KENYA URBAN ROADS AUTHORITY (KURA)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) PROJECT REPORT FOR THE PROPOSED MERU TOWN BYPASSES

Submitted to:	**Prepared by:**
The National Environment Management Authority (NEMA) Popo Road, off Mombasa Road P O Box 67839–00200 Nairobi, Kenya Tel:(254)-020-6005522/6/7 Fax:(254)-020-6008997 Email: dgnema@swift.co.ke Web: www.nema.go.ke	**Kiri Consult Ltd** **P.O. Box 4125 -00506** **NAIROBI**

BASIC INFORMATION ABOUT THE PROJECT

Proponent:	Kenya Urban Roads Authority (KURA)
Address:	P. O. Box 41727 – 00100 Nairobi
Type of Activity:	Proposed Construction of Meru town road bypasses
Location:	Meru Town
Division:	Miriga Mieru West
District:	Imenti North
Province:	Eastern
Elevation:	1500-1700masl
EIA Period:	March-May 2011

CERTIFICATION

Table 1: The experts who conducted the study

Name	Registration status /Expertise	Practicing licence Nr.
Tom Omenda	EIA Lead Expert	011
Ken Kibet Koech	EIA Associate Expert	1609
Eng. Mungeria Kirimania	Civil Expert	

DECLARATION

I **Tom Omenda (NEMA Lead Expert Reg. No. 011)** on behalf of Kiri Consult Ltd, declare that to my knowledge and belief, all information contained in this Environmental and Social Impact Assessment Report for the proposed Meru Bypasses in Meru Municipality is accurate and truthful representation of all findings as relating to the Project"

Sign:_____Lead Expert Reg No. 011

Date: _____

I, ...on behalf of Kenya Urban Roads Authority submit this Environmental and Social Impact Assessment Project Report for the proposed Meru Bypasses in Meru Municipality.

Signature:_____

Designation _____

Date_____

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ACRONYMS

AIDS	Acquired Immuno-Deficiency Syndrome
BD	Biological Diversity
CFCs	Chlorofluorocarbons
DOHS	Directorate of Occupational Health and Safety
EMCA	Environmental Management and Coordination Act
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
ESAP	Environmental and Social Assessment Procedures
ESIA	Environmental and Social Impact Assessment
PI	Public Involvement
EMP	Environmental Management Plan
RDM	Road Design Manuals
RE	Resident Engineer
ESO	Environmental & Social Officer
ESMP	Environmental/Social Management Plan
HH	Household Head
HIV	Human Immuno-deficiency Virus
KURA	Kenya Urban Roads Authority
KFS	Kenya Forest Services
KNBS	Kenya National Bureau of Statistics
KWS	Kenya Wildlife Service
LHS	Left Hand Side
Masl	Meters Above Sea Level
MDGs	Millennium Development Goals
MEMR	Ministry of Environment and Mineral Resources
NEMA	National Environmental Management Authority
NGOs	Non-governmental Organisations
ODA	Official Development Assistance
OP	Operation Policy
OSHA	Occupational Health and Safety Act
RHS	Right Hand Side
ToR	Terms of Reference
URTI	Upper Respiratory Tract Infection
UNFCCC	United Nations Framework Convention on Climate Change
WRMA	Water Resources Management Authority
GoK	Government of Kenya

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EXECUTIVE SUMMARY

1. Introduction

Kiri Consultants Ltd was commissioned by the Government of Kenya (GoK) through its implementing agency, Kenya Urban Roads Authority (KURA), on 21st January, 2011,to offer the Consultancy Services for Feasibility Study, Preliminary and Detailed Design of Meru town Bypass in Meru Municipality to bitumen standard. This included undertaking of Environmental and Social Impact Assessment Study and preparation of Environmental and Social Impact Assessment Project Report (this report).

This report is a product of the Environmental and Social Impact Assessment (ESIA) of the proposed Meru town bypasses situated in Meru County within Meru Municipality on the eastern slopes of Mt Kenya and consists of two bypasses, one on the Western side and the other on Eastern side of Meru Town, with a total length of approximately 20km. The roads will serve markets, Meru town and institutions in the Project area.

This report constitutes descriptions of possible environmental and socio-economic impacts likely to occur during the proposed road construction project life cycle, - design, site preparation, construction, operation and decommissioning. The report has been divided into nine (9) parts covering Executive Summary, Introduction, Policy and legal frame work, description of project environment, project description and justification, project alternatives, stakeholders' and public consultations, potential impacts and mitigation measures, Environmental and Social Management Plan (ESMP), conclusion and recommendations.

The proposed road traverses Meru town which is one of the towns in Kenya with severe traffic congestion problems along with Eldoret town and Nairobi City. It will also be a carriageway for farm produce around Meru region which is a high potential area. Currently the roads are earth with small batches of gravel improvements which has made it impassable during rainy seasons.

Objective of the study

The purpose of this study and its overall objective is to ensure that all the environmental concerns are integrated in the implementation of the project, in order to contribute to sustainable development of the general project area and areas in close proximity to it. The specific objectives are:

1. To identify impacts to the biophysical and human environment;
2. To gain public views, concern and value in regards to the proposed project by consulting communities living in close proximity to the proposed project sites;
3. To determine the significance levels of the identified impacts;
4. To recommend preventive, and mitigative measures for the significant negative impacts of the project on human and biophysical environment; and
5. To develop an environmental management and monitoring plan.

The most important aim of the report is to ensure that the activities of the project will comply with the legal statutes and institutional frameworks as stipulated in the Kenya´s Environmental Management and Coordination Act, EMCA (1999) as well as the provisions of the project financing agencies.

Methodology

The scope of the study conformed to the aspects outlined in the project Terms of Reference (ToRs) issued by KURA. General guidelines and procedures for EIA from EMCA (1999) and Environmental (Impact Assessment and Audit) Regulations, 2003 were applied. The ESIA study was carried out using various methodological approaches best to address the study objectives.

Secondary data were reviewed and later relevant deductions made by the EIA experts. Digital photography, site documentations, critical project site visits, observations and interviews /consultative meetings (public barazas) with project stakeholders and questionnaires were used. A checklist was later used during the study for assessing possible environmental impacts as well giving an indication of their significance during the construction and operation phase of the proposed road bypasses.

2. Policy Legal and Institutional / Administrative Framework

The primary objective of the environmental policies in Kenya is to ensure that economic development is sustainable and does not destroy the natural resources on which it depends. Policy, legislation and regulations relevant to this project among others are:

- Environmental Management and Coordination Act, 1999 and its subsidiary legislations;
- Environmental(Impact Assessment and Audit) Regulations 2003;
- Occupational Safety And Health Act, 2007;
- Water Act, 2002;
- Wildlife (Conservation and Management) Act, 1989;
- Forests Act, 2005;
- Agriculture Act, Cap 318;
- Local Government Act Cap 265;
- Acts related to land;
- Physical Planning Act (Cap 286) of 1996"
- Employment Act 2007
- Work Injury Benefits Act 2007
- Public Health Act Cap 242 and
- Traffic Act Cap 403.

2.1 Development Partners Regulations on Environmental and Social Management

Reference has been made to the World Bank Safeguard Policies, and the World Bank Environmental Assessment Source Book Volume II, which provides the relevant sectoral guidelines including the Banks Operation Policies/Bank Procedures. These includes:

- World Bank Operational Policy 4.01-Environmental Assessment
- Bank Operational Policy 4.04-Natural Habitats
- Bank Operational Policy 4.11-Physical Cultural Resources
- Bank Operational Policy 4.12-Involuntary Resettlement
- World Bank Policy on Access to Information
- World Bank OP 4.11 Cultural Property
- World Bank OP 4.09 Pest Management
- World Bank OP 4.36 Forests

3. Project Environment

<u>Biophysical environment</u>

The road generally traverses through rolling topography with a general altitude of 1700m asl at the Western Bypass and 1500m asl at the Eastern Bypass.

Both Bypasses cross River Kathita and several small perennial streams. The river and the streams originate from Mt Kenya and intersect the Project road, flowing eastwards as tributaries of the River Tana.

The climatic condition in the study area is typically tropical (continental) climate characterised by a bi-modal rainfall; the short rains fall during the months of March to June and the long rains during October to December.

Socio-economic environment

The population of Imenti North district stands at 258,947. The area traversed by the Project road is highly productive with agricultural activity as the main stay. Coffee, tea and “miraa” (also known as Khat) farming are the major cash crops while maize, beans and bananas are the principal subsistence crops. Livestock farming is minimal using zero grazing method. The land acreage ownership is very low.

4. Project Description

The Meru town bypasses (Western B6-C482-B6) and (Eastern B6-C92-D482-C91) is approximately 20 km long of single carriageway, two-lane 6.5 m wide, bitumen surfaced road with 1.0 m shoulders on each side. It will traverse Ntakira, Mpuuri and Ntima locations in Western bypass, Igoki and municipality location on the Eastern bypass in Imenti North district of Eastern Province of Kenya.

The major items of works to be executed under the Contract include the following:

- Setting out, referencing and taking cross sections;
- Site clearance and removal of top soil;
- Earthworks;
- Constructing drainage structures (box and pipe culverts including protection works);
- Construction of pavement comprising bitumen surfacing, cement stabilised base and improved material subbase;
- Relocation of services (power lines and water lines);
- Works necessary to effect the safe and convenient passage of traffic through the Works;
- Provision of road furniture e.g. signs, guardrails, marker posts, wire fencing, etc.;
- Operations ancillary to the main Works such as the construction of offices, laboratories and staff housing, accommodation works, diversion of services, the operations in quarries and borrow areas, the provision of water supply, the diversion of existing services.

The design of the road includes facilities such as lay-bays, bus bays and widening at market centres along the road. The typical road cross sections and the safety devices incorporated in the design are shown in the Book of Drawing.

Justification

The primary aim of the Project road is to decongest Meru town by diverting traffic destined to Nanyuki, Isiolo Maua, Ruiri and other suburbs of Meru town into the town bypasses and reduce traffic loads on the B6 road going through the town centre. Currently Meru town is experiencing severe traffic congestion problems along B6 road because it’s the major link to all other towns and centres in Meru town.

This Project falls within the overall Government strategy for economic recovery and poverty eradication in Eastern Province in Kenya. In relation to the proposed Project, the Government Policy on road sector is of relevance. The Investment Programme for the Economic Strategy for Wealth and Employment Creation (IP-ERS) targets at reducing the proportion of road network in bad/poor condition to 20% within year 2006/2007, down from 28% in 2005/2006.

The Meru Bypasses Road is a major regional link connecting major roads in the region. It is therefore vital that the town has efficient and effective flow of traffic, meet a minimum national standards for roads and its importance for access to markets for produce cannot be overemphasised. Construction of the road bypasses to an all-weather standard will unlock the rural potential in contributing to the Kenya Vision 2030 and Millennium Development Goals (MDGs).

5. Project Alternatives

There were three alternatives that were considered:

1. Alternative mode of transport;
2. Zero option / No project alternative;
3. Construction of new road bypass for the proposed bypasses.

Alternative modes of transport considered included air, rail, and water transport. These are unlikely to either complement or to substitute for roads or highways in this region. This is because; there are no railway transport system close to the project area and no water body that can be used as a mode of transportation in the project area. The only possible means is air transport but, this is a rather expensive alternative and cannot be used as an alternative to the road bypasses. The proposed road bypasses is therefore the best option.

The no project alternative option will not achieve the objectives of the project since traffic congestion will persist in Meru town. Considering that the project road bypasses forms an integral section of connecting rural areas (farmers) to markets, this option will impact negatively to the local socio-economy. Accidents along the dilapidated road will continue to occur, slow traffic flow will not improve and therefore slow transportation of goods and produce to markets, loss of economic time, wastage of produce will continue as well as increased levels of air pollution, higher fuel consumption and severely hinder access to social services, in particular health care. This is not a desirable alternative.

The proposed Meru Town road Bypass project will have limited and reversible adverse environmental impacts. The new road alignment will involve land acquisition (displacement of individuals, loss of livelihoods), clearance of vegetation, and removal of top soils. These adverse environmental and social impacts will be mitigated through an Environmental Management Plan (EMP) and a Resettlement Action Plan (RAP).

6. Stakeholder and Public Consultation

Consultations were undertaken along the route with individual stakeholders including transport operators, traders at market places, Government officials, and the local community. 49 questionnaires were administered and 5 public meetings held.

Both positive and negative issues raised by stakeholders are as follows:

a) Creation of employment, leading to increased incomes;
b) Businessmen in the trading centres along the proposed road bypasses will thrive regardless of the environmental considerations;
c) It will increase the value of land;
d) It will spur development;
e) Social pollution, in that of the workforce's interactions with the local communities will increase prostitution along the town centres, resulting in an increase in the incidence of STDs, including HIV/AIDS;
f) It will increase crime rates and insecurity especially during construction;
g) Solid waste disposal and sanitation at the camps will be an issue;
h) Water sources may be stressed;
i) Increase in the number of traffic accidents during construction;
j) Increase in noise and dust levels from heavy truck during the operations;
k) Excavation of quarries, borrow pits and sand sources will have negative impacts on the natural environment;
l) Soil erosion will occur during and after construction works; and
m) Rehabilitation related work such as road diversions and clearing the vegetation will affect the communities and settlements in proximity to the project road.

Further consultations will be held prior to commencement of construction and during construction.

7. Potential Impacts

The impacts of the project will be both positive and negative. They have been presented according to the various phases of project cycle which includes construction, operation and decommissioning phases.

Positive impacts during construction

- **Creation of employment opportunities:** The construction of the road will create employment opportunities for many people directly or indirectly during construction phase. It is anticipated that approximately 50 people will be employed directly and over 100 indirectly during the project period;
- **Improved local socio-economy:** The project road will contribute immensely to the development of business at the trading centres along the road and the following socio-economic benefits.

Negative impacts during construction

The most critical negative impact is the land take due to re-alignments and temporary changes in the socio-cultural set up of the community due to migrant workers. KURA should therefore undertake an inventory of all the Project Affected Persons under a Resettlement Action Plan (RAP) and ensure full compensation is paid before the project commences.

Other impacts include:

- Construction material sourcing;
- Air pollution;
- Noise pollution;
- Vegetation loss;
- Impacts on soil and drainage;
- Solid and liquid waste from Contractor's camp site;
- Hazardous sites;
- Disruption of access to property;
- Relocation of public utilities;
- Delays in transportation;
- Emergence of unplanned settlements;
- Occupational Health and Safety;
- Public health and HIV/AIDS;
- Site security; and
- Fire incidences.

Positive impacts during operation

- **Ease traffic congestion:** Construction of Meru town bypasses will improve transport and communication in Meru town because of reduced traffic in town.
- **Employment Creation:** The proposed project, upon implementation will directly employ supervising engineering team and monitoring personnel from KURA.
- **Improved living standards:** The project will result in the improvement of the living conditions of population living along the road and the entire district in general thus contributing to poverty reduction. It will save time, improve access to markets, improved communication and will result in efficient traffic flow.
- **Improved security:** The project area where the road traverses is peri-urban. Better road communication would result in an improvement of security by increasing easier movement/patrols by security agents.
- **Education**: Better road communication would open up the area for development which would also lead to building of more schools and colleges.
- **Improved national transport**: With improved road conditions it is expected that there will be improved transport within the region. This is likely to benefit the local and regional economy in the short term and the national economy in the long term.

- **Road safety**: The project will lead to reduction in accidents due to improvements in vertical and horizontal alignments, improved carriageway width, junction layout or greater separation of pedestrians, non-motorised traffic and motor vehicles.
- **Empowerment of women:** Women play an important role in agriculture in the area. However, the existing road making it hard for women to access markets for their products due to the high transport costs as public transport operators are few and as a result the fares are high.
- **Improved access to amenities.** Due to poor state of the road it takes very long for women to reach trading centres and hospitals. This will however change with the construction of the proposed road thus empowering women in the district.

Negative impacts during operation

- Noise pollution;
- Soil erosion and water quality degradation;
- Road accidents;
- Right-of-Way encroachment;
- Illegal trade on trees and its products;
- HIV/AIDS.

Positive impacts during decommissioning

Positive impacts that may be realised during decommissioning phase include:

- Rehabilitation of the whole area; and
- Employment opportunities.

Negative impacts during decommissioning

The project is expected to be in operation for many years and therefore decommissioning is not anticipated to happen soon but should this happen all the positive impacts mentioned in this report would be reversed. Other negative impacts during decommissioning may include:

- Waste generation;
- Noise pollution;
- Dust and exhaust emissions; and
- Occupational hazards.

8. Mitigation measures

Mitigation measures have been proposed for all identified impacts, and an environmental and social management plan has been prepared. Mitigation measures will be included in the Bill of Quantities are drainage, provision of appropriate road signage, road marking, road studs, guardrails, kerbstones, speed humps, gabions, scour checks, river training, mitre and cut-off drains, re-profiling of side drains, desilting culverts, planting of grass and trees, HIV/AIDS awareness campaign, rehabilitation of materials sites, compensation for temporary acquisition of land (e.g. for deviations and the contractor's camp), and rehabilitating borrow pits and other road works after construction. Other measures (e.g. protection of water sources, minimization of dust, chance finds procedures) will be specified in the conditions of contract and the technical specifications.

9. Environmental and Social Management

Best practice in construction environmental management will be achieved through implementation of a detailed ESMP. The Supervising Engineer for the project will be responsible for environmental management and related social components. The potential environmental aspects to be managed include: sound contouring and profiling of the road, adequate drainage and grassed verges; management of borrow pits and water sources for construction and community use; work camp siting and decommissioning; construction site management and workshop health and safety.

The ESMP covers all necessary steps to mitigate negative impacts. These include measures during construction to: a) mitigate risks of erosion and sedimentation around watercourses; b) restrict water and soil contamination on work sites and around work camps (including littering and waste disposal); c) restrict generation of dust during construction; d) reduce risk of fire, cutting of trees for firewood, and trapping by construction workers; e) implement HIV/AIDS awareness programs and, f) minimize risk of accidents and ensure occupational safety of workers on construction sites.

The Contractor will also undertake environmental monitoring during construction as provided in chapter 8. Some of the parameters to be monitored include air, noise, soil erosion, water quality vegetation clearance and social impacts.

Construction related costs for mitigation of environmental impacts will be included in the Bill of Quantities (BoQ) as part of the design and tender documentation for the Project road.

10. Conclusion and Recommendation

Conclusion

The findings of the ESIA study conclude that the impact of upgrading to bitumen standards the Meru Town Bypasses is positive overall on the socio-economic environment of the area. The impacts of the proposed Project on the bio-physical environment are temporary and limited both in the construction phase and over the life of the road. The social impacts of land take and Resettlement will be addressed during the RAP studies.

The majority of the environmental and social management measures proposed relate directly to sound operating practices both during the construction phase and subsequently over the operational life of the road.

Provided the road is upgraded with due attention to the mitigation and management measures outlined, the Project will have a positive impact on both the bio-physical and socio-economic environment of the project area. It is recommended that this road project be implemented and that the proposed mitigation and monitoring measures are enforced.

Recommendations

- The proposed road Project should be granted a licence to commence.
- KURA should ascertain the exact number of Project Affected Persons (PAPs) before the construction phase.
- The consultant recommended that the project be implemented in compliance with all the relevant legislation and planning requirements of Kenya at all times.
- A monitoring programme as outlined in the EMP should be adhered to by the supervising Engineers and KURA during operation phases.
- KURA should liaise with other entities/organisations having utilities on the road (water, electricity and communication lines) to ensure that they only use the edges of the road reserve to avoid future costs of relocation of service and inconvenience.
- KURA should survey and put beacons on the road reserves so as to stop encroachment and ease maintenance of roads.
- KURA should undertake an environmental audit (EA) of the projects, in accordance to NEMA Regulations, twelve (12) months after completion of the project.

1 INTRODUCTION

1.1 Background

Kiri Consultants Ltd was commissioned by the Kenya Urban Roads Authority on 21st January, 2011, to offer the Consultancy Services for Feasibility Study, Preliminary and Detailed Design of Meru Bypasses in Meru Municipality to bitumen standard (Western Bypass B6-C482-B6 and Eastern bypass B6-C92-D482-C91).

As part of the preliminary design, an Environmental Impact Assessment was to be undertaken. This is therefore an Environmental and Social Impact Assessment (ESIA) Project Report which presents the environmental assessment and the management plan for mitigating or minimizing the identified environmental impacts likely to arise due to the proposed road Project.

1.2 Project Location

The proposed road is situated in Meru County within Meru Municipality on the eastern slopes of Mt Kenya and consists of two bypasses, one on the Western and the other on Eastern side of Meru Town, with a total length of approximately 20km. The roads serve Markets and institutions.The Project road is shown on the location plan in **Appendix 1.**

The topography of proposed road generally traverses through rolling topography with a general altitude of 1700m asl at the Western by-pass and 1500m asl at the Eastern Bypass. Both bypasses cross River Kathita and several small perennial streams. The river and the streams originate from Mt Kenya and intersect the project road, flowing eastwards as tributaries of the River Tana.

1.3 Scope

The main objective of this assessment was to identify significant potential impacts of the project to environmental, economic and social aspects, and formulate recommendations to ensure that the proposed Project takes into consideration appropriate measures to mitigate any adverse impacts to the environment and people's health through all phases of its implementation.

The assessment was undertaken in full compliance with the Environmental Management and Coordination Act 1999 and also the Environmental (Impact Assessment and Audit) Regulations, 2003. In addition, appropriate sectoral legal provisions touching on such projects have also been referred to for the necessary considerations during the construction, commissioning and operation of the proposed project.

1.4 Objectives

The broad objectives and scope of the ESIA study were to:

1. Study the baseline environmental conditions in the project area, such as the physical, biological and socio-economic environment;
2. Study the project conditions and requirements in terms of location, construction and operational requirements;
3. Describe the policy, legal and institutional framework governing the road sector in the country;
4. Undertake public consultation and disclosure;
5. Assess environmental and social impacts of the project and suggest suitable mitigation measures for adverse impacts; and
6. Prepare an environmental and social management plan (ESMP) for implementation and monitoring of mitigation measures along with budgetary estimates, institutional and reporting requirements.

1.5 Terms of reference

The Terms of Reference for this assessment are based on the (Environmental Impact Assessment and Audit) Regulations dated June 2003. According to the Regulations, the Environmental Impact Assessment Project Report should, where possible, contain descriptions of the following:

1. Description of the nature of the proposed project;
2. The location of the project including the physical area that may be affected by the project's activities;
3. The activities that shall be undertaken during the project construction, operation and decommissioning phases;
4. The design of the project;
5. The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
6. The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;
7. An action plan for the prevention and management of possible accidents during the project cycle;
8. A plan to ensure the health and safety of the workers and neighbouring communities;
9. The economic and socio-cultural impacts to the local community and the nation in general;
10. The project budget; and
11. Any other information the Authority (NEMA) may require.

1.6 Project Cost

Preliminary estimate of the project is KShs. 2 billion, that is Sh. 100 million per kilometre for 20 km. This value is exclusive of taxes and duties.

1.7 Methodology

1.7.1 Environmental Impact Assessment

The Environmental Impact Assessment (EIA) was based on field assessments, document review and discussion with some Government officials and project team members such as the Highway Engineer, Hydrologist, Materials Engineer and Surveyor. The project team provided the proposed project details. Discussions with the Government officers involved an explanation of the proposed project and soliciting their views on environmental and social aspects that need to be considered during the design and implementation of the project. The data collection was carried out through structured questionnaires, use of checklists, observations and photography, site visits, consultation with stakeholders and desk environmental studies and where necessary in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003.

Existing basic documents which were gathered during the study included topographic maps, scientific and technical reports; past or current project appraisal reports, other Environment Impact Assessment documents, and Government reports. Information sources and references have been provided and the end of this report.

1.7.2 Social Impact Assessment

The assessment used both secondary and primary sources of data. The primary sources of information were mainly questionnaires.

The survey adopted a cross-sectional design methodology of households using a structured questionnaire. A total of 49 questionnaires (statistically representative) were carried out at five

locations. They included:

- Ntakira;
- Mpuuri;
- Ntima;
- Igoki; and
- Municipality.

The survey was conducted on the people living close to the proposed road, women and men in some of the trading centres, and generally in the Project area.

1.7.3 Stakeholder Consultations

Stakeholder Consultation was carried out using structured questionnaires. The stakeholders had the opportunity to raise any concerns they anticipate with the project and suggest how these can be mitigated. This included consultations with government institutions within the Project area.

1.7.4 Public Consultation

Consultation with local residents was also undertaken through public barazas in five locations in the Project area. They were organised by the Consultant together with the provincial administration and they were held at Municipality Chiefs office, Tabiru Coffee Factory, Ntakira Chief's Office, Giantune market and Gitoru KFS/KWS gate. This assisted in baseline data gathering by validating information from other sources. The objectives of the public consultation process were as follows:

- To inform the public of the details of the proposed road project;
- To ask local residents about problems they anticipate with the proposed Project and how these can be mitigated;
- To gather information on likely impacts of the project as perceived by the locals.

1.8 Structure of the report

This report has been prepared under the following chapters:

Chapter 1: Introduction. This chapter gives the background information relevant to the project and describes the objectives and requirements of the study.

Chapter 2: Policy, legal and institutional / administrative framework. This chapter outlines the Kenyan Government policy on the environment, the relevant legislation relating to natural resource management and environmental protection and the institutions that deal with various aspects of environmental management. It also outlines the World Bank Operational Policies that are triggered by the project.

Chapter 3: Description of the existing environment. This chapter provides a description of the existing environment in order to provide an understanding of the bio-physical and social environmental setting.

Chapter 4: Project Description and Justification. This chapter summarises the key project activities and presents a brief justification of the project, its purpose and the needs to be fulfilled by the project. It also gives a description of the status of the project in the project cycle, details of the proposed Project, designs and implementation strategies.

Chapter 5: Alternatives to the project. This chapter presents the various alternatives considered to reach the Project's objectives, including the "no action" option.

Chapter 6: Public consultation. This chapter outlines the actions undertaken to consult the affected groups and other concerned key stakeholders. It also presents major

findings and outcomes of public consultations.

Chapter 7: Potential impacts and mitigation measures. The first part of this chapter presents the analysis of beneficial and adverse impacts of the project on the biophysical and human (social, cultural and economic) environments. The analysis covers anticipated impacts during the construction and operation phases.

The second part identifies and briefly describes the mitigation measures proposed to prevent, minimize, mitigate or compensate for adverse impacts as well as the estimated cost of mitigation.

Chapter 8: Environmental and social management plan. This chapter presents the surveillance and monitoring activities proposed in the Environmental and Social Management Plan prepared for the Project.

Chapter 9: Conclusions and Recommendations. The conclusion briefly presents the environmental and social acceptability of the project, taking into account the impacts and measures identified during the assessment process.

2 POLICY LEGAL AND INSTITUTIONAL/ADMINISTRATIVE FRAMEWORK

2.1 Policies

The Government of Kenya's Policy on Road Transport is to provide efficient and reliable road network to spur social, economic and security improvement.

Kenya's National Environment Action Plan process culminated in the formulation of the policy on Environment and Development under Sessional Paper No. 6 of 1999. This policy presents broad categories of development issues that require a sustainable approach. Its main objectives are to ensure that environmental considerations are taken into account in all development policies, programmes and projects, and that independent EIA reports are prepared for projects before implementation.

2.1.1 Kenya Road Policies

The objectives of Kenya Road Policies are based on the following criteria:

i. Integration: Ensuring that all roads decisions are taken in the context of a coherent, integrated transport policy covering all modes.
ii. Accessibility: Making it easy to reach the places we wish to get to.
iii. Safety: Making travel safer.
iv. Economy: Getting good value for money and supporting sustainable economic activity in appropriate locations.

2.1.2 Environmental Impact and Road Policies

The road policy further emphasises on the following environment relevant issues:

i. All road improvements need to be sustainable. Consequently, short-run gains from road infrastructure should not obscure wider or long-run damage that may be associated with it.
ii. The aim is to limit and where possible reduce damage at local, regional and global levels, taking account of all relevant environmental policies such as those on climate change, local air quality and biodiversity. It is also important to acknowledge positive environmental benefits that the trunk road system can bring.
iii. Bypasses have their positive and negative sides. They can take noisy, polluting traffic out of towns and villages and allow the implementation of traffic calming and other measures to improve the urban environment. They can also reduce accidents. On the other hand, bypasses intrude on the countryside.
iv. Road improvements have a mixed effect on emissions. By easing congestion they could help reduce emission of some pollutants, but they increase emission of others.

2.1.3 Kenya Vision 2030

The economic, social and political pillars of Kenya Vision 2030 are anchored on macroeconomic stability; continuity in governance reforms; enhanced equity and wealth creation opportunities for the poor; infrastructure; energy; science, technology and innovation (STI); land reform; human resources development; security as well as public sector reforms..The 2030 Vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications.

2.1.4 National Environmental Action Plan (NEAP) 1994

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy effort aimed at integrating environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of

natural resources are integral part of societal decision-making. The NEAP also established the process of identifying environmental problems and issues, raising awareness, building national consensus, defining policies, legislation and institutional needs, and planning environmental projects.

2.1.5 The National Environmental Action Plan Framework, 2009 - 2013

The National Environmental Action Plan Framework is the second national environmental policy after the 1994 National Environmental Action Plan (NEAP). The development of NEAP is provided for by EMCA, 1999 which requires preparation of Environmental Action Plan at different levels; district, provincial, and national levels. The framework recognizes the intertwined linkages between economic growth and environment in Kenya. It highlights priority themes and activities for the country towards achieving sustainable environment.

