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Kenya National Highways Authority

Quality Highways, Better Connections

SOUTHERN SUDAN – EASTERN AFRICA REGIONAL TRANSPORT TRADE AND DEVELOPMENT FACILITATION PROGRAMME (SS-EARTTDFP) (P131426)

REVIEWED AND UPDATED ESIA STUDY REPORT

Review of the Environmental and Social Impact Assessments (ESIA) for the Proposed Rehabilitation of Lesseru – Kitale – Marich Pass (A1) Road, 164 Km

Review and Update by:

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Client: Kenya National Highways Authority (KeNHA)

Project Name: Reviewing and Updating the Environmental and Social Impact Assessments (ESIA) For the Proposed Rehabilitation of Lesseru – Kitale – Marich Pass (A1) Road, 164Km

Report Title: Reviewed and Updated Environmental and Social Impact Assessment Study

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Table of Contents

List of Tables

List of Figures

Acronyms

ADT	Average Daily Traffic
a.s.l	Above Sea Level
CBO	Community Based Organization
CPP	Consultative Public Participation
dB	Decibels
EIA	Environmental Impact Assessment
EMCA	Environmental Management and coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HIV/AIDs	Human Immunodeficiency Virus/ Acquired immune deficiency syndrome
KeNHA	Kenya National Highways Authority
Km	Kilometer
MCA	Member of County Assembly
MDG	Millennium Development Goal
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NGO	Non- Governmental Organization
NMT	Non Motorized Transport
NPEP	National Poverty Eradication Plan
PAPS	Project Affected Persons
PCU	Passenger Car Unit
PEC	Poverty Eradication Commission
PRSP	Poverty Reduction Strategy Paper
PWD	Persons with Disabilities
RAP	Resettlement Action Plan
ToR	Terms of Reference
URTI	Upper Respiratory Tract Infection
VCT	Voluntary Counseling and Testing
WRMA	Water Resource Management Authority

Executive Summary

Introduction

The Government of the Republic of Kenya has received a credit from the International Development Association (IDA) towards the cost of the Northern Corridor Transport Improvement Project (NCTIP). The corridor links Kenya and Sudan such as to form one of the backbones of Corridor 3 of the high priority Trans-National Road Corridors under the East African Community Road Network. Part of the credits has been utilized in the "Consultancy Services for Feasibility Study, Environmental Impact Assessment, Resettlement Action Plan, Detailed Design and Tender Document preparation of the Lesseru – Kitale – Marich Pass Road Rehabilitation Project".

The project road commences at Lesseru junction within Uasin Gishu and Kakamega Counties to link Kitale in Trans-Nzoia County and then Kapenguria and Marich Pass in West Pokot County is a section of the Northern Corridor. It is noted that over the years, the social and environmental settings have been changing with more people moving into the urban centers for business and other activities, demand for more land (settlement and agriculture) and increased traffic from local catchments and as well as the economic potential features in the northern zones of Kenya and the neighbouring countries. The road section was constructed in the early nineties but was reportedly not adequately maintained.

An Environmental and Social Impact Assessment Study had been undertaken (September 2014) along the preliminary design process. The study was undertaken within the provisions of the established regulations under EMCA, 1999 as well as the World Banks Social and Environmental safeguards. This ESIA review has been commissioned to provide an independent verification and update of the environment and social status along the corridor and confirm the sustainability during the project implementation.

Review Findings

The initial ESIA Report was reviewed alongside the design report and drawings followed by a review verification mission of the road corridor comprising the Environmentalist (Team Leader), Sociologist, the Highway Design Engineer and a Field Support Team. The following are the key findings made;

(i) The design drawings for the road sections are well thought out and seem to have fairly addressed the main challenges facing the road stretch including among others;
- ✓ Safety,
- ✓ Geometry (slopes and curves),
- ✓ Reduced social conflicts
- ✓ Provisions for drainage
- ✓ Improved junctions

(ii) However, the drawings have not been supported with adequate design report as expected to analyze the concepts, especially where critical interventions are anticipated, particularly on the section in West Pokot County. This status, therefore, makes it a challenge for a non-Engineer to interpret the design linkages effectively,

(iii) The re-alignments proposed through Kamatira Forest ought to be accompanied by a design mitigation proposals for the anticipated impacts including drainage structures, indication of the surface areas for biomass quantification and erosion protection,

(iv) The initial Environmental and Social Impact Assessment report has provided global environmental status for project Counties (Uasin Gishu, Trans Nzoia and West Pokot

Counties) but did not cover specific baseline conditions along the road corridor (Kakamega County had been omitted) such as to cover;

- ✓ Water resources crossing or along the corridor,
- ✓ Hydrology of the project corridor,
- ✓ Description of drainage characteristics along the corridor,
- ✓ Geological conditions of the corridor
- ✓ Ecological characteristics including forests, wetlands and conservation areas,
- ✓ Description of sensitive environments including steep slopes, flood plains and unstable geological areas (especially in West Pokot County section),

(v) While presenting details on the global social and economic status of the project counties, there was no analysis of the specific aspects along the corridor including among others;

- ✓ Administrative settings
- ✓ Population distribution of the project areas,
- ✓ Settlement and housing trends
- ✓ Economic activities
- ✓ Poverty and livelihoods
- ✓ Land use trends
- ✓ Public amenities and infrastructural provisions,
- ✓ Health and safety and,
- ✓ Gender issues

While appreciating the impacts analysis in the initial ESIA report, it was felt that arising from the above findings, significant specific linkages along the corridor required to be updated. Equally, specific management factors in the Environmental Management Plan also required updating on the basis of the established corridor specific linkages.

ESIA Review Justification

Environmental and Social Impact Assessment (ESIA) reports are prepared to identify significant linkages of projects to the environment and social settings for projects. ESIA reports provides management plans and intervention actions that are based on physical environmental and social features, defined timelines and implementation cost elements. The management actions are also based on design concepts and principles.

When the implementation of ESIA reports and related management plans is surpassed by time or changes in physical environment, social and/or economic situations, certain aspects has to be reviewed. Such a review becomes even more important if the design concepts changes or when new components are introduced into the project, then the ESIA reports also have to be reviewed. Part of social issues are also captured through Resettlement Action Plans (RAP) developed to provide a policy guidelines on ensuring smooth relocation of persons and economic features from projects target areas to suitable and acceptable alternatives. As part of the social impacts, the resettlement issues are based on the extent to which a project displaces people directly or indirectly through associated impacts. This again depends on among other parameters time, land use features, population density, land productivity and other monetary and non-monetary values.

The assignment is meant to review and update the environmental and social impact assessments (ESIA) for the proposed rehabilitation of Lesseru – Kitale – Marich Pass Road (A1), 164 KM. The project road is expected to portray a set of environmental and social challenges which changes with time. The initial ESIA Report was reviewed as part of this assignment and the following was concluded;

(i) The report has not effectively analyzed the design report and associated documents (RAP, Hydrology, Material report and Socio-Economic Report documents) to provide an effective integration of the respective findings into the ESIA study,
(ii) Verification of the baseline conditions presented in the initial ESIA report with the actual ground conditions, it was established that significant details on data and information had been missed out. This posed a challenge in identifying realistic environmental and social linkages with the proposed rehabilitation proposals and also to the development of mitigation and corrective measures. This included environmental and ecological issues (including Kamatira Forest),
(iii) The stakeholders and public consultations only illustrates a limited participation of the public and no clear engagement with the middle stakeholders including the County Government, County Commissioners, Government Departments, Conservation Organizations, key business community, key transporters and service providers among others. This, therefore, did not provide opportunities for meaningful technical comments on the proposed rehabilitation plan,
(iv) The impacts and mitigation measures as presented required to be expanded,
(v) The EMP required to be reviewed to reflect the updated baseline conditions.

In view the above, therefore, it was necessary to have a comprehensive update of the ESIA Study report to evaluate the current environmental and the social status. However, other than raising and addressing specific issues from the document, it was found more logical to re-write the whole documents for proper integration of the captured aspects and additional findings.

The ESIA review involved the study of the reports and associated base documentation as well as a physical re-assessment of the project corridor. Fresh environmental and social sampling was also undertaken to update the status while rapid consultations with the beneficiaries and other stakeholders was undertaken to establish the level of acceptability of the project. The output of the assignment was a Reviewed and Updated ESIA Study Report for integration into the project implementation.

Key Observations

The road physical conditions including the surface, road shoulders, roadside drainage, road furniture and culvert crossings have exceeded their design life and calls for rehabilitation and/or total reconstruction. The most attention should be between Kapenguria and Marich Pass which is in poor condition with most areas being beyond routine maintenance operations. The Lesseru – Kitale – Marich Pass section constitutes among the three sections whose ESIA and RAP are being reviewed on the International Trunk Road A1 of Corridor 3 of the High Priority Trans-National Road Corridors under the East African Community Road Network identified for rehabilitation.

The estimated 155 km long A1 section may be divided into the following three sections for purposes of this review based on the current road condition;

(i) Lesseru – Kitale ~55 km
(ii) Kitale – Kapenguria ~35 km
(iii) Kapenguria – Marich Pass ~65 km

<u>Lesseru – Kitale Section</u>
The road starts off at Lesseru and traverses a low lying marshy section for the first 5km. It the traverses terrain that is predominantly rolling through Uasin Gishu, Kakamega and Trans Nzoia Counties. This section of the project road was constructed to bitumen standards over 20 years ago, and was not adequately maintained; despite a continuous increase in the traffic volume and

loading. Traffic volumes are relatively high and mainly consisting of heavy good vehicles serving Northern Kenya and South Sudan, buses and pick-ups serving regional traffic demand. The section between Lesseru and Moi's Bridge has recently been overlaid with asphalt and is now in a reasonable state of repair but is also beginning to show signs of early distress.

Generally there are no traffic signs along the project road, besides guide posts, mostly damaged and covered with bushes were rarely observed at the section of the road with horizontal curves. The narrow road width in all built up areas and settlement areas bears a high accident risk mainly for the non-motorized traffic, e.g. pedestrian, cyclists, donkey carts. Appropriate traffic segregation by way of service roads and NMT facilities through built-up areas have also not been incorporated.

The road width varies between 6.0 and 7.0 m. The geometric condition of this road section can generally be described as fair to good. There are no paved shoulders long most of the road section making by-passing or overtaking of larger vehicles dangerous. In nearly all towns the road width originally has been increased but due to edge damage only some 6.0 m are still usable which often compromises the safety of road users as slow donkey carts and bicycles, parking Minibuses and normal traffic have to share the narrow carriageway.

