existing river systems or from boreholes should be undertaken after acquisition of the prerequisite licenses, • Rehabilitation of materials sites to take place upon exhaustion (Contractors will provide appropriate rehabilitation plans for each material site). • If commercial material sources are adopted, the Contractor(s) should ensure due diligence process is followed by the suppliers at all times, • Material extraction and haulage should be done in dump conditions to keep dust low, especially if it is located within settled areas.			- - - - - - -
Operational phase				
Noise Pollution and Excessive Vibrations	• Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation.	Contractor/KeNHA	Monthly	-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	• Install speed control measures in town areas and near public institutions • Install no hooting signs in sensitive areas such as near schools, etc.			As appropriate PPC
Impacts on flora and Fauna biodiversity	• Liaise with KWS to ensure that important wildlife crossing corridors and dispersal areas are not affected • Maintenance of road signs at appropriate areas to warn drivers on wildlife crossing paths.	Contractor/ KeNHA/KFS/KWS	Continuous	- As appropriate -
Increased Generation of Storm Water	• Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration. • Regular inspection and maintenance of permanent erosion and runoff control features. • Use of vegetated swales, filter strips, terracing, check dams, detention ponds or basins, infiltration trenches and infiltration basins. • Repair works to be carried out in dry weather to prevent runoff of asphalt or cement materials.	Contractor/KeNHA	Continuous	- - - -
Loss of human and animal life due to increased road accidents	• Install speed calming measures next to public institutions , towns and settlement • Provide road signages all along the	Contractor/KeNHA	Continuous	- -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	road • Conduct road safety sensitization Programmes. • Carry out Risk Assessment to identify risk areas and provide appropriate prevention measures.			As appropriate -
Road Safety	• Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas. • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions. • Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross). • Prepare an emergency preparedness and response plan in coordination with the local community and local emergency responders. • Comply with OSHA 2007 requirements, they include;	Contractor/KeNHA	Continuous	As appropriate - - - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	○ Carrying out Safety Audits. ○ Implementing DOSHS improvement orders. ○ Carrying out EHS Risk Assessments. • Involve all the relevant stakeholders during the audit so as to incorporate suggested EHS measures into the report.			- - - -
Increased Generation of Solid Waste	• Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base. • Incorporating recyclable materials to reduce the volume and cost of new asphalt and concrete mixes. • Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines. • Provision of bottle and can recycling and trash disposal receptacles at parking lots and bus stops to avoid littering along the road. • Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods. • Managing sediment and sludge removed from storm drainage	Contractor/KeNHA	Continuous	- - - As appropriate - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics. • Management of all removed paint materials suspected or confirmed of containing lead as hazardous waste. • Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road bed or other uses. • Ensure implementation of the project's operation phase Waste Management Plan. • Comply with EMCA Cap 387 Waste Management Regulations, 2006.			- - -
Occupational Health and Safety	• When undertaking road repairs, use protective barriers to shield workers from traffic vehicles, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of maximum vehicle speeds in work zones. • Training of workers in safety issues related to road maintenance activities. • When undertaking road repairs, ensure safe practices for work at night and in other low-visibility	Contractor/KeNHA	Continuous	- - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	conditions, including use of high-visibility safety apparel and proper illumination. • When repairing the road, use asphalt product of appropriate specification and ensure application at the correct temperature to reduce the fuming of bitumen during normal handling. • Maintenance of work vehicles and machinery to minimize air emissions. • Reduction of engine idling time in construction sites; Use of extenders or other means to direct diesel exhaust away from the operator. • Ventilation of indoor areas where vehicles or engines are operated or use of exhaust extractor hose attachments to divert exhaust outside. • Carry out Safety Audits. • Implement DOSHS improvement orders.			- - - - - -
Soil Quality Degradation	• Rehabilitate borrow areas. • Revegetate cleared areas. • Ensure proper drainage infrastructure along the road. • Used oil and spills should be disposed in an environmental friendly manner.	Contractor/KeNHA/Public	Continuous	As appropriate As appropriate - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Risk of spread of invasive species	• Reduce open gaps in road reserves by planting appropriate tree species suitable for highway or road side tree planting • Monitor composition of species regenerating along road reserves and take prompt actions in case of emergence of invasive species • Carry out routine road reserves maintenance mainly to clear bushes that may harbor invasive species.	Contractor/KeNHA/Public	Continuous	As appropriate
DECOMMISSIONING PHASE				
Demolition waste	• Use of an integrated solid waste management system i.e. through a hierarchy of options: o Source reduction o Recycling o Composting and reuse o Combustion o Sanitary land filling. • All buildings, machinery, equipment, and others that will not be used for other purposes must be removed and recycled/reused as far as possible. • All foundations must be removed and recycled, reused or disposed of at a licensed disposal site. • Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be	Contractor/KeNHA	at the time of decommissioning	- - - - - - - - -

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	taken to a licensed waste disposal site. • Donate reusable demolition waste to charitable organizations, individuals and institutions.			- -
Noise and Vibration	• Sensitize workforce including drivers of construction vehicles. • Install sound barriers for pile driving activity. • Install portable barriers to shield compressors and other small stationary equipment where necessary. • Proper maintenance of all equipment. • Workers near high level noise to wear safety and protective gear.	Contractor/KeNHA	at the time of decommissioning	As appropriate As appropriate - - -
Dust Emission	• Spray demolished piles of earth with water. • Avoid pouring dust materials from elevated areas to ground. • Cover all trucks hauling soil, sand and other loose materials. • Provide dust screen where necessary.	Contractor/KeNHA	at the time of decommissioning	As appropriate As appropriate As appropriate As appropriate
Site degradation	• Implement an appropriate re-vegetation programme to restore the site to its original status. • Consider use of indigenous plant species in revegetation.	Contractor/KeNHA	at the time of decommissioning	As appropriate -

9.3 GENERAL EHS PLANS REQUIREMENTS IN CONSTRUCTION PROJECT

9.3.1 Occupational Health and Safety Plans

The plan should be having details on the following listed topics.

Table 7 Health and Safety Plan content

No	CONTENTS OF THE HEALTH AND SAFETY PLAN	CLARIFICATIONS
1	Contractors Health & Safety Policy / Statement	The policy should be placed at selected places within the camp(s) and offices. It should be clear, visible and legible in English and Kiswahili.
2	Management & Supervision Organizational Chart.	This will be in form of a flow chart, to be displayed clearly in specific offices at the camps. It will assist in identifying the respective management staff and supervisors.
3	Construction Risk Assessment	The assessment should consist: (i) Risk assessment leader, (ii) Risk assessment team members (iii) Date of risk assessment. This will involve Identifying the risks, their description, probability of getting involved in the risk and impacts from the risk. A description of control measures/procedures/methods to manage the risk will be provided.
4	Fall Protection Plan	This will involve listing risk types, their description, probability of getting involved in the risk and impacts from the risk. Control measures/procedures/methods to manage the risk and the responsible person.

5	Hazardous Work/Activities-Method Statements	Hazardous work/Activity (HWA) method statement will be provided by listing the HWA, their description, Method To be followed / Used to safely carry Out the hazardous activity and the responsible person.
6	Personal Protective Equipment Requirements	A billboard with clear drawing of PPEs and their description will be provided.
7	Measures to Control the Condition and Use of Tools and Equipment	Description of various tools will be provided. Measures & procedures to ensure safe condition & use of tool/equipment and responsible person named.
8	Fire Prevention and Control Measures	Details of control and safety measures to be taken during storage and use of the inflammable substance
9	Environmental Protection Measures	A schedule of waste materials and effluents types of wastes will be identified. Description of waste/effluent generated on the site will be provided. Disposal/ effluent disposal methods and procedures to be named. Further, name and contact details of the company responsible for disposal of waste will be provided.
10	First Aid Arrangements -	First Aid Arrangements will include: Name(s) of first aiders on the work site. Number of and location of first aid boxes Details of other first aid/emergency medical arrangements made
11	Construction Site Signage	There will be a graphic illustration of the signage and the description on where to use/wear.