The policy framework among others, proposes integration of environmental concerns into regional and local development plans, promotion of appropriate land uses and enforcement of EMCA, 1999 and its subsidiary and other relevant legislations. The policy framework also advocates for efficient water harvesting, storage and usage. On human settlements and infrastructure, this policy framework recognizes the associated environmental issues. These include waste management, sanitation, diseases, land use changes in conservation areas, demand for water, energy, construction materials, pollution, land degradation, biodiversity loss etc. In managing operations of the proposed Project, consideration of the highlighted issues is vital towards contribution to the national sustainable development goals.

Multiple stakeholders' involvement inclusive of the private sector is advocated for within the implementation of this framework towards achievement of sustainable development goals. Finally, the framework also advocates for monitoring and evaluation to ensure effective and efficient environmental policy implementation.

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy effort to integrate environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of the societal decision-making.

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

The paper, now being developed into a full policy on environment, presents broad categories of development issues that require sustainable approach. The paper harmonizes environmental and developmental objectives so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development. With regard to wildlife, the policy reemphasizes the aims of the Wildlife Policy of 1976 and especially the 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 resource. The paper also advocates for the establishment of zones that allow for the multiple use and management of wildlife.

2.1.7 The National Biodiversity Strategy, 2007

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed and the 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.

2.1.8 The National Poverty Eradication Plan (NPEP) and Poverty Reduction Strategy Paper (PRSP)

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

The NPEP emphasizes the empowerment of poor people and their communities to better manage their resources for collective advancement. The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya's commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without participation of the poor themselves. Any development project that incorporates these strategies in its plans is most welcome in Kenya.

2.1.9 The Wildlife (Conservation and Management) Policy, 2004

The above policy initially outlines the principal direction of the Kenya Wildlife Service (KWS) by elaborating its purpose, in both general and strict terms. Aspects of the law with which KWS is directly concerned are then outlined, that is, the Wildlife Act, amended in 1989.

Protected areas under the Wildlife Act are also outlined, and include terrestrial national parks, and marine national parks, as well as guidelines for activities within these protected areas, such as residence in national parks; recreational, spiritual and cultural activities; and mining. The connections between private/communal lands to national parks are also elaborated, and more detail offered on national reserves and local sanctuaries.

Additional key areas elaborated in the above policy include conservation outside protected areas, such as migratory corridors; guidelines for general conservation and management; wildlife use outside protected areas; human-wildlife conflicts; conservation education; wildlife research; veterinary service; and eco-tourism.

2.1.10 Kenya Forest Service Strategic Plan, 2009-2013

The above Plan has six strategic objectives:

1. To intensify conservation and sustainable management of strategic forest resources for environmental protection and economic growth;
2. To maintain and enhance productivity of industrial forest plantations and increase efficiency in wood utilization for wealth and employment creation;
3. To promote forest extension on farm and dry lands to increase tree cover for sustained timber, wood fuel, non-wood forest products and environmental conservation;
4. To develop and disseminate technologies in forest management, on-farm tree planting, forest utilization and forest information system;
5. To enhance revenue generation through sustainable forest-based industries, ecotourism and payment for environmental services;
6. To improve institutional capacity and infrastructure through collaboration, training and development.

2.2 Legal framework

Kenya has over 77 statutes which relate to environmental concerns. Most of these statutes are sector specific, covering issues such as public health; soil erosion; protected areas; endangered

species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc.

Previously, environmental management activities were implemented through a variety of instruments such as policy statements and sectoral laws and also through permits and licences. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under the Local Government Act of 1998; it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance.

With the enactment of the Environmental Management and Co-ordination Bill in December 1999, the institutional framework for environmental management was strengthened. The Environmental Management and Co-ordination Act (EMCA) of 1999 provided for the establishment of a National Environment Management Authority (NEMA), which became operational in July 2002, with the statutory mandate to co-ordinate all environmental activities.

2.2.1 Environment Management and Coordination Act (No. 8 of 1999), EMCA

This is an Act of Parliament providing for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

This Act is divided into 13 Parts, covering main areas of environmental concern as follows: Preliminary (I); General principles (II); Administration (III); Environmental planning (IV); Protection and Conservation of the Environment (V), Environmental impact assessments (EIA), audits and monitoring (VI); Environmental audit and monitoring (VII); Environmental quality standards (VIII); Environmental Restoration orders, Environmental Easements (IX); Inspection, analysis and records (IX); Inspection Analysis and Records (X); International Treaties, Conventions and Agreements (XI) National Environment Tribunal (XII); Environmental Offences (XIII).

Under section 58 (1) of Kenya Government's Environment Management Coordination Act (EMCA), Number 8 of 1999 and National Environment Management Authority Regulations for Environmental Impact Assessment and Audit of June, 2003, the proposed Construction of the Meru Town Bypasses Road Project falls under the prescribed list of projects for which environmental impact assessment is mandatory, prior to implementation.

The Act provides for the setting up of the various ESIA Regulations and Guidelines which are discussed below:

a. Environmental (Impact Assessment and Audit) Regulations 2003

The Environmental (Impact Assessment and Audit) Regulations 2003 state in Regulation 3 that "the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part III and V of the Regulations'' basically lists the guidelines of undertaking, submission and approval of the ESIA Report (this report).

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

These are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. These Regulations apply to all categories of waste as provided in the Regulations. These include:

1. Industrial wastes;
2. Hazardous and toxic wastes;
3. Pesticides and toxic substances;
4. Biomedical wastes;
5. Radio-active substances.

The proposed Project will have to abide by these regulations in dealing with waste management

especially the provisions of Industrial, Hazardous and toxic wastes which may be generated during their operations.

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

These are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Regulations apply to drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. This includes the following:

1. Protection of sources of water for domestic use;
2. Water for industrial use and effluent discharge;
3. Water for agricultural use.

These Regulations outline:

1. Quality standards for sources of domestic water;
2. Quality monitoring for sources of domestic water;
3. Standards for effluent discharge into the environment;
4. Monitoring guide for discharge into the environment;
5. Standards for effluent discharge into public sewers;
6. Monitoring for discharge of treated effluent into the environment.

In fulfilling the requirements of the regulations the project proponent will have to undertake monitoring of both domestic water and wastewater and ensure compliance with the acceptable discharge standards.

d. Environmental Management and Coordination, Conservation of Biological Diversity (BD) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

e. Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

These regulations are described Legal Notice No. 131 of the Kenya Gazette Supplement no. 74, October 2006 and will apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions used by the Contractor. The fossil fuels considered are petrol, diesel, fuel oils and kerosene.

f. Environmental Management and Coordination (Controlled Substances) Regulations 2007

These regulations are described in Legal Notice No. 73 of 2007. The Government of Kenya banned the importation of Chlorofluorocarbons (CFCs) with effect from 1 January 2009, to ensure that Kenya is compliant with the provisions of the Montreal Protocol on Substances that Deplete the Ozone Layer.

g. Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009

These regulations are described in Legal Notice No. 19 of the Kenya Gazette Supplement no. 9, February 2009. These regulations include management of wetlands, wetland resources, river banks, lake shores and sea shores. Specific sections have requirements that apply to River Kathita is a major source of water supply to the community. The regulations will empower the District Environment Committee in Imenti north district to co-ordinate, monitor and advise on all

aspects of wetland and water resource management within the district.

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

These Regulations prohibit making or causing any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. It also prohibits the Contractor from excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source. Under the regulation the Contractor will be required to undertake daily monitoring of the noise levels within the Project area during construction period to maintain compliance.

2.2.2 Occupational Safety and Health Act 2007

This is an Act of Parliament which provides for the safety, health and welfare of all workers and all persons lawfully present at workplaces and it also provides for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

It applies to all workplaces where any person is at work, whether temporarily or permanently and therefore will apply to the project both during construction and operation phases.

The purpose of this Act is to:

1. Secure the safety, health and welfare of persons at work; and
2. Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work.

The Occupational Safety and Health Act (OSHA) 2007 repealed the Factories and Other Places of Work Act. Anything done under the provisions of the Factories and Other Places of Work Act including subsidiary legislation issued before the commencement of the OSHA 2007 shall be deemed to have been done under the provisions of this Act.

The Factories and Other Places of Work Act had over the years passed several subsidiary rules and regulations for effective implementation of the Act. All shall, as long as it is not inconsistent with OSHA 2007 remain in force until repealed or revoked by subsidiary legislation under the provisions of OSHA 2007 and shall for all purposes be deemed to have been made under this Act.

These regulations include:

1. The Factories (Cellulose Solutions) Rules 1957;
2. The Factories (Wood Working Machinery) Rules 1959;
3. The Factories (Dock) Rules 1962;
4. The Factories (Eye Protection) Rules 1978;
5. The Factories (Electric Power) (Special) Rules 1978;
6. The Factories (Building Operations and Works of Engineering Construction) Rules 1984;
7. The Factories and Other Places of Work (Health & Safety Committees) Rules 2004;
8. The Factories and Other Places of Work (Medical Examination) Rules 2005;
9. The Factories and Other Places of Work (Noise Prevention and Control) Rules 2005;
10. The Factories and Other Places of Work (Fire Risk Reduction) Rules 2007;
11. The Factories and Other Places of Work (Hazardous Substances) Rules 2007.

The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions and plantations. It establishes codes of practices to be approved and issued by the Director, Directorate of Occupational Health and Safety (DOHS) for practical guidance of the various provisions of the Act.

Other parameters within the Act relevant to the project include:

1. Duties of employers, owners or occupiers of workplace;
2. Establishment of safety and health committees;
3. Annual safety and health audit of workplaces;
4. Safety and Health obligations for persons who may come to premises for work and are not employees of that particular workplace;
5. Reporting of any accident, dangerous occurrence or occupational poisoning caused in the workplace to the area Occupational Health and Safety Office. These incidents should be entered in the General Register. In case of a fatal accident information to the area Safety and Health Office should be within 24 hrs and a written notice to the same within 7 days;
6. The duties of manufactures, designers, importers and suppliers to ensure that all articles and substances for use at workplace are safe and will not cause injury to health and the environment;
7. Duties of self employed persons;
8. Duties of employed persons;
9. Prohibition of interference or misuse of any appliance, convenience or any other facility provided to secure Safety, Health and Welfare at work by any person (occupier, self employed person or employed);
10. The administration of the Act is the responsibility of a Director and other appointed and gazetted officials (Occupational Health and Safety Officers);
11. The registration of all workplaces by the Director Directorate of Occupational Health and Safety (DOHS) forming the basis of his work statistics;
12. Machinery safety to include:

    i. Safe use of machinery, plant and equipment;
    ii. Prime makers and transmission machines;
    iii. The maintenance, construction of fencing safeguards;
    iv. The statutory requirements of various machines, plants and equipment (hoists and lifts, chains and ropes, cranes, steam receivers and containers, air receivers, cylinders for compressed liquefied and dissolved gases and refrigeration plants).

13. Chemical safety including:

    i. Handling, transportation and disposal of chemicals and other hazardous substances;
    ii. Importance of Materials Safety Data Sheets (MSDS);
    iii. Labelling and marking of chemical substances;
    iv. Classification of hazardous chemicals and substances;
    v. Establishment and adoption of exposure limits on hazardous substances in a workplace;
    vi. Control of air pollution, noise and vibrations;
    vii. Redeployment on medical advice.

14. Health, safety and welfare special provision including:

    i. Permit to Work systems;
    ii. Work processes that are likely to harm persons below eighteen (18) years;
    iii. Supervision of apprentices and indentured learners;
    iv. Training and supervision of inexperienced workers;
    v. Medical surveillance.

15. Penalties, offences and legal proceedings including:

    i. The upward adjustments of all fines imposed in the event of failure to comply with provisions of the Act;
    ii. The need to investigate and prosecute the real offender otherwise all those who fail to comply with any provisions of this Act that have been legally imposed on him/her shall be prosecuted;

16. The establishment of the safety and Health fund and Safety and Health regulations and

procedures thereof;

2.2.3 Water Act 2002

Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. The control and right to use water is exercised by the Minister administering the Act, and such use can only be acquired under the provisions of the Act. The Minister is also vested with the duty to promote investigations, conserve and properly use water throughout Kenya. Water permits may be acquired for a range of purposes, including the provision and employment of water for the development of power and other uses. The following are the regulations developed under Water Act 2002 relevant to the Project. These regulations will relate to abstraction and use of water from rivers.

a. The Water Resources Management Rules (2007)

These Rules are described in Legal Notice Number 171 of the Kenya Gazette Supplementary Number 52 of 2007. They apply to all water resources and water bodies in Kenya, including all lakes, water courses, streams and rivers, whether perennial or seasonal, aquifers, and shall include coastal channels leading to territorial waters.

The Water Resources Management Rules empower Water Resources Management Authority (WRMA) to impose management controls on land use falling under riparian land.

It also enables any person with a complaint related to any matter covered by these rules to the appropriate office in WRMA as per the Tenth Schedule which provides a format for report on complaints. WRMA is to reply to the complainant with “copies to all other relevant parties within twenty one days of receiving the complaint, starting with what action is being taken, the position of the Authority on the matter and any recommendation to the complainant.”

The rules also elaborate on the following:

1. Mechanisms for appeal;
2. Public notification;
3. Public consultation;
4. Orders on compliance;
5. Protection of the integrity of the water resources monitoring network;
6. Water Resource User Associations;
7. Water Resource Database;
8. Approval of activities listed in the fifth schedule of Water Act 2002;
9. Authorisation and permitting;
10. Wetlands;
11. Allocation of water for irrigation;
12. Prior right to water for storage;
13. Dams;
14. Groundwater development and its regulation;
15. Control of water pollution and effluent discharge;
16. Water works;
17. Water use charges on permitted water use;
18. Conservation of riparian land and catchment areas;
19. Catchment management strategies;
20. Protected areas and ground water conservation areas;
21. Establishment and protection of reserve water;
22. Miscellaneous provisions which include provisions on:
    i. Qualifications to practise as a water resource professional;
    ii. Qualifications for a registered contractor;
    iii. Recognised water quality laboratories;
    iv. Emergency orders;
    v. Penalties for offences;
    vi. Revocation of rules under Cap 372.

Part IX : Conservation of Riparian and Catchment Areas of the Rules, Section 116(5) states " Unless otherwise determined by a water resources inspector, the riparian land adjacent to the ocean is defined as a minimum of two metres vertical height or thirty metres horizontal distance from the high watermark, whichever is less".

Section 118 (1) of the Rules state " No person shall undertake the activities listed in the Sixth Schedule on riparian land unless authorised by the Authority in consultation with other relevant stakeholders".

Part A of the Sixth Schedule: Protection and Conservation of Riparian and Catchment Areas of the Rules provide activities proscribed on riparian land as:

1. Tillage or cultivation;
2. Clearing of indigenous trees or vegetation;
3. Building of permanent structures;
4. Disposal of any form of waste within the riparian land;
5. Excavation of soil or development of quarries;
6. Planting of exotic species that may have adverse effect to the water resource;
7. Or any other activity that in the opinion of the Authority and other relevant stakeholders may degrade the watercourse.

2.2.4 Traffic Act, Cap 403

This Act specifies that motor vehicles use proper fuel. The Traffic Regulations promulgated under the Act specifies that every vehicle is required to be well constructed, maintained and used so as not to emit any smoke or visible vapour. The vehicles to be used during construction process should be serviced and be in good condition so that they do not emit any hazardous emissions.

KURA and the contractor should ensure that during the construction phase, all trucks used for transportation and other vehicles involved comply with this Act.

2.2.5 The Wildlife (Conservation and Management) Act, 1989

The Wildlife (Conservation and Management) Act, Cap 376 of 1976, as amended in 1989, covers matters relating to wildlife in Kenya including protected areas, activities within protected areas, control of hunting, import and export of wildlife, enforcement and administrative functions of wildlife authorities. The 1989 amendment specifically established the Kenya Wildlife Service (KWS) as the parastatal charged with implementation of the provisions of the Act. The proposed project will be located near the Nairobi National Park.

The Act specifically provides for the protection and regulation of protected animals, game animals and game birds as defined in three schedules. The first schedule includes game animals mostly mammals, although the list also includes crocodile and ostrich. The second schedule lists game birds, and the third schedule lists protected animals, which comprise primarily mammals, although it also includes two species of marine turtles, while in 1981 it was amended to include several species of reptiles, amphibians and butterflies. Apart from the protection provided to plants within National Parks and National Reserves, plants receive no further protection under this Act outside the protected areas.

Specific provisions of the Act allow for the establishment of National Parks (Section 6), National Reserves (Section 18), and local sanctuaries (Section 19). The National Parks are managed by KWS. Strict regulations prohibit various activities within National Parks, unless they are subject to the written consent of the Minister or, in other cases, the Director of KWS. No such prohibitions are specified for National Reserves or for local sanctuaries. Areas that were formerly game reserves but are declared as National Reserves continue to be administered by the local authorities, unless otherwise directed by the Minister by notice in the Kenya Gazette. Management of local sanctuaries is not addressed in the Act.

2.2.6 The Forest Act No 7, 2005

The Forest Act, Cap 385 of 1962 (revised 1982, 1992 and 2005) addresses the reservation, protection, management, enforcement and utilisation of forests and forest resources on Government land. The Forest Act is applicable to gazetted forest areas (Forest Reserves) and specifically covers:

* Gazettement, alteration of boundaries and de-gazettement of Forest Reserves (Section 4);
* Declaration of Nature Reserves within Forest Reserves and regulation of activities within Nature Reserves (Section 5);
* Issuance of licenses for activities within Forest Reserves (Section 7);
* Prohibition of activities in Forest Reserves (removal of forest produce, grazing, cultivation, hunting, etc.) and on unalienated Government land (removal of trees, collection of honey, lighting of fires) except under license from the Director of Forest Services (Section 8);
* Enforcement of the provisions of the Act, penalties and powers afforded to enforcing officers (Sections 9-14);
* Power of the Minister to make rules with respect to sale and disposal of forest products, use and occupation of land, licensing and entry into forests (Section 15). This prerogative has been taken with the Forests (General) Rules, which sets forth rules for sale of forest produce and specifies royalty rates for these products.

Section 4 of the Forest Act relates to excision and addition to the Government forest estate. Section 4 (2) states that declaration or alteration of forest boundaries, or cessation of a forest area may not take place unless twenty-eight days notice of the intention to make the declaration is published by the Minister in the Kenya Gazette. Implementation of changes in forest areas can be effected by Legal Notices (published in the Kenya Gazette Supplement) once the formalities of 28 days notice are complete.
The project area consists of expansive Mt. Kenya Forest to the East, Lower Imenti Forest, Ontulili Forest Station, Mucheene forest and Meru Forest.

2.2.7 The Agriculture Act, Cap 318 of 1980 (revised 1986)

This Act has the stated objectives to promote and sustain agricultural production, provide for the conservation of the soil and its fertility, and stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry. Authorised officers are empowered to prohibit the clearing of vegetation and the grazing of livestock and to require the planting of trees to protect the soil from erosion, as well as to impose penalties under the Act. The road will traverse an area where agriculture is a main economic activity and this act may therefore be triggered.

2.2.8 Acts related to Land

Kenya has several legislations which relate to land. They include:

a. Government Land Act Cap 280

This Act provides for regulation of leasing and other disposal of Government lands and for other purposes. More specifically, it provides for the disposal of land within townships, agricultural land, and land for special purposes. The Act also provides for Licenses for temporary occupation of land, general provisions relating to leases, licenses and agreements, and registration of transactions relating to Government land.

b. Land Titles Act Cap 282

This Act makes provision for the removal of doubts that have arisen in regard to titles to land, and to establish a Land Registration Court. Specific provisions include guidelines on adjudication of claims, and registration of documents after certificate of ownership is granted.

The above Act is also accompanied by subsidiary legislation, that is:

i. The Land Titles Rules;
ii. The Land Titles (Fees; Custody of Documents) Rules;
iii. The Land Titles (Fees; Land Registration Court) Rules;
iv. The Land Titles (Survey Fees) Rules; and
v. The Land Titles (Registration Fees) Rules, 1994.

c. Registration of Titles Act Cap 281

This Act provides for the transfer of land by registration of titles. Parts within the Act elaborate on mechanisms of bringing land under the Act, grants, transfers and transmission of land, registration of titles, and mode and effect of registration, transfers, leases, charges, powers of Attorney, and rectification of titles, among others.

d. Land (Group Representatives) Act Cap 287

This Act provides for the incorporation of representatives of groups who have been recorded as owners of land under the Land Adjudication Act, and for related purposes. The Act also elaborates on the incorporation of group representatives and the administration of groups.

e. Trust Land Act Cap 291

This Act makes provision for Trust land, through the establishment of divisions and divisional boards. The Act also establishes guidelines for the setting apart of land, as well as leases and guidelines.

f. Registered Land Act Cap 300

The above Act makes further and better provides for the registration of title to land, and provides for the regulation of dealings in land so registered, and for purposes connected therewith.

The Act further elaborates on the organization and administration of the Act, the effect of registration, title deeds, certificates of lease and searches, instruments and agents, transmissions and trusts, restraints on disposition, rectification and indemnity, and decisions of registrars and appeals.

g. Land Control Act Cap 302

This Act provides for controlling of transactions in agricultural land. The Act further elaborates on the establishment of land control areas and boards, the control of dealings in agricultural lands, and rules governing Appeal Boards.

2.2.9 Local Government Act Chapter 265 (Revised 1998)

The Act empowers Local Authorities to make by-laws to control nuisances and to keep premises free from offensive or wholesome matter which could be injurious to health. In addition Section 163(e) of the Act empowers Local Authorities to prohibit and control all businesses and factories that in their operations produce smoke, fumes, chemicals, gases, dust, smell, noise and or vibration that may become a source of danger, discomfort or annoyance to the neighbourhood. The Local Authority is also empowered to refuse licensing or renewal if that granting of the license is not to the public interest or would cause nuisance or annoyance to the neighbours, and should methods adopted to prevent noxious/offensive vapours, gases or smells become inefficient.

Section 166 empowers Local Authorities to prohibit and control development and use of land and buildings in the interest of its area of jurisdiction.

2.2.10 The Physical Planning Act Chapter 286

This is the main Act that governs land planning and all proposed developments must be approved by the respective Local Authority and certificate of compliance issued accordingly.

Under the Act, the Director of Physical Planning advises the Commissioner of Lands on land alienation issues that fall under Government Lands Act and Trust Land Act. The Director also advises the Commissioner of Lands and Local Authorities on land use, sub-division and or amalgamation of land; prepares regional and local physical development plans.

At the District Level, The District Physical Planning Liaison Committee comprises heads of the various Departments and is chaired by the District Commissioner. One of the major functions of the Liaison Committee is to determine development applications for change of user or sub-division of land that could have significant impact on adjacent land and or breach registered conditions in a given title deed; and also industrial location which could have negative impact on the environment and adjoining land.

The Director is required to publish the regional physical development plan and also notify the Local Authority within whose jurisdiction the plan is to be affected.

Section 30(1) requires a developer in any Local Authority to be granted development permission by the respective Local Authority, failure to which heavy fines will ensue; and the Land Registrar shall decline to register such a document. No sub-division of private land shall take place within a Local Authority unless the sub-division is in accordance with the requirements of an approved local physical development plan.

The Director in consultation with the Board of National Museums may prohibit owner of a building from demolition, alteration or extension if in the Director's opinion the building is of special architectural value or historic interest as stated in Section 47(1).

2.2.11 Antiquities and Monuments Act, Cap 215 of 1983

This Act aims to preserve Kenya's national heritage. Section-2 defines an antiquity as any moveable object other than a book or document made or imported into Kenya before 1895. Human, faunal or floral remains in Kenya dating to before the benchmark date of 1895 are also deemed to be antiquities. Both the National Museums of Kenya and the Kenya Cultural Centre have been established in part to discharge this Act.

2.2.12 The Employment Act, 2007

This Act declares and defines the fundamental rights of employees; minimum terms and conditions of employment; to provide basic conditions of employment of employees; and to regulate the employment of children, among other rights. Key sections of the Act elaborate on the employment relationship; protection of wages; rights and duties in employment; termination and dismissal and protection of children, among others. This Act will guide the management of workers, especially during the construction period.

2.2.13 Other Relevant Sectoral Legislation

While the EMCA supersedes all other environmental legislation, numerous other laws and regulations in addition to those described above influence the various aspects and activities of the Project, which include the following among others:

i. Public Health Act, Cap 242 (rev 1986);
ii. Way leaves Act Chapter 292
iii. Trade Licence Act, Cap 497;
iv. Penal Code Cap 63 (rev. 1985);
v. Standards Act, Chapter 496 (1974);
vi. Building Code (1968);
vii. Work Injury and Benefits Act (2007);

viii. Food, Drugs and Chemical Substances Act, Cap 254 (rev 1992);
ix. Use of Poisonous Substances Act, Cap 247(rev. 1983);
x. Transport Licensing Board Act (Cap. 404).

2.3 Administrative/Institutional framework

There are over 20 institutions and departments, which deal with environmental issues in Kenya. Some of the key institutions include the Ministry of Environment and Mineral Resources (MEMR), Kenya Forest Services (KFS), Kenya Wildlife Service (KWS), National Museums of Kenya (NMK), and the public universities, among other organisations. There are also local and international NGOs involved in environmental issues in Kenya.

In 2001, the Government established specific administrative structures to implement the Act. The main administrative structures are described in the following sections.

2.3.1 The National Environment Council

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

2.3.2 The National Environment Management Authority

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

In addition to NEMA, the Act provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC) which will govern the discharge limits to the environment by the proposed project.

2.3.3 Provincial and District Environmental Committees

The Provincial and District Environmental Committees also contribute to decentralised environmental management and enable the participation of local communities. These environmental committees consist of the following:

i. Representatives from all the ministries;
ii. Representatives from local authorities within the province/district;
iii. Two farmers / pastoral representatives;
iv. Two representatives from NGOs involved in environmental management in the province/district;
v. A representative of each regional development authority in the province/district.

The committees are empowered to discuss the environmental issues affecting the area of their jurisdiction, KURA will therefore be required under the Act to liaise with the Imenti North District Environmental Committee and the Eastern Provincial Environmental Committees during the life of the project.

2.3.4 Public Complaints Committee

The Act has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

2.3.5 Kenya Roads Board

Strengthening the institutional framework is one of the strategies the GoK has adopted to improve the road network in Kenya. The Roads Maintenance Levy Fund manages the roads in repair and rehabilitation. The Kenya Roads Board has the following major tasks which are to:

1. Coordinate the implementation of all policies relating to maintenance, rehabilitation and development of network;
2. Coordinate maintenance, rehabilitation and development of road network to achieve efficiency, cost-effectiveness and safety;
3. Administer funds derived from the fuel levy and any other fund that may accrue to the board;
4. Determine the financial allocation for road agencies and evaluate the delivery of works through technical financial and performance audit;
5. Ensure all procurement of works is conducted in accordance with the guidelines and criteria set by the board;
6. Recommend to the minister responsible for roads the areas for study and research, the specifications, design standards and classifications for roads, vehicle types, dimensions for axle – load limits and road safety measures.

2.3.6 Kenya Urban Roads Authority (KURA)

The Urban Roads Authority shall have the responsibility for the management, development, rehabilitation and maintenance of all public roads in the cities and municipalities in Kenya except where those roads are national roads.

For the purposes of discharging its responsibility under subsection (1) the Authority shall have the following powers and duties:

1. constructing, upgrading, rehabilitating and maintaining roads under its control;
2. controlling urban road reserves and access to roadside developments;
3. implementing roads policies in relation to urban roads;
4. ensuring adherence by motorists to the rules and guidelines on axle load control prescribed under the Traffic Act and under any regulations under this Act;
5. ensuring that the quality of road works is in accordance with such standards as may be defined by the Minister;
6. in collaboration with the Ministry responsible for transport and the Police Department, overseeing the management of traffic and road safety on urban roads;
7. monitoring and evaluating the use of urban roads;
8. planning the development and maintenance of urban roads;
9. collecting and collating all such data related to the use of urban roads as may be necessary for efficient forward planning under this Act;
10. preparing the road works programmes for all urban roads;
11. liaising and co-ordinating with other road authorities in planning and on operations in respect of roads; and
12. advising the minister on all issues relating to urban roads.

2.4 World Bank Operational Policies Triggered by this Project

The proposed project has been rated Category B under the World Bank Operational Policy on Environmental Assessment (OP4.01), requiring a partial Environmental Assessment (EA). A proposed project is classified as Category B if the potential impacts on the environment are typically site-specific, reversible in nature; less adverse than those of Category A projects and for which mitigatory measures can be designed more readily

Reference has been made to the World Bank Safeguard Policies, and the World Bank Environmental Assessment Source Book Volume II, which provides the relevant sectoral guidelines including the Banks Operation Policies/Bank Procedures.

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for Bank and borrower staff in the identification, preparation, and implementation of programs and projects. Operational policies have often provided a platform for the participation of stakeholders in project design and have been an important instrument for building ownership among local populations.

2.4.1 World Bank Operational Policy 4.01-Environmental Assessment

The environmental assessment process provides insights to ascertain the applicability of other WB safeguard policies to specific projects. This is especially the case for the policies on natural habitats, pest management, and physical cultural resources that are typically considered within the EA process. The policy describes an environmental assessment (EA) process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale, and potential environmental impact of the proposed project. The policy favors preventive measures over mitigatory or compensatory measures, whenever feasible.

The operational principles of the policy require the environmental assessment process to undertake the following:

- Evaluate adequacy of existing legal and institution frameworks, including applicable international environmental agreements. This policy aims to ensure that projects contravening the agreements are not financed.
- Stakeholder consultation before and during project implementation.
- Engage service of independent experts to undertake the environmental assessment.
- Provide measures to link the environmental process and findings with studies of economics, financial, institutional, social and technical analysis of the proposed project.
- Develop programmes for strengthening of institutional capacity in environmental management.