Kitale – Kapenguria Section

The project road section is approximately 35km long commencing from Kitale town ending at Kapenguria town in the Trans Nzoia District. The project road was constructed as a bituminous surfaced road over 20 years ago and has been in limited maintenance works despite the increase in traffic volume. Traffic on this section is relatively lower and mainly consisting of heavy good trucks serving Northern Kenya and Southern Sudan and a low level volume serving the local demand. The road capacity does not seem to have the capacity required for future traffic volume. The pavement condition can be classified as fair but with poor roadside drainage that also seem to compromise the integrity in some of the road sections. Other challenges facing the road section include poor road signage with high risks of safety, road width especially considering the type of traffic, steep grades in some sections and also conflict with the growing urban centres along the corridor.

Kapenguria – Marich Pass

The project road section is approximately 65km long starting from Kapenguria town and ends at Marich Pass at the B4 road junction in West Pokot District. The project road was constructed as a bituminous surfaced road over 20 years ago and has experienced increasing traffic volumes and loading particularly during the relief operations in Northern Kenya and South Sudan. The first 16 km from Kapenguria town have received some emergency maintenance mainly pothole patching though the pavement still appears to be in poor state. The rest of the road section is in very poor physical condition with some sections having suffered complete pavement failure. Only two existing major structures, bridges and number of minor drainage structures, mostly of pipes culverts, were observed. The major structures are generally in good condition. Minor drainage structures are structurally in good condition though seriously affected by siltation problems. For the last 40km, the route corridor follows the Moruny river gorge and south of Sebit the road traverses hilly terrain characterized by steep gradients and sharp bends.

Updated ESIA Study

The main objective of this assignment was to study the initial ESIA report prepared at design stage with the aim of identifying gaps and areas of intervention. The study was to establish required additional data and information as well as missing links to the environment and social settings in the respective areas. The focus on ESIA report was mainly on updating the environmental, social and economic baseline conditions as important parameters for the review of the respective environment and social management plans (ESMPs), the latter being the ultimate tool in the project

implementation. In addition to the documentary review, project areas were also re-appraised with respect to the existing physical conditions as well as environmental and social quality.

In accordance with the ToR, specific objectives included the following;

(i) Review and analyze policies, legal and institutional framework governing environmental resources management in Kenya,
(ii) Review of documented information and data on the areas affected by the project and verify the documents with the ground status,
(iii) Examine and document the current environmental and social baseline conditions of the project corridor,
(iv) Review the environmental and social impacts (positive and negative) associated with the project preparation, construction, operations and decommissioning stages and establish appropriate mitigation or preventive measures,
(v) Review the environmental and social management plan (EMP) and produce a revised comprehensive version for integration into the project implementation process,
(vi) Review the environmental and social monitoring plan (EMoP) covering all stages of the project lifecycle,
(vii) Prepare an updated ESIA Study report for submission to NEMA and the World Bank.

The ESIA review involved the study of the reports and associated base documentation as well as a physical re-assessment of the project corridor. Fresh environmental and social sampling was also undertaken to update the status while rapid consultations with the beneficiaries and other stakeholders was undertaken to establish the level of acceptability of the project. The output of the assignment was a Reviewed and Updated ESIA Study Report for integration into the project implementation.

Anticipated Impacts

The overall impact of the rehabilitation project was focused on facilitating traffic movement for the local and transit traffic. Social and economic linkages including accessibility to settlements, public services, institutional growth, security management and delivery of farm inputs and produce are among the key benefits associated with the new road. Employment opportunities and income generation for the local communities were singled out as of major interest during the construction period and use of the road thereafter. On the other hand, efficient transportation of goods and people as part of the Northern Corridor to Northern Kenya and the neighbouring states has been the major justification for the project implementation.

<u>Positive Impacts</u>
Rehabilitation of the Lesseru – Kitale – Marich Pass – Lodwar – Nandapal road will have an overall benefit to the local social and economic activities, the northern parts of Kenya and the neighblouring countries (Southern Sudan, Ethiopia and Northern Uganda through efficient transit of goods and people. Efficient traffic movement will directly have a direct benefit to the environment (including climate change aspects through emissions reduction) especially through major urban areas such as Mois Bridge, Kitale and Makutano towns. Specific positive impacts of the proposed road improvement project will need to be enhanced.

<u>Specific Negative Impacts</u>
Negative impacts associated with the road project have been identified and mitigation measures established to ensure the project sustainability, not only for the short term but also on the long term. The impacts have been clustered into construction and road use such as to cover environmental (environmental pollution, water resources degradation, air quality, ground cover, land destruction,

drainage management, waste management, etc.), social (health and safety, displacements, access to services and amenities, noise and vibrations, air quality, transportation efficiency, etc.), economic (access to markets, transport costs, appreciation of assets, land use developments, etc.) and cultural issues. The impacts associated with the project implementation are expected from the

Environmental and Social Management Plan

This management plan presents the key management principles that then defines a scope of the plan implementation. Broad indications of the responsibilities have also been discussed along with the possible implementation constraints anticipated while detailed actions are tabulated in a matrix for ease of reference and review. It should also be noted that the matrix is not complete in itself and continuous reviews would be necessary throughout the project implementation period. The plan would provide the key environmental and social concerns, appropriate preventive actions and responsibilities, targets to be achieved and where possible estimate of the respective costs. The plan will also provide basic success indicators for monitoring purposes.

The guiding principles behind the road project are based on the national objective of enhancing environmental, social and economic benefits to the affected persons as well as sustainable national development and in compliance with the environmental laws (EMCA, 1999 and associated regulations as well as relevant sectoral statutes). To achieve these objectives, the project should be acceptable to the majority and ensure minimal effects to the physical environment through integrated stakeholder consultations, evaluations and review of the design aspects throughout the project route and a sustained monitoring of the road upon commissioning.

The scope of this environmental and social management plan (ESMP) is to give guidelines to all parties involved during construction, maintenance and utilization of the road in fulfillment of environmental and social requirements. Precautions to ensure that damages to the environment are minimized calls for a concerted effort from the project management, the Contractor(s) and all stakeholders. The Resident Engineer is expected to discuss and convey the contents of this management plan, recommended mitigation/interventions outlined under the impact, instructions from National Environment Management Authority (NEMA) as well as the wishes of the affected stakeholders to the Contractor and construction workers for integration in the construction process. The local NEMA Offices will also be involved to take advantage of the valuable information on the environmental trends in the area.

Conclusions and Recommendations

Conclusions	Recommendations
It is appreciating that the initial ESIA Study Report provided a strong basis on the project area characteristics, especially at the County levels. However, it did cover specific linkages to environment and social aspects along the project corridor. Due to this status, impacts and management aspects had to be updated based on reviewed environment and social baseline conditions	The ESIA Study Report to be updated by integrating the revised environment and social baseline conditions as well as the re-established impacts and mitigation measures. An environmental and social management plan is also to be updated to provide for a guided Construction Environmental Management Plan (CEMP) during the construction phase.
Demand for efficient transportation corridor to Northern Kenya (driven by the County requirements and the promising oil production) as well as the	The environment and social management plan developed under this report is an indication of the monitoring parameters to ensure long term

Conclusions	Recommendations
regional transport integration linking Southern Sudan, Ethiopia and Northern Uganda is justification enough for rehabilitation of Lesseru – Marich Pass as part of the Northern Corridor Transport Improvement Project. This is an existing road transport corridor and with already existing heavy transit goods movement activities. The expansion will only bring on additional volumes and potential expansion of social and economic activities, especially around the towns and markets.	sustainability of the highway. The same should be customized for actual construction works through a Construction Environment Management Plan (CEMP)
It is observed that significant portion of the road pavement is in fair condition but requires strengthening or improvement. The other portion is generally worn out or just a gravel surface calling for total reconstruction. The works, therefore, demand for intensive supply of construction materials including gravel, hard stone aggregate, sand and water among others. The materials has to be sustainably sourced locally. Similarly, identification and acquisition of construction camp sites, workmen camps and materials holding and preparation areas will be the responsibility of the Contractor(s). The site have potential implications to the environmental and social settings.	While the design process have identified potential areas with material deposits, it will be necessary for the Contractors to carry out comprehensive ESIA studies and seek approvals from NEMA before extraction. These will include gravel borrow areas, hard stone quarries, water sources and sand harvesting sources. Equally important will be undertaking ESIA studies and seeking approvals for all construction camp sites. Agreements between the Contractor(s) and the landowners hosting material areas and camp sites will need to agreements with clear responsibilities on restorations upon completion and the restoration quality.
Going by the design, there will be minimal realignment of the existing carriageway, apart from limited expansions (within the existing road Right of Way, especially through market centers) and portions within Kamatira Forest. It is anticipated that the existing RoW will be adequate for deviation routes. No significant displacements of people are anticipated though notable disruptions to social and economic activities are likely to occur through the market centres. It is noted that a RAP review was running parallel to this study. The limited realignments also have environmental effects including soil loss, interference with delicate steep slopes, vegetation removal and damages to river banks.	The Resettlement Action Plan (RAP) report is to provide the level of social disruptions. The affected persons (PAPs) should be compensated fully before the commencement of the works. Environmental compensation will require effective restoration for damages and re-vegetation programmes (grassing and tree planting in pre-selected areas). The construction works, should, therefore, establish and maintain a count and record of all trees (indigenous and exotic species) removed during the construction for replanting accordingly.
The road corridor is characterized with significant numbers of road safety spots, especially market centers, steep slopes and sections with sharp bends. Others include sections adjacent to schools, religious premises, livestock crossing points, river crossings (bridges) and sections with potential falling stones and landslides. Traffic Management during the construction through	The rehabilitation should give high priority to effective safety signage and information. Traffic Management Plan including scheduling of deviation routes shall be prepared. Clear safety signage and information will be provided in all the work areas at all times.