9.3.1.1 Occupational and Safety Concerns during Construction Phase

Based on the identified hazards, the contractor shall evaluate the risk by considering the likelihood of occurrence and severity. The likelihood of occurrence shall be based on Very Low, Low, Medium, High or Very High. A numerical system can also be used ranging from 1 to 5. The extent of the rating shall be based on the controls that the contractor has put in place. It shows an evaluation of the risk, severity and causal factors.
The risk assessment shall be used to priories the remedial measures. Risks with high evaluation scores shall be given priority for remedying the situations.

9.3.1.2 Occupational and Safety Concerns during Operation Phase

There are some periods towards the end of the construction phase that the road may be opened intermittently for public use. During these periods the workers may still be undertaking construction works on the project road. This implies that the workers shall be exposed to vehicles and pedestrians form the public with risks of accidents that can lead to serious accidents and fatalities.
Towards this, the remedy shall be:

- to enhance safety signage to forewarn the road users that the road is still under construction some sections
- Use traffic marshals to direct other road users
- Demarcate work areas with physical barriers. These barriers should have on them retroreflective materials for enhanced vision in the night
- Where appropriate, slow down traffic by use of bumps, rumble strips or zigzag bollards where appropriate.

Table 8 Material Site History, Description of Current Status and Details of Decommissioning

Name of Material Site	Sites operational Functional history	Records Of Assessment Activity By Authority (NEMA, OSHA etc.)	Records on Contractors Interaction with Owner and Local Community	Impacts on the Site and Community due to Interactions
Names of material site to be indicated after selection by the contractor	• When it was last utilized? • Was there any agreement on rehabilitation? • Was it rehabilitated after use?	• Are records available or not available?	• Were there any records (official correspondence) between stakeholders?	• Were there any impacts? • How were they addressed?
	DETAILS ON PROPOSED DECOMMISSIONING			
	Alternative consideration	**Type of Decommissioning Approach**	**s of Work**	**Technical Baseline and Assumptions for the Project**
	• List of alternatives (water pan, do nothing alternative, fill up, dump site etc.).	• Involve the quarry owners in planning the decommissioning type	• Clarification on work schedule with details of decommissioning activities.	• List and review the assumptions and possible impacts
	MANAGEMENT OF THE MATERIAL SITE			
	Contract Out, Use of Construction Manager	Training	Schedule	
	• Details of contract type	• Details of contract type		
	WORK AND ENVIRONMENTAL PROTECTION DURING DECOMMISSIONING			
Names of material site to be indicated after	**Occupational Safety**	**Occupational Exposure**	**Environnemental Compliance Program (Audits etc.)**	**Safety Analysis and Review of Decommissioning**

Name of Material Site	**Sites operational Functional history**	**Records Of Assessment Activity By Authority (NEMA, OSHA etc.)**	**Records on Contractors Interaction with Owner and Local Community**	**Impacts on the Site and Community due to Interactions**
selection by the contractor				**Activities**
	• OSHA guidelines to be adhered to	• Occupational exposures and mitigation.	• Were Audits carried out, EMP adhered to etc.	• Details on the safety analysis while decommissioning.
	WASTE MANAGEMENT			
	Waste Minimization Techniques Used	Waste Handling	Waste Management	
	FINAL SITE SURVEY			
	Independent Verification Inspection by NEMA County Environmental Officer		Independent Verification by Community Leaders	

9.3.2.1 Borrow Pits and Quarries Reinstatement during and After Project Completion

The Contractor, in consultation with the RE and the supervising environmental consultant to coordinate in implementing the EMP on borrow pits and quarries. Status of the material sites should be reported on monthly basis and when need be during the monthly progress meeting between the Contractor, Client and the supervising engineers.

9.3.2.2 Suggested Contents of Borrow-pit/Quarry Lease Agreement

Owners of the possible material sites will likely to be gullible while making legally binding agreement with the Contractor – in case the contractor intends to acquire material from such land parcels and hence the related agreements.

To avoid the Contractor coming up with a one-sided unconscionable agreement while leasing a material site, it will be necessary that an ESIA should be done before the starting the extraction of construction materials. The ESIA should have a copy of the Lease Agreement made between the lessor and the lessee. Parallel to NEMA's ESIA approval process, the following issues should be complied with.

Before the Start of Quarrying Activities

i. Copies of the Agreement should be presented to the following people for approval:
    a) Area NEMA County Director, to be included in the ESIA report for the site.
    b) KeNHA's Deputy Director for Environment and Social Safeguards
    c) Area Chief or sub-chief
    d) Community opinion leaders, - a man and a woman.
ii. Once the above listed stakeholders have reviewed and commented on the proposed agreement, the project's Resident Engineer will give the final decision on the proposed material borrow site, either reject it or accept it, based on the comments from a) – d) above.
iii. KeNHA – the project proponent – in consultation with NEMA will thereafter make the final decision.
iv. To facilitate fast review of the agreement, a template with a compliance checklist will be given to the stakeholders a) to d) above to ascertain Contractor's level of compliance.

After Completion of Quarrying Activates

i. A certificate of material site reinstatement should be filled in by a) to d) and later handed over to the RE, KeNHA for approval
ii. Outstanding issues should be handled by the Contractor in reference to the agreement

9.3.3 Vehicle/Traffic Management Plan

During construction phase of the proposed road, the Contractor should manage the Motorized and Non-motorized traffic in the following ways:

- To ensure that disruptions to traffic and road transport are minimized.
- To ensure that the roads remain open to traffic during construction activities;
- Prior to construction activities, the Contractor will install all signs, barriers and control devices needed to ensure the safe use of the road by traffic and pedestrians.
- Information, warning and direction signs will be incorporated provided at specific places along the project road. Vandalized signs should be replaced.
- County authorities and residents in a working area will be consulted before any detours for construction or diverted public traffic are established;
- Disposal sites and haul routes will be identified and coordinated with local officials;
- Construction vehicles will use temporary roads constructed for that purpose to minimize damage to agricultural land and local access roads.
- Where local roads are used, e.g. haulage of raw material from identified sites, they will be maintained and reinstated to their original condition after the completion of work.

9.3.4 Waste Management Plan

Specific sources of liquid and solid waste will be:

i) Bulk earthworks,
ii) Waste from site office/camp,
iii) Used spare parts from trucks, plant and equipment

Some of the waste will include waste oil, effluent disposal (septic tanks), drilling slurries and drilling fluids, wastewater from site and dredging. The table below has details on managing the waste during construction period.