The requirements of the policy are similar to those of EMCA, which aim to ensure sustainable project implementation. Most of the requirements of this safeguard policy have been responded to in this report, by evaluating the impact of the project, its alternatives, existing legislative framework and, conducting public consultations and by proposing mitigation measures for the potential impacts identified.

2.4.2 Bank Operational Policy 4.04-Natural Habitats

This operational policy requires that the study use a precautionary approach to natural resource management, to ensure environmental sustainability. The policy requires conservation of critical habitat during project development. To ensure conservation and project sustainability the policy requires that:

- Project alternative be sought when working in fragile environment areas;
- Key stakeholders are engaged in project design, implementation, monitoring and evaluation including mitigation planning.

The requirements of this policy were observed as much as possible during the EIA study. The consulting team engaged several stakeholders during project impact so as to incorporate their concerns and views in the EMP. This policy is not triggered by the proposed project as the project area does not directly fall within critical and/or protected natural habitats.

2.4.3 Bank Operational Policy 4.11-Physical Cultural Resources

This policy guides in preserving physical cultural resources and helps reduce chances of their destruction or damage. The policy considers Physical Cultural Resources (PCR) to be resources of archeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic or other cultural significance.

The policy is not triggered by this project as during the study there were no observed physical or cultural resources to be affected by the project. Nevertheless , the Contractor is responsible for

familiarizing themselves with the following “Chance Finds Procedures”, in case culturally valuable materials are uncovered during excavation, including:

1. Stop work immediately following the discovery of any materials with possible archeological, historical, paleontological, or other cultural value, announce findings to project manager and notify relevant authorities;
2. Protect artifacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artifacts
3. Prevent and penalize any unauthorized access to the artifacts
4. Restart construction works only upon the authorization of the relevant authorities.

2.4.4 Bank Operational Policy 4.12-Involuntary Resettlement

The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets, or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to project appraisal of proposed projects. The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement.

The policy requires the displaced persons and their communities, and any host communities receiving them, are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement. Appropriate and accessible grievance mechanisms are established for these groups. In new resettlement sites or host communities, infrastructure and public services are provided as necessary to improve, restore, or maintain accessibility and levels of service for the displaced persons and host communities.

This policy will be triggered as the project causes the involuntary taking of land and other assets resulting in:

1) Relocation or loss of shelter;
2) Loss of assets or access to assets;
3) Loss of income sources or means of livelihood, whether or not the affected persons must move to another location;
4) Loss of land,

2.4.5 World Bank Policy on Access to Information

The World Bank Policy on Access to Information sets out the policy of the World Bank on public access to information in its possession. This Policy supersedes the World Bank Policy on Disclosure of Information, and took effect on July 1, 2010. This Policy is based on five principles:

- Maximizing access to information.
- Setting out a clear list of expectations
- Safeguarding the deliberative process
- Providing clear procedures for making information available
- Recognizing requester’s right to an appeals process.

In disclosing information related to member countries / borrowers in the case of documents prepared or commissioned by a member country / borrower (in this instance, safeguards assessments and plans related to environment and resettlement: OP / BP 4.01, Environmental Assessments, and OP / BP 4.12 Involuntary Resettlement) the Bank takes the approach that the Country / Borrower provides such documents to the Bank with the understanding that the Bank will make them available to the public.

Table 2.1: Summary of World Bank Safeguards Policies

Safeguard policy	Description
OP 4.01 Environmental Assessment	The environmental assessment process provides insights to ascertain the applicability of other WB safeguard policies to specific projects. This is especially the case for the policies on natural habitats, pest management, and physical cultural resources that are typically considered within the EA process. The policy describes an environmental assessment (EA) process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale, and potential environmental impact of the proposed project. The policy favors preventive measures over mitigatory or compensatory measures, whenever feasible. The operational principles of the policy require the environmental assessment process to undertake the following: ▪ Evaluate adequacy of existing legal and institution frameworks, including applicable international environmental agreements. This policy aims to ensure that projects contravening the agreements are not financed. ▪ Stakeholder consultation before and during project implementation. ▪ Engage service of independent experts to undertake the environmental assessment. ▪ Provide measures to link the environmental process and findings with studies of economics, financial, institutional, social and technical analysis of the proposed project. ▪ Develop programmes for strengthening of institutional capacity in environmental management. ▪ The requirements of the policy are similar to those of EMCA, which aim to ensure sustainable project implementation. Most of the requirements of this safeguard policy have been responded to in this report, by evaluating the impact of the project, its alternatives, existing legislative framework and, conducting public consultations and by proposing mitigation measures for the potential impacts identified
OP 4.36 Forests	**All projects** must avoid significant damage to **Critical Forests** (= forested Critical Natural Habitats), same as under the Natural Habitats OP 4.04. **All projects** must minimize and mitigate damage to other (non-critical) natural forests, same as OP 4.04.
OP 4.04 Natural Habitats	This operational policy requires that the study use a precautionary approach to natural resource management, to ensure environmental sustainability. The policy requires conservation of critical habitat during project development. To ensure conservation and project sustainability the policy requires that: ▪ Project alternative be sought when working in fragile environment areas; ▪ Key stakeholders are engaged in project design,

	implementation, monitoring and evaluation including mitigation planning.
OP 4.09 Pest Management	This policy promotes the use of ecological based pest management practices. The policy requires that procured pesticides should meet the WHO recommendations and not be among those on the restricted list of formulated products found in the WHO Classes IA and IB or Class II. This policy is not triggered by the proposed project as it shall not involve use of pesticides. All activities involving handling of vegetation will be manual labor based thus not necessitate use of pesticides. It is recommended that plant enrichment will be done using organic manure if necessary which can be locally found.
OP/ 4.12 Involuntary Resettlement	Details involuntary resettlement, emphasizing the severe economic, social and environmental risks, if unmitigated. It ensures that the population displaced by a project receives benefits from it and also covers those with usufruct or customary rights to land or other resources taken for the project. The Operational Policy is specifically inclusive, ensuring that all those affected both directly and indirectly by project developments are compensated as part of the project. Affected populations include those with income derived from informal sector and non-farm activities, and from common property resources. The absence of legal title does not limit rights to compensation. The World Bank's Policy objectives urge that involuntary resettlement be avoided whenever possible. If unavoidable, displaced persons need to: • Share in project benefits, • Participate in planning and implementation of resettlement programs, and • Be assisted in their efforts to improve their livelihoods or standard of livings or at least to restore them, in real terms, to pre-displacement levels or levels prevailing prior to the beginning of project implementation, whichever is higher.
OP 4.11 Cultural Property	Cultural property is defined to include both remains left by previous human inhabitants (e.g. graves, shrines) and unique natural environmental features such as canyons and waterfalls. The Bank does not support projects that will significantly damage non-replicable cultural property and assists only those projects that are sited or designed so as to prevent such damage.

2.5 Alignment of WB and GOK Polices relevant to this ESIA

Both the World Bank safeguards and GoK laws are generally aligned in principle and objective:

- Both require Environmental Assessment before project design and implementation (which also includes an assessment of social impacts).
- Both require public disclosure of EIA reports and stakeholder consultation during preparation.
- While OP 4.01 of World Bank stipulates different scales of EIA for different category of projects, EMCA requires EIA for all sizes of projects, which require to be scoped as applicable.

- Where EMCA requires Strategic Environmental Assessments, OP 4.01 requires that an Environmental Assessment be conducted depending on the project category while an ESMF should be prepared for municipal projects.
- EMCA recognizes other sectoral laws while WB has safeguards for specific interests.
- The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project which is equivalent to the EMCA requirements.
- Additionally, statutory annual environmental audits are required by EMCA.

In Kenya, it is a mandatory requirement under EMCA 1999 for all development projects (Schedule Two) to be preceded by an EIA study. Thus, under the Laws of Kenya, environmental assessment is fully mainstreamed in all development process consistent with World Bank policies. It is anticipated that projects to be supported under WaSSIP AF will be quite small in scale. However since EMCA provides no minimum size threshold, all projects will be screened at identification stage so as to determine level of environmental assessment required under EMCA. Further, in order to fully insure against triggers to WB safeguard policies, individual investments will be screened against each policy as part of the EIA Study.

3.1 General

Imenti North district was curved out of the larger Meru Central district district in Eastern Province with its headquarters in Meru town. The district covers an area of 934.7 sq km. The district is divided into 4 administrative divisions namely Timau, Buuri, Miriga Mieru East and Miriga Mieru west.

3.2 Physical environment

3.2.1 Climate

The climate and rainfall in the study area is greatly influenced by Mt. Kenya and the Nyambene Hills. The short rains occur between March and May and the long rains from October to December. Rainfall varies from 2600 mm annually in the upper highlands of Mt. Kenya to 500 mm in the lower dry parts of the district. Meru District is one of the districts with high agricultural potential in Kenya. Most agro-ecological zones found in Kenya are found here.

3.2.2 Rainfall

Rainfall is bimodal, falling between March and June (short rains) and October through December (long rains). The southeastern slopes of Mt. Kenya where many of the farms lie, receive between 1250mm and 2500 mm of rainfall per year (Meru Central District Development Plan, 2002). The leeward side of the mountain and northern and eastern lowlands receive between 380 mm and 1000 mm annually.

3.2.3 Topography

The road generally traverses through mountainous topography. The general altitude of the project is 1700m above sea level (asl) at the Western by-pass and 1500m asl at the Eastern Bypass. The landforms recognized in the area are two: uplands with gently undulating to rolling slope ranging from 2-16% and minor valleys with 5-30% slopes (undulating to hilly). In some places, the valleys are deeply incised.

3.2.4 Soils

The soils of the area are primarily developed from Mt. Kenya basalts. The major soils are nitisols which are poorly consolidated hence susceptible to erosion, mass movement and high seepage where water is conveyed in open channels.

3.2.5 Geology

Tertiary volcanic rocks-olivene basalts, nepheline phonolites.

3.2.6 Water resources

The area has two perennial rivers, Kathita on the northern and Riiji on the southern side. There are numerous springs in the area. All the rivers and streams flow from west to east.

3.3 Biological environment

3.3.1 Vegetation and land use

Farmers in Imenti North practice mixed cropping methods with maize and common beans as the dominant farming system. Other food crops include bananas, yams, potatoes, sweet potatoes (*Ipomea batatas*), sorghum (*Sorghum bicolor*), finger millet (*Eleucine coracana*), cassava, arrowroot, pigeon pea, lablab beans, cowpeas, groundnuts, kales, tomatoes, onions, cabbage,

pumpkins, sugar cane, avocados, mangos, citrus and papaya. Coffee, tea, tobacco, cotton, sunflower, macademia and pyrethrum are grown for cash. *Catha edulis* (also called “miraa” or “khat”) is a stimulant used mostly by Somalis, Swahili people, and in the Arab Gulf. It has been an important cash crop in wetter tea-growing areas, such as the Nyambene Hills in the northeast of the greater Meru area. It is now being grown by many of the farmers in Imenti North as well. Farmers in the coffee zones have recently started growing it for cash with the decline of the coffee industry.

A major feature of the farming landscape, especially in the middle and upper zones, is the Australian tree (*Grevillea robusta)*. Apparently it was promoted for many years for intercropping with coffee. It is very popular for all farmers; however, as a fast-growing tree that produces good lumber. Other introduced species include *Cassia* and *Leucaena* species, especially in the lower zones.

Livestock in the area include cattle, goats, sheep, pigs, rabbits, and chickens. Farmers also keep bees. Livestock goods such as dairy products, meat, and hides are also produced.

3.3.2 Wildlife

The Imenti Forest is one of many small remnant patches of the forest in which fragmented elephant herds shelter, threatened by a burgeoning human population of agriculturalists who are not sympathetic to their presence. Cultivation within the elephants’ ancient migratory routes denies them safe passage to the Mount Kenya forests, and that population to which the Imenti elephants rightfully belong.

The Imenti Forest lies East of Mount Kenya between the towns of Embu and Meru and today a handful of elephants (probably no more than about 50) shelters within, surrounded by human settlement and isolated from their Mount Kenya brethren. Illegal logging within the forest itself is inflicting further pressure on this small band of surviving elephants, whose future is doomed unless safe passage for them can be arranged by way of a corridor so that they can reach the Mount Kenya forests. It is worth noting however that the road not traverse the forest but follows the edge of the forest for about 2 kms.

The area around lake Nkunga forest, a walking distance from Meru town has is an elephant breeding area between December and April. Nursery Herds of up to 20 accompanied by a few days old calves can be observed on the Meru-Isiolo road during this time.

The road bypass will run along the forest edge around Gitoro area before joining B6 road hence not affecting the forests, or near the wildlife sensitive sites The Kenya Forestry Service has an electric fence which prevents access to the Imenti Forest.

3.3.3 Forests

The Meru Central Forest Zone covers 86,000 hectares encompassing Imenti South, Meru Central, Imenti North and Buuri Districts. All these contribute to the expansive Mt. Kenya Forest to the East. Lower Imenti Forest is the smallest covering 2,462 hectares whereas Ontulili Forest Station is the vastest covering 34,000 hectares. In terms of productivity Mucheene forest has the most productive plantations. Meru Forest is highly characterized by exotic tree species such as cypress, pines and eucalyptus. The main indigenous trees include the Meru Oak, Cedar, Olea, Croton and Pruners.

In the farms Grevalia is the most common tree. Conservation efforts in the forest are carried by the Meru Forest Environmental Conservation and Protection Association (MEFECAP). The road passes along the forest edge for 2km into Gitoro with forest vegetation on the last 500m towards Meru Technical Institute.

3.4 Socio-Economic Environment

3.4.1 Population profile and demographic characteristics

The population of the Imenti North district according to Kenya National Bureau of Statistics (KNBS) 2009 census stands at 258,947 and 73, 300 households. The density stands at 168.

The young population (0-14) accounts for about 44% of the population at year 2002 while the aged 60 and above accounts for 6% of the total population. Both groups adds up to 50% and this gives a dependency ratio of 100:103. The large number of dependants leads to a low savings and strain the existing health education facilities. The economically active population (15-64) constitutes about 57.1% of the population of which women comprised 50.5%. The female population is estimated at 129,032 while males is estimated at 129,915 hence presenting a female/male ratio of 99:100

The population as per divisions is as shown in Table 3.1 below.

Table 3.1 Population of Imenti North district per division

Division	Population	Households	Area (sq km)	Density
Timau	64,079	19,949	721.0	89
Buuri	45,724	12,444	250.1	183
Miriga Mieru East	66,535	16,475	171.2	389
Miriga Mieru west	82, 609	24,432	122.0	677

Source (KNBS, 2009)

The proposed project cuts across five locations in Miriga Mieru west division. The details of the locations traversed by the proposed road are as shown in Table 3.2 below.

Table 3.2 Details of the project area

Location	Population	Households	Area (sq km)	Density
Municipality	27303	8159	8.7	3149
Ntakira	21840	6303	17.1	1275
Ntima	12015	3840	4.5	2699
Igoki	9525	3017	5.9	1624
Mpuri	5761	1483	77.6	74
Total	**76444**	**22802**	**113.8**	**8821**

Source (KNBS, 2009)

3.4.2 Poverty levels

About 50% of the population in Buuri, and Timau divisions are considered to be poor while more than 45% in the other divisions are regarded as being poor. This situation is common in household with 6 or more members. The most vulnerable groups affected by poverty are women, youth, and the aged and small scale farmers.

According to the Welfare Monitoring Survey III of 1997, Meru Central had 41% of the population who were food poor and contributed about 1.32% towards the national poverty level. The main causes of poverty in the district include: inadequate and unreliable rainfall leading to crop failure, drought and lack of water for irrigation in dry areas, inadequate land or landlessness etc. The high cost of agricultural inputs, poor infrastructure, high rates of school drop outs due to inability to pay school fees, high consumption of illegal brews and drug taking by the youth leading to low working capacity further causes poverty.

3.4.3 Source of income

The income in Imenti North district is basically derived from sales of agricultural products. Tea, coffee, pyrethrum, maize, beans, Irish potatoes and milk products are the mainstays of the district. Thus the family incomes generally are from these agricultural sources.

3.4.4 Education

In Meru Central district, only one in two (50 per cent) children of school-going age attend primary school. The net primary school attendance rate is 88 per cent, while that of secondary school stands at 31 per cent. The female adult literacy rate in Meru Central is 82 per cent.

3.4.5 Health

Meru Central District has slightly over 160 health facilities that are spread all over the district. There is a problem of accessibility of health facilities since the average distance to the nearest health facility is 7 km². There is only 1 doctor for every 33,259 patients (doctor to patient ratio is 1:33,259). This therefore implies that most of the health facilities in the district are manned by other cadres of health workers.

The most prevalent diseases in the district are Malaria, Diseases of Respiratory Systems and Intestinal Worms. Thus programmes of Primary Health Care (PHC); and STI/STD including HIV/AIDS should be put in place.

HIV/AIDS is a major health challenge in the district. The current prevalence is estimated at 38 per cent. The effort to deal with HIV/AIDS in the district has been noted with focus on; how to cope with pandemic since there is no cure; how to contain the spread of HIV among the adolescent and youth, women and girls and the high risk group; how to remove situations that undermine/hinder prevention efforts such as stigma on HIV/AIDS; circumcision especially female genital cutting (FGC), multiple sex partners, (as in polygamy and prostitution); how to provide for those infected and affected, and to availability of drugs.

Patients suffering from HIV/AIDs related illness occupy more than half of hospital beds in Meru General Hospital Wards. The number of orphaned children whose parents have died of AIDs is increasing every day.

3.4.6 HIV/AIDS

Forty nine per cent of women aged 15-49 years have comprehensive knowledge about HIV/AIDS prevention. Ninety nine per cent know that HIV/AIDS can be transmitted from mother to child, but only 44 per cent have knowledge of all the three ways of mother-to-child transmission of HIV/AIDS. Fifty five per cent of women aged 15-49 years reported that they were tested for HIV/AIDS. Ninety two per cent of women who delivered in the last two years received counselling on prevention of mother-to-child transmission of HIV and 95 per cent had the HIV test.

3.4.7 Infrastructure

a. Roads

North Imenti district is served by fairly good road network both bitumen standard, gravel and earth roads which are managed and maintained by Kenya Highways Authority (KenHA), Kenya Rural Roads Authority (KeRRA) and Kenya Urban Roads Authority (KURA).

b. Postal and Telephone Services

Postal services are available in Meru town. Here letters are delivered to individual rented Post office box numbers and supplemented by the major courier service providers in Kenya. The districts is well covered by all the four mobile service providers which include Safaricom, Airtel, Yu and Orange with few people mostly the organisations using Telcom landline services.

c. Electricity Supply

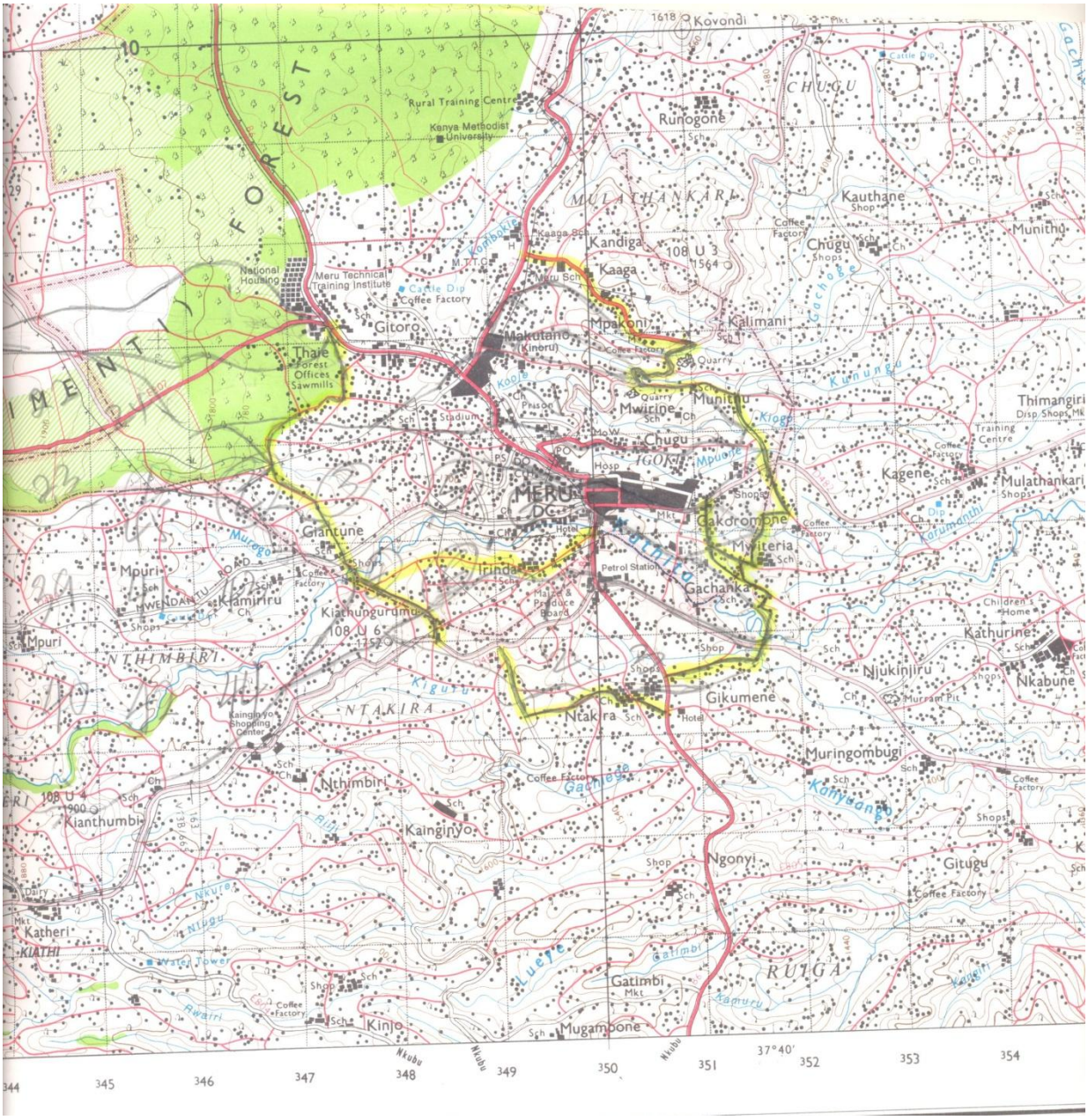
The district is covered by the national grid although most households do not yet have access to electricity. The ministry of Energy has supplied electricity to households and market centers through the Rural Electrification Programme; more houses are getting access to electricity supply.

d. Water and Sanitation

About 83 per cent of the Meru Central district population have access to safe drinking water from (piped, rain or boil spring and borehole water). Thirty seven per cent of this group also reported treating their drinking water. Around two in five (40 per cent) households also have good toilet facilities.

4.1 Description of the Proposed Road

The proposed Meru town bypass will have two loops running on the periphery of the town which are the Western and eastern bypasses. The junctions and their respective chainages are outlined in section 4.2.2.



4.1.1 Western Bypass

The Western Bypass begins on the Embu – Meru (B6) road at Gitembene, it gradually ascends on a gentle incline for some 300m on a westerly route surrounded by permanent buildings until Irinda primary School. It continues on a south-westerly route for about a kilometre to Calvary Church which is located on a ridge.

The road then descends rapidly on a North-westerly route towards a bridge crossing over R. Kathita before rounding a ridge and ascending on a N. Westerly route to Giantune Primary School after crossing the Meru- Kithirune C482 road. The route then descends towards River Gatobora and thereafter runs next to Kenya Forest Service Electric Fence for Imenti Forest. There is no existing road towards the end of the project. Part of this section descends rapidly towards a swampy area connecting Meru-Nanyuki Road (B6) opposite the Meru Technical Institute at Gitoro.

4.1.2 Eastern Bypass

The road begins on the B6 at Gikumene on a relatively blind corner. It proceeds on an easterly direction for some 600m passing four junctions before intercepting the Meru Ena (C92) road. The route then descends rapidly to the Kathita River in a northwesterly Direction crossing the Meru-Mikinduri Road (D482). It join the old Meru Maua road and follows this route going first westerly in a descent to a swampy area characterised by hard rock, before ascending North-North West to Kaaga boys school to the junction of the Meru –Maua road (C91). 2 km of the last section is bituminised. Refer to Map on **Appendix 1.**

4.1.3 Alignment and Geometry

The existing horizontal road alignment is characterised by tight curves and sharp bends that wind between and through private parcels of land and the steep terrain. The vertical alignment consists of sharp ascents and descents for the most part on the eastern bypass as it negotiates through the valleys and ridges of the mountainous topography. It is much gentler on the Western by-pass.

4.1.4 Traffic

a. Reconnaissance Visit

During the site visit it was observed that there was light traffic volume on both the Eastern and western bypasses. Most traffic used the B6 going through Meru, and onward bound either connecting with the C91 junction to Maua or continuing with the B6 to Nanyuki or Isiolo. Only local traffic which was minimal could be seen on the target roads. The Consultants preliminary assessment is that it should be possible to accommodate local traffic through the works and on the acquired road reserve.

b. Historical traffic data

There is no indication of traffic survey stations on the project road for the annual 60-point national traffic census and historical traffic data for the road has not been obtained from the MoR.

4.1.5 Hydrology and Drainage

a. Existing drainage structures

The western bypass has one single lane, 5m span bridge crossing over Kathita River and one 600mm cross culvert at River Gatobora. Access culverts were however found at the start of the road for some 300m next to the shops.

On the Eastern by-pass six 600mm cross culverts were found and one 5m span single lane bridge crossing over River Kathita.

The Consultant noted that both bridges were on tight approach bends and therefore relocation may be required further downstream. All the culverts will need replacement to accommodate the wide carriageway. Additional culvert will also be provided, especially at low points.

Table 4.1 Inventory of drainage structures and cross culverts

Chainage	Drainage structures/Cross Culverts
Eastern Bypass	
0+800	Single 600mm diameter CC
1+600	5m Single Span one way bridge
1+800	Single 600mm diameter CC
3+800	Twin 600mm diameter CC
4+000	Single 600mm diameter CC
6+800	Single 600mm diameter CC
Western Bypass	
0+000	Single 600mm diameter CC
2+600	5m Single Span one way bridge
4+600	Single 600mm diameter CC

b. Access Culverts

The consultant has prepared a list of all major institutions, factories, business centres, homesteads, adjacent to the road for provision of access culverts. **Appendix 4** shows the existing number of Left Hand Side (LHS) and Right Hand Side (RHS) accesses as 66 No. and 42 No. respectively.

c. Existing Pavement Condition

Western By-pass

The road consists of a fairly well maintained gravel road hemmed in by properties with a width ranging of about 7-10m from the beginning of the junction reducing to an earth road of 4-6m before climaxing as a trail on the boundary with the Imenti forest.

Eastern By pass

The section of the road consists of a poorly conditioned gravel road hemmed in by properties with a width of between 4-7m in width from the start of the road up to km 6+800 some three kilometres before the road exit at Kaaga. For both bypasses land acquisition will be finalised before the works go to tender.

4.2 Proposed Project Design and Construction Activities

The works to be executed under the Contract comprise the construction of approximately 20 km of single carriageway, two-lane 6.5 m wide, bitumen surfaced road with 1.0 m shoulders on each side. The major items of works to be executed under the Contract include the following:

- Setting out, referencing and taking cross sections;

- Site clearance and removal of top soil;
- Earthworks;
- Constructing drainage structures (box and pipe culverts including protection works);
- Construction of pavement comprising bitumen surfacing, cement stabilised base and improved material sub-base;
- Works necessary to effect the safe and convenient passage of traffic through the Works;
- Provision of road furniture e.g. signs, guardrails, marker posts, wire fencing, etc.;
- Operations ancillary to the main Works such as the construction of offices, laboratories and staff housing, accommodation works, diversion of services, the operations in quarries and borrow areas, the provision of water supply, the diversion of existing services.

The design of the road includes facilities such as lay-bays, bus bays and widening at market centres along the road.

4.2.1 Proposed Engineering Works

The following engineering works are proposed:

a. Road Alignment

The proposed road alignment is presented in A**ppendix 3**

b. Design Speed

The road design speed is 40 km/h which complies with the Ministry of Roads (MoR) Design Manual's standard which specifies a design speed of 40 km/h in level terrain.

c. Design for Junctions

Where intersected by classified roads, junctions are designed according to the Design Manual Type B, with an island on the secondary road. A semi-trailer has been used as the design vehicle. For unclassified roads, the junctions are designed without the island on the secondary road. Other accesses are designed as simple junctions without the island and the compound curves.

d. Project Length and Additional Roads Modifications

The additional road modifications increase the overall project length by about 17% as shown below:

Table 4.2 Overall length of proposed new alignment

Main road (km)	20.25
B6 junction at Gikumene Girls Western bypass	2.85
To KURA Offices	0.4
Overall project length (km)	**7.018**

e. Horizontal Realignments

The road horizontal alignment along the center line will be determined after a detailed study of the optimum alignment between control points specified. Station points at 20 m intervals and other important parameters such as Beginning of Transitions and Circular Curves (BTCs & BCCs), and End of Transition and Circular Curves (ETCs & ECCs) will be defined relative to stations on the baseline by coordinates and offsets suitable for road setting out. Horizontal alignment design will be carried out in accordance with Chapter 5 Section 5.3 of Road Design Manual I (RDM I).

f. Vertical Realignments

Vertical alignment will be carried out in accordance with Chapter 5 Section 5.4 of the RDM I. Alignment design will take into consideration design standards approved by General Manager (Design and Construction) and at the same optimizing earthworks. Coordination between horizontal and vertical alignment will be done to the best extent. Consideration will be made to safety requirements as detailed in the RDM I. (Road Design Manual 1).

g. Parking Bays

The project will provide parking bays for the existing markets and trading centres along the road.

h. Road Furniture

1. Edge marker posts will be provided at bridge approaches (where there are no guard rails), pipe culverts, sharp curves and at locations where sight distance requirements are not complied with, although these are very few on this road;
2. Kilometre marker posts will be provided at suitable intervals on either side of the road;
3. Warning signs will be provided and installed in accordance with the requirements of the Manual for Traffic Signs in Kenya, Part II;
4. Guardrails will be provided at bridge approaches, box culverts and high fills.