Conclusions	Recommendations
the existing pavement and deviation routes constitutes part of the safety interventions. This will be the responsibility of the Contractor(s). The safety of workers, road users and the riparian communities is an important factor during the entire works period.	Provide all workers with personal protection gear and enforce application at all times, Cordon off work areas from the public including material sites, materials preparation sites and structural sites for their safety.
Air quality arising from dust and machinery equipment is an issue of concern to the affected residents and road users.	Maintain constant watering of the corridor to the extent possible to keep the dust low, Hard stone crushers to be equipment with dust control mechanisms Materials haulage trucks be covered to reduce dust

Chapter 1: The ESIA Review Background

1.1 Introduction

The Kenya National Highways Authority (KeNHA) is among the road agencies in Kenya and is mandated to manage, develop, rehabilitate and maintain the international trunk roads linking centers of international importance, crossing international boundaries and terminating at international ports (Class A), national trunk roads linking nationally important centers (Class B) and the primary roads which link the provincially important centers to each other or to other higher class roads (Class C roads). KeNHA being the custodian of the national road network also plays a key role in ensuring quality national road network for sustainable social and economic development with great commitment on the improvement on the environmental performance.

Through KeNHA, the Government of the Republic of Kenya has received a credit from the International Development Association (IDA) towards the cost of the Northern Corridor Transport Improvement Project. The corridor links Kenya and Sudan such as to form one of the backbones of Corridor 3 of the high priority Trans-National Road Corridors under the East African Community Road Network. Part of the credits has been utilized in the "Consultancy Services for Feasibility Study, Environmental Impact Assessment, Resettlement Action Plan, Detailed Design and Tender Document preparation of the Lesseru – Kitale – Marich Pass Road Rehabilitation Project".

An Environmental and Social Impact Assessment Study had been undertaken (September 2014) along the preliminary design process. The study was undertaken within the provisions of the established regulations under EMCA, 1999 as well as the World Banks Social and Environmental safeguards. This ESIA review has been commissioned to provide an independent verification and update of the environment and social status along the corridor and confirm the sustainability during the project implementation. The ESIA review is to be undertaken by a multi-disciplinary team headed by Mr. Harrison W. Ngirigacha, a Lead Expert registered by NEMA (Reg. No. 027).

1.2 The Project Road

The project road commences at Lesseru (A104/B2 junction) within Uasin Gishu County to link Kitale in Trans-Nzoia County and then Kapenguria and Marich Pass in West Pokot County is a section of the Northern Corridor. It is noted that over the years, the social and environmental settings have been changing with more people moving into the urban centers for business and other activities, demand for more land (settlement and agriculture) as well as increased traffic from local catchments and as well as the economic potential features in the Northern zones of Kenya and the neighbouring countries. The road section was constructed in the early nineties but was reportedly not adequately maintained.

The road physical conditions including the surface, road shoulders, roadside drainage, road furniture and culvert crossings have exceeded their design life and calls for rehabilitation and/or total reconstruction. The most attention should be between Kapenguria and Marich Pass which is in poor condition with most areas being beyond routine maintenance operations. The Lesseru – Kitale – Marich Pass section constitutes among the three sections whose ESIA and RAP are being reviewed on the International Trunk A1 of Corridor 3 of the High Priority Trans-National Road Corridors under the East African Community Road Network identified for rehabilitation.

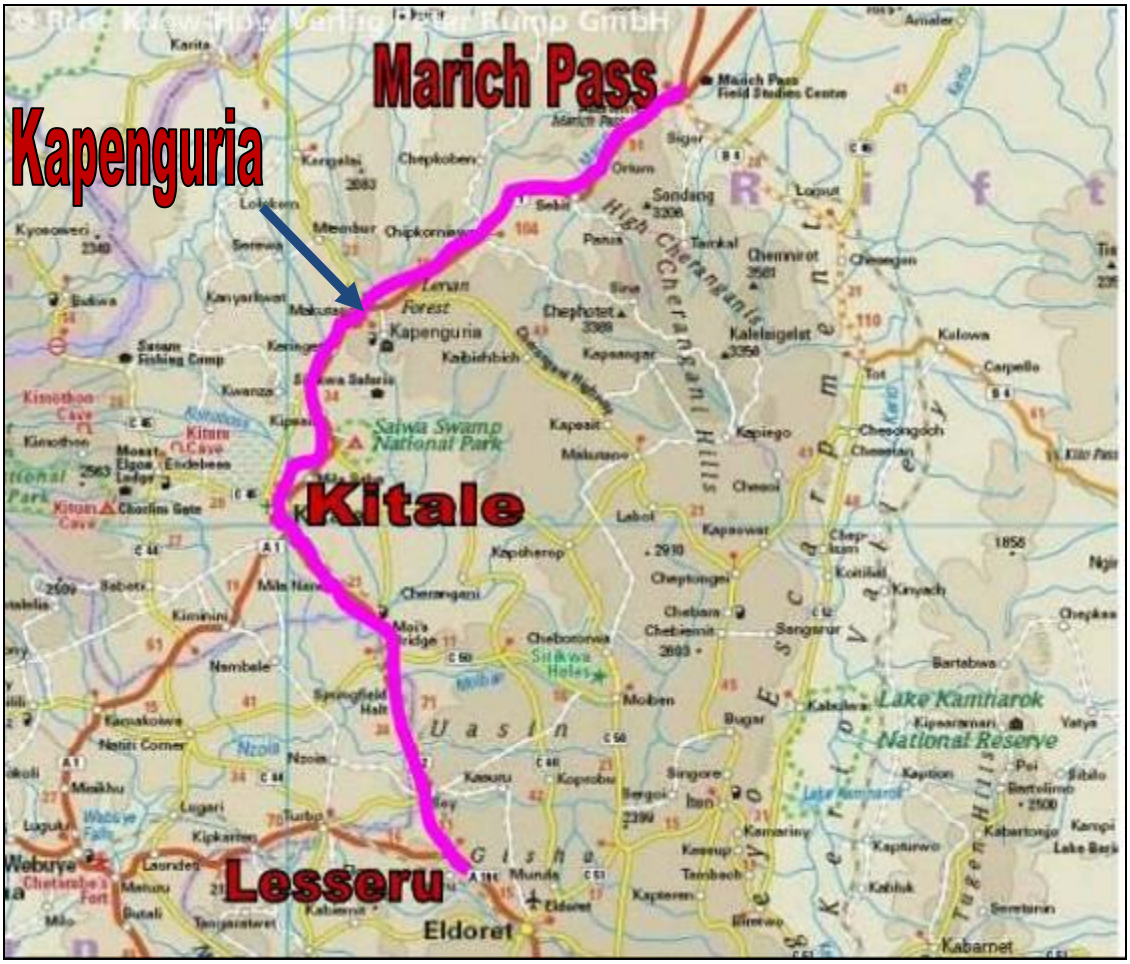
The estimated 155 km long A1 section may be divided into the following three sections for purposes of this review based on the current road condition;

(i) Lesseru – Kitale ~55 km

(ii) Kitale – Kapenguria ~35 km
(iii) Kapenguria – Marich Pass ~65 km

The figure below illustrates the project road layout.

Figure 1: Project Road Layout



1.3 Review Findings

The initial ESIA Report was reviewed alongside the design report and drawings followed by a review verification mission of the road corridor comprising the Environmentalist (Team Leader), Sociologist, the Highway Design Engineer and a Field Support Team. The following are the key findings made;

(i) The design drawings for the road sections are well thought out and seem to have fairly addressed the main challenges facing the road stretch including among others;
- ✓ Safety,
- ✓ Geometry (slopes and curves),
- ✓ Reduced social conflicts
- ✓ Provisions for drainage
- ✓ Improved junctions

(ii) However, the drawings have not been supported with adequate design report as expected to analyze the concepts, especially where critical interventions are anticipated, particularly on the section in West Pokot County. This status, therefore, makes it a challenge for a non-Engineer to interpret the design linkages effectively,

(iii) The re-alignments proposed through Kamatira Forest ought to be accompanied by a design mitigation proposals for the anticipated impacts including drainage structures, indication of the surface areas for biomass quantification and erosion protection,

(iv) The initial Environmental and Social Impact Assessment report has provided global environmental status for project Counties (Uasin Gishu, Trans Nzoia and West Pokot Counties) but did not cover specific baseline conditions along the road corridor such as to cover;
- ✓ Water resources crossing or along the corridor,
- ✓ Hydrology of the project corridor,
- ✓ Description of drainage characteristics along the corridor,
- ✓ Geological conditions of the corridor
- ✓ Ecological characteristics including forests, wetlands and conservation areas,
- ✓ Description of sensitive environments including steep slopes, flood plains and unstable geological areas (especially in West Pokot County section),

(v) While presenting details on the global social and economic status of the project counties, there was no analysis of the specific aspects along the corridor including among others;
- ✓ Administrative settings
- ✓ Population distribution of the project areas,
- ✓ Settlement and housing trends
- ✓ Economic activities
- ✓ Poverty and livelihoods
- ✓ Land use trends
- ✓ Public amenities and infrastructural provisions,
- ✓ Health and safety
- ✓ Gender issues

While appreciating the impacts analysis in the initial ESIA report, it was felt that arising from the above findings, significant specific linkages along the corridor required to be updated. Equally, specific management factors in the Environmental Management Plan also required updating on the basis of the established corridor specific linkages.

1.4 ESIA Review Justification

Environmental and Social Impact Assessment (ESIA) reports are prepared to identify significant linkages of projects to the environment and social settings for projects. ESIA reports provides management plans and intervention actions that are based on physical environmental and social features, defined timelines and implementation cost elements. The management actions are also based on design concepts and principles.

When the implementation of ESIA reports and related management plans is found inadequate, surpassed by time or changes in physical environment, social and/or economic situations, certain aspects has to be reviewed. Such a review becomes even more important if the design concepts changes or when new components are introduced into the project, then the ESIA reports also have to be reviewed. Part of social issues are also captured through Resettlement Action Plans (RAP) developed to provide a policy guidelines on ensuring smooth relocation of persons and economic features from projects target areas to suitable and acceptable alternatives. As part of the social impacts, the resettlement issues are based on the extent to which a project displaces people directly or indirectly through associated impacts. This again depends on among other parameters

time, land use features, population density, land productivity and other monetary and non-monetary values.