Table 9 Waste Management Plan during Construction Phase

Process	**Waste Management during Construction Phase**		
Actions	**Requirements**	**Responsibility**	**Timing**
	Spoils from bulk earthworks will be stockpiled and reused where possible	Construction Manager	Throughout the Construction period
	Waste from site office/camp and repairs and maintenance will be segregated at source and disposed as per the procedure for solid waste management	Site Office Project Manger	Throughout construction works
Performance Indicators	No waste will be deliberately or unintentionally released	Site Manager / Construction Manager	Throughout construction works
Monitoring	Waste quantities measured and recorded on	Site Office Project	Throughout

	a daily basis	Manager	construction works
Reporting	Reporting to Site Office Project Manager and HSE Advisor	All staff	Throughout construction works
	Any reporting to Resident Engineer and NEMA	Site Office Project Manager	Throughout construction works
Corrective Actions	Awareness and training of waste handling.	Site Office Project Manager	Throughout construction works

9.3.5 Camp Design / Installation Plan

The Contractor's camp(s) for labour, accommodation, offices and construction plant sites shall be identified based on the following guidelines.

- The camp should be constructed in accordance with contract documents, adhering to the specified and required standards.
- The construction site shall be located minimum distance from the road project site and away from any settlement (Min 1km). This will keep off unauthorized persons into the camp and the associated and unnecessary interference.
- The camp should be enclosed with boundary wall, with only one guarded entrance.
- Movement of the workers, in and out of the camp - should be registered during the nighttime. This will prevent possible illegal activities, e.g. pilfering of camp's items, ill behaviour from workers at night etc.
- Camp activities should not create any disturbance to the local community.
- Operation of the plant and machinery should be restricted to daytime only
- Care should be taken while starting and moving the heavy vehicles, there is a possibility that children of near settlement may be playing with machinery parked outside the camps.

9.3.6 Ancillary Plans

Ancillary plans for the Construction sites should include:

Facilities at the Workmen's Camp

- Potable water supply in quantity and quality,
- Safe access road is required at camps
- Waste (all kind of solid and liquid wastes) generated should be disposed of in accordance with NEMA's Waste Management Regulations) 2006, Part II, Solid Waste, which has provisions on disposal methods

Sanitation Facilities

- Construction camp shall be provided with sanitary latrines and urinals.
- Closed drainage systems and the proper treatment systems according to the local conditions should be constructed for the proper flow and effective treatment. The sewage system built for the camp will be operated properly to avoid health hazard, ground water and soil pollution.

- Compost pits will be constructed for the disposal of the garbage and other biodegradable wastes generated from the camps. Proper collection, transportation and disposal of the wastes will be ensured.

Health care Facilities:

- Health problems of the workers should be taken care of by providing basic health care facilities through a health centre set up at the construction camps.
- The health centre will have at least a qualified medical staff (part time), duty staff, medicines and minimum medical facilities to tackle first-aid requirements for minor accidental cases.
- Arrangements and contacts should be made with the nearest hospital to refer patients of major illnesses or critical cases.

9.3.7 Spills Prevention and Response Plan

The spill prevention and response plan will provide the Contractor general guidance and procedures to manage project site operations which have potential to cause environmental damage and procedures to follow in case spill occurs. The following discharges - potential pollutants - are likely to occur during construction phase.

i) Wastewater from washout of concrete;
ii) Wastewater from washout and cleanout of paint, form release oils, concrete grinding slurry, curing compounds and other construction materials;
iii) Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
iv) Soaps, solvents, or detergents used in vehicle and equipment washing; and
v) Toxic or hazardous substances from a spill or other release.

Table 10 Issues of concern in the Spills Response Plan

	Contractors Areas of Concern in the Plan	**Examples of Issues of Concern in the Plan**
1	Contractor Responsibilities	• Contractor to follow proper procedures storage and handling of hazardous materials. • Train employees to control the identified waste and recyclable products in the containers provided. • Maintain Material Safety Data Sheets (MSDS) on file for hazardous chemicals used on the project and ensure employees follow all of the incorporated requirements. • Use correct PPEs.
2	Fueling and Maintenance of Equipment or	• Use drip pans and absorbents under or around leaky vehicles; • Dispose of or recycle oil and oily wastes in accordance with NEMA.

	Vehicles	• Clean up spills or contaminated surfaces immediately, using dry clean up measures and eliminate the source of the spill to prevent discharge or a furtherance of an ongoing discharge
3	Washing of Equipment and Vehicles.	• Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of washing. • Avoid washing activities in the existing water courses.
4	Disposal of Waste Products	• Separate hazardous waste from construction waste. • Store waste in sealed containers, which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled. • Provide waste containers (e.g., dumpster or trash receptacle) of sufficient size and number to contain construction and domestic wastes.

In complying with the corrective actions in spillage management, the Contractor is responsible to comply with Hazardous Spill Prevention and Response Plan.
Contractor's non-compliance to spill containment control measures will be communicated to the Resident engineer and supervising OHS advisor,

9.3.8 Emergency Response Plan (ERP)

Emergency/Disaster Preparedness Plans for the Proposed Road Project

The contractor shall develop and implement the guidelines for emergency/disaster preparedness and response as provided below:

- Objective:
  - To define emergency situations that may arise during the construction phase of the project;
  - To prepare emergency response plans in line with the identified emergency situations;
  - To put systems in place to equip facility with emergency equipment;
  - To put mechanisms in place to test the emergency procedures and propose improvements.
  - Keep contacts, both internal and external, of persons in charge for management of emergencies and disasters.
- Emergency situations have been defined as follows:
  - Occupational health and safety
    - Fire outbreak
    - Flooding
    - Fatality on site
    - Serious accident leading to multiple personal injuries
    - Illness due to food poisoning
    - Mass illnesses arising from inhalation and contact with hazardous chemicals
  - Environmental incidents/Disasters

  - Incidents / accidents that may lead to stoppage of works for more than 1 working day;
  - Incidents that may significantly impart negatively on the project and lead to negative publicity within the project neighborhood and to the media
  - Incidents that may cause damage and harm to the environment, especially pollution to soil, water sources and air pollution.
- The process for Identification of Significant Occupational Safety and Health Risks; Identification of Significant Environment all Aspects has come up with the following as emergency situations that are likely to occur:
  - Occupational Health and Safety incidents:
    - Fire outbreak at residential and offices camps, heavy equipment, plants and motor vehicles;
    - Fatality at site;
    - Multiple serious injuries;
    - Food poisoning from worker's canteen;
    - Camp invasion scare
  - Environmental and social incidents
    - Fire outbreak at the Camp, equipment, and plants;
    - Oil spillage leading to surface and ground water contamination and soil degradation;
    - Chemicals spillage, fire;
    - Camp invasion by local residents due to perceived injustices ranging from employment opportunities, degradation of environment and moral related issues due to labour influx.
- Preventative measures:
  - All Emergency measures shall have preventative measures documented and implemented. These shall be outlined in the risk assessments conducted in section 2 above
  - Whenever new or modifications of processes are put in place, the risk assessment shall be reviewed to incorporate the modification or introduction of new processes.
- Repair and Maintenance of emergency equipment
  - An initial fire survey shall be done jointly with a DOSHS approved fire inspector;
  - Emergency equipment shall be procured as per the recommendation if the fire inspector;
  - Once the equipment has been procured and installed, there shall be monthly inspections by the Health and Safety Officer who shall record observations in a prescribed format. For equipment that shall require top up, services for repair and maintenance shall be sought;
  - Periodic repairs and shall be conducted on quarterly basis or as per the advice of emergency equipment and service provider.