4.2.2 Junctions and Trading Centres

The table below shows the major junctions along the proposed road.

Table 4.3 Chainage of junctions and details

Road Bypass	Approximate Chainage (Km)	Details
Western	0+000	Junction at B6 Kwa nthambi
	0+300	junction
	0+500	Junction to Irinda Primary School
	1+700	Junction
	2+200	Junction
	3+100	Junction to D481 Giantune market
	3+800	Junction
	4+300	Junction
	5+800	Junction to KWS and KFS
	6+300	Junction to B6 and Meru Technical Inst.
Eastern	0+000	B6 junction
	0+020	Junction
	0+300	Junction
	0+400	Junction
	0+600	Junction
	0+900	Junction
	1+400	Junction to C92
	1+500	Junction from C92
	1+800	Junction
	2+800	Junction to Mwiteria seconderyu school
	3+500	Junction to mwiteria primary school
	4+700	Junction to primary school
	4+800	Junction to Meru-Mikinduri road D487
	5+500	Junction to Mwirine Primary school
	6+500	Junction to Meru-Maua Road
	7+800	Junction to old Meru-Maua road
	9+800	Junction to Meru-maua road

4.2.3 Road Reserves

The roads falling on the route are mostly unclassified. In most cases, the available road corridor measured from the property fencing and hedges was less than 7m. From section 2.4 of the RDM, unclassified roads have a road reserve of 20m, which the Consultant will endeavour to maintain while designing. Land acquisition will be a key task that will need to be finalised before the project goes to tender.

4.2.4 Temporary Works

In addition to the permanent works described above, some temporary works will be undertaken to facilitate construction. These include:

- Diversion roads to allow passage of traffic to be maintained along the full length of the construction works;
- A work camp for accommodation, offices, services, stores, workshops and parking of vehicles;
- Production facilities such as concrete precast yard, timber and reinforced steel bending yards;
- Temporary stockpile areas to be set aside for delivered or double-handled materials such as aggregates and sand;
- Spoil areas for disposal of unsuitable or surplus materials.

4.2.5 Pavement Design

a. Sub –Base & Base Layers

Information obtained at the preliminary stage will help identify suitable material sources for base and sub- base construction purposes. Depending on materials properties in each material site and in consideration of other factors such as traffic loading, pavements layers up to sub-base level will be designed as detailed in the RDM III. With this information, the Materials Engineer will also design for natural gravel improvements or cement /lime stabilization.

b. Wearing Courses

Information obtained at the preliminary study stage will be used to determine the most suitable quarry for hard stone based on stone quality, location, access and ease of working.

Further sampling for each selected quarry will be investigated to prove quantity and quality of stone. Test carried out on each sample will be: LAA, ACV, SSS, PI on LAA fines, SG and Bitumen Affinity. Additional tests will include: Grading of crushed samples FI, Sand equivalent and Compaction test.

c. Materials Utilization

Using the knowledge gathered in sections above, the Materials Engineer will then prepare a material utilization programme for the road. Exact locations of all construction materials available will be indicated together with their known quantities

4.3 Justification of the Project

4.3.1 Economic Recovery Strategy

The Kenya Government launched its Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) in June 2003. It outlines the objectives of its economic and social programme for the period 2003-2007. This strategy is largely inspired by the Poverty Reduction Strategy Paper. The major challenges facing the Kenya Government are the restoration of economic growth, the expansion of employment opportunities and the reduction of poverty levels.

The ERSWEC is anchored on four pillars:

1. Achievement of rapid economic growth in an environment of macro-economic stability
2. Strengthening of the institutions of governance
3. Rehabilitation and expansion of the physical infrastructure
4. Investment in human capital of the poor.

4.3.2 Poverty Reduction Strategy

The Government's economic programme recognises that economic recovery is the most effective strategy to reducing and eventually eradicating poverty. The macro-economic objectives over 2003-2007 are ambitious and include:

1. Creating 500,000 jobs annually
2. Reducing poverty level by at least 5% from the current 56% level
3. Achieving a high real Gross Domestic Product (GDP) growth rate, rising from 2.3% in 2003 to 7% in 2006
4. Containing the average annual inflation rate to below 5%
5. Increasing official foreign exchange reserves from US$1.1 billion or 2.8 months import cover in 2002 to US$1.7 billion or 3.5 months import cover in 2007
6. Increasing domestic savings to enable higher levels of investment for sustainable development.

This economic recovery is being attained through the revival of the productive sectors, in particular, agriculture, tourism, industry and trade. Policy measures and reforms have been outlined for each sector, geared towards assisting this recovery by eliminating constraints such as regulatory impediments that impact heavily on business costs.

Most of the objectives have been attained, save for inflation which stood at almost 20% in 2007. The economic recovery trend is positive and close to the programme.

4.3.3 Kenya Vision 2030

The economic, social and political pillars of Kenya Vision 2030 are anchored on macroeconomic stability; continuity in governance reforms; enhanced equity and wealth creation opportunities for the poor; infrastructure; energy; science, technology and innovation (STI); land reform; human resources development; security as well as public sector reforms..The 2030 Vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications

4.3.4 Economic importance of Meru Town Bypasses Road

In relation to the current project, the Government policy on road sector is of relevance. The Investment Programme for the Economic Strategy for Wealth and Employment Creation (IP-ERS) targets at reducing the proportion of road network in bad/poor condition to 20% within year 2006/2007, down from 28% in 2005/2006.

From the Budget Outlook Paper of 2007(BOPA2007), investment in physical infrastructure will claim the largest share of Development Budget allocated to any sector, with 44.2 % of the 2006/2007 development budget and 42.1% of 2007/2008 development budget being proposed for investments in this sector.

Regarding economic and geographic location of the project road, over 80% of the agricultural production in Kenya is found in the high potential areas. The Government recognises the need to develop infrastructure in these areas.

Accordingly, this project falls within the overall Government strategy for economic recovery and poverty eradication in the Eastern Province of the Republic of Kenya.

5 ALTERNATIVES TO THE PROJECT

5.1 Alternative mode of transportation

There are no alternatives to this road bypasses that fulfil the functions primarily of diverting traffic from Meru town and also serve as a fast and cheap land transportation. Air, rail, and water transport are unlikely to either complement or to substitute for roads or highways in this region. There is no railway transport system close to the project area and no water body that can be used as a mode of transportation in the project area. The only possible means is air transport but, this is a rather expensive alternative and cannot be used as an alternative to the road bypass.

The road will be the most important bypass in Meru town and will divert traffic from Meru town hence reducing traffic congestion in Meru town. This project is among those prioritised by Government of Kenya alongside Nairobi and Eldoret towns.

The proposed project road is an existing gravel and earth road and its upgrading will not involve any major horizontal or vertical realignment except as has been discussed in detail in Chapter 4 and7.

5.2 “No Project” Alternative

The No Project Alternative will not achieve the objectives of the project since traffic will still be a big problem in Meru town. Considering that the project road bypasses forms an integral section of connecting rural areas (farmers) to markets, this option will impact negatively to the local socio-economy. Accidents along the dilapidated road will continue to occur, slow traffic flow will not improve and therefore slow transportation of goods and produce to markets, loss of economic time, wastage of produce will continue as well as increased levels of air pollution, higher fuel consumption and severely hinder access to social services, in particular health care. This is not a desirable alternative.

There will be defined intermittent road repairs undertaken from time to time. The no project case is therefore to assume that similar interventions will continue in the future and that the maintenance strategy will be to ensure that the road remains passable. The maintenance strategy may involve any of the following options:

i. Heavy routine maintenance. This would involve clearing blocked drains and culverts and treatment of the road surface;
ii. Periodic maintenance. This would spot repairs to failed sections of the road surface and measures to restore drainage to good condition;
iii. Timely routine maintenance. This would involve keeping drains in good shape and cutting back vegetation and weeds.

The “no project” alternative is expensive in the long term and would involve periodic extraction of material from borrow sites. This will necessitate further development of borrow pits resulting in the following negative environmental impacts:

i. Landscape scarring creating unpleasant changes in scenery when a gaping hole is left behind due to the excavation;
ii. Incidences of malaria in the vicinity of pits where drainage was not possible;
iii. Open un-protected water bodies which pose a potential drowning hazard, particularly for young children;
iv. Increased flow of surface run-off, particularly in areas where the vegetation is removed and is not re-vegetated.

5.3 New Meru town road bypass

New alignment of the proposed project will have limited adverse environmental impacts. New road alignment will involve land acquisition (displacement of communities, loss of livelihoods), clearance of vegetation, and removal of top soils.

Since the design of a new road alignment would have high social and financial costs, the upgrading of the existing road alignment to bitumen standard is the preferred option which is both economically and socially acceptable since the impacts identified in chapter 7 can be effectively mitigated as provided for in both chapters 7 and through the EMP in chapter 8.

The prevailing condition of the project road and the need to construct bitumen standard road bypasses will be duly considered during the development of design. The current earth roads are not heavily trafficked by both cargo and passenger vehicles. Construction of road bypasses will therefore be the desirable alternative. The proposed Project takes precedence as it will lead to many positive impacts as discussed in chapter 7.

6.1 Introduction

The purpose of public participation in this ESIA study was mainly to create awareness on the Project, involve and facilitate those likely to be impacted positively or negatively, other stakeholders by giving them an opportunity to raise their views, concerns, perceived impacts and ways of mitigating/enhancing project effects. This intended to create a sense of commitment in implementing the ESMP.

To get information about community concerns on the road project, the consultants interviewed community leaders and the general public along the project road. Questionnaires, observations and discussions were the main techniques used to gather the required information (Schnell, R; Hill, B et al 1999). Public meetings in the Project area were also another technique used by the consultants to involve the public.

Inadequate public consultation can result in significant information gaps, which could mislead road planners undertaking an environmental assessment. Lack of attention to communication and consultation processes can generate individual, community, or regional opposition to a road project. This can ultimately be a cause of substantial delays, increased costs, and unsatisfactory compromise solutions, which could have been avoided through earlier consultation.

6.2 The Consultation Process

6.2.1 Stakeholder Consultations

Six (6) key informants were interviewed on 30 and 31 March 2011 in Imenti North District. They are as shown in Table 6.1 below.

Table 6.1 List of key informants interviewed during ESIA study

No	Name	Organisation	Designation
1	Fredrick Rimbere	Municipal Council of Meru	SDO
2	Mburu E.W	Municipal Council of Meru	Physical Planning Officer
3	Manyara L Kiambi	Municipal Council of Meru	Roads Department
4	J. M Alaine	Government of Kenya	District Agricultural Officer
5	George N Karanja	Meru Water and Sanitation	Technical Manager
6	Maneno Evans	Kenya Forest Service	Zonal Forest Officer

Their comments on the various issued asked are as shown in Table 6.2 below.

Table 6.2 Comments from the Key Stakeholders

Issue	Comments
A. Value of the existing roads	
Prevalent Mode of transport within the district	1. Motorcycles, Salon vehicles (private transport) and public transport (Nissans), lorries and donkeys
Whether they find the roads bypass useful and beneficial.	1. All of them agreed that the road is useful in terms of: i. Ease access to Meru town and ease traffic congestion ii. Ease access to markets in Meru town; iii. Carrying out private business easily; iv. Improves economy and development; v. Commuter transport; and vi. Low transport costs due to low fuel use by vehicles.

Issue	Comments
Disadvantages of the current road	1. Short term inconvenience. 2. Increased traffic in town roads; 3. High rate of vehicle wear and tear; 4. Reduced development rate; 5. Discharge of runoff to nearby farms thus destroying crops; 6. Nuisance to people living next to the road; 7. Drainage problems; 8. Traffic jams which impede movement; and 9. Impassable road during rainy season thus disruption of transport
Effects of traffic congestion to Meru community	1. Delay of the farm produce reaching the market e.g. miraa (Khat), coffee, tea, maize and milk; 2. Waste of time; 3. Accidents; 4. Breakdown of vehicles hence increase in transport costs; 5. Hinders communication; and 6. Reduction of business. proceeds
How the Meru Town Bypasses upgrading will impact on the community	1. Easy transportation of agricultural produce hence improved livelihoods of the community; 2. Opening up the place for investors; 3. Increased urbanization 4. Establishment of institutions e.g. schools and colleges; 5. Reduced transportation costs and fares; 6. Integration of communities; 7. Increase accessibility; 8. Transport to hospitals, schools and market centres; 9. Improve economic status and economic empowerment; 10. Expansion and growth of nearby centres; and 11. Increased number of vehicles playing the route 12. Increase in property value.
B. Change in the Local Economy	
Centres that are of major economic value in the district	1. Gikumene market 2. Kwa Nthambi 3. Giantune 4. Gitoro 5. Kaaga 6. Kironi
How the existing road has affected household income and local trade	1. Cost of transportation of goods is high; 2. Hampered transportation of farm produce and losses to farmers; 3. Poor trading hence low returns; 4. Poor marketing of goods; 5. Use of road to access hospitals; and 6. Slowed economic development hence household income especially during rainy season.
Major concerns regarding the planned new road	1. Road should be constructed properly so that it can last longer; 2. Health and safety standards should be followed; 3. Timely completion of the road; 4. Maintenance should be regular 5. Compensation of property 6. Work force- consider locals 7. Drainage should be considered to avoid erosion in the farms; 8. Pollution should be mitigated

Issue	Comments
	9. Incidences of accidents may increase; 10. Mushrooming of business units which may act as hideouts for criminals thus increasing theft; and 11. Contractor to be monitored by Ministry of Roads.
C. Demographic and Settlement Patterns	
How the road has affected population and settlement patterns in the area	1. Growth of small centres; 2. More population near the main road;; 3. Migration of people to places where there are good roads; 4. High transport costs; and 5. Mushrooming of Kiosks and subdivision of farms into plots for construction of shopping centres.
How the new road will affect population and settlement patterns in the area	1. Rise in property value 2. Expansion and growth of centres; 3. Most farms adjacent to the roads will be turned into plots for construction;
D. Impacts on Land Use and Land Productivity	
Major economic activities in the district	1. Tea khat, maize, vegetables, tomatoes, coffee, bananas, coffee, horticulture and employed works. 2. Dairy farming; 3. Quarrying; and 4. Transport; and 5. Trade.
Constraints encountered in the named economic activities	1. High transport costs due to poor state of roads; 2. Poor prices; 3. Loss of produce due to deteriorating quality; and 4. Lack of value addition facilities.
How the new road will affect land use and land productivity in the area	1. Maximum/optimum use of land for farming and housing; 2. Increased productivity and profits in terms of goods and services; 3. Improved livelihood of the people; 4. Farm produce will increase and regional markets will be tapped and Nairobi will be accessed easily; 5. Easy accessibility due to reduced traffic 6. Will lead to efficiency and economic improvement; and 7. Increased farming.
Opinion on whether the road will improve the situation	1. All the stakeholders were in agreement that the road will improve the situation
E. Impact of Undesirable Developments Abutting the Road	
Main undesirable developments brought about by the present road	1. Soil erosion; 2. Drainage problems; 3. Growth and indecent housing; 4. Accidents; 5. Thefts; 6. Loss of perishable products; 7. Vehicle breakdown; and 8. Delays in transportation.
F. Road Construction and Workforce	
Ways in which the local community can be involved in road construction	1. Involve the locals in unskilled labour with a prioritise on skilled locals; 2. Recruitment should be done in liaison with provincial administration; and 3. Involve the locals in road maintenance. 4. Use locally available resources
Locations recommended for road workforce	1. Municipality location 2. Igoki location

Issue	Comments
	3. Ntakira location 4. Mpuuri location 5. Ntima location
Services to be provided by the local community during construction	1. Guards including security; 2. Catering services; 3. Skilled and unskilled labour; 4. Accommodation; 5. Guides 6. Drivers, mechanics; 7. Clearing of road; and 8. Culvert construction.
G. Road Construction and Workforce	
Quarries and borrow pits used to construct present road	Material sites are being investigated.
Whether quarries and borrow pits been rehabilitated to the community's satisfaction	Material sites are being investigated
Any specific preference or problem areas for quarries and borrow pits	1. Rehabilitation after mining; 2. The materials should meet the road specifications; 3. Problem of breeding mosquitoes and other rodents; 4. Hazards to life; and 5. Compensation for land owners.
H. Development within the Road Reserve	
Do you know the road reserve is not your land for development	1. All of them said yes
Interventions that the government should take to deal with encroachment on road reserves	1. Through public barazas and local administration; 2. Legal means and enforce the law; 3. Road reserve sensitization; 4. Involve all stakeholders in acquisition process. 5. Encroachers to be prosecuted; 6. Provide sleeves for utilities every 500M interval 7. Educating the local community; 8. Issue notices and reposes; 9. Demolition of buildings on bypasses; and 10. Marking of road reserves.
If the new road has new alignments, would you expect compensation or relocation	1. Most preferred compensation while preferred both compensation and relocation
Would you offer new sites for borrow pits for future construction	1. Yes, if the once being exploited are exhausted or unfit.
I. Participation in Road Maintenance	
Willingness to carry out road maintenance	1. Yes
Would you like to serve as local road maintenance committee	1. All said yes
J. Social Impacts	
Impacts that the non-local workers will have on the locals	1. Prostitution; 2. Insecurity; 3. Change of lifestyle; 4. Integration, peace building and friendship; 5. Intermarriages; 6. Education/exchange of knowledge/ideas; 7. Conflicts if non-residents are employed as unskilled workers; 8. Disease outbreak; 9. Depletion of local resources; and 10. Different customs.
Suggestions to reduce the resultant negative impacts	1. Give the locals jobs; 2. Involve local leaders in integrating local and non-

Issue	Comments
	local workers; 3. Community policing; 4. HIV/AIDS awareness; 5. Sensitization and mobilisation of the community; 6. Increase security patrols; 7. Rehabilitation of quarries; 8. Education and barazas; 9. Inspection of mushrooming structures; 10. No grazing along the road; 11. Advertise recruitment to the local community; and 12. Involve all other departments

6.3 Public meetings

Five public meetings "barazas" were conducted at Municipality Chiefs Office, Tabiru Coffee factory, Ntakira Chiefs office, Giantune market and KFS/KWS gate. The meetings held on 31st March and 1st April 2011 and were meant to introduce the project, understand social and community structures. The list of attendants and minutes of meeting are appended in **Appendix 2.**

Table 6.3 Details of the public meetings held

No	Location	Venue	Number of participants
1	Municipality	Municipality Chiefs office	113
2	Igoki	Tabiru coffee factory	24
3	Ntakira	Ntakira chiofs office	
4	Mpuuri	Giantune market	137
5	Ntima	KWS/KFS gate	70

6.3.1 Benefits of the Proposed Upgrading of the Road to Bitumen Standards

Generally, the local communities consulted were positive about the proposed Project since they anticipate numerous benefits upon implementation of the project. They highlighted a number of benefits of the proposed road project, as follows:

a. Ease off Traffic Congestion

The proposed road bypass will help ease traffic congestion that has caused so much agony to motorist in the town and even hurt both the local economy and public transport in the town.

b. Improved Road Surface

With improved road surface, there will be increased comfort in travelling and better means of transport unlike the current use of motor cycles, donkey carts and trekking.

c. Access to Essential Services

Many people will be able to access essential medical facilities in both in town and those in peri urban areas due to improved road surface i.e., supplies of farm inputs and other products to the area will also be delivered with minimal delays. Access to emergency services like ambulance and fire fighting will improve considerable.

This road provides an essential link for delivery of agricultural inputs and produce, in this high potential area.

d. Improvement of Local Socio-Economy

The local community consulted mentioned that they would like to see improvement of the road, as it would increase business and boost the economy of the region. The road also provides an interlink between major and feeder roads in Meru.

The local community anticipated that the markets and trading centres would expand, attracting investors and businessmen. They anticipated that their incomes would improve with improvement in the transportation of their goods since commodities will be transported everyday along the road as market days are allocated to each of the main trading centres during the week.

e. Agricultural Development

Agricultural production is the main economic activity in the project area. The local community anticipated that with upgrading of the road bypasses to bitumen standards will lead to the following agricultural development through:

1. Increased marketing of agricultural produces from the primary markets and secondary markets;
2. Reduce wastage of agricultural produce due to spoilage due to lack of access to the markets;
3. Access to agricultural value chain centre, buying centres, factories and subsequently reducing transport/marketing cost;
4. Easy access by the agricultural extension officers to educate farmers on good production practices;
5. Easy delivery of produce to other local markets and even international markets.

f. Increased Employment Opportunities

1. Many people stated that they anticipated a creation of job opportunities during the construction of the road;
2. More market centres and trading centres will open up and existing ones will expand when the road is upgraded, business will flourish thus creating more indirect employment.

g. Reduced Transport Costs and Travel Time

1. The businessmen in the area were particularly keen that the road is improved as it will attract more public passenger vehicles and with competition, it is hoped that the fares would decrease;
2. It is anticipated that with an improved road, travel time will be reduced and women will be able to travel to the main markets themselves to sell their produce as opposed to using middlemen;
3. New transport routes along the bypasses.

h. Improved Security

Construction of the road bypass will ease the security patrols hence lowering the crime rates in the peri-urban and urban area of Meru County experiencing a typical urban type of crime.

i. Reduced Vehicle Breakdown

With the construction of the proposed road, the community were of the opinion that it will reduce vehicle breakdown thus saving on cost of vehicle maintenance.

6.3.2 Problems and Concerns Cited on the Proposed Upgrading of the Road

The local communities consulted cited many problems that they anticipate with the proposed road.

a. Employment

The community expressed concern on employment; they wanted unskilled workers to be recruited from the local area and local leaders to be consulted as part of the recruitment to reduce the disputes or conflicts that could emerge between the Contractor and the local population during the construction period. This was mentioned in all the local meetings. It may also result in unnecessary tension especially if the locals are not considered for employment.

b. Encroachment onto the Road Reserve Demolitions and Relocation of Service

Encroachment in the road reserve includes crop cover, woodlots, buildings and temporary structures in several market centres along the project are within the road reserve. Some parts of the road will be realigned leading to relocation of some community members. The community recommended that the government compensates them and relocation of services for all amenities should be done by the contractor and proper procedures be followed on individuals who have encroached on the road.

c. Accidents

The community expressed concern on the possible increase of accidents on the road due to smooth running surface after upgrading:

1. Speeding vehicles;
2. Lack of road safety signs;
3. Lack of bumps;
4. Livestock and children crossings.

d. Breakdown of Social Values

The road traverses an area mainly dominated by the Ameru people though the town is cosmopolitan. Most community members expressed concern that with the incoming of new people from diverse backgrounds and social setting during construction there would be probable breakdown of social values, which could result in unwanted marriages, social problems and spread of diseases.

e. Parking Facilities and Bus Bays

There are no parking and bus bays at all the trading centres along the road, causing congestion particularly during the market days. The critical areas highlighted by the community are at Giantune market and other trading centres along the bypass.

f. Transport Costs and Travel time

People interviewed during public consultations were concerned about:

1. Delays in transportation of goods and services during the construction of the road;
2. The high public vehicle fares and length of time it takes to travel between trading centres;
3. Poor road conditions which make it difficult to transport food stuff from neighbouring Districts;
4. Inaccessibility of some market centres during the rainy seasons.

The mitigation measures for above concerns have been discussed in Chapter 7. In order to avoid the disputes or conflicts that could emerge between the local administration and the population at the time of the construction of this road, there is need to consider the following recommendations:

1. To sensitise the communities living along the project road about the importance of this road. This method of communication aims to avoid social tensions with the inhabitants. This campaign of information should be run by the local administration in order to prepare the population for eventual compensation;

2. The affected communities or persons should participate in the inventory of the rural structures (crops, fields, and houses) that will be affected by the proposed works;
3. Once the inventory of the rural structures is complete, the Department of Lands together with the local administration should conduct their expert valuation;
4. Before the actual relocation, the Government should compensate the project-affected persons and allocate new plots to the expropriated people.

g. Relocation of Utilities

The community raised concern over existing service lines including water pipes, fibre optic and power lines on the road reserve. This however will be moved appropriately before commencement of works. The relocation of service should be done with due care so as not to disrupt the local operations of the locals.

All the above process should be completed before commencing the construction of the bypasses.

h. Dust and Noise

The community expressed fears of possible increase in dust and noise especially during the construction phase

i. Changes in Physical Features

Due to felling of trees, crop cover and new alignments within the proposed road bypasses, the community felt that this will negatively affect the physical appearance of the area.

j. Degradation of Water Courses

The community were of the opinion that the value of the wetlands and water courses will be degraded in the feeder roads drains it runoff to the various wetlands in the area.

k. Insecurity

Presence of construction workers in the area will bring about insecurity in the area since most of the people are of unknown backgrounds and their profiles unknown to the local administration and security agents.

l. Soil Erosion

Topography and land fragmentation in the area may pose a challenge to the road drainage. However it was agreed that the road drainage be designed so as not to accumulate storm water hence becoming an erosive agent.

6.4 Community Perceptions on the Project

The consultant administered 49 questionnaires to the households living within the Project area. The questionnaire had the following parts:

1. Identification of interviewee;
2. Perception on the Project area; and
3. Cultural assessment.

a. Project Awareness and Sources of Information

About 81% of the respondents confirmed that they have heard about the project with the majority (97%) having heard about it through the friends and neighbours followed by the chief's baraza.

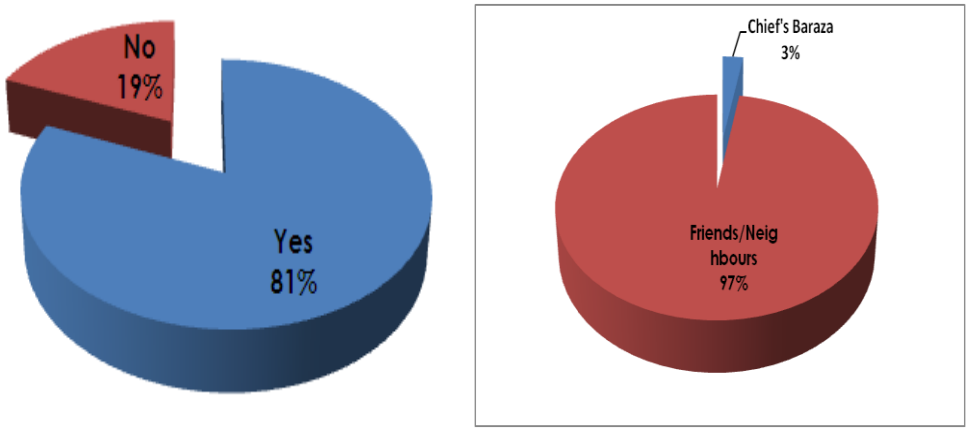


Figure 6.1 Source of Information on the Proposed Project

b. Anticipated Project Benefits

Most of the respondents said that the proposed Project will have some benefits to them and the benefits are indicated according to their percentages and the results showed that majority of the respondents (76%) believe that the project will lead to improved transport followed by opening of new markets at 10%. This is as shown in Figure 6.2 below.

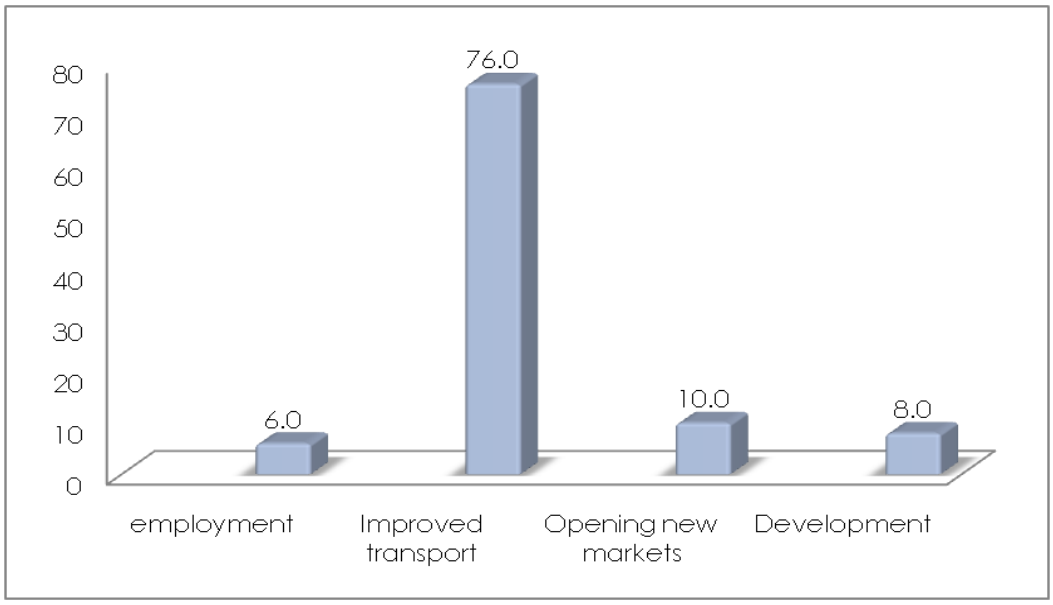


Figure 6.2 Anticipate project benefits

c. Anticipated Negative Impacts of the Project

There were some concerns that the proposed Project may lead to some negative impacts because of land size in the area. Some of the negative impacts are as shown in the figure below.