The assignment is meant to review and update the environmental and social impact assessments (ESIA) for the proposed rehabilitation of Lesseru – Kitale – Marich Pass Road (A1), 164 KM. The project road is expected to portray a set of environmental and social challenges which changes with time. The initial ESIA Report was reviewed as part of this assignment and the following was concluded;

(i) The report did not effectively analyze the design report and associated documents (RAP, Hydrology, Material report and Socio-Economic Report documents) to provide an effective integration of the respective findings into the ESIA study,
(ii) Verification of the baseline conditions presented in the initial ESIA report with the actual ground conditions, it was established that significant details on data and information had been missed out. This posed a challenge in identifying realistic environmental and social linkages with the proposed rehabilitation proposals and also to the development of mitigation and corrective measures. This included environmental and ecological issues (including Kamatira Forest),
(iii) The stakeholders and public consultations only illustrates a limited participation of the public and no clear engagement with the middle stakeholders including the County Government, County Commissioners, Government Departments, Conservation Organizations, key business community, key transporters and service providers among others. This, therefore, did not provide opportunities for meaningful technical comments on the proposed rehabilitation plan,
(iv) The impacts and mitigation measures as presented required to be expanded,
(v) The EMP required to be reviewed to reflect the updated baseline conditions.

In view the above, therefore, it was necessary to have a comprehensive update of the ESIA Study report to evaluate the current environmental and the social status.

1.5 ESIA Review and Update Scope

The main objective of this assignment was to study the initial ESIA report prepared at design stage with the aim of identifying gaps and areas of intervention. The study was to establish required additional data and information as well as missing links to the environment and social settings in the respective areas. The focus on ESIA report was mainly on updating the environmental, social and economic baseline conditions as important parameters for the review of the respective environment and social management plans (ESMPs), the latter being the ultimate tool in the project implementation. In addition to the documentary review, project areas were also re-appraised with respect to the existing physical conditions as well as environmental and social quality.

In accordance with the ToR, specific objectives included the following;

(i) Review and analyze policies, legal and institutional framework governing environmental resources management in Kenya,
(ii) Review of documented information and data on the areas affected by the project and verify the documents with the ground status,
(iii) Examine and document the current environmental and social baseline conditions of the project corridor,
(iv) Review the environmental and social impacts (positive and negative) associated with the project preparation, construction, operations and decommissioning stages and establish appropriate mitigation or preventive measures,

(v) Review the environmental and social management plan (EMP) and produce a revised comprehensive version for integration into the project implementation process,
(vi) Review the environmental and social monitoring plan (EMoP) covering all stages of the project lifecycle,
(vii) Prepare an updated ESIA Study report for submission to NEMA and the World Bank.

The ESIA review involved the study of the reports and associated base documentation as well as a physical re-assessment of the project corridor. Fresh environmental and social sampling was also undertaken to update the status while rapid consultations with the beneficiaries and other stakeholders was undertaken to establish the level of acceptability of the project. The output of the assignment was a Reviewed and Updated ESIA Study Report for integration into the project implementation.

1.6 ESIA Review Approach

1.6.1 Assessment Criteria

According to the ToR, the established NEMA and the World Bank Policy 4.01 and other safeguards were applied as the benchmarks for the ESIA review. The ESIA Report is written to address the following key areas;

(i) Environmental and social baselines such as to cover physical, biological and socio-cultural conditions for the respective Counties covered by the project road corridor,
(ii) Based on the proposed design concepts, the project road rehabilitation components be clearly described,
(iii) Analysis of the established legal and policy framework at the national level as well as the World Bank Social and Environmental safeguards. Also to be analyzed are the requirements of the European Union, JICA and AfDB,
(iv) All potential environmental and social impacts associated with the rehabilitation project including short term, medium terms, long term, reversible and irreversible as well cumulative impacts. Also to be identified are adverse issues associated with sensitive ecosystems including Kamatira Forest, wildlife habitats and location of construction materials sources,
(v) Assessment of the occupational health and safety concerns, especially through urban centers and high population zones,
(vi) A detailed analysis of the project alternatives such as to include a No-Action alternative, design alternatives, costs investments, operations alternatives, etc.,
(vii) A second level public participation and consultation on the impacts involving County Authorities, Government Officials NGOs and Community Group Representatives,
(viii) Enhanced mitigation measures to the impacts established,
(ix) Review the environment and social management plan for the mitigation of the negative impacts such as to encompass preventive actions, monitoring parameters and elimination/minimization or reduction of impacts as well responsibilities, timelines and costs estimates,
(x) Developing a social and environmental monitoring plan including parameters, methodologies, sampling locations, frequency of measurements and timeframes,

Additional requirements considered in the review study include the following;

(i) Design considerations through markets and towns with respect to accessibility, safety and convenience of the residents including service lanes, loops into the markets, NMT, crossings, etc.

(ii) Considerations of truck parking areas and rest areas for the road users,
(iii) Drainage outfalls and associated land acquisition policies and guidelines from KeNHA for this road section,
(iv) Considered accesses to public facilities along the corridor including schools and health facilities as part of the social benefits,
(v) Integration of sensitive ecosystems in the design for construction and road use thereafter,
(vi) Review of the materials sites management such as to include acquisition of specific NEMA licenses, restoration and rehabilitation responsibilities,
(vii) Considered modes of spoil management including disposal plans.

1.6.2 ESIA Review Activities

Documentary Review
Relevant documents were reviewed from previous studies, published data and information sources, institutional records etc. These documentary review provided further understanding of the terms of reference, environmental status, data on demographic characteristics of the project area, land use practices, development strategies and plans (local and national) as well as the policy and legal documents.

Among the documents reviewed include; initial ESIA Project Report, initial RAP Report, Design Report and Drawings, hydrology report, materials Report, Social-Economic Report, National Population census Report , County Integrated Development Plans (CIDPs) for Uasin Gishu, Kakamega, Trans Nzoia and West Pokot Counties, Town physical plans especially for Kitale and Kapenguria towns, initial ESIA and RAP reports for the downstream sections of the A1 road. Others include policy and legal framework such as; policy documents, legal and regulatory documents, World Bank requirements and the safeguards provided from other financial institutions including AfDB, JICA, EU, EIB, KFW among others.

Physical Assessments
Comprehensive physical re-evaluation of the project corridor was undertaken, taking into consideration the physical and the biological environmental status, human settlement and the social economic activities. The field re-evaluation was undertaken to enable verification of previous findings and determine the physical environmental features likely to be affected (ecologically sensitive areas, water bodies, wetlands, forested areas, land use features, urban centers, steep slopes, etc.) within the proximity of the road corridor. The field assessments were expected to achieve the following;

(i) Available information and data from local public offices including Environment, Water, Lands and Agriculture,
(ii) Verification of environmental settings and making general observations on topography, land use trends, surface water sources, public amenities, wetlands, settlements, forests, soils, etc.,
(iii) Confirm extent of vegetation cover variations along the corridor,
(iv) Rapid assessment of population densities, human settlement trends, social and economic activities and presence of any important cultural sites.
(v) Planning stakeholders consultations meetings as supplementary participation.

Stakeholders Consultations
The supplementary stakeholders consultations were planned during the reconnaissance tour of the project corridor. This consultations process involved the briefing of the County Governments, County Commissioners, Heads of Department and the institutions, transport organization,

conservation groups as well as the selected groups of the community organizations. These intensive stakeholders consultations and public participation were planned to obtain views of stakeholders within the project areas with the main focus on the social and conservation aspects as well as the perceived associated impacts.

Impacts Identification
Anticipated impacts that may emanate from the road project were analyzed against the re-established baseline conditions. To enable objective impacts prediction, the road route was segmented into two sections for specific social and ecological aspects. Effects of the project to the environment and social well being were evaluated against issues such as vegetation cover, land and soil, environmental pollution, health and safety, cultural integration and overview of benefits to the residents and country.

Environmental Management Plan
An environmental and social management plan had been developed under the initial studies. Upon re-identification of the impacts from the project, appropriate measures were drawn up to mitigate the impacts. This then lead to a review of the environmental management plan to guide the project implementation. This ensures proper integration of the recommended mitigation measures in the implementation process. A monitoring plan was also developed to serve as a supervisory schedule with respect of the environmental aspects during the construction and use of the road.

1.6.3 Anticipated Review Constraints

This review was basically focused on interrogating the initial ESIA Study report and associated supporting documents with a review to identifying areas requiring strengthening or overhaul. While this is a straight forward activities, there are challenges encountered in the process including;

(i) The initial documents were limited in comprehensive coverage of the environmental and social baseline data and information that would have formed the basis for impacts review and appropriate management plan. In this regard, the whole baseline framework had to be reworked backed up with full corridor re-assessment,
(ii) It was assumed that the initial ESIA process had fully engaged the public through the corridor. However, with no comprehensive proceedings on the meetings, it was difficult pick specific issues raised by the public (majority indicated they were not aware of previous consultations). In this regard, a rapid interview of the public followed by Stakeholders forums was found necessary. In this regard, stakeholders forums have been planned at County levels but to be convened along the corridor specifically at the main sub-county offices,
(iii) The initial study did not present environmental quality (water, air, noise and soil). It, therefore, became necessary to have indicative samples for water analysis as well as prediction of noise and air quality undertaken,
(iv) Due to the unprecedented scope of gathering additional baseline data and information and the level of stakeholder consultation, more time and resources was required. However, the deliverable timeframes were not affected.

1.7 Reporting

This involved a compilation of the field findings, documentary information and data, results from discussions and interviews as well as harmonizing the monitoring and environmental management plans. The reports to be generated included an Inception Report, Draft Updated and Final Updated ESIA Report. The main output from the reports was updated ESIA Study Report.