- Emergency response team

An emergency response team shall be constituted. This team shall have the membership and responsibilities as shown in

Table 11 Composition and Emergency tasks/ Disaster Preparedness Response Plan

	EMERGENCY ROLE	RESPONSIBILITIES DURING EMERGENCIES
1.	Emergency Controller	- The overall coordinator of reported emergencies - Monitor the situation as it unfolds - Contact with GoK Officers and the Consultants Engineers - Give media brief where need be - Delegate the duties to any other manager where necessary
2.	Assistant Emergency Controller	- Deputize the emergency controller - Liaise with affected stakeholder stakeholders - Update the emergency controller on feedback from stakeholders
3.	Emergency Coordinator	- Liaise with the emergency services on site - Liaise with affected stakeholders - Give feedback to the Emergency controller - Spearhead the roll call at the assembly points - Announce all clear once the emergency situation eases up - Write the report and learning arising from the emergency response. Distribute the report to the emergency team
4.	Assistant Emergency Coordinator	- Deputize the Emergency controller - Coordinate and translate with the Chinese workers
5.	Emergency Marshalls	- Ensure emergency alarm is raised - Mobilize workers in their areas of jurisdiction - Where safe to so, ensure that the emergency situation is averted - Ensure all workers, visitors and sub-contractors have evacuated to the assembly point

- Emergency drills/practices
  - An emergency response centre shall be established on site. Likewise, an alternative emergency centre shall be designated in event that the aforementioned response centre is rendered out of use;
  - A response plan shall be developed for each of the identified emergency situations;
  - Each of the identified drills shall undergo tests at least once a year
  - Lessons learnt during the drills shall be documented and improvements for future drills and emergencies proposed and implemented in the next drill / emergency.
- Emergency contacts
  - Emergency contacts shall be documented and distributed in all offices and notice boards including security gatehouses;

- The contacts shall include: police, fire emergency services, ambulance services
- The contacts list shall be revised at least once a year to ascertain validity telephone numbers and individual's names.

9.3.9 Environmental Awareness Plan

The plan will focus on training, awareness and competence for the site staff with the objective of making them able to work and address tasks that have the potential to cause a significant environmental impact. Environmental awareness and training shall be achieved by:

- Site induction, including relevant environmental issues.
- Environmental posters and site notices.
- Method statement and risk assessment briefings.
- Toolbox talks, including instruction on incident response procedures.
- Key project specific environmental issues briefings.

9.3.10: Decommissioning Plans for the camps and other installations

A decommissioning and abandonment plan for camps and ancillary facilities should be prepared at least three months prior to decommissioning. The plan should consider the following:

• Relocating all un-used tools and equipment to an appropriate storage site.

• Any equipment that has gone into waste should be treated as waste and disposed of in Appropriate ways for example re-use, recycle, reduce or sold to recycling plants

• Demolition of any additional structures that were constructed/installed by the contractor

• Dispose of all the generated waste in accordance with the waste management plan and Waste management regulations

• Clean-up of the site and handover the site to the Client and demobilize/withdraw all Personnel that had been posted to the site including the security personnel. A handover Acknowledgement should be written/documented.

• An Environmental Evaluation Report (EER) should be prepared to determine if the activities carried out at the site have caused any detrimental effects and if any so as to discuss mitigations and restoration measures.

• In-depth Environmental Studies for the actual removal of equipment (demolition) to be carried out.

9.4 ENVIRONMENTAL MONITORING

Environmental monitoring is the systematic measurement of key environmental indicators over time within a particular geographic area. Monitoring should focus on the most significant impacts identified in the ESIA. The main aim of ESIA monitoring is to provide the information required to ensure that project implementation has the least possible negative environmental impacts on the people and environment. Various types of monitoring activity are currently in practice. During the ESIA study baseline monitoring on basic environmental parameters in the project area of influence was conducted. Subsequent monitoring would help assess the changes

in those parameters over time against the baseline. Other main types of environmental monitoring that will be conducted are briefly described below:

(a) Impact Monitoring

The biophysical and socio-economical (including public health) parameters within the project area, must be measured during the project construction and operational/ utilization phase in order to detect environmental changes, which may have occurred as a result of project implementation e.g. air emission, dust, noise, water pollution etc. (European Commission, 1999).

(b) Compliance Monitoring

This form of monitoring employs a periodic sampling method, or continuous recording of specific environmental quality indicators or pollution levels to ensure project compliance with recommended environmental protection standards. This type of monitoring should be regular and performed over a long period of duration so as to gather sufficient data to draw accurate conclusion concerning project impact

Table 12 Environmental Monitory Plan

Monitoring Impacts	Frequency			Methodological indicators	Responsible entity
	Construction	**Operation/Utilization**	**Decommissioning**		
1. Noise and vibration impacts	Daily observation; monthly noise level analysis	Semi-annually noise measurements	Daily observation; monthly noise level analysis	Noise level quarterly analysis on log of vehicles and machine servicing; trees planted; Number of noise licenses issued Number of PPE provided/ issued and sensitization meetings held.	KeNHA & Contractor NEMA Respective County Government
2. Impacts on air quality	Daily dust observation; monthly air quality analysis	Monthly air quality analysis	Daily dust observation; monthly air quality analysis	Daily dust observation; quarterly air sampling and lab analysis; Quarterly reports on PPE provided; log off vehicle and machine servicing; sensitization meetings held; frequency of sprinkling water	KeNHA & Contractor NEMA
3. Disturbance of faunal species	Twice monthly m monitoring of reported cases of wildlife disturbances	-	-	Reports on wildlife sighted; meeting with KWS and bush clearing	KeNHA & Contractor NEMA KWS
4. Destruction of existing habitats and vegetation	Daily vegetation monitoring	-	-	Reports on site zoning program; community initiatives held on tree planting; Number of invasive species identified Landscaping programme or re-vegetation.	KeNHA & Contractor KFS NEMA
5. Oil spills	-Daily management of spills -	-	Daily spills audit and inspections Spill Kit	Reports of oil trapping equipment installed; number of oil spill incidents and corrective measures taken	KeNHA & Contractor NEMA

Monitoring Impacts	Frequency			Methodological indicators	Responsible entity
	Construction	**Operation/Utilization**	**Decommissioning**		
6. Solid and liquid waste generation	Weekly accounting of waste and collection	Monthly reporting of waste recorded on the road	Weekly wastes generated	Reports on waste management plans developed Amount of waste generated; Facility provided for handling and storage of waste Methods employed for waste disposal Training meetings held Waste water quality analysis results Reports on liquid waste management plans Number of inspections to help identify leaking or blocked pipes.	KeNHA & the Contractor NEMA Relevant County Government
7. Soil erosion	Daily monitoring	-	-	Reports on storm water management and soil erosion control plans o site Amount of surface run-off and roof catchment harvested Water harvesting and storage facilities installed	KeNHA & Contractor NEMA Relevant County Government
8. Visual and aesthetic impacts	Quarterly assessment	-	-	Reports on public consultations held Landscaping program designed and implemented	KeNHA & Contractor
9. Cultural heritage and Archaeological find	Monthly assessment and analysis of recorded chance finds	-	-	Reports on heritage areas and archaeological chance finds encountered	KeNHA & Contractor NMK
10. Traffic issues	Daily traffic monitoring	Annual traffic assessment/ studies	-	Traffic diversions and management plans	KeNHA & Contractor