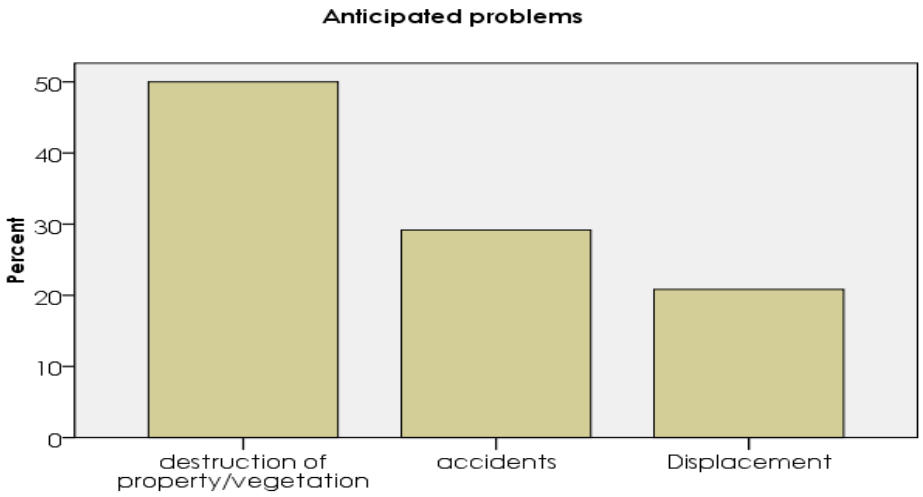


Figure 6.3 Anticipated negative impacts of the project

d. Issues Affecting Project Area

They also give the general problems which are facing the community in the project area. The respondent felt that infrastructure is their biggest problem followed by insecurity then youth unemployment. This is as shown in Figure 6.4 below.

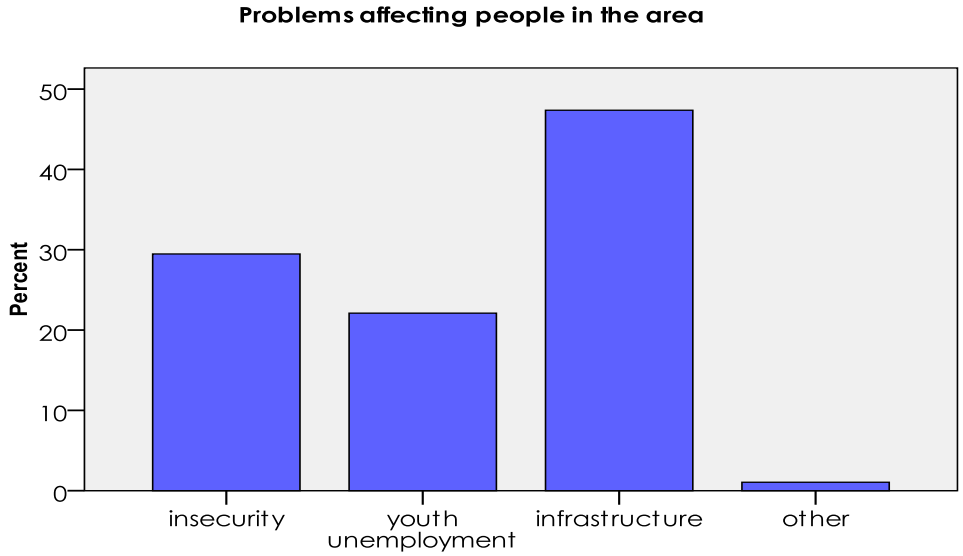


Figure 6.4 Problems facing the project area

e. Anticipated Positive Impacts During Construction

There are several positive impacts to be accrued during project construction and operations. They are shown in Figure 6.5 below.

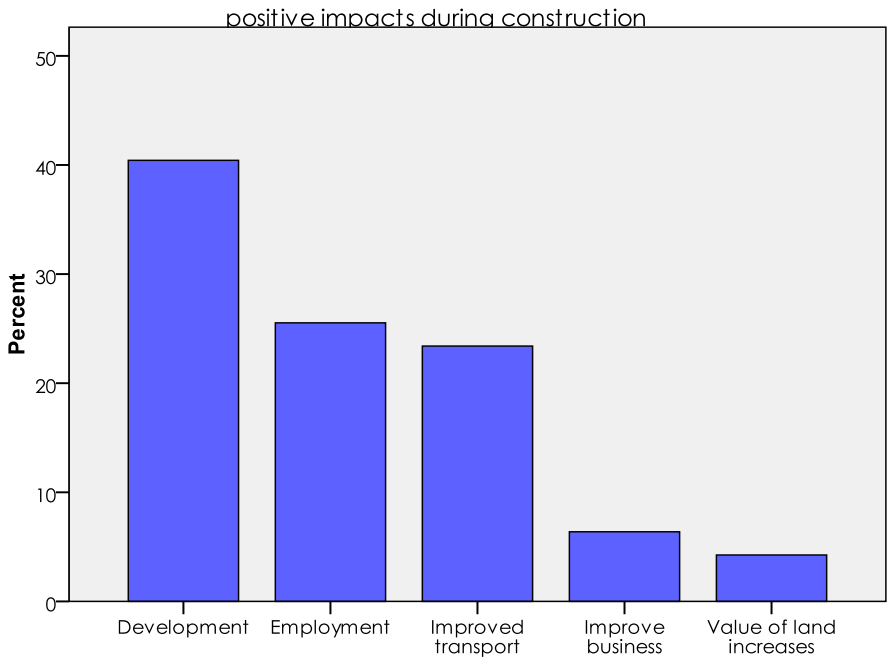


Figure 6.5 Positive impacts during construction of the bypass

f. Negative Impacts During Construction of Bypass

The stakeholders went further to identify the following negative impacts that might arise during the construction phase. Figure 6.6 below shows that the respondents feel that immorality will increase, followed by crimes then insecurity and loss of business, destruction of crops and finally, increase in accidents.

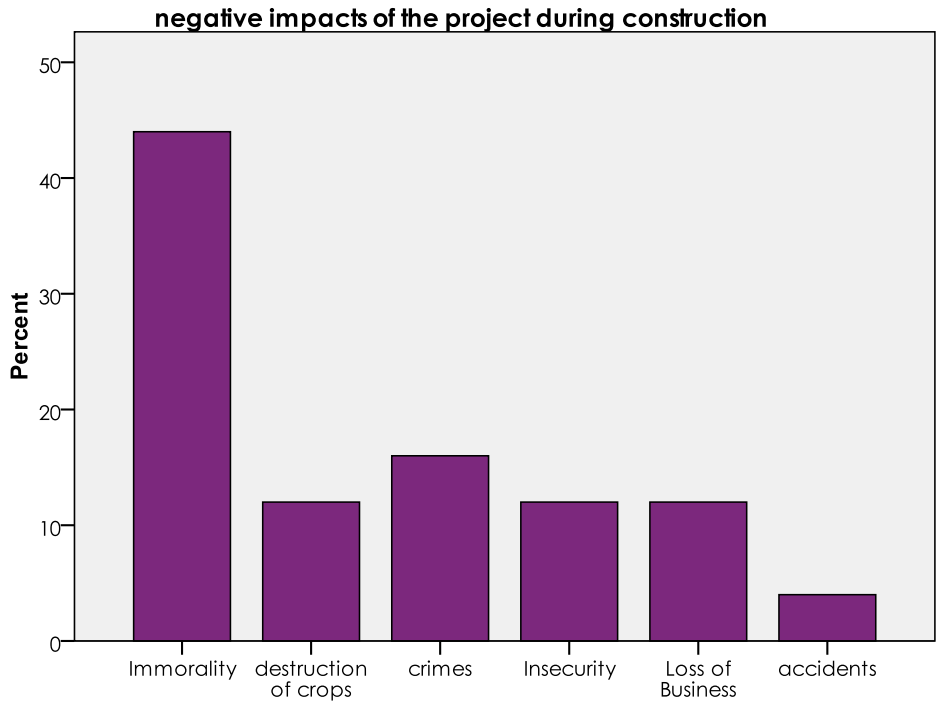


Figure6.6 Negative impacts during construction

g. Impact of Project on Locals Operations and Project Acceptability

i. Impact of Project on Current Operation

Most residents in the project area don't expect the project to affect their current operations (79%) while 21% expect the project may affect their current operations like change of route (diversions), dust to crops and loss of livelihoods. However 98% are in support of the Project. This is illustrated in the figure below.

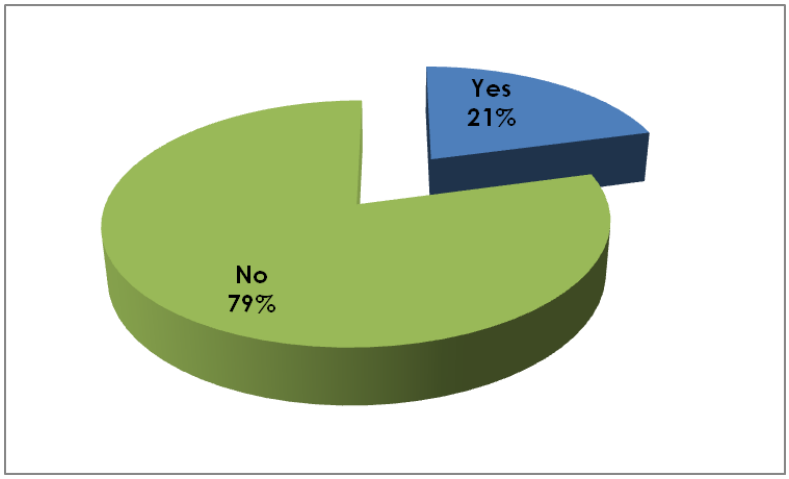


Figure 6.7 Impact of project on current operations

ii. Those Supporting the Project

Figure 6.8 shows that 98% of the respondents are in support of the project unlike 2% who do not support the Project.

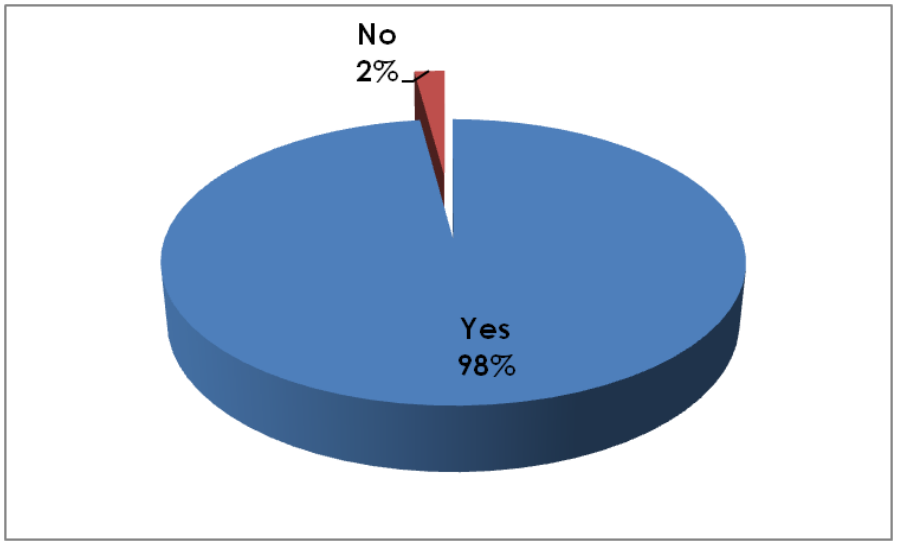


Figure 6.8 Project acceptance

6.4.1 Cultural Assessments

Results showed that there are NO sites in the area which are considered to be of cultural importance. Nevertheless chance finds procedures will be incorporated into the EMP and civil works contracts. The following wording is proposed:

If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:
- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Museums of Kenya take over;
- Notify the supervisory Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the [Culture Department of Province] immediately (within 24 hours or less);

Responsible local authorities and the [Culture Department of Province] would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.

Decisions on how to handle the finding shall be taken by the responsible authorities and the [Culture Department of Province]. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage.

Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.

-Construction work may resume only after permission is given from the responsible local authorities or [Culture Department of Province] concerning safeguard of the heritage.

6.5 Public Disclosure

Once the final ESIA Project Report is ready it will be submitted to NEMA for approval and disclosure, and will be submitted to the World Bank for disclosure in the World Bank InfoShop. NEMA is required to disseminate the ESIA Project Report to lead agencies, including local authorities in the affected areas , so that they may disclose it for reviews and comments.

6.6 Future Consultations

The initial consultations during the design phase and ESIA study will be followed by more consultations during the construction phase and operation phases. The findings of these consultations will be reflected in the Environmental Audit to be undertaken upon completion of the project.

7.1 General

The purpose of the environmental and social impact assessment (ESIA) of the road project is to improve decision making and to ensure that the project progresses in a sustainable approach. The ESIA identifies ways of improving the project environmentally and socially by preventing, minimising, mitigating, or compensating for adverse impacts. These measures will help to avoid potentially costly remedial measures.

The proposed road project activities are likely to have potential impacts on natural and human environment. These impacts can be categorized in various ways. They can be grouped according to their nature, into positive or negative impacts, random or predictable impacts, cumulative, local or widespread impacts, temporary or permanent impacts, short- or long-term impacts or even their level of seriousness.

Table 7.1 Type of Impacts and Examples

Type of impact	Example
Predictable	Road accidents due to speeding.
Temporary	Noise and dust during haulage of raw materials from borrow pits or quarries.
Permanent	Change of landscape within areas where new roads are constructed or if a new road alignment will be followed.
Direct impacts	Land consumption, removal of vegetation, and severance of farmland. An example of this is removing gravel material from a borrow pit for use in surfacing a road.
Indirect impacts	Degradation of surface water quality by erosion of land cleared for a new road, urban growth near a new road, and increased deforestation of an area stemming from easier (more profitable) transportation of logs to market or the influx of settlers.
Cumulative	Impairing the water regulating and filtering capacity of a wetland system by constructing a road across it.

Source: Adopted from Wasike, 2001

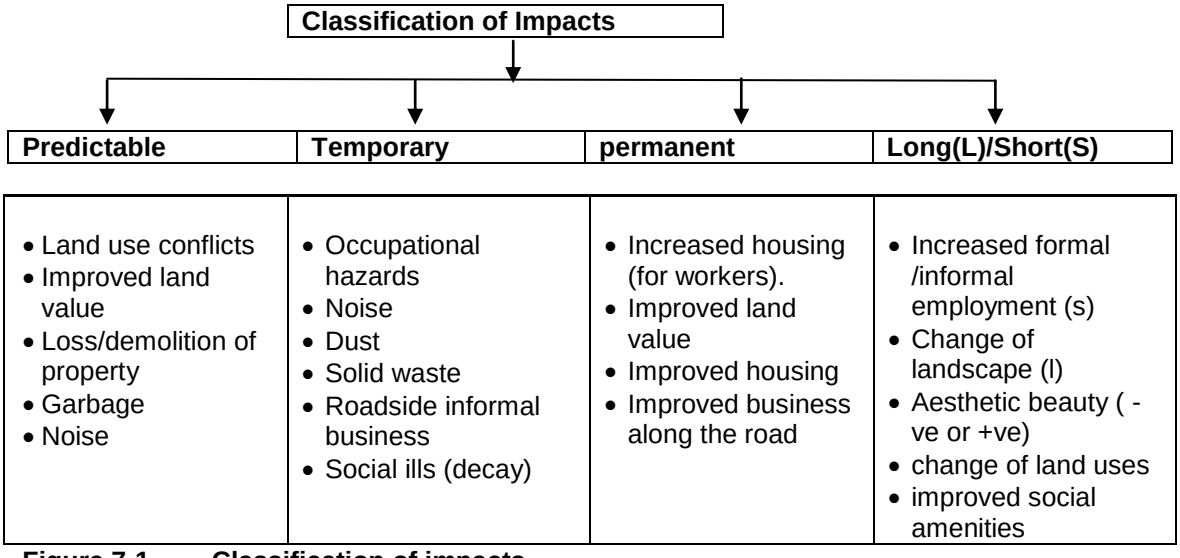


Figure 7-1 Classification of impacts

7.2 Summary of Potential Impacts

An overview of the project road design components has been presented in Chapter 4.

The potential impacts of the proposed project have been listed in Table 7.2 below and analysed into different categories based on the stakeholders' views, perceptions and the consultant's previous experience in undertaking road Projects ESIAs and experiences gained from other road construction projects.

Table 7.2 Summary of potential positive and negative impacts

Environmental and Social Impacts	Positive/ Negative	Direct / Indirect	Temporary / Permanent	Major / Minor	Occurrence		
					Construction	Operation	Decommissioning
Increased employment opportunities.	Positive	Direct	Permanent / Temporary	Major	✓	✓	✓
Ease traffic congestion in Meru town	Positive	Direct	Temporary/Permanent	Major	✓	-	✓
Improvement of local socio-economy.	Positive	Direct	Permanent / Temporary	Major	✓	✓	✓
Improved drainage	Positive	Direct	Permanent	Major	-	✓	✓
Improved living standards	Positive	Direct	Permanent	Major	-	✓	-
Increased security	Positive	Indirect	Permanent	Minor	-	✓	-
Education	Positive	Direct	Permanent	Major	-	✓	-
Improved national transport	Positive	Direct	Permanent	Major	-	✓	-
Road safety	Positive	Direct	Permanent	Major	-	✓	-
Empowerment of women	Positive	Direct	Permanent	Major	-	✓	-
Land acquisition and displacement of people	Negative	Direct	Permanent	Minor	✓	-	-
Construction material sourcing	Negative	Direct	Temporary	Major	✓	-	-
Air pollution	Negative	Direct	Temporary	Minor	✓	✓	✓
Noise pollution.	Negative	Direct	Temporary	Major	✓	✓	✓
Vegetation loss	Negative	Direct	Temporary -	Major	✓	-	-
Impacts on soil and drainage	Negative	Direct	Permanent	Major	✓	✓	-
Impacts on water resources	Negative	Direct	Temporary	Minor	✓	-	-
Contractor's camp site	Negative	Direct	Temporary	Minor	✓	-	-
Solid wastes	Negative	Direct	Temporary	Minor	✓	-	✓
Liquid wastes	Negative	Direct	Temporary	Minor	✓	-	-
Hazardous sites	Negative	Direct	Temporary	Minor	✓	-	-
Diversions and access roads	Negative	Direct	Temporary	Minor	✓	-	-
Disruption of access to property	Negative	Direct	Temporary	Minor	✓	-	-
Relocation of public utilities	Negative	Direct	Temporary	Minor	✓	-	-
Delays in transportation	Negative	Direct	Temporary	Minor	✓	-	-
Emergence of unplanned settlements	Negative	Direct	Temporary	Minor	✓	-	-
Discrimination on employment opportunities	Negative	Direct	Temporary	Minor	✓	-	-
Occupational Health and Safety	Negative	Direct	Temporary	Minor	✓	-	✓
Public health and HIV/AIDS	Negative	Direct	Permanent	Major	✓	✓	✓
Disruption of community	Negative	Direct	Permanent	Minor	✓	-	-
Site security	Negative	Indirect	Temporary	Minor	✓	-	-

Environmental and Social Impacts	Positive/ Negative	Direct / Indirect	Temporary / Permanent	Major / Minor	Occurrence		
					Construction	Operation	Decommissioning
Fire Incidences	Negative	Direct	Temporary	Minor	✓	✓	✓
Climate change	Negative	Direct	Permanent	Major	✓	✓	✓
Road accidents	Negative	Direct	Permanent	Major	-	✓	-
Right-of-Way encroachment	Negative	Direct	Permanent	Minor	-	-	-
Illegal trade on trees and its products	Negative	Indirect	Permanent	Minor	-	-	-
Cultural changes	Negative	Indirect	Permanent	Minor	-	-	-

LEGEND ✓Present ▬ Not present

The impacts of the proposed Project will be both positive and negative. They have been presented according to the various phases of project cycle which includes construction, operation and decommissioning phases.

7.3 Positive Impacts during Construction Phase

7.3.1 Improved Drainage

Road bypasses are expected to improve drainage infrastructure and general discharge of storm water from the road/carriageway which will reduce soil erosion in the project area. This will be a major gain to the project site as it is facing serious road drainage problems because the topographic gradient in the project area is more than 6%.

7.3.2 Creation of Employment Opportunities

The construction of the Meru Town road Bypasses will create employment opportunities for many people directly or indirectly during construction phase. Most of the people will be employed as casual or unskilled workers. It is anticipated that approximately 50 people will be employed directly and over 100 indirectly during the Project period.

7.3.3 Improved local Socio-Economy

Respondents who were interviewed acknowledged that the proposed Project road will contribute immensely to the development of business at the trading centres along the road. Some of the socio-economic benefits include:

- Increased business opportunities at the market centres due to the presence of the project workforce during construction;
- Employment of local workers during the construction phase of the project;
- Strengthening of local economy through the establishment of micro-enterprises such as bulking points;
- Easy access to markets through lower transport costs, less time and improved road condition.

The road Project comprises of construction of bitumen standard road bypasses on existing gravel and earth roads; no major realignments are proposed and any minor improvements of horizontal and vertical alignments to improve curvature and sight distance will be accommodated within the road reserve. Thus, the direct impact on land use will be negligible,

and the requirements for land acquisition are minimal, apart from those for the establishment of the Contractor's and workmen's camps.

7.4 Potential Negative Impacts During Construction Phase

7.4.1 Land Acquisition

Horizontal alignment design was carried out in accordance with Chapter 5 Section 5.3 of RDM I and Vertical alignment will be carried out in accordance with Chapter 5 Section 5.4 of the RDM I. The new road alignment follows the existing old road alignment in many sections. However there are realignments in the some sections of the road due to topographic conditions and road standards requirements. The land to be acquired for above reasons will be in the surveys which is ongoing on.

Mitigation Measures

The Resettlement Action Plan (RAP) and related socio-cultural impacts and mitigation measures to the community was not part of this assignment. Therefore, the RAP Study will be prepared under a separate contract. However, land acquisition should be carried out in accordance with land administration laws of Kenya and the World Bank OP 4.12 , Involuntary Resettlement. The compensation should be guided by the principle that the affected people will have their former living standards and income-earning capacity improved or at least restored. The affected people must be provided with adequate support during the transition period.

7.4.2 Construction Material Sourcing

Major concerns relating to the proposed raw material sites, gravel sites and sand harvesting sites include vegetation clearance, landscape scars, dust and general disturbance during excavation, and the need to reinstate or landscape the gravel sites when the contractors have completed excavation works.

Materials sites (quarry, borrow areas and sand harvesting sites) if not reinstated and rehabilitated after project completion, will create a badlands type of landscape with water bodies, scattered boulders and rubble of ballast on the soil surface. This calls for economic use of these stone resources by the contractor to avoid wastage. The pools of water that will form during the rainy season, without outflow on the borrow pits shall be suitable habitats for disease vectors for example; malaria, bilharzias and liver fluke. Further impacts in case such borrow pits are abandoned, and left without being rehabilitated are:

1. Once the quarry dams are filled with water, their banks can burst hence causing flood and associated damage within the nearby sites.
2. Unfenced quarry dams will be risky to public (especially children), livestock and wildlife due to drowning associated deaths, therefore should be fenced off when in use.
3. Illegal excavation of ballast for sale from abandoned quarries will lead to development of badlands (barren unproductive areas), leading to erosion of topsoil.

Land will be acquired for obtaining construction materials i.e. borrow pits and quarries.

Sand harvesting on the other hand should not be done in rivers as may cause the following environmental problems:

- Siltation of the river;
- Drying of river beds hence affecting the water table / storage capacity of the river.

Mitigation Measures

The Contractor is required to do the following:

1. Ensure that appropriate authorisation to use the proposed borrows pits and quarries has been obtained before commencing activities by seeking approval from the National Environmental Management Authority before use of any active quarry site;
2. Carry out inspection of each of the site's soil stability before excavation;
3. All borrow pits sites shall be clearly indicated on a plan and approved by the RE.
4. Borrow pits and quarries shall be located more than 20 meters from watercourses in a position that will facilitate the prevention of storm water runoff from the site from entering the watercourse;
5. The Contractor shall give 14 days' notice to nearby communities of his intention to begin excavation in the borrow pits or quarries;
6. Prepare health and safety plan before any work on the quarries is commenced;
7. Cordon off the quarry and borrow areas to keep livestock and children off;
8. Maintain fences and "make good" of the sites afterwards;
9. Prepare and implement borrow pit plans and borrow pit rehabilitation plans, which would minimise the risk of erosion;
10. Topsoil shall be stripped prior to removal of borrow and stockpiled on site. This soil shall be replaced on the disturbed once the operation of the borrow site or quarry is complete;
11. The use of borrow pits or quarries for material spoil sites may be approved by the RE (and/or with the appropriate consent of the "landowner"). Where this occurs, the materials spoiled in the borrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil;
12. Decommission the borrow pits and quarries upon completion of the Contract and reinstate the land to its natural condition by grading excavations and planting suitable saplings;
13. The contractor is expected to follow the sand harvesting regulations published by NEMA.
14. In case of blasting:
    i. The Contractor will be responsible for obtaining a current and valid authorisation from the Department of Mines and Geology prior to any blasting activity. A copy of this authorisation shall be given to the RE;
    ii. A qualified and registered blaster by the Department of Mines and Geology shall supervise all blasting and rock-splitting operations at all times;
    iii. The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);
    iv. The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site;
    v. The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the RE and the relevant authorities;
    vi. The Contractor shall ensure that adequate warning is provided to the local communities immediately prior to all blasting. All signals shall also be clearly given;
    vii. The Contractor shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover.

7.4.3 Air Pollution

The road traverses through a region with poorly consolidated notisols soils. Dust in road construction areas originates mainly from the scraping of the earth surfaces, from the movement of heavy machinery on earth roads especially deviation routes and from haulage activities of the ballast chipping. Already there is significant dust along the project road at its current status.

Mitigation Measures

1. Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications;

2. Workers shall be trained on dust minimisation techniques;
3. The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible;
4. Do not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds. The RE shall suspend earthworks operations wherever visible dust is affecting properties adjoining the road;
5. Water sprays shall be used on all earthworks areas. Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the RE;
6. Vehicles delivering soil materials shall be covered to reduce spills and windblown dust;
7. Vehicle speeds shall be limited to minimise the generation of dust on site and on diversion and access roads;
8. Any complaints received by the Contractor regarding dust will be recorded and communicated to the RE;
9. Plants and all construction works should be undertaken strictly during business hours;
10. NEMA and the Ministry of Transport has published regulatory measures related to vehicle air pollution. It is anticipated that these measures will be adhered to and the law enforcers will take control;
11. Project-specific design improvements to limit motor vehicle air pollution impacts include:
    i. The carriage way provides sufficient capacity to avoid traffic congestion, with projected increases in traffic flow;
    ii. Avoiding steep grades and sharp curves which would promote deceleration, acceleration and shifting wherever possible;
    iii. Planting tall, leafy, and dense vegetation along the road to filter pollutants.

7.4.4 Noise Pollution

Noise generating activities such as blasting in hard stone quarries, equipment operations and the workers themselves will be a public nuisance to the surrounding especially close to residential areas, health centres and schools. The movement of heavy machines, where possible, will have to be synchronized with school programs and hospitals, blasting will have to be preceded with ample notices to communities within the area. Also the workers will be briefed on the need to maintain order to minimize noise concerns.

Mitigation Measures

1. The Contractor shall keep noise level within acceptable limits and construction activities shall, where possible, be confined to normal working hours in the residential areas;
2. Schools, hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of school hours, where approved by the RE;
3. Construction workers will be required to wear ear muffs in areas exposed to excessive noise levels;
4. Equipment should be maintained regularly to reduce noise resulting from friction;
5. No unnecessary hooting by project and resident vehicles;
6. Any complaints received by the Contractor regarding noise will be recorded and communicated to the RE.

7.4.5 Vegetation Loss

Clearing of vegetation from road reserves for access to gravel pits, and excavating gravel from gravel pits with slopes exceeding 4% could result in an increase in runoff along the slopes and thus encourage erosion. Soil erosion is likely to be an on-going problem because of the varied nature of the environment along the road.

The proposed Project generally follows the old alignment in many sections and therefore, during construction, only vegetation which, has encroached into the road reserve will be cleared to give way for the proposed road.

Road construction will also involve the establishment of work camps and exploitation of borrow areas which may lead to crushing and removal of plants.

Due to the rising costs of energy in the country, the labour force might rely on fuel wood. Exploitation of fuel wood as the only affordable source of energy could deplete the natural vegetation along the road alignment.

Mitigation Measures

1. Except to the extent necessary for establishing the construction site and carrying out the construction works, vegetation shall not be removed, damaged or disturbed nor should any unauthorised planting of vegetation take place;
2. The clearance of the site for construction purposes shall be kept to a minimum. The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc shall be encouraged;
3. Areas to be cleared should be agreed and demarcated before the start of the clearing operations;
4. Clearing and removal of vegetation, especially at borrow sites must be carried out in such a way that damage to adjacent areas is prevented or minimised;
5. All vegetation encroaching into the road reserve must be cleared to give room for visibility;
6. Areas with dense indigenous vegetation are not to be disturbed unless required for construction purposes, nor shall new access routes be cut through such areas;
7. Trees should be trimmed rather than removed wherever possible;
8. The Contractor should plants indigenous and native trees along the project road at suitable distance of approximately 50m apart, this should be included in the Bill of Quantities. In cases where non-native species are deemed essential, careful monitoring should be planned, to ensure that they do not compete too successfully with native species and spread uncontrollably;
9. The use of fuel wood by construction workers should be discouraged. Workers should be encouraged to use alternative energy sources such as kerosene, electricity or gas;
10. The use of indigenous plants as firewood is prohibited unless they are obtained from approved sources;
11. The contractor should establish contracts with wood fuel suppliers, where wood is used. The suppliers should show permits from the relevant Government agencies to prevent illegal felling of trees and to ensure plantation timber is used.