1.8 Study Experts

The study team included the following experts;

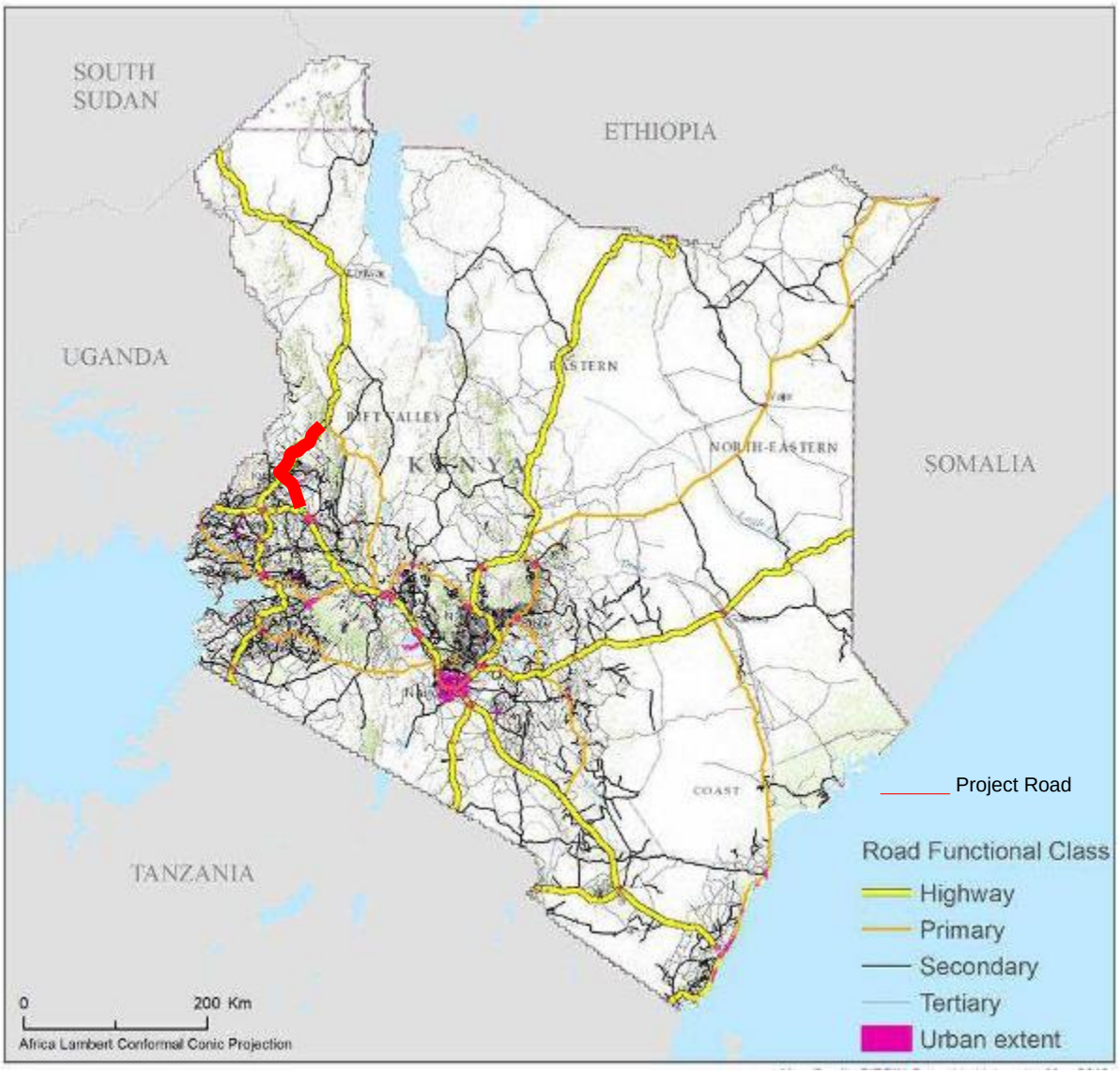
(i) Lead Expert/Environmentalist/Team Leader
(ii) Sociologist
(iii) Highway Design Engineer
(iv) Environmental Field Assistants

Chapter 2: Updated Project Description

2.1 Project Location

The study road corridor commences at Leseru junction of Eldoret – Kitale (B2) and Eldoret – Malaba (A104) about 10KM from Eldoret Town centre. The GPS Coordinates of Lesseru (KM 00) are: 35^{O} 11' 46.151"N and 0^{O} 36' 23.175"E and Marich Pass (KM 158) are 35^{O} 26' 47.803"N and 1^{O} 32' 2.867"E. It is a two way single carriageway with notable ratting and worn out surface in most of the sections. The road is generally rural as it traverses agricultural settlements and numerous urban centers. It is also characterized by a variety of physical and biological environment features comprising of rivers ,wetlands ,forests, steep slopes, arid and semiarid areas as well as areas of special social and cultural interest. The relative project location is illustrated in the figure below.

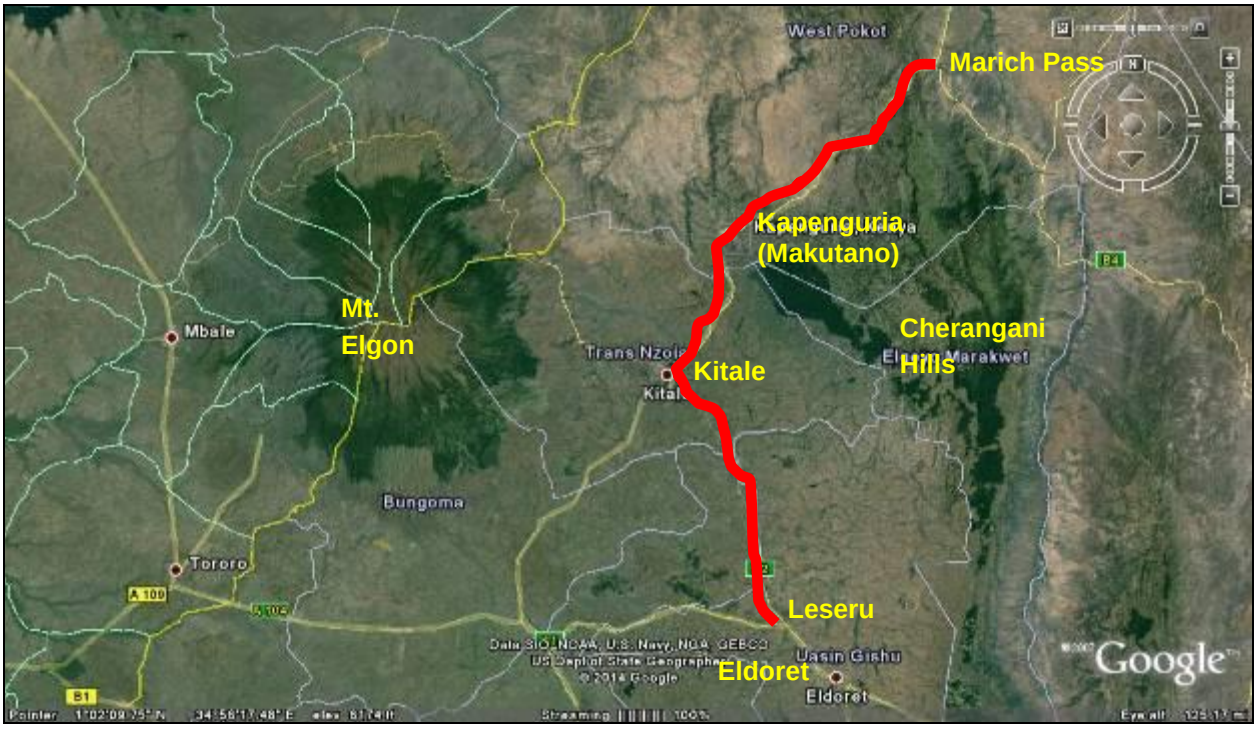
Figure 2: Project Location



Source: Economic Report

The figure below shows the road route.

Figure 3: Aerial Image of Project Road Route



The road corridor traverses four counties in two distinct climatic and ecological zones. The road plays a major trunk transport link between A104 at Lesseru junction (Eldoret) via B2 to A1 at Kitale constituting the Northern Corridor towards Northern Kenya, Sudan and Ethiopia. The road corridor traverses four counties namely;

(i) Uasin Gishu County
(ii) Kakamega County
(iii) Trans Nzoia County
(iv) West Pokot County.

The road sections by County are illustrated in the corridor topo maps shown on the figures below;