Monitoring Impacts	Frequency			Methodological indicators	Responsible entity
	Construction	**Operation/Utilization**	**Decommissioning**		
				Number of vehicles recorded in weekly basis Number of accidents resulting	
11. Health and Safety issues	Daily cases reported	Monthly assessment	Daily cases	Quarterly reports on health and safety plans HSE training programs Records of incidents, accidents, investigations and corrective action undertaken PPE provided, warnings posted, HSE issues closed out and Permit to Works System issued.	KeNHA & Contractor NEMA DOSHS Relevant County Government
12. . Increase in social vices	Monthly reporting of the statistics	Semi-annually assessment by third parties	Monthly undertaking of statistics	Reports on sensitization forums; sessions held on guidance and counselling on HIV/AIDs and other STDs, Number of condoms issued out	KeNHA & Contractor Relevant County Government
13. Land take – Resettlement and Loss of use	Monthly reported value of land compensation and resettlement	-	-	Reports of RAP implementation including compensation for land, structures and crops/ trees damage	KeNHA & Contractor National Land Commission relevant County Government
14. Pressure on existing infrastructure	Daily assessment	-	Daily reporting	Reports of the number of people accessing social infrastructure Reported cases of grievances or conflicts with the community Number of grievances addressed	KeNHA & The Contractor Samburu County Government
15. Rehabilitation	-	-	Monthly	Reports on vegetation program	KeNHA &

Monitoring Impacts	Frequency			Methodological indicators	Responsible entity
	Construction	Operation/Utilization	Decommissioning		
of project site and associated areas				developed Number of borrow pits and quarries restored Number of tree species planted	Contractor NEMA Relevant County Government

CHAPTER 10.0. CLIMATE CHANGE AND ROAD INFRASTRUCTURE

To counter the impacts of the various climate change related implications a number of strategies can be adopted:

a. Road Specific

Road specific is one of the major categorizes which is focus on road strengthen including raising the road level, adjust side slope and paving surface. This adaptation options can be applied in flood/drought prone areas.

i. Raising Road Level

This is one solution to adapt to climate change events, especially flooding. The road surface level will be raised to an elevation higher than expected flood level to reduce risk of road damage and to prevent an inaccessible road during flood event. Ideally the road design level should be 0.5 m higher than highest expected flood level.

ii. Adjusting Side Slope

Side slope should be adjusted from 1:2 to 1:3 or flatter to prevent flood damage and erosion from road surface runoff. Adjusting side slopes from 1:2 to 1:3 will also increase traffic safety of the road.

b. Paving Road Surface

In areas that experience high precipitation, paved roads offer better resistance to flooding, will drain the water from the surface more easily and will reduce the risk of potholes and water stagnation on the road surface. Paved surface will also reduce the risk of water penetrating and submerging the road construction layers and thereby reducing the bearing capacity of the road.

During the dry season, paved road surfaces will reduce the risk of dust on and around the road. It will increase traffic safety on the road and improve the environment for people living along the road.

c. Drainage

A good road drainage system, which is properly maintained, is vital for all type of roads. A good drainage system conveys water from the surface of the road, as well from the different layers of the road structure, to a safe exit (stream or cross drainage structure). The drainage system also intercepts surface water flowing towards the road and conveys water across the road in a controlled fashion. The destructive power of water increases exponentially as its velocity increases. Therefore, water must not be allowed to develop sufficient volume or velocity so as to cause excessive wear along ditches, at culverts or along exposed running surfaces, cuts or fills.

The presence of excess water within the roadway will adversely affect the properties of the materials with which it was constructed. Cut or fill failures, road surface erosion and weakened subgrades followed by a mass failure are all products of inadequate or poorly-designed drainage.

Different types of drainage structures can be utilized: cross drainage, ditches and drains, French drains, drain deflectors, underdrains, scour checks, and cut-off ditches or catch water ditches

d. Erosion

Erosion is expected to be a major problem, with possible increased rainfall, and to prevent increased erosion might be an important adaptation option to climate change. Some methods to protect the road and its drainage system include retaining walls, gabion boxes, rip-rap and grass sodding

e Realignment

Realignment is a good solution for climate change adaptation. The cost of new road construction could be lower than the maintenance cost of the present road, especially for roads located close to rivers frequently flooded and causing road damage.

f **Revised Road Design Standards**

Climate change factors should be added to road design standards, especially focusing on areas with major risks of flooding that might cause erosion and damage to the road. The most important factors are the road levels, the cross drainage of the road and erosion protection of the road.

g Green Planning

This entails tree planting along roads which helps in increasing forest cover in the country and also serve as a carbon sink.

h **Monitoring**

All roads should be regularly monitored in order to control and propose improvement of the road as well as the area around the road. If an early warning system is established in the area, it should be maintained and monitored regularly.

CHAPTER 11.0: CONCLUSION AND RECOMMEDNDATIONS

11.1 CONCLUSION

The ESIA study has established that the proposed development project by KeNHA is a worthy investment by the proponent and broadly with no doubt will contribute significantly to the economic development of the country. This will be achieved through the prior discussed positive impacts namely; growth of the economy, boosting of the informal sector. The construction of the Proposed Wikililye- Kavisuni will ease movement of people from Kitui County to Makueni County without having to go through Machakos County. In addition, socioeconomic benefits, such as improved businesses and enhanced productivity due to increased market access coupled with lower operating cost and reduced travel time.

However, the ESIA study has established that the proposed project will also come along with some negative impacts. The negative environmental impacts that will result from establishment of the proposed project which include possible livestock-vehicular accidents, noise pollution, dust emissions, solid waste generation, increased water demand, increased energy consumption, among others that can however be significantly mitigated.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the Environmental Management and Monitoring Plan as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects in Kenya.

11.2 RECOMMENDATIONS

The report has strived to give comprehensive mitigation measures and environmental management and monitoring mechanisms which if put in place will minimize or completely eliminate the possible negative impacts. The environmental management and monitoring mechanisms developed in this report should be strictly adhered to, to ensure that the project remains environmentally and technically sound throughout its life. The following recommendations should be adhered to:

- Slope gradient maintenance and controlled borrow pits and quarry excavation to avoid vertical phases
- Erosion control measures in excavated borrow pits areas and working sites along the road
- Site reclamation or rehabilitation during decommissioning phase of the project

- Sprinkling of water on dry and dusty surfaces regularly including the access roads and diversion tracks.
- Add suitable soil stabilizers on access roads or pave access roads to control dust.
- Erection of dust screens around buildings under construction especially at the workers' camps. Dust control measures should be adopted at concrete batching plants, providing adequate PPE to staffs, canopying loading points and erecting dust screens around the plant.
- Ensure machines and vehicles are properly and regularly maintained.
- Discourage plant operators and drivers of construction vehicles from unnecessary revving and idling.
- Limit construction traffic movement and operations to the most necessary activities through adequate planning.
- Sensitize construction drivers and machinery operators to switch off engines when not being used.
- Ensuring that the construction machines, equipment and vehicles have the requisite inspection certificate.
- Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections.
- Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm).
- Acquire Noise and Excessive Vibrations Pollution Control Permit and comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009.
- Incorporating recyclable materials (e.g. glass, scrap tires, certain types of slag and ashes) to reduce the volume and cost of new asphalt and concrete mixes.
- Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines and Waste Management Regulations, 2006.
- Provision of bottle and can trash disposal receptacles at parking lots to avoid littering along the road.
- Before commencement of construction activities, the contractor, shall be required to come up with Traffic Management Plan to aid traffic movements at sites;
- The contractor will be required to place trained traffic marshals strategically at operations sites;
- Installation and maintenance of appropriate road safety provisions (road furniture, speed controls etc.) before commissioning as well as during the operation of the project.