7.4.6 Impacts on Soils and Drainage

a. Storm Water and Soil Erosion

Soil erosion was observed at different sections along the project road. Soil erosion is attributed to:

1. Run-off from unprotected steep slopes in the hilly areas;
2. Run-off from blockage of culverts or lack of drainage facilities;
3. Lack of scour checks on the side drains; and
4. Accumulation of storm water over long distance.

Construction activities such as excavation and hauling of material from borrow pits and cuts for construction of embankments may also result in soil erosion to some degree. The Contractor shall take reasonable measures to control storm water and the erosive effects.

Mitigation Measures

1. Earthworks should be controlled so that land that is not required for the road works is not disturbed;
2. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain;
3. Excavated materials and excess earth should be kept at appropriate sites approved by the Supervising Engineer;
4. Wherever possible, the earth dumping sites will be designed in such a manner as to facilitate natural water discharge;

5. The contractor should adhere to specified cut and fill gradients and planting embankments with shrubs and grass to reduce erosion and take care of stability problems of road embankments. Areas cleared for improving sight distance should be planted with grass to reduce erosion;
6. Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion, these include:
    i. Areas stripped of topsoil;
    ii. Soil stockpiles;
    iii. Spoil sites;
    iv. Borrow pits;
    v. Sites for bridges and drainage structures.
7. On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be limited to:
    i. Confining construction activities;
    ii. Using cut off drains;
    iii. Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls;
    iv. Mulch or chip cover;
    v. Constructing anti-erosion berms;
    vi. The erosion prevention measures must be implemented to the satisfaction of the RE; and
    vii. Where erosion does occur on any completed work/working areas, the Contractor shall reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the RE and ESO.

b. Drainage

Discharge of storm water from the road presents a key concern from the communities. Discharge of roadside storm water presents a very large negative impact to the project community because of the small land sizes and land topography.

Bridges (Reinforced Concrete, Composite) and pipe culverts are the only drainage structures existing on the project road. New drainage structures to be redesigned shall include pipe culverts, box culverts, bridges and drains/ditches. Details of existing drainages along the eastern and western bypass are as shown in Table 4.1 in chapter 4.

Lack of drainages may increase the chances of soil erosion.

The Project design has catered for the following to mitigate against drainage problems:

1. Box culverts shall be designed to replace some cross pipe culverts that by visual inspection appeared to overtop during floods.
2. Depending on the structural integrity some bridges/box culverts may be retained but extended.
3. More closed drains and paved side drains on high gradient areas.

<u>Mitigation Measures</u>

1. Where new culverts are to be installed, consultation with people settled there will be required to avoid possible conflicts that may arise due to channelling of water;
2. The Contractor shall ensure that provision is made to facilitate continuity of base water flow at all times during construction of these features across streams, rivers, lagoons and flood plains;
3. Ensure that drainage structures are able to accommodate high rainfall and flash floods, drainage structures are regularly maintained by desilting;
4. The Contractor shall not divert, dam or modify any watercourse without the approval of the RE and relevant authorities as required by the law;
5. The Contractor shall submit a Method Statement to the RE for approval prior to commencing construction of bridges or culverts.

7.4.7 Impacts on Local Resources

Increased population associated with road construction workers and vendors may exert pressure on local resources such as water and land, and may trigger price increases for commodities and services. Similarly, increased population associated with road construction workers and job speculators will stress the existing social services such as housing, health facilities and sanitation.

Mitigation Measures

1. The contractor should consult the community on partitioning of access to local resource for construction purposes;
2. The Contractor must adhere to water quality regulations described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Rules describe the following:
   - Water sources for domestic use;
   - Sewage treatment;
   - Ground water;
   - Water for agricultural use;
   - Water for other uses;
   - Schedules depicting standards.
3. Abstractions from natural, municipal and / or private water resources (e.g. rivers, boreholes and springs) for potable water and construction water shall be approved by the Water Resources Management Authority. The Contractor shall arrange for the necessary approvals / permits from the water authorities under the direction of KURA for the abstraction of water.

7.4.8 Contractor's Camp Site

The construction contractor will need to establish camps including site offices, workshops, stores, vehicle parking, and staff accommodation. The camp sites are bound to have high human activity, material storage facilities, sanitary facilities which will lead to generation of solid and liquid wastes generation which require adequate management and proper disposal.

Mitigation Measures

The mitigation measures have been divided according to the different components of the contractor's camp.

General

1. The site for the Contractor's Camp shall be determined in collaboration with the RE taking into consideration the following:
   i. The security situation in the area (expressed authority must be given by the Officer Commanding Police Division of Imenti North District and preferably to be located on the existing market centres within the road alignment.
   ii. The local administration shall be involved in the site location to avoid destruction of any ritual site or any other conflict;
   iii. The Contractor's Camp layout shall take into account availability of access for deliveries and services and any future works;
   iv. The Contractor's Camp should also be of sufficient size to accommodate the needs of all sub-contractors that may work on the project.
   v. Decommission the camps and reinstatement of the land to its natural condition by filling excavations and planting suitable saplings.
2. The Contractor shall implement the following as required with the approval by the RE:
   i. The contractor will be required to prepare a waste management plan for the work sites and camps at the start of the project;

ii. A suitable storm water drainage system to prevent soil erosion, protect storage areas and to prevent stagnant ponds forming;
iii. A suitable potable water supply;
iv. Suitable facilities for bathing, washing clothes or vehicles – site staff will not be permitted to use open water bodies for such activities;
v. Suitable sanitation facilities, adequate for the number of staff on site;
vi. Facilities for cooking;
vii. Facilities for solid waste collection; and
viii. Facilities for waste water management.

Sanitation

1. The Contractor shall comply with all laws and any by-laws relating to public health and sanitation;
2. All temporary/ portable toilets or pit latrines shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over;
3. The type and exact location of the toilets shall be approved by the RE prior to establishment. The use of septic tanks may only be used after appropriate investigations have been made and the option has been approved by the RE;
4. All toilets shall be maintained by the Contractor in a clean sanitary condition to the satisfaction of the RE;
5. A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimise the spread of possible disease;
6. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility for disposal;
7. The Contractor shall instruct their staff and sub-contractors that they must use toilets provided and not the bush or watercourses.

Workshops

1. Where practical, all maintenance of equipment and vehicles on site shall be performed in the workshop.
2. If it is necessary to do maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities;
3. The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his workshop and other plant or emergency maintenance facilities.
4. The workshop shall be kept tidy at all times and shall have the following as a minimum:
   i. A smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage;
   ii. the floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil);
   iii. Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant (such as compressors);
   iv. The drip trays shall be inspected and emptied daily;
   v. Drip trays shall be closely monitored during wet weather to ensure that they do not overflow.

General Materials Handling and Storage

1. All materials shall be stored within the Contractor's camp unless otherwise approved by the RE;
2. Stockpile areas shall be approved by the RE;
3. All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE;
4. The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required;

5. Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product;
6. Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any leaks is reduced;
7. Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced in timely manner;
8. Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

7.4.9 Solid Waste

Construction will result in the creation of various solid wastes, principally surplus earth and rock (spoil), metal scraps, plastics (wrappings and containers), cardboard, paper, wood, office wastes including e.g. used toner cartridges, kitchen (canteen) wastes, workshop wastes including e.g. used oil filters, and waste concrete.

This can be a nuisance and the site should therefore be kept clean, neat and tidy at all times. The Contractor shall implement measures to minimise waste.

Mitigation Measures

1. The contractor should develop a waste management plan;
2. All personnel shall be instructed to dispose of all waste in a proper manner;
3. At all places of work the contractor shall provide litter collection facilities;
4. The final disposal of the site waste shall be done at the location that shall be approved by the RE, after consultation with local administration and local leaders;
5. No burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted;
6. The provision of sufficient bins (preferably vermin and weatherproof) at the camp and work sites to store the solid waste produced on a daily basis;
7. Wherever possible, materials used or generated by construction shall be recycled;
8. Provision for responsible management of any hazardous waste generated during the construction works;
9. Dispose of surplus material ("spoil") only at designated sites and by approved methods which must consider long-term soil stability against shrinking and swelling. In both cases the fill platforms must be secure against erosion, and not interfere with floodwaters;
10. The spoil area should preferably be located on land already cleared wherever possible. Communities shall be involved in the site location to avoid destruction of any ritual site or any other conflict;
11. The disposal site need to be more than 20 meters from watercourses and in a position that will facilitate the prevention of stormwater runoff from the site from entering the watercourse;
12. The development and rehabilitation of spoil areas shall include the following activities;
    i. Stripping and stockpiling of topsoil;
    ii. Removal (to a nominal depth of 500mm) and stockpiling of subsoil;
    iii. Placement of spoil material;
    iv. Contouring of spoil site to approximate natural topography and drainage and/or reduce erosion impacts on the site;
    v. Placement of excavated subsoil and then topsoil over spoil material;
    vi. Contouring and re-vegetation;
    vii. The Contractor shall ensure that the placement of spoil is done in such a manner to minimise the spread of materials and the impact on surrounding vegetation and that no materials ‘creep’ into ‘no-go’ areas.

Table 7.3 Summary of solid waste management strategies

Solid Waste Management Issues	Waste Management and Disposal Methods / Provisions
Responsibility of waste generators (*contractor)*	• Waste from road construction shall be disposed in designated waste receptacles only. • Waste generated shall be collected, segregated at the source and disposed off in designated waste receptacles only (e.g. excavated materials from the site during site preparation • Waste generators to ensure that waste is transported to a person who is licensed to transport and dispose off waste in designated waste facilities.
Segregation of waste by generators	• Use the 3R Waste Management Approach, i.e. *Reduce, Reuse and Recycle* whereby waste shall be segregated – plastics, glass, tins, papers, wood, metals etc (later to be re-used or recycled • Licensed private artisan groups *(Jua Kali)* to provide avenue for reuse of old and disposable items hence reducing the volume of the garbage at the site during the whole project cycle.
Application of Cleaner Production principles (Waste minimization from the source)	Enabling the recovery and re-use of waste where possible (e.g. plastics bottles etc)
Waste Transportation	During the construction and operation of the project, all the waste transport vehicles from the proposed project shall be approved by the Authority, NEMA and from Lead Agency

7.4.10 Liquid Wastes

a. Wastewater

During the construction phase, various liquid wastes including grey and black water (respectively washing water and sewage), concrete washings, runoff from camp and workshop areas, and various liquid waste streams from washing construction vehicle and equipment washing will be generated. These wastes pose real toxicity and quality threats to the soil and ground water, as well as existing wetlands within the area.

Mitigation Measures

1. No grey water runoff or uncontrolled discharges from the site/working areas (including washdown areas) to adjacent watercourses and/or water bodies shall be permitted;
2. Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and concrete swills;
3. The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies;
4. Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;
5. Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted;
6. The Contractor shall notify the RE of any pollution incidents on site.

b. Fuels, Oils, Hazardous Substances and other Liquid Pollutants

The construction phase will involve the use of stationary and mobile plant and equipment requiring refuelling and the construction of permanent and temporary fuel storage facilities. As

with any construction activity this will increase the possibility of accidents and spills, the two most likely impacts being contamination of soil by used engine oils and the spillage of diesel from mobile browsers. Contaminated soil is injurious to plant growth and must be removed. Contamination of water is potentially more serious since pollutants may move fast destroying aquatic life and rendering water unsafe for domestic and livestock use.

Mitigation Measures

1. The contractor should construct machinery and vehicle maintenance areas as well as sealed areas for the storage of pollutants so as to avoid any accidental discharge that would pollute water resources;
2. Hazardous materials shall not be stored within 2 kilometres of the top water level of public water supply reservoirs;
3. Hazardous materials shall be stored above flood level and at least 20 metres from any watercourse;
4. Chemicals and fuel shall be stored in storage tanks within a secure compound. All chemicals and fuels shall be stored in accordance with manufacturer's instructions;
5. Storage areas or secondary containment shall be constructed of waterproof reinforced concrete or approved equivalent, which is not adversely affected by contact with chemicals captured within them;
6. The minimum volume for secondary containment shall be 110% of the capacity of the largest tank system, plus 10% of the total capacity of all other separate tanks and containers within the bund wall with closed valves for controlled draining during rains;
7. Pipe-work carrying product from the tank to facilities outside the containment shall be provided with secondary containment;
8. Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment or provided with own containment;
9. Fence of the tank compound with locks or other adequate security controls at the site;
10. Locks on unattended dispensing hoses;
11. Appropriate training for the handling and use of fuels and hazardous material is to be provided by the Contractor as necessary. This includes providing spill response and contingency plans;
12. Extreme care will be taken when transferring chemicals and fuels from storage vessels to equipment and machinery on an impervious sealed area which is kerbed and graded to prevent run-off. Chemical and fuel transfer areas shall drain away from the perimeter bund to a containment pit. The design shall provide for the safe and efficient movement of vehicles;
13. All chemicals stored within the bunded areas shall be clearly labelled detailing the nature and quantity of chemicals within individual containers;
14. Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal;
15. Stormwater shall be diverted away from the fuel handling and storage areas. An oil water interceptor shall be provided to treat any rainwater from fuel storage and handling areas;
16. Measures should be taken to ensure proper storage of fuel, oil and bitumen. Oil-water interceptors or sumps should be constructed to capture discharge of oils, fats and other polluting liquids from maintenance workshops, vehicle and equipment washing bays and kitchen drains;
17. At the work sites the contractor will be expected to maintain strict surveillance particularly when working within the vicinity of water supply points and the rivers within the project area;
18. A safety and emergency response plan will need to be developed for all operations with emphasis on the protection of the environment prior to start up;
19. Oil pollution should be prevented by ensuring proper storage, handling and disposal of oil and oil wastes;
20. Rehabilitation of the existing water points, use of soak pits, stone pitching and check dams as velocity and siltation reducing measures of this water sources and springs The Contractor shall ensure that the footprint of construction activities is minimised at river and stream crossings;
21. No construction materials shall be stockpiled within areas that are at risk of flooding;

22. The Contractor shall ensure that all construction activities at the seasonal river crossings are commenced and completed during the dry seasons;
23. All temporary and permanent fill used adjacent to, or within, the perennial river bed shall be of clean and or larger particles. Silts and clays shall not be permitted in the fill;
24. Plastic sheeting, sandbags or geofabric approved by the RE shall be used to prevent the migration of fines through the edges of the fill into the river;
25. The Contractor shall not modify the banks or bed of a watercourse other than necessary to complete the specified works. If such unapproved modification occurs, the Contractor shall restore the affected areas to their original profile;
26. The Contractor shall preserve all riparian vegetation;
27. The Contractor shall not pollute the watercourse or sources through any construction activities.

7.4.11 Hazardous Sites

Some sites which will be used to prepare construction materials such as asphalt and cement may contain hazardous chemicals and should be properly sited.

a. Asphalt, Bitumen and Paving

Decanting of bitumen into the bitumen tank can be associated with spillage, and hence polluting the nearby environment. Dust from the asphalt plant, especially from the stockpiles for ballast chippings will be associated with dust during haulage procedures. The site of the asphalt plant shall be selected and maintained accordingly.

Mitigation Measures

1. The plant should be situated on flat ground;
2. Topsoil shall be removed prior to site establishment and stockpiled for later rehabilitation of the site;
3. Bitumen drums / products shall be stored in an area approved by the RE. This area shall be indicated on the construction camp layout plan. The storage area shall have a smooth impermeable (concrete or thick plastic covered in gravel) floor. The floor shall be bunded and sloped towards a sump to contain any spillages of substances;
4. The area shall be covered to prevent rainwater from contacting the areas containing fuels, oils, bitumen etc and potentially generating contaminated runoff;
5. The plant shall be secured from trespassers and animals through the provision of fencing and a lockable gate to the satisfaction of the RE;
6. Well-trained staff shall be responsible for plant workings.
7. Within the bitumen plant site, areas shall be demarcated/marked for plant materials, wastewater and contaminated water;
8. An area should be clearly marked for vehicle access;
9. Drums/tanks shall be safely and securely stored; and
10. Materials requiring disposal shall be disposed of at an appropriate waste facility.

b. Cement / Concrete Batching

Mitigation Measures

1. Concrete batching plant shall be located more than 20 m from the nearest stream/river channel;
2. Topsoil shall be removed from the batching plant site and stockpiled;
3. Concrete shall not be mixed directly on the ground;
4. The concrete batching works shall be kept neat and clean at all times;
5. Contaminated stormwater and wastewater runoff from the batching area and aggregate stockpiles shall not be permitted to enter streams but shall be led to a pit where the water can soak away;
6. Unused cement bags are to be stored so as not to be effected by rain or runoff events;
7. Used bags shall be stored and disposed of in a manner which prevents pollution of the surrounding environment (e.g. via windblown dust);

8. Concrete transportation shall not result in spillage;
9. Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment;
10. Suitable screening and containment shall be in place to prevent windblown contamination associated with any bulk cement silos, loading and batching;
11. Waste concrete and cement sludge shall be scraped off the site of the batching plant and removed to an approved disposal site;
12. All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete and disposed at an approved disposal site. Washing the remains into the ground is not acceptable;
13. All excess aggregate and sand shall also be removed;
14. After closure of the batching plant or any area where concrete was mixed all waste concrete/cement sludge shall be removed together with contaminated soil. The surface shall then be ripped to a depth of 150mm and the topsoil replaced evenly over the site and re-grassed.

7.4.12 Diversion and Access Roads

The design contemplates making access roads and diversions during construction phase. This is likely to result in dusty environment and noise pollution within the area as a result of the anticipated heavy traffic along the roads. The negative health and aesthetic effects will be on residents and the natural environment respectively.

Mitigation Measures

1. Since the major part of the road is going to be under the current alignment the Contractor shall adhere to the road reserve (if possible) in locating the diversion routes. If diversion routes go beyond the road reserve, necessary permission should be sought;
2. Where possible the diversion must be limited to already connecting routes in the area;
3. The Contractor shall comply with all applicable laws and by-laws in Kenya with regard to road safety and transport;
4. Access to the construction site and works area shall utilise existing roads and tracks where possible;
5. Upgrading of the access roads shall be undertaken within the existing confines of the road, unless otherwise agreed with the RE;
6. All diversion and temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the RE;
7. Damage to the existing access roads and services as a result of construction activities shall be repaired to the satisfaction of the RE. The cost of the repairs shall be borne by the Contractor;
8. To avoid dusts and air pollution, the Contractor must sprinkle water in the diversion route, as necessary, this must be supervised by RE and ESO.

7.4.13 Disruption of Access to Property

The new road alignment together with diversions and access roads may lead to disruption of access to property.

Mitigation Measures

1. Disruption of access to property must be kept to a minimum at all times. Where such disruption is unavoidable, the Contractor shall advise the affected parties and the RE at least seven working days in advance of such disruption.

7.4.14 Relocation of Public Utilities

Road construction could lead to disruption of existing utilities which were noted during the ESIA study. This includes water pipes and electricity lines. However, this will be temporary as the contractor will relocate the services to the edge of the road reserve. These interruptions will be of a short time but may lead to disturbances and inconveniences.

Mitigation Measures

1. Undertake inventory of existing utilities in the project area before construction begins;
2. Relocation of services should be provided for in the BoQs
3. Notice should be given to the utility users prior to any interruption in supply;
4. Liaise with relevant parties which include Meru Water service company, KPLC and other institutions having utilities on the road reserve

7.4.15 Delays in Transportation

During construction phase, the road traffic will be controlled and in some cases complete road closure will be necessary. This will entail disruption to traffic flows resulting in delay to transport of people and goods. There will be also delays caused by diversion during construction.

Mitigation Measures

1. To avoid delays to road users, the contractor will be required to plan itineraries for site traffic on a daily basis. Traffic management and control is mandatory throughout the project;
2. Temporary road signs that are visible both during the day and at night indicating road works and restrictions will be required;
3. The contractor should also set aside footpaths, cycle lanes and parking bays for heavy goods vehicles and public transport vehicles;
4. Areas where construction is taking place should have clearly marked speed reduction signage.

7.4.16 Emergence of Unplanned Settlements

The construction of the road is likely to lead to the growth of unplanned settlements along the road. Already there are a number of structures along the road at the start of the road at all the market centres traversed by the road.

Mitigation Measures

1. To forestall the growth of unplanned settlements around the construction camps and other work sites, the road agencies and local administration will need to undertake routine and strict surveillance around the work sites;
2. The community along the project road is aware that the road is under study for upgrading to bitumen standards. They are also aware that it is normal procedure to receive compensation for crops and structures within the right of way. To mitigate against the potential increase of persons who may be affected by the project, presently and in future, the KURA should inform the district administration to help in stopping further developments within the right of way.

7.4.17 Discrimination on Employment Opportunities

Social conflicts may arise if local people don't get the expected jobs at construction sites as project proponent will not necessarily employ workers living within the vicinity of the project road during its construction, operational and decommissioning phases.

Mitigation Measures

1. To avoid conflicts with the local people on employment is it proposed that the Contractor employs the locals in liaison with local administration in unskilled and semi-skilled duties;

2. To promote the livelihood of vulnerable groups such as the women-headed households, there will be a need to undertake sensitisation and awareness campaigns to the local community to promote gender equity in employment during the road construction works;
3. Where feasible on-the-job training should be provided to local people; and
4. Procure locally available materials where feasible and use local suppliers where appropriate.

7.4.18 Occupational Health and Safety

During construction phase, accidents, occupational diseases, ill health and damage to property can occur if precautionary measures are not taken. Increased movement of vehicles may lead to increased accidents among local communities, construction workers and vehicles operators.

Mitigation Measures

1. Road construction sections with running machines should be protected from general public to avoid accidents or unnecessary interference with the working procedures;
2. Authorities will enhance compliance with road safety measures for both the contractor's workers and the communities.
3. The Contractor shall comply with all standard and legally required health and safety regulations as stated in Occupational Safety and Health Act, 2007 and also the ILO Guidelines on Safety and Public Health in the construction activities;
4. The Contractor shall provide a standard first aid kit at the site office;
5. There should be a Safety Officer on site who has first aid training and knowledge of safety procedures;
6. Speed limits appropriate to the vehicles driven are to be observed at all times on access and haul roads;
7. The Contractor shall provide the appropriate Personal Protective Equipment for staff;
8. The contractor must have insurance cover for the workmen.

7.4.19 Public Health and HIV/AIDS

The proposed road development may be instrumental in the decline in health of the local population in several ways, this include:

- Facilitate the transmission of diseases;
- Pollution of soil and water sources by liquid wastes (Section 7.4.10);
- Pollute the air (Section 7.4.3); and
- Become a source of noise pollution (as discussed in Section 7.4.4).

Disease transmission will be facilitated by the migration of people, which invariably will accompany road projects during construction. Work crews as well as the relatives and dependents that usually follow them may bring with them a multitude of communicable diseases including diphtheria, poliomyelitis, tetanus, and malaria. The temporary work camps, often characterized by standing water and poor waste management practices, provide the ideal conditions for vermin, and other vectors of disease, to multiply and infect the local human population. At the same time, it is possible that a disease endemic to the project area will be contracted by the work crew, and then transmitted to a population near the next work site.

Presence of construction workers earning above average incomes and often coming without their families may threaten the security of women leading to breaking up of marriages, early and unwanted pregnancies among girls, and the spread of HIV/AIDS and STDs. Irresponsible sexual behaviour may also lead to increase in HIV/AIDS and other STIs.

Mitigation Measures

1. A comprehensive health awareness campaign, carried out in conjunction with the road project team will be done to prevent outbreak of disease. This will include Successful preventive measures such as immunizing the vulnerable population, and educating people

about diseases and how they are contracted, and how to avoid them by using treated water and keeping living areas cleaner;
2. Treating affected local and migrant populations will also be used in controlling the movement of disease vectors (through contaminated water and between people).
3. The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities;
4. All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected;
5. The HIV/AIDS awareness campaigns should be conducted at the camps as well as in the trading / market centres. The contractor shall take an active role in civic and public health education to his employees and the community. The campaign shall include the training of facilitators within the workers, information posters in more frequented areas in the campsite and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and theatre groups. The contractor will co-ordinate with the Provincial and District HIV/AIDS control councils, health officers and the NGOs undertaking education and sensitisation programmes;
6. The contractor will provide condoms at appropriate places in the work camps. The campaigns will be continuously done by the relevant Government organisation even during operation phase of the road;
7. The implementing agency for HIV/AIDS campaign shall monitor activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognising the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from focus group discussions;
8. Implementation of initiatives which target knowledge, attitude, behaviour, prevention, treatment and care in collaboration with Kenya National AIDS Control Council (NACC) at regional and local levels, NGOs and CBOS;
9. Interventions should give attention to high risk groups, factors perpetuating risk behaviours, female headed households, child headed household, orphans, people living with AIDS, youth, school girls and boys;
10. KURA should allocate some money for subsidizing the local clinics to meet increased demand for medicines for general ailments, antiretroviral and treatment of general opportunistic diseases associated with HIV/AIDS brought about by project workers.

7.4.20 Disturbance to Community

All construction activities will cause disturbance to the community around the area. Managing the welfare of a significant number of workers is inevitably a major challenge, and the co-existence of multiple contractor crews of workers from diverse ethnic and geographic backgrounds can be problematic.

During construction, the contractor will be required to implement measures to protect the welfare of the community. This should be achieved via application of a grievance mechanism, which must be developed prior to the construction programme.

Mitigation Measures

1. The RE is to establish a formal grievance mechanism through which affected people can lodge a grievance and to help ensure a speedy satisfactory resolution of any disputes;
2. The Contractor will be required to minimise the risk of grievances with the local communities through implementing the specifications described in the ESMP;
3. Where grievances occur, the Contractor will be required to assist in the process to investigate and resolve the grievance as effectively and quickly as reasonable;
4. The Contractor shall keep a 'Complaints register' on Site. The register shall contain:
    i. All contact details of the person who made the complaint and information regarding the complaint itself;
    ii. The investigations undertaken and response provided;

iii. Actions taken and by whom;
iv. Any follow-up actions taken.

5. Copies of complaints received are to be copied to the RE, and where pertinent, the ESO.

7.4.21 Security

The local communities may be subjected to increased crimes associated with immigrant construction workers, and others in search of jobs and business opportunities. To reduce crime associated with immigration, available local security should be reinforced and community information network enhanced. This will curb on incidences of theft which may lead to loss of property and delay in project completion.

Mitigation Measures

1. Security arrangements must be included in the Bills of Quantities to avoid any delays which might be caused due to insecurity;
2. The Supervising Engineer and Contractor in liaison with the security organs must create awareness to the security situation on the ground all the times;
3. Appropriate fencing, security gates, shelter and security guards are to be provided at the Construction Site to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff;
4. The Contractor must ensure that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft;
5. Site staff that are found to be involved in incidences of theft or pose other security risks to the local community are to be dismissed and reported to the authorities.

7.4.22 Impacts on Wildlife

Most animal species tend to follow established patterns in their daily and seasonal movements. The areas, through which they travel on their way to and from feeding, breeding and birthing grounds, and between their seasonal ranges, are known as corridors. When a road intersects a livestock and wildlife area, the result is an increase in mortality because of collisions with vehicles. Unfortunately, some animals are attracted to roads for various reasons, including protection from predators, good food supplies, better travel conditions, and so forth. This often leads to accidental death and poaching. On busy roads, the death rate for the local amphibian or other slow-moving animal populations can be as high as one in ten. Fortunately the Lower Imenti Forest Reserve is fenced and large terrestrial fauna are contained inside the reserve. Furthermore the road is aligned outside this fence so direct impacts on protected wildlife are not expected.

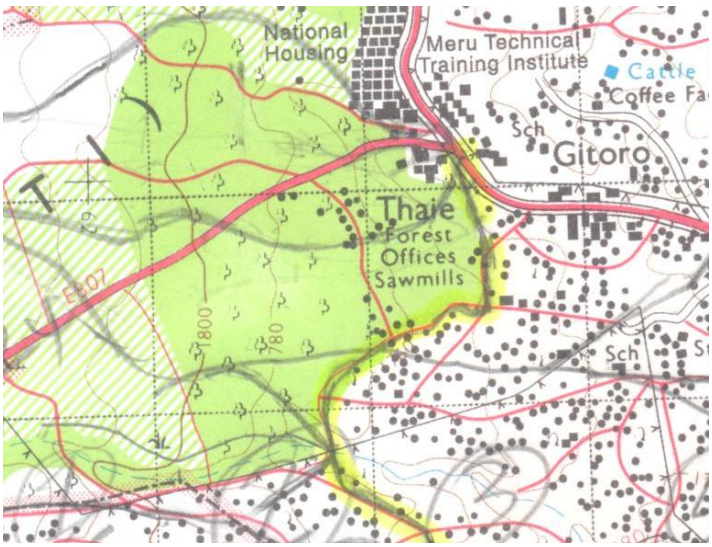


Figure 7.2: Section of the western bypass that bounds the Lower Imenti Forest (yellow line)

However, off-site indirect impacts could still occur through wildlife disturbance occasioned by construction actions such as blasting, dumping, noise, dust pollution, night lights, the use of mechanical plant and construction traffic especially across the 2 km that runs adjacent to the Lower Imenti Forest Reserve. Possibility of poaching by construction workers exist, although this is unlikely since all workers are likely to be housed in rented houses within Meru Town and not in camps. In sum, potential impacts on wildlife are rated as low and easy to mitigate.

Mitigation Measures

KURA shall establish an agreement with KWS on addressing construction in the vicinity of Imenti forest elephant population. Prior to commencement of civil works on the site, the following steps shall be taken:

- The agreement is established.
- A copy of the agreement is sent to the World Bank.
- The contractor is aware of the provisions of the agreement.

The contractor should develop a code of conduct for the workforce, prohibiting killing of game for any reason whatsoever, and the workers should be sensitized on the Wildlife Act that prohibits killing and poaching of game. Consultations and agreement with the KWS on construction schedule such that activities that involve use of noisy heavy machinery and powerful floodlights that can disrupt wildlife are not used at night along the 2 km section that bounds the forest.