Figure 4: Section of the Road in Uasin Gishu and Kakamega Counties

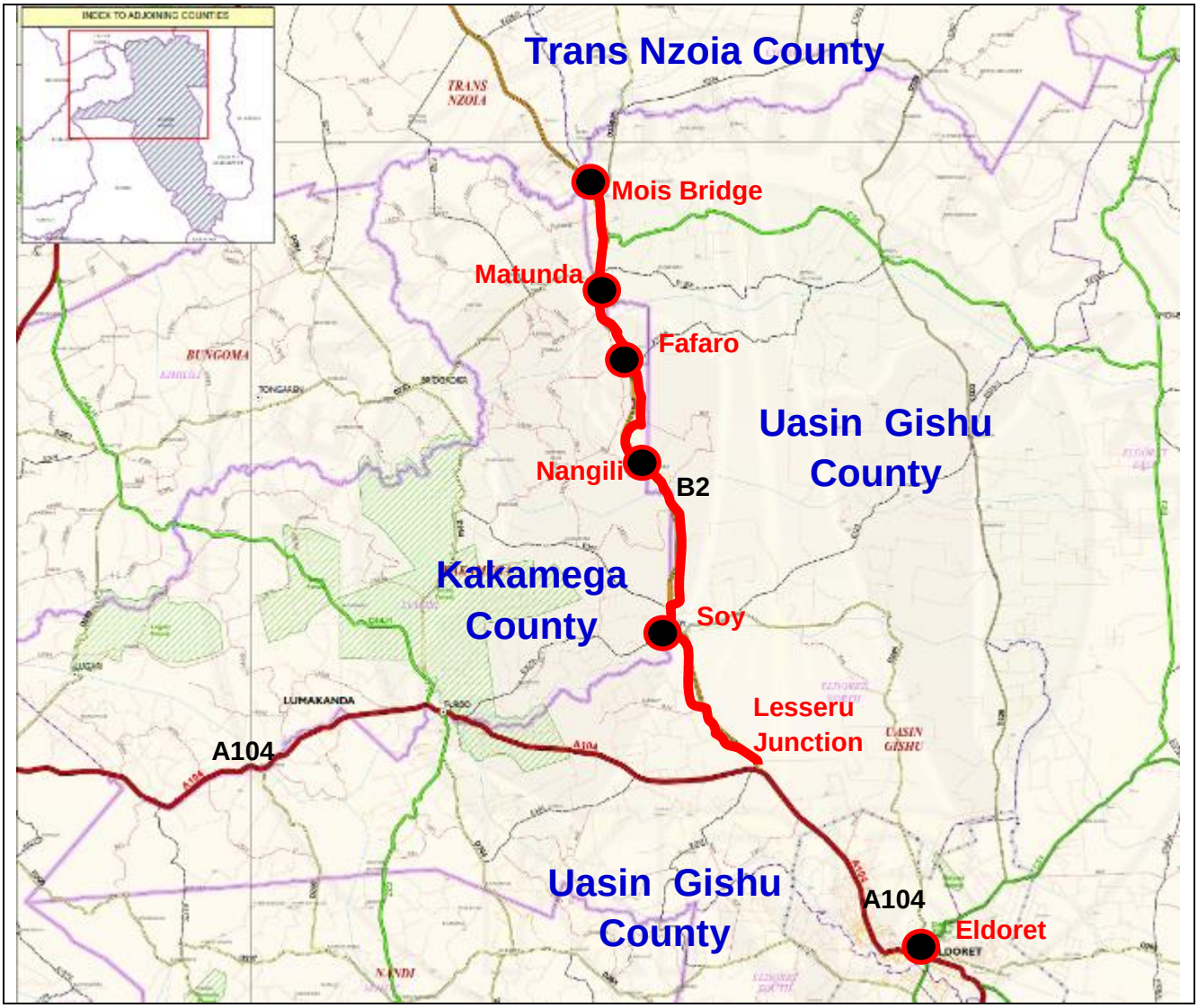


Figure 5: Section of the Road in Trans Nzoia County

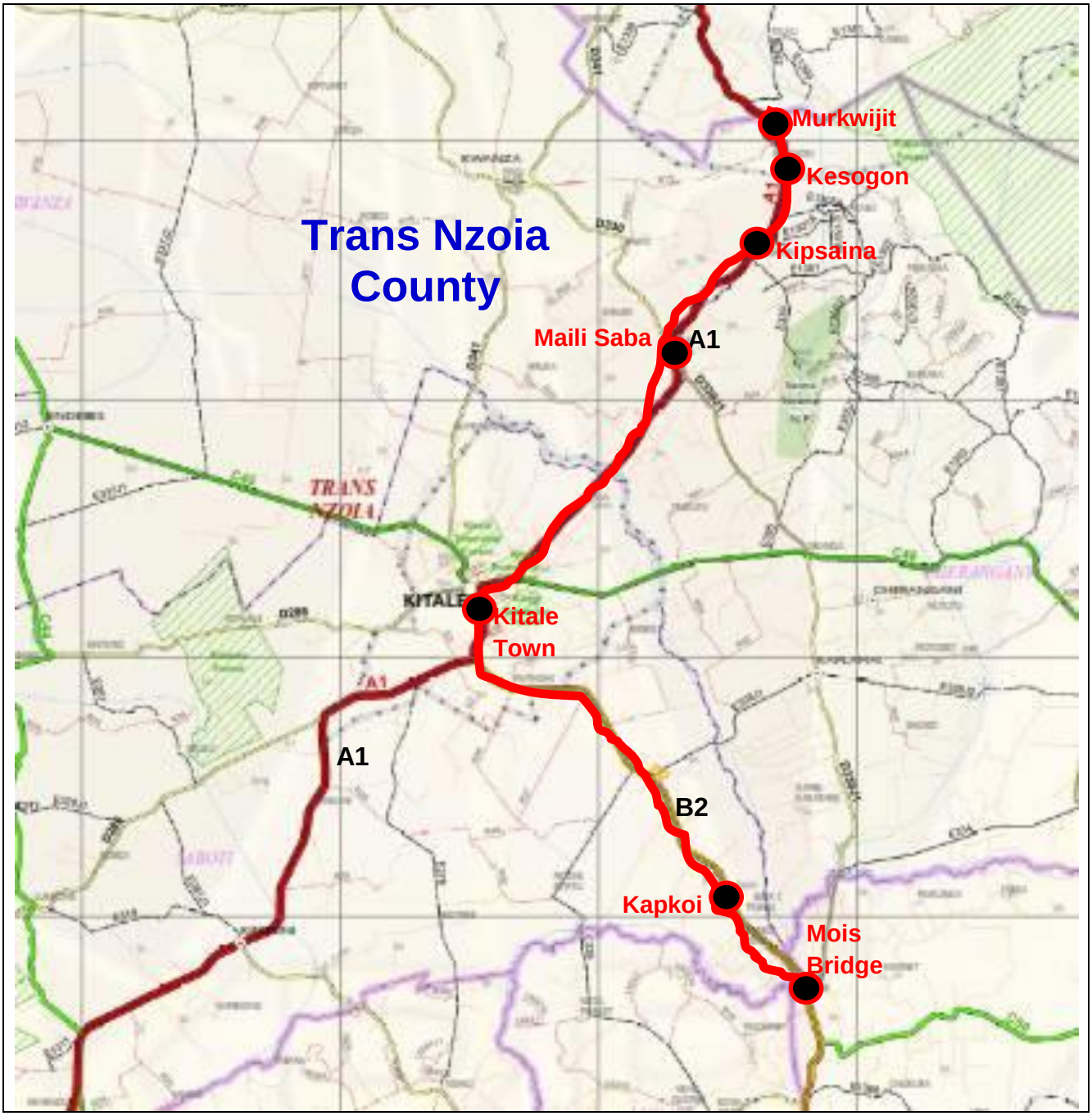
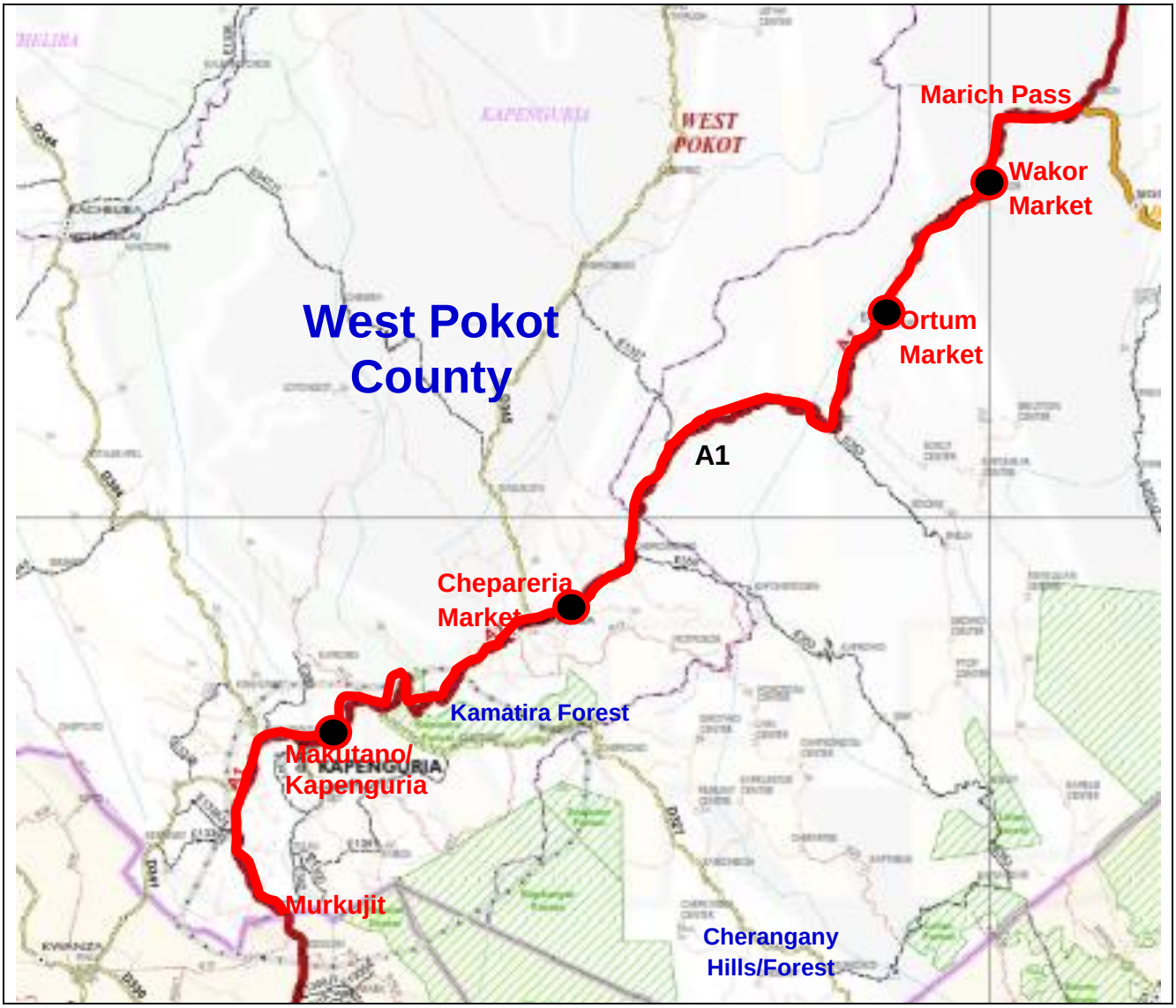


Figure 6: Section of the Road in West Pokot County



There are numerous market centers at various locations, especially at the main road junctions junction. Among the major urban centres along the project road include Lesseru junction market, Soi market, Nangili market, Matunda market, Moi's bridge, Kitale town, Maili Saba, Kesogon, Kapenguria, Chepareria market, Sakat, Ortum market, Chepkoniswo, Serbit market and the Marich Pass. The figure below shows aerial sections of the road traversing the urban and market centers

Figure 7: Sections of the Project Road

Lesseru Junction

Soi Market

Nangili Market

Matunda Market

Mois Bridge

Kitale

Kapenguria (Makutano)

Chepaleria Market

Ortum Market

2.2 Current Corridor Condition

Lesseru – Kitale Section

The road starts off at Lesseru and traverses a low lying marshy section for the first 5km. It the traverses terrain that is predominantly rolling through Uasin Gishu and Trans Nzoia. This section of the project road was constructed to bitumen standards over 20 years ago, and was not adequately maintained; despite a continuous increase in the traffic volume and loading. Traffic volumes are relatively high and mainly consisting of heavy good vehicles serving Northern Kenya and South Sudan, buses and pick-ups serving regional traffic demand. The section between Lesseru and Moi's Bridge has recently been overlaid with asphalt and is now in a reasonable state of repair but is also beginning to show signs of early distress.

Generally there are no traffic signs along the project road, besides guide posts, mostly damaged and covered with bushes were rarely observed at the section of the road with horizontal curves. The narrow road width in all built up areas and settlement areas bears a high accident risk mainly for the non-motorized traffic, e.g. pedestrian, cyclists, donkey carts. Appropriate traffic segregation by way of service roads and NMT facilities through built-up areas have also not been incorporated.

The road width varies between 6.0 and 7.0 m. The geometric condition of this road section can generally be described as fair to good. There are no paved shoulders long most of the road section making by-passing or overtaking of larger vehicles dangerous. In nearly all towns the road width originally has been increased but due to edge damage only some 6.0 m are still usable which often compromises the safety of road users as slow donkey carts and bicycles, parking Minibuses and normal traffic have to share the narrow carriageway.