- Environmental impact assessments (EIA) to be undertaken prior to extraction of materials from identified sites and approved by NEMA.
- Operations of the materials sites to be guided by respective management plans established and approved under the ESIA,
- Material extractions and delivery should only be done during the day.
- If borrow pits and quarries are operated, they be fenced off.
- Develop a comprehensive STDS, HIV and AIDs awareness and control programmes such as provision of condoms to workers both male and female.
- Provision of STDs, HIV and AIDS prevention measures to workers.
- Creation of awareness of STDs, HIV/AIDS in workers camps through trainings and installation of posters.
- Adhere to and implement the Sexual Offences Act, 2006 and its amendment 2012.Develop and enforce a fleet management plan for road construction that includes measures to ensure work zone safety for construction workers and the travelling public.
- Establishment of work zones to separate pedestrians and livestock travelling by foot from vehicular traffic and equipment by routing of traffic to alternative roads where possible.
- Regular issuance of appropriate PPEs and regular trainings on proper use and maintenance of PPEs
- Conduct basic Occupational Health Training programs to construction workers during construction phase.
- Separate EIAs should be conducted for camps, borrow pits, quarries, boreholes (if any) and other ancillary facilities.
- Minimize clearing and disruption of riparian vegetation.
- Provide adequate protection against scour and erosion; and consider the onset of the rainy season with respect to construction schedules.
- Minimize clearing of indigenous plant species and replanting of indigenous plant species in disturbed areas
- Stone pitching and side drains to cover meaningful lengths along the prone protection areas.
- Timing of the construction of proposed bridges to coincide with dry periods when water levels in the rivers are low to avoid possible water pollution.
- Contractor to avoid dumping of waste materials within the riparian zones/ within the watercourses.
- The contractor should develop and implement labour influx plan, an employee code of conduct and child protection strategy during the project implementation phase.

CHAPTER 12.0 REFERENCES

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UPGRADING OF THE WIKILILYE-KAVISUNI ROAD TO BITUMEN STANDARDS

MINUTES OF PUBLIC CONSULTATION MEETING HELD ON 17TH JANUARY, 2022 AT WIKILILYE CHIEF'S CAMP.

IN ATTENDANCE:
Reference to be made on the attached attendance list.

AGENDA

1. opening prayer
2. introduction of participants
    - National government representatives
    - County government representatives
    - KeNHA Team
    - Project area leaders
3. Purpose of conducting the public consultations meeting (KeNHA)
4. ESIA study activities carried out along wikililye – Kavisuni Road
5. Findings of the study (social and Environmental impacts)
6. Proposed mitigation measures
7. Views of the participants (Projects impacts and mitigation)
8. Responses
9. Closing remarks by (KeNHA/ County Government / National Government)
10. A.O.B
11. Closing prayers

MIN	DISCUSSIONS	ACTION
1.0	**Arrival and reception of participants**	
	The meeting officially began at 12.25pm with prayers and presided over by the Chief, with an introduction of all the community representatives from various locations and sub locations along the project road. The MCA introduced himself and the team, also emphasized on the importance of the public participation on the ongoing project.	All to note
2.0	**Project Overview – KeNHA**	
	Mr. Richard Mogesi introduced KeNHA team, giving a brief insight into the Wikililye-Kavisuni project covering 100km in total and a brief overview on the environmental impacts that are expected to be met and mitigated/ managed. He then introduced Eng. Kamangu, who sensitized the public on the importance of the project on aspects revolving around safety and economy performance. He informed the public that the project is meant to start in 2021-2022 financial year, and that the road is meant to cover a distance of 14km for the lot 1 section, having a width of 7m, 2m shoulders, 3m culverts and 1m for drainage provision. He reiterated on the fact that the survey team from KeNHA concluded that there was no need to take extra land along the subject road corridor. He informed the community that the government had laid down a road reserve of 40m worth of width length for the project to be complete. He also stressed on the fact that the project was meant to improve the existing bridges along the corridor, signage and road markings, pavement layers, Drainage systems and earthworks. He also touched on objectives of the project, reiterating that it will take less time to travel from one place to the other, spur economic activities, job creation and knowledge transfer. He advocated on public participation encouraging them to air their opinions	Info

	on the project and to improve homogeneity of stakeholder participation. Mr. Mogesi again took over from Eng. Kamangu and emphasized on the ESIA process in detail, stressing on the description of the study, baseline choices and what it entails, identification of potential impact and enhancement measures of mitigating the negative /adverse impacts of the project, the social dynamics that will be experienced amidst the project e.g. HIV/AIDS spread amongst involved workers and the neighbouring locals, and the importance of having health consultations before the project commences. He also stressed on how the road will boost the economic status of the subject area by linking the region to major towns like Embu, Isiolo, Meru etc. Concluded by saying there will be thorough road safety awareness, HIV /AIDs consultations, substance awareness and other vices to consider.	
3.0	**QUESTIONS AND ANSWERS**	

ISSUE	**RESPONSE**
The public was concerned about the labour force considering the locals and how policies in relation to equality would be met.	Mr. Richard answered by saying, there will be thorough follow up and engagement with the contractor to make sure labour equality is adhered to and also that a committee will be formed from the DCC's office to ensure that local employment policy is implemented thoroughly.
The locals wanted to know if the consultant on HIV/AIDS will come from the local region or from Nairobi.	Mr. Richard answered by saying the contractor will advertise the tender on the same to make sure the aspect on merit is adhered to and that the locals should apply competitively
The locals were concerned about the houses marked, and asked if they will be demolished amidst the project.	Eng. Kamangu answered by saying that the new design has followed the existing route carefully assuring the locals that no properties will be affected, and if they will, they will be compensated fully to the latter after a thorough consultation.

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	The locals asked if the project will merge with the existing road that ends or it will be destroyed and rebuilt again from scratch.	Eng.Kamangu answered by saying the project will begin from the where the existing road stops and that they will rehabilitate the existing road where need be.	
	The community asked how long will the 14km road take to be completed?	Eng. Kamangu answered by saying the project will take a period of 24 months at least for the road to be at par with the foreseen design	
	the locals were concerned on how the width will be addressed from 36m to 40m without any adverse effect.	Eng. Kamangu answered by saying that the existing road will allow for extension without affecting the structures along the road corridor.	
	The community wanted to know if there will be a comprehensive map demarcating precisely, areas that will be taken amidst the project.	Mr. Richard answered by saying the locals won't be affected adversely, and if one feels his asset is on danger, one can go to the regional offices with an authentic title deed for further consultations and verifications or, one can visit KeNHA offices any time, for further clarifications and actions. Also said that compensation will be addressed according to that detailed map from land valuers.	
			Info
4.0	**CLOSING REMARKS-**		
	Mr. Richard gave a vote of thanks on behalf of the team and Madam chief thanked all the participants for being patient all through the meeting. Meeting adjourned at 2.40pm.		Info

Prepared by:

Name: Edwin Odhiambo **Designation Intern, ESS** **Signature**

Signed by: **Designation** **Signature**

Name: RICHARD MOGESI **Senior Environmentalist**

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UPGRADING OF THE WIKILILYE-KAVISUNI ROAD TO BITUMEN STANDARDS

MINUTES OF PUBLIC CONSULTATION MEETING HELD ON 18TH JANUARY, 2022 AT THE DCC'S OFFICE – KATULANI SUB COUNTY.

IN ATTENDANCE:
Reference to be made on the attached attendance list.