The Supervising Engineer should liaise with the Kenya Wildlife Service to identify the historical wildlife crossing areas – just in case some rogue animals may break the fence - and ensure that appropriate safety signage is placed alongside the road warning motorists of ''dangers ahead''.

7.4.23 Fire Incidences

Fire is an inherent risk in any construction which might lead to loss of property and sometimes loss of life. This risk is especially high at the contractor's camp.

Mitigation Measures

1. The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started as a consequence of his activities on site;
2. The Contractor shall ensure that there is basic fire-fighting equipment available on site;
3. Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulations;
4. Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires;
5. 'Hot' work activities shall be restricted to a site approved by the RE;
6. Smoking shall not be permitted in those areas where there is a fire hazard. These areas shall include:
   i. Workshop;
   ii. Fuel storage areas;
   iii. Any areas where vegetation or other material is such as to make liable the rapid spread of an initial flame;
7. The Contractor shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to:
   i. Regular fire prevention talks and drills;
   ii. Posting of regular reminders to staff;
   iii. Any fires that occur shall be reported to the RE immediately and then to the relevant authorities;
   iv. In the event of a fire, the Contractor shall immediately employ such plant and personnel as is at his disposal and take all necessary action to prevent the spread of the fire and bring the fire under control;
   v. Costs incurred through fire damage will be the responsibility of the Contractor, should the Contractor's staff be proven responsible for such a fire.

7.4.24 Climate Change Impacts

Construction procedures for the project road are some of the human activities that will change the environment. Road site clearance, changes in land use pattern, deforestation, agriculture, will lead to a rise in the emission of carbon dioxide, one of the greenhouse gases. These climate change effects are due to an increase in greenhouse gases in the atmosphere. The main gases are carbon dioxide, methane, nitrous oxide and fluorocarbons, principally from the burning of fossil fuels, forest destruction and agriculture.

The Project area may experience high rainfall and flash floods, storm water, which may damage the road infrastructure itself or cause damage to property and crops and may be exacerbated by climate change weather patterns.

Mitigation measures

1. Contractor should maintain his plant and equipment to limit carbon emissions;
2. The contractor should seek permission or notification from KFS and local authorities before cutting trees. The Kenya Wildlife Service requires notification of such intentions;
3. Contractor should plant trees along the road periphery (20 trees per km) in order to help absorb carbon emissions from road traffic.

7.5 Potential Positive Impacts during Operation

7.5.1 Ease Traffic Congestion in Meru Town

Construction of Meru town bypasses will improve transport and communication in Meru town because of reduced traffic in town. After construction, the road bypasses will improve transportation more so due to reduced traffic in Meru town centre, easier transportation of commodities to and from the project area. This is a large positive impact.

7.5.2 Employment Creation

The proposed project, upon implementation will directly employ supervising engineering team and monitoring personnel from KURA.

7.5.3 Improved living Standards

The implementation of the project will result in the improvement of the living conditions of population living along the road and the entire district in general thus contributing to poverty reduction.

The community felt that the travel time between the Meru Town and other trading centres will be shortened and there will be improved access to markets to sell their livestock products. Both the male and female gender felt that the upgrading of the road will result in efficient traffic flow with savings in both time and cost thus there will be improved communication, which at present is a big problem.

7.5.4 Increased Security

The area where the road traverses is neighbouring an area with rampant cases of general crimes. Better road communication would result in an improvement of security by increasing easier movement by security agents. Any improvement in security from the current levels would be a major benefit to the community.

7.5.5 Education

Better road communication would open up the area for development which would also lead to building of more schools and colleges. This would eventually lead to improvement of education institutions in the area. Any improvement in educational attainment from the current levels would be a major benefit to the community.

7.5.6 Improved National Transport

The main mode of transportation in the area is road transport which is used for transportation of passengers and goods to the various centres along the project area. There are no other affordable options for transport in the project area.

With improved road conditions it is expected that there will be improved transport within the region. This is likely to benefit the local and regional economy in the short term and the national economy in the long term. There will also be easier access to the essential services offered in the neighbouring districts.

7.5.7 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-motorised traffic and motor vehicles.

The proposed Project design will contribute to improving road safety and the comfort of road users in several ways:

1. Sight distance and visibility especially at approaches to bridges will be improved;
2. Road signs (both warning and directional) and road markings have been included in the design; and
3. Adequate shoulders have been designed throughout its length.

The poor state of the road leads to use of old motor cycles and converted saloon cars. These vehicles are very uncomfortable, gender insensitive and often overloaded as there is no space for comfort and prone to accidents. The area is also experiencing traffic congestion, rutty, rugged nature of the roads (poorly patched roads, dust, ditches and pools of water etc) which increases accident rates. The proposed project will therefore reverse this current situation.

7.5.8 Empowerment of Women

Women play an important role in agriculture in the area. However, the existing road makes it hard for women to access markets for their products due to the high transport costs. The poor state of the road leads to use of unconventional public service vehicles such as Land Rovers and motor cycles. These vehicles are very uncomfortable, gender insensitive and often overloaded. This is anticipated to change with the construction of the road.

7.6 Potential Negative Impacts during Operation

7.6.1 Noise Pollution

Noise associated with the proposed road development in the area will be from four main sources discussed below:

a. Vehicle Noise

Vehicle noise will come from the engine, transmission, exhaust, and suspension, and is greatest during acceleration, on upgrades, during engine braking, on rough roads, and in stop-and-go traffic conditions. Poor vehicle maintenance is a contributing factor to this noise source.

b. Road Noise

Frictional noise from the engine revving, contact between tyres and pavement contributes significantly to overall traffic noise. The level depends on the type and condition of tyres and pavement. Frictional noise is generally greatest at high speed and during quick braking.

c. Driver Behaviour

Drivers contribute to road noise by using their vehicles' horns, by playing loud music, by shouting at each other, and by causing their tyres to squeal as a result of sudden braking or acceleration. This is common in populated market centres and urban areas.

d. Road Maintenance

Road maintenance generally requires the use of heavy machinery, and although these activities may be intermittent and localized, they nevertheless contribute tremendous amounts of sustained noise during equipment operation. These can degrade the human welfare and disrupt noise sensitive areas like schools and hospitals.

Mitigation Measures

1. Vehicles using the road should adhere to the Traffic Act where they are supposed to keep the vehicles in roadworthy conditions;
2. Road users to adhere to NEMA rules on noise pollution i.e. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

7.6.2 Erosion and Water Quality Degradation

Poor maintenance of drainage structures may render the road impassable and in the long-run wear out the road. If surface runoff is not properly channelled, it may lead to soil erosion.

Mitigation Measures

1. Maintenance engineers from KURA shall inspect all drainage structures and outfalls;
2. All the damaged culverts, wing walls and aprons shall be repaired and additional measures for velocity reduction and erosion protection shall be implemented in case or development of erosion.

7.6.3 Road Accidents

The improvement of the project road and changes in road furniture may lead to significantly increased running speeds and is likely to induce significant generated traffic. This may pose a greater risk to travellers, pedestrians and livestock through road accidents. However, with proper engineering design, the frequency and number of accidents should decrease.

On the other hand, if the road is left in poor condition, this may probably lead to some accidents that would not normally occur on a better running surface. These accidents would be avoided after the improvement and upgrading.

Mitigation Measures

1. Proper design of road safety features is a very effective way to prevent accidents. The Resident Engineer and the Contractor involved with the implementation of the design of the road should:
    i. Examine road design standards, safety equipment specifications and training to ensure that design details take account of safety concerns and that specific safety features are correctly designed and installed;
    ii. Require that road design audits be done, at final design stages, by specialists in road safety and traffic operations;
    iii. Draft traffic management plans, including details of signs, markings, and intersection layouts, channelisation of flows, access restrictions, footpaths, bus stops, and provisions for non-motorized vehicles;
    iv. Painting of edge lines in order to separate shoulders;
    v. Provision of traffic signals with phases for bicyclists;
    vi. Establishment of non-motorised vehicle waiting area;
    vii. Improvement of visibility;

viii. Provision of speed limit signs;
ix. Construction of bumps to reduce speeds;
x. Improvement of crossing sites paintings of zebra crossings; and
xi. Regulations, educations and safety trainings.

2. Active police enforcement of speeds;
3. Road safety and accident prevention campaigns are recommended at the end of construction. To monitor the effectiveness of the road safety information and education campaigns, the following measures are recommended:
   i. KURA shall monitor traffic accidents through records kept at the local police stations along the project road;
   ii. A report will be required after two years of monitoring and the results used to recommend further mitigation measures, if necessary.

7.6.4 Right -of – Way Encroachment

After completion of construction, there are high chances of encroachment on the right-of-way. Encroachment is a common practise in Kenya and illegal structures can be sighted on most road reserves.

Mitigation Measures

1. KURA should clearly demarcate the road reserve using, for example, concrete bollards or beacons at 50m intervals along the project road;
2. KURA should create awareness among local population on the need to respect the road reserve during the road safety and accident prevention campaigns.

7.6.5 Illegal Trade on Trees and its Products

The land acquired as wayleave may be considered as no-man's land which may lead to increase in illegal trade on trees and its products (timber, charcoal, wood fuel) and / or any other natural resources within the unused parts of the wayleave.

Mitigation Measures

1. There needs to be consultation between KURA and other Government departments, especially the Kenya Forest Service on how best to manage the problem;
2. Prior to completion of the Contract, the Contractor shall contract an implementing agency to undertake an awareness campaign in the communities, mainly in market centres about environmental protection.

7.6.6 Impacts on Wildlife

About 2 km of the western bypass to the north is aligned along the boundary of the Lower Imenti Forest Reserve. The road will not run through the forest but will maintain an alignment outside the Forest Reserve fence.

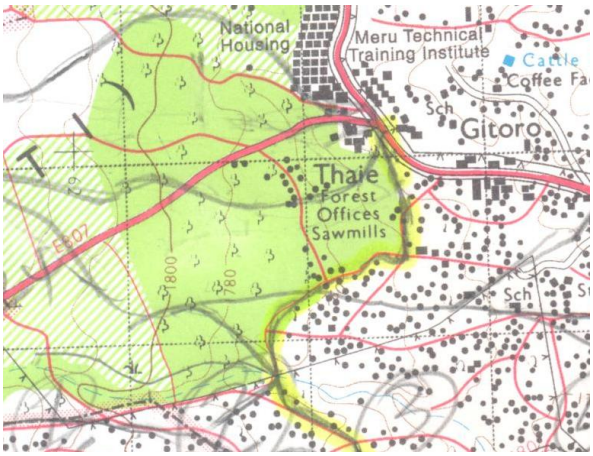


Figure 7.3: Section of the western bypass that bounds the Lower Imenti Forest (yellow line)

The portion of the forest that bounds the road does not host significant wildlife population because it is close to the Kenya Forest Service and the Kenya Wildlife Service offices where there is frequent human disturbance that keeps animals away. Moreover, there is dense settlement immediately outside the fence and the residents did not report human-wildlife conflict in the area. The area where elephants occasionally cross is further north on the Meru – Maua Road. Impacts on wildlife during operation are therefore predicted to be insignificant.

Mitigation measures

Although the impacts during operation are predicted to be insignificant, it is still recommended that signages be maintained along the road that warns motorists of possible wildlife presence on the road, especially primates that are able to climb over the fence.

7.6.7 Cultural Changes

The road traverses land inhabited by Ameru who are mainly Christians. The Ameru have established social organisation systems. The upgrading of the road is likely to increase the attractiveness of the area, which may result in the following:

- Degradation of the cultural values and norms in the area;
- Increase in the levels of crime of the area;
- Increased desirable and undesirable social interaction in the area.

Still, these possible impacts are subtle and may not even be noticeable in the long run.

Mitigation Measures

1. Strengthen the cultural organizations and encouraging competitions through organization of cultural tournaments;
2. Ensure that the project contributes to the creation of an atmosphere that is conducive to the functioning of all social centres which are in the project zone of influence.

7.6.8 HIV/ AIDS

Nowhere is impact prevention more important than in the area of road safety and human health. The road project may have serious negative consequences for the health of local populations.

Throughout the world, the spread of AIDS and other sexually transmitted diseases (STDs) can be linked to the construction of roads and the resultant opening-up of new regions. Although there are no empirical data to support this theory as far as Kenya is concerned, it is believed that migrant populations, particularly truck drivers and construction workers whose mobility is enhanced by new road project are the most likely vectors for these diseases. Moreover with

opening of the region there is likely to be building of cheap lodgings along the road which is likely to turn into brothels.

Mitigation Measures

1. Sensitisation and awareness campaigns should be the responsibility of the NACC in Kenya together with their district co-ordinators.

7.7 Impacts during Decommissioning Phase

The Project is expected to be in operation for many years and therefore decommissioning is not anticipated to happen soon but should this happen all the positive impacts mentioned in this report would be reversed to be negative. Other negative impacts during decommissioning may include:

- Waste generation;
- Noise pollution;
- Dust and exhaust emissions;
- Occupational hazards.

Positive impacts may be realised during decommissioning phase. They may include:

- Rehabilitation of the whole area;
- Employment opportunities.

The Environmental and Social Management Plan (ESMP) is prepared to show how site specific concerns and mitigation measures are addressed through the detailed design, pre-construction, construction and post-construction / operation phase of the Project.

The ESMP has been developed with project knowledge and information available to date. Some of the Project's final details, such as proposed locations of construction camps, actual locations of borrow areas to be used by the Contractor, disposal areas for construction debris among other issues, are unknown at the present time. As project commencement and scheduling plans are developed and changed, components of the EMP might require amending. This is therefore a working document, which can be updated whenever new information is received or site conditions change.

8.1 Objectives of the EMP

The Environmental Management Plan (EMP) describes the range of environmental issues associated with the Project and outlines corresponding management strategies that will be employed to mitigate potential adverse environmental impacts. The EMP conveys the project's environmental and social constraints.

The Project will comply with all local laws and regulations, which seek to ensure that the construction work does not adversely affect the environment and social community resources.

The Supervising Consultant may periodically revise the EMP in consultation with the Contractor, and subject to the approval from the KURA and the National Environment Management Authority. Revisions may be made to accommodate changes in work, weather and site conditions.

The EMP should be made available to all project staff.

The objectives of the EMP are:

1. To bring the project into compliance with applicable national environmental and social legal requirements;
2. To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimise, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts;
3. To address capacity building requirements within the relevant ministries if necessary.

8.2 Responsibilities

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

1. KURA;
2. Ministry of Transport;
3. National Environmental Management Authority;
4. Resident Engineer.
5. Environmental and Social Officer;
6. Contractor;
7. Local Authority.
8. Kenya Wildlife Service.
9. Kenya Forestry Service.

8.2.1 KURA

The project road is under the jurisdiction of KURA (the project proponent). Therefore, the responsibility for ensuring that mitigation measures specified in this EMP and the contract documents are implemented will lie with them.

8.2.2 Ministry of Transport and Traffic Police

Road safety and accident prevention is the responsibility of the Ministry of Transport and the Traffic Police. It will be the responsibility of the two organs to ensure that road safety policies detailed below is implemented:

1. Mandatory use of seat belts;
2. compulsory driver training and testing;
3. prohibition and punishment of driving while impaired by drugs or alcohol;
4. traffic safety education for children; and
5. Testing and inspection of all vehicles according to national vehicle safety standards.

The Ministry of Transport and Traffic Police should also ensure the following:

1. Ensuring that post-accident emergency assistance and medical care are available to all accident victims;
2. Developing an accurate accident data recording system;
3. Conducting research and regularly monitoring the state of road safety;
4. Determining the need for further road improvements (based on accident data); and
5. Encouraging research and development of new, safety-oriented road technologies.

8.2.3 National Environment Management Authority

The responsibility of the National Environment Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment and to ensure that all mitigation measures proposed are actually implemented.

8.2.4 The Resident Engineer and Environmental and Social Officer

The Resident Engineer (RE) will be appointed by KURA or Supervising Consultant and will be required to oversee the construction programme and construction activities performed by the Contractor, in compliance with the present EMP. The RE will have an Environmental and social officer (ESO) in its team to co-ordinate all aspects of the environment during project implementation. This will include following the construction to monitor, review and verify the implementation of the project's EMP.

During construction, the ESO will be responsible for the following tasks:

1. Updating environmental aspects (not covered in the EIA / EMP) during project implementation;
2. Auditing environmental and safety aspects at the work sites;
3. S/He shall participate in the definition of the no working-areas and the location of campsite, borrow pits, quarries and other areas;
4. Recommending solutions for specific environmental problems;
5. S/He shall facilitate the creation of Community Liaison Groups and shall monitor the compliance of the social clauses of the Contract, in terms of local labour force and HIV/AIDS campaign;
6. Overseeing strategies for sensitising the local population on health and safety problems;

7. Attending consultations held at key stages of the project with the community and interested parties;
8. S/He will be required to liaise with the respective Environmental Authorities on the level of compliance with the EMP achieved by the Contractor on a regular basis for the duration of the contract;
9. Controlling and supervising the implementation of the EMP;
10. Preparing quarterly environmental and social progress or "audits" reports on the status of implementation of measures and management of work sites.

8.2.5 The Contractor

The Contractor will be appointed by the KURA and will be required to comply with the requirements of the EIA/ EMP and the Standard Specifications for Road Works in Kenya, which include specifications for Environmental Protection and Waste disposal, Borrow Pit and Quarry Acquisition and Exploitation, Landscaping and grassing and so on.

8.2.6 Local Authorities

The relevant departmental officers in the local authorities should be called upon where necessary during project implementation to provide the necessary permits and advisory services to the project implementers. Some of the areas for which the officers will be required include:

1. Approving locations for establishing work camps;
2. Involvement in relocation of project affected persons along the road;
3. Liaising with the NGOs in the project area to assist in the sensitisation campaigns for HIV/ AIDS and public health to the workforce and the local community;
4. Issuing permits for tree felling, vegetation clearing, exploitation of quarries and borrow sites (whenever necessary);
5. Identifying locations for disposal of construction debris;
6. Issuing permits or relevant documentation for health and safety monitoring in accordance with local health and safety legislation and / or ILO standards.

8.3 Environmental and Social Management

The set of instructions provided in this Chapter and summarised in Table 8.1 constitute the Environmental Management Plan (EMP). To facilitate the use of this EMP, the environmental management instructions are presented according to the sequence of project stage activities as follows:

1. Construction;
2. Operation.
3. Decommissioning

The following issues require special attention:

1. Material sources, especially the quarry sites;
2. Designs must take into considerations the topography and soil conditions.
3. Informative signs shall be considered for all social amenities (educational institutions, hospitals, trading centres etc);
4. The Contractor shall ensure that all pertinent permits, certificates and licences have been obtained prior to any activities commencing on site and are strictly enforced / adhered to;
5. The Contractor shall maintain a database of all pertinent permits and licences required for the contract as a whole and for pertinent activities for the duration of the contract.

Table 8.1 is a summary of the environmental and social management plan. It includes the impacts, mitigation measures, responsible parties and the estimated costs.

Table 8.1 Environmental and Social Management Plan during construction and operation phase

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
Land acquisition	• The Resettlement Action Plan should be undertaken. This Resettlement exercise will involve the following activities: • The local administration must ensure that all the issues pertaining to land acquisition plans are cleared before the Contractor moves on site; • The project team must undertake a pre-construction inspection of each section of the alignment and all ancillary sites. The inspection shall involve a site review of the alignment and any identified ancillary sites required by the Contractor. It will serve to: • Land required for sourcing construction materials (quarries, borrow sites, water harvesting basins) must be negotiated by the Contractor with the landowners, in the presence of local administration.	• To undertake RAP and compensate Project Affected Persons (PAPs)	KURA	Pre-construction and Construction	250,000,000.00 Contained in the BoQ
Construction material sourcing	• Ensure that appropriate authorisation to use the proposed borrows pits and quarries has been obtained before commencing activities by seeking approval from the National Environmental Management Authority before use of any active quarry site; • Carry out inspection of each of the site's soil stability before excavation; • All borrow pits sites shall be clearly indicated on a plan and approved by the RE. • Borrow pits and quarries shall be located more than 20 meters from watercourses in a position that will facilitate the prevention of storm water runoff from the site from entering the watercourse; • The Contractor shall give 14 days' notice to nearby communities of his intention to begin excavation in the borrow pits or quarries;	• Proper sourcing of construction materials and rehabilitation of quarries and borrow sites after completion of construction.	Contractor	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**

	• Prepare health and safety plan before any work on the quarries is commenced;
	• Cordon off the quarry and borrow areas to keep livestock and children off;
	• Maintain fences and "make good" of the sites afterwards;
	• Prepare and implement borrow pit plans and borrow pit rehabilitation plans, which would minimise the risk of erosion;
	• Topsoil shall be stripped prior to removal of borrow and stockpiled on site. This soil shall be replaced on the disturbed once the operation of the borrow site or quarry is complete;
	• The use of borrow pits or quarries for material spoil sites may be approved by the RE (and/or with the appropriate consent of the "landowner"). Where this occurs, the materials spoiled in the borrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil;
	• Decommission the borrow pits and quarries upon completion of the Contract and reinstate the land to its natural condition by grading excavations and planting suitable saplings;
	• The contractor is expected to follow the sand harvesting regulations published by NEMA
	• In case of blasting:
	  • The Contractor will be responsible for obtaining a current and valid authorisation from the Department of Mines and Geology prior to any blasting activity. A copy of this authorisation shall be given to the RE;
	  • A qualified and registered blaster by the Department of Mines and Geology shall supervise all blasting and rock-splitting operations at all times;
	  • The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);				

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site; • The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the RE and the relevant authorities; • The Contractor shall ensure that adequate warning is provided to the local communities immediately prior to all blasting. All signals shall also be clearly given; • The Contractor shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover.				
Air quality and dust	• Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications; • Workers shall be trained on dust minimisation techniques; • The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible; • Do not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds. The RE shall suspend earthworks operations wherever visible dust is affecting properties adjoining the road; • Water sprays shall be used on all earthworks areas within 200 metres of human settlement. Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the RE; • Vehicles delivering soil materials shall be covered to reduce spills and windblown dust;	• To reduce pollution of ambient air	Supervising Engineer and the Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• Vehicle speeds shall be limited to minimise the generation of dust on site and on diversion and access roads; • Any complaints received by the Contractor regarding dust will be recorded and communicated to the RE and ESO; • Plants and all construction works should be undertaken strictly during business hours; • NEMA and the Ministry of Transport has published regulatory measures related to vehicle air pollution. It is anticipated that these measures will be adhered to and the law enforcers will take control; • Project-specific design improvements to limit motor vehicle air pollution impacts include:				
Noise	• The Contractor shall keep noise level within acceptable limits and construction activities shall, where possible, be confined to normal working hours in the residential areas; • Schools, hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of school hours, where approved by the RE; • Construction workers will be required to wear ear muffs in areas exposed to excessive noise levels; • Equipment should be maintained regularly to reduce noise resulting from friction; • No unnecessary hooting by project and resident vehicles; • Any complaints received by the Contractor regarding noise will be recorded and communicated to the RE.	• To avoid exposure of the community living around the project area and workers to noise nuisance	Contractor	Construction	No additional cost
Vegetation loss	• Except to the extent necessary for establishing the construction site and carrying out the construction works, vegetation shall not be removed, damaged or disturbed nor should any unauthorised planting of vegetation take place; • The clearance of the site for construction purposes shall be	• To protect vegetation	Contractor	Construction	BOQ item 1.22: 2,000,000

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	kept to a minimum. The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc shall be encouraged; • Areas to be cleared should be agreed and demarcated before the start of the clearing operations; • Clearing and removal of vegetation, especially at borrow sites must be carried out in such a way that damage to adjacent areas is prevented or minimised; • All vegetation encroaching into the road reserve must be cleared to give room for visibility; • Areas with dense indigenous vegetation are not to be disturbed unless required for construction purposes, nor shall new access routes be cut through such areas; • Trees should be trimmed rather than removed wherever possible; • The Contractor should plants indigenous and native trees along the project road at suitable distance of approximately 150m apart, this should be included in the Bill of Quantities. In cases where non-native species are deemed essential, careful monitoring should be planned, to ensure that they do not compete too successfully with native species and spread uncontrollably; • The use of fuel wood by construction workers should be discouraged. Workers should be encouraged to use alternative energy sources such as kerosene, electricity or gas; • The use of indigenous plants as firewood is prohibited unless they are obtained from approved sources; • The contractor should establish contracts with wood fuel suppliers, where wood is used. The suppliers should show permits from the relevant Government agencies to prevent illegal felling of trees and to ensure plantation timber is used.				
Storm water and	• Earthworks should be controlled so that land that is not	• To conserve soil	Contractor	Construction	BOQ No. 7:

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**

Soil erosion	required for the road works is not disturbed;
	• Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain;
	• Excavated materials and excess earth should be kept at appropriate sites approved by the Supervising Engineer;
	• Wherever possible, the earth dumping sites will be designed in such a manner as to facilitate natural water discharge;
	• The contractor should adhere to specified cut and fill gradients and planting embankments with shrubs and grass to reduce erosion and take care of stability problems of road embankments. Areas cleared for improving sight distance should be planted with grass to reduce erosion;
	• Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion, these include:
	  • Areas stripped of topsoil;
	  • Soil stockpiles;
	  • Spoil sites;
	  • Borrow pits;
	  • Sites for bridges and drainage structures.
	• On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be limited to:
	  • Confining construction activities;
	  • Using cut off drains;
	  • Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls;
	  • Mulch or chip cover;
	  • Constructing anti-erosion berms;
	  • The erosion prevention measures must be implemented to the satisfaction of the RE;
		and avoid stripping of top soil			26,373,283
					
					BOQ Item 5.11: Grassing 24,548,001.00

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• Where erosion does occur on any completed work/working areas, the Contractor shall reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the RE and ESO.				
Drainage	• Where new culverts are to be installed, consultation with people settled there will be required to avoid possible conflicts that may arise due to channelling of water; • The Contractor shall ensure that provision is made to facilitate continuity of base water flow at all times during construction of these features across streams, rivers, lagoons and flood plains; • Ensure that drainage structures are able to accommodate high rainfall and flash floods, drainage structures are regularly maintained by desilting; • The Contractor shall not divert, dam or modify any watercourse without the approval of the RE and relevant authorities as required by the law; • The Contractor shall submit a Method Statement to the RE for approval prior to commencing construction of bridges or culverts.	• To ensure drainage structures are constructed well to avoid erosion	Contractor	Construction	BOQ No. 8: 79,154,828

Impact on local resources	• The contractor should consult the community on partitioning of access to local resource for construction purposes;
	• The Contractor must adhere to water quality regulations described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Rules describe the following:
	  • Water sources for domestic use;
	  • Sewage treatment;
	  • Ground water;
	  • Water for agricultural use;
	  • Water for other uses;
	  • Schedules depicting standards.
	• Abstractions from natural, municipal and / or private water
		• To ensure the community resources are used well and not depleted	Contractor	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	resources (e.g. rivers, boreholes and springs) for potable water and construction water shall be approved by the Water Resources Management Authority. The Contractor shall arrange for the necessary approvals / permits from the water authorities under the direction of KURA for the abstraction of water.				

Contractors camp
• General
	• The site for the Contractor's Camp shall be determined in collaboration with the RE taking into consideration the following:
	  • The security situation in the area (expressed authority must be given by the Officer Commanding Police Division of Imenti North District and preferably to be located on the existing market centres within the road alignment.
	  • The local administration shall be involved in the site location to avoid destruction of any ritual site or any other conflict;
	  • The Contractor's Camp layout shall take into account availability of access for deliveries and services and any future works;
	  • The Contractor's Camp should also be of sufficient size to accommodate the needs of all sub-contractors that may work on the project.
	  • Decommission the camps and Reinstate the land to its natural condition by filling excavations and planting suitable saplings.
	• The Contractor shall implement the following as required with the approval by the RE:
	  • The contractor will be required to prepare a waste management plan for the work sites and camps at the start of the project;
	  • A suitable stormwater drainage system to prevent soil erosion, protect storage areas and to prevent stagnant ponds forming;
		• To ensure proper siting of contractor's camp	Contractor	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• A suitable potable water supply; • Suitable facilities for bathing, washing clothes or vehicles – site staff will not be permitted to use open water bodies for such activities; • Suitable sanitation facilities, adequate for the number of staff on site; • Facilities for cooking; • Facilities for solid waste collection; • Facilities for waste water management.				
• Sanitation	• The Contractor shall comply with all laws and any by-laws relating to public health and sanitation; • All temporary/ portable toilets or pit latrines shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over; • The type and exact location of the toilets shall be approved by the RE prior to establishment. The use of septic tanks may only be used after appropriate investigations have been made and the option has been approved by the RE; • All toilets shall be maintained by the Contractor in a clean sanitary condition to the satisfaction of the RE; • A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimise the spread of possible disease; • The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility for disposal; • The Contractor shall instruct their staff and sub-contractors that they must use toilets provided and not the bush or watercourses.	• To ensure proper sanitation	Supervising Engineer and Contractor	Construction	No additional cost
• Workshops	• Where practical, all maintenance of equipment and vehicles on	• To ensure	Contractor	Construction	No additional

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**

	site shall be performed in the workshop.
	• If it is necessary to do maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities;
	• The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his workshop and other plant or emergency maintenance facilities.
	• The workshop shall be kept tidy at all times and shall have the following as a minimum:
	  • A smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage;
	  • the floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil);
	  • Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant (such as compressors);
	  • The drip trays shall be inspected and emptied daily;
	  • Drip trays shall be closely monitored during wet weather to ensure that they do not overflow.
		proper maintenance of equipment and machinery and cleanliness in the workshop			cost

• General Materials Handling and Storage	• All materials shall be stored within the Contractor's camp unless otherwise approved by the RE; • Stockpile areas shall be approved by the RE; • All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE; • The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required; • Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product;	• To ensure proper handling and storage of materials	Contractor	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any leaks is reduced; • Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced in timely manner; • Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.				
Solid wastes	• The contractor should develop a waste management plan; • All personnel shall be instructed to dispose of all waste in a proper manner; • At all places of work the contractor shall provide litter collection facilities; • The final disposal of the site waste shall be done at the location that shall be approved by the RE, after consultation with local administration and local leaders; • The provision of sufficient bins (preferably vermin and weatherproof) at the camp and work sites to store the solid waste produced on a daily basis; • Wherever possible, materials used or generated by construction shall be recycled; • Provision for responsible management of any hazardous waste generated during the construction works; • Dispose of surplus material ("spoil") only at designated sites and by approved methods which must consider long-term soil stability against shrinking and swelling. In both cases the fill platforms must be secure against erosion, and not interfere with floodwaters; • The spoil area should preferably be located on land already cleared wherever possible. Communities shall be involved in	• To maintain sound waste management practice.	Supervising Engineer and the Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**

	the site location to avoid destruction of any ritual site or any other conflict;
	• The need to be more than 20 meters from watercourses and in a position that will facilitate the prevention of stormwater runoff from the site from entering the watercourse;
	• The development and rehabilitation of spoil areas shall include the following activities;
	  • Stripping and stockpiling of topsoil;
	  • Removal (to a nominal depth of 500mm) and stockpiling of subsoil;
	  • Placement of spoil material;
	  • Contouring of spoil site to approximate natural topography and drainage and/or reduce erosion impacts on the site;
	  • Placement of excavated subsoil and then topsoil over spoil material;
	  • Contouring and re-vegetation;
	  • The Contractor shall ensure that the placement of spoil is done in such a manner to minimise the spread of materials and the impact on surrounding vegetation and that no materials 'creep' into 'no-go' areas.				