Kitale – Kapenguria Section

The project road section is approximately 35km long commencing from Kitale tiwn ending at at Kapenguria town in the Trans Nzoia District. The project road was constructed as a bituminous surfaced road over 20 years ago and has been in limited maintenance works despite the increase in traffic volume. Traffic on this section is relatively lower and mainly consisting of heavy good trucks serving Northern Kenya and Southern Sudan and a low level volume serving the local demand. The road capacity does not seem to have the capacity required for future traffic volume.

The pavement condition can be classified as fair but with poor roadside drainage that also seem to compromise the integrity in some of the road sections. Other challenges facing the road section include poor road signage with high risks of safety, road width especially considering the type of traffic, steep grades in some sections and also conflict with the growing urban centres along the corridor.

Kapenguria – Marich Pass

The project road section is approximately 65km long starting from Kapenguria town and ends at Marich Pass at the B4 road junction in West Pokot District. The project road was constructed as a bituminous surfaced road over 30 years ago and has experienced increasing traffic volumes and loading particularly during the relief operations in Northern Kenya and South Sudan. The first 16 km from Kapenguria town have received some emergency maintenance mainly pothole patching though the pavement still appears to be in poor state. The rest of the road section is in very poor physical condition with some sections having suffered complete pavement failure. Only two existing major bridges structures and number of minor drainage structures, mostly of pipes culverts, were observed. The major structures are generally in good condition. Minor drainage structures are structurally in good condition though seriously affected by siltation problems. For the last 40km, the route corridor follows the Moruny river gorge and south of Sebit the road traverses hilly terrain characterized by steep gradients and sharp bends with falling stones on the road.

2.3 Project Alternatives

It is expected that the road corridor will follow the existing alignment as much as possible. There are however several sections that may be considered for realignment for geometry and safety suitability but without compromising the environmental and social requirements. Limitations in project alternatives are based on a number of factors including land acquisition (the cost of land procurement and displacement of people), road design speeds, topography and linkages to the social and economic centers along the corridor. There are two major alternatives with the rehabilitation options having sub-alternatives based on the proposed pavement structure options and the realignment. The two main options are “with the project” and “without the project”

2.3.1 Alternative 1: No Project Option

This option implies that the project road do not get upgraded and should remain in the current status as it is. The option is preferable to implementation of the project since it will avoid causing any adverse environmental impacts associated with the road upgrading activities. Leaving the project road in these condition is not a viable option, especially as the desired objective of construction of the project road has not been achieved. This implies the following benefits will be foregone:

(i) The development of economic and social exchanges between the neighbouring regions,
(ii) Provision of access to the whole population, regional and national economic integration,
(iii) Employment opportunities for local residents along the project road,
(iv) Reduction in travel time and cost.

2.3.2 Alternative 2: With Project Option

The option of improving the existing pavement alignment as is through reconstruction, provision of drainage and safety components could be considered. This option consists of implementing the construction of the Leseru – Kitale – Marich Pass road . Construction of the project road is critical and will promote and facilitate a regional economic integration between Sudan and Kenya, direct road access to the port of Mombasa for Sudan's export and import, as well as facilitating relief and re-construction efforts in all sectors in Sudan.

This, however, will ensure a sound pavement but will not eliminate the associated safety and motorability. However, this option may not be preferable, especially where road safety and geometry may require improvement. The objectives for this project is to reconstruct the project road between Lesseru and Marich Pass. The expected benefits are defined as follows:

(i) Savings in vehicle operating cost;
(ii) Savings in maintenance expenditures;
(iii) Time savings to passengers and freight;
(iv) Reductions in the number and severity of accidents;
(v) Induced exogenous benefits, such as industrial, agricultural or tourist activities that were previously constrained by poor access;
(vi) Social benefits arising from the increased mobility of the population and improved accessibility to health, education and other services.

From the economic analysis carried for the project, it is recommended that the project road be considered for reconstruction at the earliest possible opportunity. The HDM-4 analysis gives very impressive results with an IRR of 31.4%. This alone shows that the benefits accruing to the project are adequate. The project is thus viable on the basis of HDM-4 analysis alone while the sensitivity test and risk analysis also confirm viability of the project.

However, the benefits to the Kenyan economy as a whole and the local economy will be substantially higher, although no exact figure can be provided of these additional benefits. These include the non-quantifiable exogenous benefits accruing to the project. On the basis of regional integration and cooperation, it is also noted that the project will yield numerous benefits to South Sudan as it forms a major arterial that will link the oil rich country to the port of Mombasa. The" with project" alternative can further be explored based on the pavement structure options. With Project Option also has 2No. sub-alternatives outlined below;

2.3.3 Alternative 2A: With Project Option (Realignments as Designed)

Most of the road works will be restricted within the existing 40 meters wide road reserve. However, to improve motorability on the road, some sections of the road will be realigned, these include;

(i) Provision for an interchange with realigned approaches at Leseru (Km0+000)
(ii) Adoption of the Kitale Town bypass between Km 55+000 and Km57+100 where interchanges will be constructed at Kitale Interchanges are strategically located along old Kitale – Kapenguria road next to the Kitale Show Ground,
(iii) Realignments proposed within Kamatira Forest sections between Km98+300 and Km99+800 implying clearance of forest cover section and earth moving,
(iv) Others sections are Km100+900 – Km101+200 as well as Km102+400 – Km103+400 both sections also being with Kamatira Forest. Additional clearance of forest and earth moving will also be experienced.

Whereas this proposal has impressive viability based on HDM-4 analysis, the net impact on environment and social on the realignment would need to be evaluated on a case by case basis.

2.3.4 Alternative 2B: With Project Option (No Realignments)

Whereas this option is desirable in terms of the net impact on environment and social the expected benefits on life saving and accident will not be realized. It is also observed that the issues of drainage handling will not be realized. Further, the interchanges would have to be avoided resulting in very low level of service and thereby resulting in negative environmental and social impacts from the delays, vehicle operation costs, air pollution load and lost opportunity. This option is thus not desirable.

Alternative 2B is, therefore, preferable in achieving the desired road safety and efficiency though there are anticipated impacts to the forest ecosystem for a total of ~4km with a width of 60m through Kamatira Forest that will require mitigation measures (tree count and biomass quantification for compensation, drainage intervention, restoration after the earthworks and wildlife movements.

2.4 The Design Concepts

2.4.1 General

The project road falls within two classifications, international trunk road (Class A) and National trunk road (Class B) in the national road network hierarchy. The design of the project road has been carried out based on the MOR&PW Road Design Manuals (Part 1 & 3) and Draft manual for traffic signs in Kenya. The design year for the cross sections of the respective roads is selected on the basis of 10 years AADT after opening of the road).

2.4.2 Geometric Design Standards

In carrying out the geometric design, the Consultant has been guided by the following general design philosophy:

(i) To ensure that scarce funds available for road works are used to the best advantage and therefore aim to strike an optimum balance between the cost of construction and overall road user cost.
(ii) To investigate alternative alignments, pavement and structural design proposal with a view to obtaining the optimum alignment that is commensurate with the MOR&PW Road Design Manuals standards.
(iii) Aim to provide a road alignment that is aesthetically pleasing and that maintains harmony between the road and the surrounding environment, while minimizing any negative impact on the environment.

<u>Design Speed</u>
The design speed determines the stopping and passing sight distances and plays a major role in the operational and safety characteristics of the road. A single design speed, therefore, is not applicable in the light of changing topography, roadside development and traffic volumes.

The project road traverses the terrain that varies from flat to rolling on the South to hilly and mountainous towards the end of the project. Road design Manual Part 1 recommends design speeds ranging from 100 -120 km/h in level terrain , 70-100 km/h in rolling terrain and 50 -70 km/h in mountainous terrain for class A and B roads. This principle has informed the speed design

concepts of the project road. In view of the fact that the primary function of the project road is to provide access and mobility to the road users the adopted design speeds for respective sections of the road have been based on the predominant terrain and land use. For uniformity, the design speed was divided into sections of either 100 km/h or 50 km/h based on the prevailing conditions with all urban towns/centers limited to 50 km/h. This also informed the horizontal alignment.

Road Cross-Sections

The design cross used in the design is in accordance with the Road Design Manual Part 1 whose selection has been based on several factors which include the traffic flow volume, the road design speed, the terrain traversed and the predominant function of the particular road. The Criteria used is from the manual is summarized in the table below as extracted from the Road Design Manual recommended cross-section type for two-lane rural roads, such as the project road:

Table 1: Design Criteria for Road Cross-Sections Type Selection

AADT or DHV in Year 10 (PCU)	Cross-Section Type
AADT < 150	V, VI, VII, or VIII
150 < AADT < 500	IV, V or VIII
500 < AADT < 2000	III or IV
1000< AADT < 4000 or 250 < DHV <500	II or III
AADT > 4000 or DHV>500	II

Source: Road Design Manual Part I - Table .2.2)

Proposed dual carriageway comprises of a 14 m carriageway and 1.5 m shoulders on both sides. Cross-section Type II comprises of 7.0 m carriageway and 2.0m shoulders on both sides. The cut slopes for the road cross-section will generally be 1:2 in soft and intermediate material and 4:1 in rock where encountered. For large fills or cuts (>4m), a slope of 1:1.5 is adopted. The fill slopes will be 1:4 where fill is less than 1m and 1:2 for fills between 1 and 4m and 1:1.5 for larger fills. Climbing lanes are proposed for steep sections while service lanes are proposed for urban town sections.

Horizontal and Vertical alignment

The criteria for horizontal and vertical alignments are summarized as follows:

(i) The minimum horizontal radius when design speed is 50kph is 90m while the normal crown is 700m and for 2.5% revers crown is 600m.
(ii) The minimum horizontal radius when design speed is 100kph is 435m while the normal crown is 3,000m and for revers crown is 2500m.
(iii) The maximum grade/gradient is 6%.
(iv) The maximum standard super elevation is 6%.
(v) For the vertical profiles the minimum k values are summarized in the table below:

Table 2: Design Criteria for vertical sight distances

Consideration – Sight Distance	Minimum k value	
	Design speed –50 km/h	Design speed -100 km/h
Stopping Sign Distance	7	52
Passing sight distance	138	520
Headlight sight distance	13	45

Drainage Design Criteria

Flood Design frequencies are normally selected taking in consideration the following;

(i) Facilities cost;
(ii) Volume of traffic;
(iii) Potential floods damage to property, and
(iv) Expected level of service and magnitude of risk associated with damages from larger flood events.