AGENDA

12. opening prayer
13. introduction of participants
    - National government representatives
    - County government representatives
    - KeNHA Team
    - Project area leaders
14. Purpose of conducting the public consultations meeting (KeNHA)
15. ESIA study activities carried out along wikililye – Kavisuni Road
16. Findings of the study (social and Environmental impacts)
17. Proposed mitigation measures
18. Views of the participants (Projects impacts and mitigation)
19. Responses
20. Closing remarks by (KeNHA/ County Government / National Government)
21. A.O.B
22. Closing prayers

MIN	DISCUSSIONS	ACTION
1.0	**Arrival and reception of participants**	
	The meeting officially began at 9.30am with prayers and presided over by DCC (madam Shaufa Omar), with an introduction of all the community representatives from various locations and sub locations along the project road and various officers from various institutions. The MCA (Peter Kimanthi) was present again for the second time, introduced himself and the team, also emphasized on the importance of the public participation on the ongoing project.	All to note
2.0	**Project Overview – KeNHA**	
	Mr. Richard Mogesi introduced KeNHA team, giving a brief insight into the Wikililye- Kavisuni project covering 100km in total and a brief overview on the environmental impacts that are expected to be met and mitigated/ managed. He then introduced Eng. Kamangu, who sensitized the stakeholders on the importance of the project on aspects revolving around safety and economy performance. He informed the stakeholders that the project is meant to start in 2021-2022 financial year, and that the road is meant to cover a distance of 14km for the lot 1 section , having a width of 7m, 2m shoulders, 3m culverts and 1m for drainage provision He reiterated on the fact that the survey team from KeNHA concluded that there was no need to take extra land along the subject road corridor. He informed the community that the government had laid down a road reserve of 40m worth of width length for the project to be complete. He also stressed on the fact that the project was meant to improve the existing bridges along the corridor, signage and road markings, pavement layers, Drainage systems and earthworks. He also touched on objectives of the project, reiterating that it will take less time to travel from one place to the other, spur economic activities, job creation and knowledge transfer. He advocated on public participation encouraging them to air their opinions on the project and to improve homogeneity of stakeholder participation. Mr. Mogesi again took over from Eng. Kamangu and emphasized on the ESIA process in detail, stressing on the description of the study, baseline choices and what it entails, identification of potential impact and enhancement measures of	Info

	mitigating the negative /adverse impacts of the project, the social dynamics that will be experienced amidst the project e.g. HIV/AIDS spread amongst involved workers and the neighbouring locals, and the importance of having health consultations before the project commences. He also stressed on how the road will boost the economic status of the subject area by linking the region to major towns like Embu, Isiolo, Meru etc. Concluded by saying there will be thorough road safety awareness, HIV /AIDs consultations, substance awareness and other vices to consider.	
3.0	**QUESTIONS AND ANSWERS**	

The ward administrator wanted to know if there will be any feeding programs for the schools along the subject road.	Mr. Richard said the CSR are dealt with when the contractor is on the ground or when the project has commenced.	Info
The DCC was requesting KeNHA to tarmac the entry points to the public offices for easier access.	Eng.Kamangu said that he will make it an objective to make sure the governmental offices are easily accessible.	
The social protection officer wanted to know if there is any Grievance redress mechanism committee in place that will handle issues like destruction of properties.	Mr. Richard said forming a grievance redress mechanism committee is a prerequisite of the project and it involves nominating various committee members and training them on effective redress management.	
The MCA wanted to know what can be offered to level 4 hospital, especially issues related to water. Also wanted to know if the drainage system will stretch all the way to wotee.	Eng.Kamangu said the water issue will be looked into, and also that the drainage system will stretch all the way to wotee.	
The assistant chief was concerned on why the boreholes were drilled and destroyed after use by the Chinese contractors, the previous projects.	Mr. Richard assured the stakeholders that the boreholes this time will not be destroyed once the project is complete, and the custody will be transferred to the local authority to manage.	
The NEMA officer wanted to know if the ESIA report is complete.	Mr. Richard answered by saying the report is still being worked on and	

		once it is complete, it will be posted on the NEMA website for public reference	
	The county public works engineer proposed a proper signage along the road especially schools. He also proposed the next meeting to have a physical planner from KeNHA and labour office.	Eng.Kamangu answered by saying a proper signage is part of the project's design and that the next meeting will consider having a physical planner on board from KeNHA.	
	The officer from NEMA was concerned about proper utilization of material sites in place, dumping of overburden in rivers and also installing a proper drainage system along the road especially, focussing on provision proper outflows along low water points.	Mr. Richard said that KeNHA collaborates with NEMA offices on attaining licenses and also that a material site report is always submitted to NEMA as a requirement. On dumping of overburden in rivers, Mr. Mogesi said that it is something that is strongly discouraged and that the contractor should be reported if seen doing so. He also assured the officer that a proper drainage system will be installed and proper outflows will be installed across all low water points.	
			Info
4.0	**CLOSING REMARKS-**		
	Mr. Richard gave a vote of thanks on behalf of the team and Madam DCC thanked all the participants for being patient all through the meeting. Meeting adjourned at 12.20pm.		Info

Prepared by:

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Name: RICHARD MOGESI **Senior Environmentalist**

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UPGRADING OF THE WIKILILYE-KAVISUNI ROAD TO BITUMEN STANDARDS

MINUTES OF PUBLIC CONSULTATION MEETING HELD ON 19TH JANUARY, 2022 AT THE CHIEF'S CAMP KAVISUNI.

IN ATTENDANCE:
Reference to be made on the attached attendance list.

AGENDA

23. opening prayer
24. introduction of participants
    - National government representatives
    - County government representatives
    - KeNHA Team
    - Project area leaders
25. Purpose of conducting the public consultations meeting (KeNHA)
26. ESIA study activities carried out along wikililye – Kavisuni Road
27. Findings of the study (social and Environmental impacts)
28. Proposed mitigation measures
29. Views of the participants (Projects impacts and mitigation)
30. Responses
31. Closing remarks by (KeNHA/ County Government / National Government)
32. A.O.B
33. Closing prayers

MIN	DISCUSSIONS	ACTION
1.0	**Arrival and reception of participants**	
	The meeting officially began at 2.10am with prayers and presided over by the chief (Madam Eunice Kiema) with an introduction of all the community representatives from various locations and sub locations along the project road including the DCC (Madam Omar) and the MCA(Mr. Peter Kimanthi).	All to note
2.0	**Project Overview – KeNHA**	
	Mr. Richard Mogesi introduced KeNHA team, giving a brief insight into the Wikililye-Kavisuni project covering 100km in total and a brief overview on the environmental impacts that are expected to be met and mitigated/ managed. He went on ahead and sensitized the public on the importance of the project on aspects revolving around safety and economy performance. He informed the public that the project is meant to start in 2021-2022 financial year, and that the road is meant to cover a distance of 14km for the lot 1 section, having a width of 7m, 2m shoulders, 3m culvert and 1m for drainage provision. He reiterated on the fact that the survey team from KeNHA concluded that there was no need to take extra land along the subject road corridor. He informed the community that the government had laid down a road reserve of 40m worth of width length for the project to be complete. He also stressed on the fact that the project was meant to improve the existing bridges along the corridor, signage and road markings, pavement layers, Drainage systems and earthworks. He also touched on objectives of the project, reiterating that it will take less time to travel from one place to the other, spur economic activities, job creation and knowledge transfer. He advocated on public participation encouraging them to air their opinions on the project and to improve homogeneity of stakeholder participation. Mr. Mogesi again took over from Eng. Kamangu and emphasized on the ESIA process in detail, stressing on the description of the study, baseline choices and what it entails, identification of potential impact and enhancement measures of mitigating the negative /adverse impacts of the project, the social dynamics that will be experienced amidst the project e.g. HIV/AIDS spread amongst involved workers and the neighbouring locals, and the importance of having health consultations before the project commences. He also stressed on how the road will boost the economic status of the subject area by linking the region to major towns like Embu, Isiolo, Meru etc.	Info