Wastewater	• No grey water runoff or uncontrolled discharges from the site/working areas (including washdown areas) to adjacent watercourses and/or water bodies shall be permitted; • Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and concrete swills; • The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies; • Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be	• To maintain properly dispose wastewater	Supervising Engineer and the Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	contained and the water table not endangered; • Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted; • The Contractor shall notify the RE of any pollution incidents on site.				
Fuels, Oils, Hazardous Substances and other Liquid Pollutants	• The contractor should construct machinery and vehicle maintenance areas as well as sealed areas for the storage of pollutants so as to avoid any accidental discharge that would pollute water resources; • Hazardous materials shall not be stored within 2 kilometres of the top water level of public water supply reservoirs; • Hazardous materials shall be stored above flood level and at least 20 metres from any watercourse; • Chemicals and fuel shall be stored in storage tanks within a secure compound. All chemicals and fuels shall be stored in accordance with manufacturer's instructions; • Storage areas or secondary containment shall be constructed of waterproof reinforced concrete or approved equivalent, which is not adversely affected by contact with chemicals captured within them; • The minimum volume for secondary containment shall be 110% of the capacity of the largest tank system, plus 10% of the total capacity of all other separate tanks and containers within the bund wall with closed valves for controlled draining during rains; • Pipe-work carrying product from the tank to facilities outside the containment shall be provided with secondary containment; • Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment or provided with own containment; • Fence of the tank compound with locks or other adequate	• To ensure proper handling of fuels and hazardous substances	Supervising Engineer and the Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	security controls at the site; • Locks on unattended dispensing hoses; • Appropriate training for the handling and use of fuels and hazardous material is to be provided by the Contractor as necessary. This includes providing spill response and contingency plans; • Extreme care will be taken when transferring chemicals and fuels from storage vessels to equipment and machinery on an impervious sealed area which is kerbed and graded to prevent run-off. Chemical and fuel transfer areas shall drain away from the perimeter bund to a containment pit. The design shall provide for the safe and efficient movement of vehicles; • All chemicals stored within the bunded areas shall be clearly labelled detailing the nature and quantity of chemicals within individual containers; • Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal; • Stormwater shall be diverted away from the fuel handling and storage areas. An oil water interceptor shall be provided to treat any rainwater from fuel storage and handling areas; • Measures should be taken to ensure proper storage of fuel, oil and bitumen. Oil-water interceptors or sumps should be constructed to capture discharge of oils, fats and other polluting liquids from maintenance workshops, vehicle and equipment washing bays and kitchen drains; • At the work sites the contractor will be expected to maintain strict surveillance particularly when working within the vicinity of water supply points and the rivers within the project area; • A safety and emergency response plan will need to be developed for all operations with emphasis on the protection of the environment prior to start up;				

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• Oil pollution should be prevented by ensuring proper storage, handling and disposal of oil and oil wastes; • Rehabilitation of the existing water points, use of soak pits, stone pitching and check dams as velocity and siltation reducing measures of this water sources and springs The Contractor shall ensure that the footprint of construction activities is minimised at river and stream crossings; • No construction materials shall be stockpiled within areas that are at risk of flooding; • The Contractor shall ensure that all construction activities at the seasonal river crossings are commenced and completed during the dry seasons; • All temporary and permanent fill used adjacent to, or within, the perennial river bed shall be of clean and or larger particles. Silts and clays shall not be permitted in the fill; • Plastic sheeting, sandbags or geofabric approved by the RE shall be used to prevent the migration of fines through the edges of the fill into the river; • The Contractor shall not modify the banks or bed of a watercourse other than necessary to complete the specified works. If such unapproved modification occurs, the Contractor shall restore the affected areas to their original profile; • The Contractor shall preserve all riparian vegetation; • The Contractor shall not pollute the watercourse or sources through any construction activities.				
Asphalt, Bitumen and Paving	• The plant should be situated on flat ground; • Topsoil shall be removed prior to site establishment and stockpiled for later rehabilitation of the site; • Bitumen drums / products shall be stored in an area approved by the RE. This area shall be indicated on the construction camp layout plan. The storage area shall have a smooth impermeable (concrete or thick plastic covered in gravel) floor.	• To ensure proper siting and operation of asphalt, bitumen and paving	Supervising Engineer and the Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	The floor shall be bunded and sloped towards a sump to contain any spillages of substances; • The area shall be covered to prevent rainwater from contacting the areas containing fuels, oils, bitumen etc and potentially generating contaminated runoff; • The plant shall be secured from trespassers and animals through the provision of fencing and a lockable gate to the satisfaction of the RE; • Well-trained staff shall be responsible for plant workings. • Within the bitumen plant site, areas shall be demarcated/marked for plant materials, wastewater and contaminated water; • An area should be clearly marked for vehicle access; • Drums/tanks shall be safely and securely stored; • Materials requiring disposal shall be disposed of at an appropriate waste facility.				
Cement / Concrete Batching	• Concrete batching plant shall be located more than 20 m from the nearest stream/river channel; • Topsoil shall be removed from the batching plant site and stockpiled; • Concrete shall not be mixed directly on the ground; • The concrete batching works shall be kept neat and clean at all times; • Contaminated stormwater and wastewater runoff from the batching area and aggregate stockpiles shall not be permitted to enter streams but shall be led to a pit where the water can soak away; • Unused cement bags are to be stored so as not to be effected by rain or runoff events; • Used bags shall be stored and disposed of in a manner which prevents pollution of the surrounding environment (e.g. via windblown dust);	• To ensure proper siting and operation of cement/concrete batching	Supervising Engineer and the Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• Concrete transportation shall not result in spillage; • Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment; • Suitable screening and containment shall be in place to prevent windblown contamination associated with any bulk cement silos, loading and batching; • Waste concrete and cement sludge shall be scraped off the site of the batching plant and removed to an approved disposal site; • All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete and disposed at an approved disposal site. Washing the remains into the ground is not acceptable; • All excess aggregate and sand shall also be removed; • After closure of the batching plant or any area where concrete was mixed all waste concrete/cement sludge shall be removed together with contaminated soil. The surface shall then be ripped to a depth of 150mm and the topsoil replaced evenly over the site and re-grassed.				
Diversion and access roads	• Since the major part of the road is going to be under the current alignment the Contractor shall adhere to the road reserve (if possible) in locating the diversion routes. If diversion routes go beyond the road reserve, necessary permission should be sought; • Where possible the diversion must be limited to already connecting routes in the area; • The Contractor shall comply with all applicable laws and by-laws in Kenya with regard to road safety and transport; • Access to the construction site and works area shall utilise existing roads and tracks where possible; • Upgrading of the access roads shall be undertaken within the existing confines of the road, unless otherwise agreed with the RE;	• Use of existing roads and proper use of diversion and access roads	Supervising Engineer and the Contractor.	Construction	BOQ Item 9.04: 4,206,600.00

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• All diversion and temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the RE; • Damage to the existing access roads and services as a result of construction activities shall be repaired to the satisfaction of the RE. The cost of the repairs shall be borne by the Contractor; • To avoid dusts and air pollution, the Contractor must sprinkle water in the diversion route, as necessary, this must be supervised by RE and ESO.				
Disruption of Access to Property	• Disruption of access to property must be kept to a minimum at all times. Where such disruption is unavoidable, the Contractor shall advise the affected parties and the RE at least seven working days in advance of such disruption.	• Minimise disruption of access to property	Supervising Engineer and the Contractor.	Construction	No additional cost
Relocation of public utilities	• Undertake inventory of existing utilities in the project area before construction begins; • Relocation of services should be provided for in the BoQs • Notice should be given to the utility users prior to any interruption in supply; • Liaise with relevant parties which include Meru water service company, KPLC and other institutions having utilities on the road reserve	• Minimum disruption of access to public utilities	Supervising Engineer, Contractor, KPLC and Meru water service company	Construction	No additional cost
Delays in transportation	• To avoid delays to road users, the contractor will be required to plan itineraries for site traffic on a daily basis. Traffic management and control is mandatory throughout the project; • Temporary road signs that are visible both during the day and at night indicating road works and restrictions will be required; • The contractor should also set aside footpaths, cycle lanes and parking bays for heavy goods vehicles and public transport vehicles; • Areas where construction is taking place should have clearly marked speed reduction signage.	• Traffic management plan	Supervising Engineer, and Contractor	Construction	No additional cost
Emergence of	• To forestall the growth of unplanned settlements around the	• To curb against	Supervising	Construction	No additional

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
unplanned settlements	construction camps and other work sites, the road agencies and local administration will need to undertake routine and strict surveillance around the work sites; • The community along the project road is aware that the road is under study for upgrading to bitumen standards. They are also aware that it is normal procedure to receive compensation for crops and structures within the right of way. To mitigate against the potential increase of persons who may be affected by the project, presently and in future, the KURA should inform the district administration to help in stopping further developments within the right of way.	unplanned settlements	Engineer, Contractor and Provincial Administration		cost
Discrimination on employment opportunities	• To avoid conflicts with the local people on employment is it proposed that the Contractor employs the locals in liaison with local administration in unskilled and semi-skilled duties; • To promote the livelihood of vulnerable groups such as the women-headed households, there will be a need to undertake sensitisation and awareness campaigns to the local community to promote gender equity in employment during the road construction works.	• Employment of local communities	Contractor and local administration	Construction	No additional cost
Occupational Health and Safety	• The Contractor shall comply with all standard and legally required health and safety regulations as promulgated by Factories and Other Places of Work Act and also the to ILO Guidelines on Safety and Public Health in the construction activities; • The Contractor shall provide a standard first aid kit at the site office; • There should be a Safety Officer on site who has first aid training and knowledge of safety procedures; • Speed limits appropriate to the vehicles driven are to be observed at all times on access and haul roads; • No unauthorised firearms are permitted on site; • The Contractor shall provide the appropriate Personal	• To reduce chances of accidents	Supervising Engineer and Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	Protective Equipment for staff; • The contractor must have insurance cover for the workmen.				
Public Health	• A comprehensive health awareness campaign, carried out in conjunction with the road project team will be done to prevent outbreak of disease. This will include Successful preventive measures such as immunizing the vulnerable population, and educating people about diseases and how they are contracted, and how to avoid them by using treated water and keeping living areas cleaner; • Treating affected local and migrant populations will also be used in controlling the movement of disease vectors (through contaminated water and between people). • The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities; • All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected; • The HIV/AIDS awareness campaigns should be conducted at the camps as well as in the trading / market centres. The contractor shall take an active role in civic and public health education to his employees and the community.. The campaign shall include the training of facilitators within the workers, information posters in more frequented areas in the campsite and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and theatre groups. The contractor will co-ordinate with the Provincial and District HIV/AIDS control councils, health officers and the NGOs undertaking education and sensitisation programmes;	• To reduce transmission of diseases; • To create awareness of the HIV/AIDS.	Supervising Engineer, Contractor, NGOS, Provincial and District HIV/AIDS control councils, and health officers	Construction	BOQ No. 24: 3,006,000.00

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	• The contractor will provide condoms at appropriate places in the work camps. The campaigns will be continuously done by the relevant Government organisation even during operation phase of the road; • The implementing agency for HIV/AIDS campaign shall monitor activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognising the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from focus group discussions.				

Disruption of Community	• The RE is to establish a formal grievance mechanism through which affected people can lodge a grievance and to help ensure a speedy satisfactory resolution of any disputes;
	• The Contractor will be required to minimise the risk of grievances with the local communities through implementing the specifications described in the ESMP;
	• Where grievances occur, the Contractor will be required to assist in the process to investigate and resolve the grievance as effectively and quickly as reasonable;
	• The Contractor shall keep a 'Complaints register' on Site. The register shall contain:
	  • All contact details of the person who made the complaint and information regarding the complaint itself;
	  • The investigations undertaken and response provided;
	  • Actions taken and by whom;
	  • Any follow-up actions taken.
	• Copies of complaints received are to be copied to the RE, and where pertinent, the ESO.
		• To minimise disruption of community and adequately address grievances	Supervising Engineer Contractor and ESO.	Construction	No additional cost

Site Security	• Security arrangements must be included in the Bills of Quantities to avoid any delays which might be caused due to	• To improve site security and	Supervising Engineer and	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	insecurity; • The Supervising Engineer and Contractor in liaison with the security organs must create awareness to the security situation on the ground all the times; • Appropriate fencing, security gates, shelter and security guards are to be provided at the Construction Site to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff; • The Contractor must ensure that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft; • Site staff that are found to be involved in incidences of theft or pose other security risks to the local community are to be dismissed and reported to the authorities.	avoid cases of theft	Contractor		

Fire Prevention and Control	• The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started as a consequence of his activities on site;
	• The Contractor shall ensure that there is basic fire-fighting equipment available on site;
	• Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulations;
	• Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires;
	• 'Hot' work activities shall be restricted to a site approved by the RE;
	• Smoking shall not be permitted in those areas where there is a fire hazard. These areas shall include:
	  • Workshop;
	  • Fuel storage areas;
	  • Any areas where vegetation or other material is such as to make liable the rapid spread of an initial flame;
	• The Contractor shall ensure that all site personnel are aware of
		• Fire prevention and control	Supervising Engineer and Contractor.	Construction	No additional cost

Construction Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost (KSh)**
	the fire risks and how to deal with any fires that occur. This shall include, but not be limited to: • Regular fire prevention talks and drills; • Posting of regular reminders to staff; • Any fires that occur shall be reported to the RE immediately and then to the relevant authorities; • In the event of a fire, the Contractor shall immediately employ such plant and personnel as is at his disposal and take all necessary action to prevent the spread of the fire and bring the fire under control; • Costs incurred through fire damage will be the responsibility of the Contractor, should the Contractor's staff be proven responsible for such a fire.				
Climate change	• Contractor should maintain his plant and equipment to limit carbon emissions; • The contractor should seek permission or notification to KFS before cutting trees. The Kenya Wildlife Service requires notification of such intentions; • Contractor should plant trees along the road periphery (20 trees per km) in order to help absorb carbon emissions from road traffic	• Reduce environmental pollution	RE, Supervising Engineer and Contractor	Project life cycle.	No additional costs
Impacts on wildlife	• No feeding of animals along the road • Enforcement by the contractor of code of conduct amongst his workers that prohibits poaching of game for any reason whatsoever or eating or sale of game meat • Put appropriate signs at animal crossing points • Constant liaisons' with KWS	• Reduce accidents/loss of wildlife and human life.	RE, KWS and Contractor	Project life cylce	No additional costs

Operation Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost**
Noise pollution	• Vehicles using the road should adhere to the Traffic Act where they are supposed to keep the vehicles in roadworthy conditions; • Road users to adhere to NEMA rules on noise pollution i.e. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009	• To reduce chances of noise nuisance	Traffic police and NEMA	Operation	No additional cost
Erosion and water quality	• Maintenance engineers from KURA shall inspect all drainage structures and outfalls; • All the damaged culverts, wing walls and aprons shall be repaired and additional measures for velocity reduction and erosion protection shall be implemented in case or development of erosion.	• To ensure drainage systems are in good condition	KURA	Operation	BOQ No. 8: 79,154,828.00

Road Accidents	• Proper design of road safety features is a very effective way to prevent accidents. The Resident Engineer and the Contractor involved with the implementation of the design of the road should:
	  • Examine road design standards, safety equipment specifications and training to ensure that design details take account of safety concerns and that specific safety features are correctly designed and installed;
	  • Require that road design audits be done, at final design stages, by specialists in road safety and traffic operations; and
	  • Draft traffic management plans, including details of signs, markings, and intersection layouts, channelisation of flows, access restrictions, footpaths, bus stops, and provisions for non-motorized vehicles;
	  • Painting of edge lines in order to separate shoulders;
	  • Provision of traffic signals with phases for bicyclists;
	  • Establishment of non-motorised vehicle waiting area;
	  • Improvement of visibility;
		• To avoid road accidents	KURA and Traffic police	Construction and operation	BOQ No. 20: Road furniture 74,626,760

Operation Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost**
	• Provision of speed limit signs; • Construction of bumps to reduce speeds; • Improvement of crossing sites paintings of zebra crossings; • Regulations, educations and safety trainings. • Active police enforcement of speeds; • Road safety and accident prevention campaigns are recommended at the end of construction. To monitor the effectiveness of the road safety information and education campaigns, the following measures are recommended: • KURA shall monitor traffic accidents through records kept at the local police stations along the project road; • KURA and the respective Agriculture shall record accidents with livestock; • A report will be required after two years of monitoring and the results used to recommend further mitigation measures, if necessary.				
Right -of – Way Encroachment	• KURA should clearly demarcate the road reserve using, for example, concrete bollards or beacons at 2m intervals along the project road; • KURA should create awareness among local population on the need to respect the road reserve during the road safety and accident prevention campaigns.	• Avoid encroachment on Right-of-way	KURA and local administration	Operation	Additional 2,000.000.00.
Illegal trade on trees and its products	• There needs to be consultation between KURA and other Government departments, such as the KFS on how best manage the problem; • Prior to completion of the Contract, the Contractor shall contract an implementing agency to undertake an awareness campaign in the communities, mainly in market centres about environmental protection.	• Curb against illegal trade on trees and its products	KURA and KFS	Operation	No additional cost
Cultural Changes	• Strengthen the cultural organizations and encouraging competitions through organization of cultural tournaments; • Ensure that the project contributes to the creation of an atmosphere that is conducive to the functioning of all social	• To reduce the breakdown of the	KURA and local administration	Operation	No additional cost

Operation Phase					
Environmental / social aspect	**Recommended mitigation, monitoring and/ or management measure**	**Goals**	**Responsibility for implementation**	**Time frame and monitoring indicators**	**Cost**
	centres which are in the project zone of influence.	socio-culture of the natives.			
HIV/AIDS	• Sensitisation and awareness campaigns should be the responsibility of the National Aids Control Councils in Kenya together with their district co-ordinators.	• To reduce prevalence rates	KURA and National Aids Control Councils	Operation	BOQ No. 24: STDs & HIV/AIDS 3,006,000.00

8.3.1 Uncertainty in ESMP

Uncertainty in ESMP may be occasioned by the following aspects:-

1. Non homogenous baseline due to ever changing external factors occurring during the entire project cycle;
2. Changes in legal and regulatory policy which influences the assessment of future baselines and post development issues;
3. Non uniform soil profiles which may be realized during project implementation;
4. Non compliance of the proponent and contractor with the implementation schedule.

The proponent (KURA) ought to beware of the above listed issues and together with the contractor adopt a proactive strategy to address the emerging issues and knowledge gaps.

8.3.2 EMP Management Records

Environmental management records shall be kept on site during the duration of construction and shall include the following:

i. The updated version of the EMP;
ii. All necessary permits and licences;
iii. All site specific plans prepared as part of the updated EMP;
iv. All written instructions and reports issued by the RE / Supervising Consultant;
v. A register of audit non-conformance reports and corrective actions;
vi. All related environmental, social, health and safety management registers and correspondence, including any complaints;
vii. All records shall be kept at site premises and maintained in a legible state for the full period of construction.

8.3.3 Auditing of the EMP

The ESO shall conduct quarterly audits to ensure that the system for implementation of the EMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

1. The EMP being used is the up to date version;
2. Variations to the EMP and non-compliance and corrective action are documented;
3. Appropriate environmental training of personnel is undertaken;
4. Emergency procedures are in place and effectively communicated to personnel;
5. A register of major incidents (spills, injuries, complaints, legal transgressions, spot fines and penalties etc) is in place and other documentation related to the EMP;
6. Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued through the RE.

8.3.4 Costs of Mitigation

Construction related costs for mitigation of environmental impacts will be included in the Bill of Quantities (BoQ) as part of the design and tender documentation for the project road.

8.4 Environmental and Social Monitoring

Environmental and social monitoring during construction and operation helps to predict unforeseen environmental and social impacts and allows measures to prevent or avert adverse impacts to be developed or introduced in a timely manner.

Maintenance of infrastructure during construction and operation is also important in contributing towards environmental conservation by for example, preventing soil erosion along the road and its upstream and downstream catchments and ensuring proper drainage of run-off, away from the road.

During the construction and operation phase, monitoring will be undertaken to ensure that proposed mitigation measures for negative impacts and enhancement measures for positive impacts are implemented.

Table 8.2 Environmental Monitoring Plan

Environmental Aspect	Location	Responsibility during design and construction	Responsibility for monitoring during operation	Mode and Period (c) = Construction (o) = Operation	Frequency of monitoring
Land acquisition and Resettlement	• Way leave	KURA	SURVEY REPORT	Before construction	SURVEY REPORT
Solid Waste	• Construction Camp • Project sites	Contractor, Supervising Engineer.	-.	Site visit and visual inspection (c)	Daily (c)
Air pollution	• Project site	Design Engineer, Contractor, Supervising Engineer, Forest Department.	Traffic Police; KURA.	Visual inspection (c) Speed gun (o)	Daily (c) Random (o)
Noise pollution:	• Project site.	Supervising Engineer and Contractor.	Traffic Police and KURA	Speed gun (o). Observation/Inspection (c)	Random (o)
Liquid wastes	• Project site (workshops)	Design Engineer, Supervising Engineer, and Contractor.	KURA	Visual inspection (c). Routine maintenance (o).	Daily (c). Twice a year (o).
Vegetation loss	• Way leave	Design Engineer, Contractor, Supervising Engineer, Forest Department	KURA and KFS	Visual Inspection (construction and operation)	Quartely
Water	• Material sites and project area	Contractor, Supervising Engineer	KURA, Ministry of Agriculture and Water & Irrigation	Water quality analysis(c)	Monthly
Soil erosion	• Project area	Contractor, Supervising Engineer	KURA	Drainage of project area (c)	Weekly
Social impacts	• Project area	KURA Contractor, Supervising Engineer	KURA	Public consultations ©	Quarterly
Impacts on livestock and Wildlife	• Project area	KURA Contractor, Supervising Engineer	KURA and KWS	Construction and operation	Quarterly

8.5 Costs for Monitoring

The costs for mitigation of construction related impacts will be included in the contract documents. During construction and decommissioning phases of the project, the Environmental and Social Officer will co-ordinate the monitoring programme and prepare reports for submission to the environmental authorities.

8.6 Environmental Training and Awareness

The Contractor and sub-contractors shall be aware of the environmental requirements and constraints on construction activities contained in the provisions of the EMP. The Contractor will therefore be required to provide for the appropriate Environmental Training and Awareness as described in this EMP in his costs and programming. An initial environmental awareness training session shall be held prior to any work commencing on site, with the target audience is all project personnel.

The training should include but not limited to the following:

i. Basic awareness and understanding of the key environmental features of the work site and environs;
ii. Understanding the importance of and reasons why the environment must be protected;
iii. Ways to minimise environmental impacts;
iv. Relevant requirements of the EMP;
v. Prevention and handling of fire;
vi. Health risks pertinent to the site, including prevention of communicable diseases;
vii. Awareness, prevention and minimisation of risk with regard to the contraction and spread of HIV/AIDS and other sexually transmitted diseases;
viii. The Contractor shall erect and maintain Environmental and Health Information Posters for his employees regarding HIV/AIDS and natural resources; and
ix. The Environmental and Health Information Posters shall be erected at the eating areas and any other locations specified by the RE.

8.7 Environmental Risk Management

The failure of environmental mitigation can result in serious impacts such as erosion, increased road accidents and disruption of the community lifestyles. Construction of a road also involves occupational health and safety risks to road workers, primarily in the areas of storage and handling of dangerous materials, and operation of heavy machinery close to traffic, slopes and watercourses. The anticipated risks in this project include:

1. Exposure to excessive dust particles or toxic fumes from bitumen and other chemicals used in road works;
2. Potential for collapse of trenches;
3. Risk of accidents involving passing traffic;
4. Risk of bush fires during dry seasons;
5. Risk of rock falls during blasting;
6. Risk of fuel spills and therefore contaminating soil and groundwater.

The risks can be mitigated to a large extent through:

1. Strengthening staff skills and training in environmental management;
2. Monitoring environmental actions and responsibilities and making provision for remedial actions;
3. Planning for remedial measures in case initial planned actions are not successful;
4. Limiting time of exposure to dust particles, chemicals and noise;
5. Establishing safety and inspection procedures in materials handling, operating heavy equipment and constructing trenches; and
6. Safe handling of toxic materials, explosives and other hazardous substances.

8.8 Emergency Procedures

The Contractor shall submit Method Statements covering the procedures for the main activities which could generate emergency situations through accidents or neglect of responsibilities. These situations include, but are not limited to:

1. Accidents at the work place;
2. Accidental fires;

3. Accidental leaks and spillages;
4. Vehicle and plant accidents;

Specific to accidental leaks and spillages:

i. The Contractor shall ensure that his employees are aware of the procedure for dealing with spills and leaks;
ii. The Contractor shall also ensure that the necessary materials and equipment for dealing with the spills and leaks is available on site at all times.

Specific to hydrocarbon spills:

i. The source of the spill shall be isolated and the spillage contained using sand berms, sandbags, sawdust, absorbent material and/or other materials approved by the RE;
ii. The area shall be cordoned off and secured;
iii. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown the spill;
iv. The quantity of such materials shall be able to handle a minimum of 200l hydrocarbon liquid spill;
v. The Contractor shall notify the relevant authorities of any spills that occur;
vi. The Contractor shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures. These contact details shall be listed in English and Kiswahili;
vii. The treatment and remediation of areas affected by emergencies shall be undertaken to the reasonable satisfaction of the RE at the cost of the Contractor where his staff have been proven to be responsible for the emergency.

8.9 Environmental Audits

One of the methods that will be used in monitoring will be through formal Environmental Audits according to EMCA 1999 EIA/EA Regulations 2003. The Audits will be carried out by contracted road design engineer, environmentalist, road Supervision engineers in collaboration with the contractor. NEMA´s DEO, KURA environment officials, relevant NGOs and CBOs will also be involved during and after construction to ensure sustainability of measures put in place.

8.10 Occupational Health / Safety Audits

The audits should be carried out in accordance as a legal requirement of the Directorate of Occupational Health and Safety. NEMA´s Initial and follow up audits (Self Audits) should be carried out within raw material borrow sites such as quarries and borrow pits.

9 CONCLUSIONS &RECOMENDATIONS

9.1 Conclusion

The findings of the environmental and social impact assessment (ESIA) conclude that the impact of upgrading to bitumen standards the Meru Town Bypasses Road is positive overall on the socio-economics of the area. The impact of the project on the bio-physical environment is low to moderately negative both in the construction phase and over the life of the road (operation phase), but these impacts can be reduced by the application of appropriate mitigation and support measures. The social impacts of land take and Resettlement will be addressed during the RAP studies

The environmental and social management measures proposed are generally straight forward. The majority of the measures relate directly to sound operating practices both during the construction phase and subsequently over the operational life of the road.

Provided the road is upgraded with due attention to the mitigation and management measures outlined, the project will have a positive, or at least a neutral impact on both the bio-physical and socio-economic environment of the project area. It is recommended that this road project be implemented and that the proposed mitigation and monitoring measures are enforced.

9.2 Recommendations

1. The road project should be granted a licence to commence.

2. Project Affected Persons Identification: KURA should ascertain the exact number of Project Affected Persons (PAPs) before the construction phase.

3. Implementation Plan: The consultant recommended that the proposed projects be implemented in compliance with all the relevant legislation and planning requirements of Kenya at all times.

4. A monitoring programme should be adhered to by the supervising Engineers and KURA during operation phases.

5. KURA should liaise with other entities/organisations having utilities on the road (water, electricity and communication lines) to ensure that they only use the edges of the road reserve to avoid future costs of relocation of service and inconvenience.

6. KURA should survey and put beacons on the road reserves so as to stop encroachment and ease maintenance of roads.

7. Annual Environmental Audits: KURA should undertake an environmental audit (EA) of the projects, in accordance to NEMA Regulations, twelve (12) months after completion of the project to confirm the efficacy and adequacy of the ESMP. This can be done by seeking the services of Environmental Consultants.

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