	Concluded by saying there will be thorough road safety awareness, HIV /AIDs consultations, substance awareness and other vices to consider.		
3.0	**QUESTIONS AND ANSWERS**		
	The public were concerned about the material site excavation and asked if the locals' area affected will be compensated by the government.	Mr. Richard answered by saying, the locals will have to reach an agreement with the contractor before any excavation is done in one's premises so as to prevent future mis understandings and land litigations, and that the agreements should be signed between two private entities.	Info
	The public wanted to know how the 40m width Is measured across the road.	Eng. Kamangu answered by saying the 40m is measured from beacon to beacon.	
	The community was concerned about how the project will handle title deeds that are not completed abut are in the midst of completed when the project commences.	Mr. Richard answered by saying, the government will recognize the title deeds that are complete and in case a transfer is underway, one should visit the regional KeNHA offices (in Machakos) for further consultations. Also advised them to visit National land commission for wider consultative engagement.	
	The public wanted to know if there is any material standard put in place.	Mr. Richard answered by saying the contractor determines the standards when on ground.	
	The public wanted to know if the 40m width is inclusive of the existing road or the new one that Is to be put in place and if so, those who had title deeds before 40m change, will they be compensated if they are affected?	Eng. kamangu answered by saying, the 40m width was there from the beginning. Went on ahead and said a class B road should be 60m wide but because of fund challenges, the road was meant to remain at 40m of width so as the project would commence.	
	The community wanted to know how the dust will be controlled.	Mr. Richard answered by saying there will be frequent watering of the road as there is provision of funds for that activity and also that NEMA will be involve to sure the implementation of the process takes place.	

	The public wanted to know, if the water is sourced from the public, will the local be compensated?	Mr. Richard answered by saying, the water will be sourced from public points and after the project is done, the water points custody will be given to the governmental offices for them to control.	
	The locals wanted to know If there will be tree planting along the road	Mr. Richard assured them that there will tree planting programmes set in place.	
	The public was concerned about the labour management and how the locals will be employed.	Mr. Richard assured the locals that a committee will be set in place to make sure 70% labour policy is adhered to effectively.	
	The public were concerned about the existing culverts put in place, said they were dangerous as they have caused a lot of accidents	Eng. kamangu said with the new design, all the existing culverts will be replaced with safer and up to the class B road standards culverts.	
4.0	**CLOSING REMARKS-**		
	Mr. Richard gave a vote of thanks on behalf of the team and Madam DCC thanked all the participants for being patient all through the meeting. Meeting adjourned at 4.10pm.		Info

Prepared by:

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Signed by: **Designation** **Signature**
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UPGRADING OF THE WIKILILYE-KAVISUNI ROAD TO BITUMEN STANDARDS

MINUTES OF PUBLIC CONSULTATION MEETING HELD ON 19TH JANUARY, 2022 AT THE CHIEF'S CAMP KAVISUNI.

IN ATTENDANCE:
Reference to be made on the attached attendance list.

AGENDA

34. opening prayer
35. introduction of participants
    - National government representatives
    - County government representatives
    - KeNHA Team
    - Project area leaders
36. Purpose of conducting the public consultations meeting (KeNHA)
37. ESIA study activities carried out along wikililye – Kavisuni Road
38. Findings of the study (social and Environmental impacts)
39. Proposed mitigation measures
40. Views of the participants (Projects impacts and mitigation)
41. Responses
42. Closing remarks by (KeNHA/ County Government / National Government)
43. A.O.B
44. Closing prayers

MIN	DISCUSSIONS	ACTION
1.0	**Arrival and reception of participants**	
	The meeting officially began at 9.00am with prayers and presided over by chief with an introduction of all the community representatives from various locations and sub locations along the project road.	All to note
2.0	**. Project Overview – KeNHA**	
	Mr. Richard Mogesi introduced KeNHA team, giving a brief insight into the Wikililye-Kavisuni project covering 100km in total and a brief overview on the environmental impacts that are expected to be met and mitigated/ managed. He went on ahead and sensitized the public on the importance of the project on aspects revolving around safety and economy performance. He informed the public that the project is meant to start in 2021-2022 financial year, and that the road is meant to cover a distance of 14km for the lot 1 section, having a width of 7m, 2m shoulders, 3m culvert and 1m for drainage provision He reiterated on the fact that the survey team from KeNHA concluded that there was no need to take extra land along the subject road corridor. He informed the community that the government had laid down a road reserve of 40m worth of width length for the project to be complete. He also stressed on the fact that the project was meant to improve the existing bridges along the corridor, signage and road markings, pavement layers, Drainage systems and earthworks. He also touched on objectives of the project, reiterating that it will take less time to travel from one place to the other, spur economic activities, job creation and knowledge transfer. He advocated on public participation encouraging them to air their opinions on the project and to improve homogeneity of stakeholder participation. Mr. Mogesi again took over from Eng. Kamangu and emphasized on the ESIA process in detail, stressing on the description of the study, baseline choices and what it entails, identification of potential impact and enhancement measures of mitigating the negative /adverse impacts of the project, the social dynamics that will be experienced amidst the project e.g. HIV/AIDS spread amongst involved workers and the neighbouring locals, and the importance of having health consultations before the project commences. He also stressed on how the road will boost the economic status of the subject area by linking the region to major towns like Embu, Isiolo, Meru etc.	Info

	Concluded by saying there will be thorough road safety awareness, HIV /AIDs consultations, substance awareness and other vices to consider.	
3.0	**QUESTIONS AND ANSWERS**	

The public wanted to know, if the water is sourced from the public, will the local be compensated?	Mr. Richard answered by saying, the water will be sourced from public points and after the project is done, the water points custody will be given to the governmental offices for them to control.	Info
The community wanted to know how the dust will be controlled.	Mr. Richard answered by saying there will be frequent watering of the road as there is provision of funds for that activity and also that NEMA will be involve to sure the implementation of the process takes place.	
The locals were concerned about the houses marked, and asked if they will be demolished amidst the project.	Mr. Richard answered by saying that the new design has followed the existing route carefully assuring the locals that no properties will be affected, and if they will, they will be compensated fully to the latter after a thorough consultation.	
The public wanted to know if there is any material standard put in place.	Mr. Richard answered by saying the contractor determines the standards when on ground.	
The community was concerned about how the project will handle title deeds that are not completed abut are in the midst of completed when the project commences.	Mr. Richard answered by saying, the government will recognize the title deeds that are complete and in case a transfer is underway, one should visit the regional KeNHA offices (in Machakos) for further consultations. Also advised them to visit National land commission for wider consultative engagement.	

	The public wanted to know, if the water is sourced from the public, will the local be compensated?	Mr. Richard answered by saying, the water will be sourced from public points and after the project is done, the water points custody will be given to the governmental offices for them to control.	
4.0	**CLOSING REMARKS-**		
	Mr. Richard gave a vote of thanks on behalf of the team and the chief thanked all the participants for being patient all through the meeting. Meeting adjourned at 12.30pm.		Info

Prepared by:

Name: Edwin Odhiambo **Designation Intern, ESS** **Signature**

Signed by: **Designation** **Signature**
Name: RICHARD MOGESI **Senior Environmentalist**