General hydrological guidelines recommend the following flood frequencies for the design of road drainage structures summarized as follows:

(i) Earth ditches 5 years frequency
(ii) Lined ditches 10 years frequency
(iii) Pipe Culverts 10 years frequency
(iv) Box culverts 25 years frequency
(v) Bridges 50 years frequency

Ordinarily, all drainage facilities should be checked for the next flood frequency to determine the level of damage/impact to the event so that a justifiable action is taken. Flood prediction models were based in the catchment size as follows:

(i) Rational Method <1.3 km²
(ii) Modified Rational Method 1.3-26 km²
(iii) TRRL >26 km²

Bridge and Structures Design Criteria

Design has been carried out in accordance to Part 4 of the Road Design Manual of the Ministry of Roads which specifies the British standard BS5400 as the applicable code for design of roads in Kenya. Based on the RDM, road structures on Class A roads should be designed for full HA loading and checked for 30 units of HB loading. However, because of the relatively heavier loads expected along the LAPSSET corridor which is close to this road, 45 units of HB loading has been adopted.

The spans and overall lengths of the bridges are derived from hydraulic design based on hydrological studies carried out as a complementary part of the design process and the skew angled at which the road alignment crosses the obstacles. A free-board of at least 1m is provided over and above the design flood levels.

2.4.3 Proposed Rehabilitation Design Criteria

Traffic and Cross-section type

CROSS SECTION

The proposed cross section is a 2-way carriageway (Cross Section Type II) of 7m main pavement and 2m shoulders on both sides. However, the section at the A1 junction will be dualled between A1/B2 junction – A1/C45 junction to allow for interchange and appropriate traffic management through Kitale town. The table below is the full analysis of the design against the observed traffic growth.

Table 3: Project Road Section Cross-Sections Type Designs

Road Section	Low Growth		Medium Growth		High Growth	
	AADT (pcu)	*Cross section type*	*AADT (pcu)*	*Cross Section Type*	*AADT (pcu)*	*Cross section type*
A104/B2 Junction - Nangili	6,369	II	7,825	II	10,400	II
Nangili – Moi's Bridge	5,846	II	7,265	II	9,445	II
Moi's Bridge – A1/B2 Junction	6,724	II	8,340	II	10,919	II
A1/B2 Junction - A1/C45(1) Junction	20,896	Dual carriageway	25,476	Dual carriageway	33,786	Dual carriageway
A1/C45(1) Junction – A1/C48(1) Junction	4,497	II	5,505	II	7,065	II
A1/C48(1) Junction – A1/C48(2)Junction	11,545	II	13,959	II	18,542	Dual carriageway
A1/C48(2) Junction – Maili SabaLink	7,070	II	8,566	II	11,414	II
Maili Saba – Makutano	3,982	II	4,946	II	6,479	II
Makutano – Kapenguria	5,074	II	6,290	II	7,997	II
Kapenguria – Ortum	3,157	II	4,011	II	5,068	II
Ortum – Marich Pass(A1/B4)Junction	2,816	II	3,599	II	4,542	II

Source: Draft Final Design Report

Service lanes have been proposed to be done in two towns:

(i) Makutano/Kapenguria – 3.1 km stretch
(ii) Chepararia – 0.5km stretch

KAMATIRA HILLS SECTION

The existing longitudinal slope of Kamatira Hills is about 10 – 11% including sharp bends (especially the S-type curve on the bottom of Kamatira Hill has a high potential to cause accidence and is well known as a black spot especially for trucks and high loaded vehicles). The design has proposed realignment of two sections totaling 4.5 km to reduce the grade to a maximum of 8 and improve on the curve radii as follows:

(i) Realigned and improve the radius of the curve from 100m to 200m for the sharp hairpin curve on top of Kamatira Hills. This realignment is intended to ensures that surrounding settlement is not relocated. However, the details of this realignment indicate very deep excavation and the intended protection works were not obvious but indicated as average cut is about 15m with a maximum of 30m in short sections. These will need to be reviewed to provide clear details of how this is to be achieved.
(ii) Realigned and improve the radius of the curve from 135m to 215m and 140m to 220m for s-curve on the bottom of Kamatira Hills. The details of this realignment indicate high fills and the intended protection works were not obvious but indicated that would be average fill is 20m with a maximum of 28m in short sections. These will need to be reviewed to provide clear details of how this is to be achieved.

Measures cited for slope protection are:

(i) Top soiling
(ii) Hydro-seeding

(iii) Planting
(iv) Rock or gravel protection
(v) Berms will be provided all along the slopes of the high embankments every 5m. The width of these benches may vary, but should be at least suitable for construction and maintenance plant, i.e. not less than about 2 m.

TRAFFIC LOAD CLASS

The traffic counts were conducted at eleven different junctions along the project road whose aim was to estimate the number of equivalent standard axles currently using the project road as well as the adjacent paved roads linked to it. The pavement design period was taken as 20 years.

Table 4: Project Road Sections Traffic Classifications

Junction	20-Year No. of Std Axles ($x10^6$)	Traffic Load Class
A104/B2 Junction – Nangili	20.44	T2
Nangili – Moi's Bridge	18.14	T2
Moi's Bridge A1/B2 Junction	25.76	T1
A1/B2 Junction – A1/C48(1) Junction	35.18	T1
A1/C48 (1) Junction A1/C48 (2) Junction	11.81	T2
A1/C48 (2) Junction – Maili Saba	12.06	T2
Maili Saba – Makutano	17.27	T2
Makutano – Kapenguria	12.77	T2
Kapenguria Ortum	8.66	T3
Ortum – Marich Pass Junction	10.32	T2

Source: Draft Final Design Report

DRAINAGE AND STRUCTURES

The significant drainage basins for both localized and major channels have been identified and designed. The proposed drainage structures range from pipe culverts, box culverts and major bridge structures. In summary, there are proposed:

(i) 312 number pipe culvers (some twine but mostly single of 900mm diameter)
(ii) 14 number box culverts
(iii) 12 bridges of between 1 and 4 spans (total bridge deck length of between 12m and 72m lengths)

The location and details of the bridges is summarized in the table below:

Table 5: Project Road Bridges Location And Details

Bridge no	Ch.	Crossing name	No of spans	End spans	Inner spans	Total length	Skew angle
1	0+000	Lesseru GSI	2	19.85	-	40.9	0
2	3+400	Railway O/PASS @ 9th KR	1	12.9	-	19.9	-45
3	8+185	Segoit River	1	10.6	-	13.15	23
4	16+747	Kipsangui river	1	9.6	-	12.74	30
5	26+677	Ntopolis river	1	15.6	-	16.8	0
6	Not used						
7	Not used						
8	34+358	Nzoia river	3	9.2	16.8	36.4	0
9	55+100	Kitale GSI No.1	4	17.6	17.6	71.6	0
10	57+100	Kitale GSI No.2	3	15.5	15.5	46.4	0
11	62+816	Chebwan river	1	15.6	-	16.8	0
12	48+840	Morun River 1	3	12.8	15.6	46.4	-23
13	66+790	Wakor (Kopro) River	1	48	-	49.2	0
14	71+420	Morun River 2	3	15.9	20.6	53.6	0

Source: Draft Final Design Report

All the drainage structures are made of Portland concrete (reinforced or mass) while for bridge structures the decks comprise a reinforced concrete slab on main girders of precast reinforced concrete. The foundation details were still being assessed from the design report.

PAVEMENT DESIGN

The pavement design is carried out in accordance with the Ministry of Works Road Design Manual Part III "Materials and Pavement Design for New Roads" 1987, hereafter referred to as the design manual. In general, the design considers the pavement traffic loading expected during the design life, sub grade soil strength, and materials locally available for pavement construction including those for base, sub base and surfacing.

The design for the road assumed a 20 year design period assuming January 2015 as the base year i.e. the year that the upgraded road will be open to traffic. This would need to be reviewed considering that the road construction has not commenced – it is however expected that this will not drastically revise the pavement structure of the proposed road project. A single seal of 10/14mm surface dressing on top of the asphalt concrete is recommended:-

(i) To prevent ingress of water into the lower pavement layers, and
(ii) To prevent oxidation of the bitumen and hence its hardening by preventing ingress of air into the wearing course.

Final pavement selection was Pavement option 2. This type of pavement option is economically justifiable for heavy traffic class T1 and T2 but due to the rapid ageing of the bitumen, it is recommended that the DBM be as dense as possible. Consequently, high bitumen contents (4.0% - 4.5%) may be chosen which may further facilitate compaction of thick layers (this might lead to heaving and thus should be looked at critically after proper materials testing).

For the Kamatira section, where the vertical alignment exceeds 8%, in order to prevent rutting due to slow-moving heavy trucks, a pavement option 3 (Type 13) has been incorporated in the design of climbing/descending lanes. In our assessment and from experience, the sub-base should be allowed for natural gravel of CBR≥ 60% (and not , CBR≥ 160%). We further propose that the chemical stabilization of this layer with 4% of either Portland cement or lime should be avoided and explore the option of mechanical stabilization with aggregates that are abundant along the project road (hard stone). In any event, with chemical stabilization there would be requirement for curing of at least seven days before additional layer laying resulting in delays and the failure of chemical stabilization with age. It will also be relatively cheaper in terms of time (saving) and a more superior pavement.

We, therefore, recommend a review of this pavement structure including the requirement for a higher bitumen content of the asphalt concrete surfacing.

ROAD FURNITURE AND MISCELLANEOUS FACILITIES

The following is a summary of the road furniture that could be identified from the drawings

(i) There are a total of 220 number road signs location proposed for the project road.
(ii) A total of 77 number Bus Lay-by of 3.5m width constructed of 200mm thick concrete base layer.
(iii) Guardrails will be provided in accordance with the requirements of the Ministry of Roads and Public Works Design Manuals. These will be required at the bridge crossings and where there are high fills or elsewhere as deemed necessary. Widening of the embankment for the provision of guardrails will be allowed for.
(iv) Culvert marker posts will be provided at culvert locations in general and where additional definition is desirable.
(v) Loading Bays - The road is widened at selected chainages through market centers to provide loading bays for farm market products. These will mainly serve as collection points for loading vegetables and other farm products to heavy and light trucks
(vi) The book of drawings have shown a general trucks packing but have not been indicated in terms of location on the project road between Lesseru and Murkwijit section while for the other book of drawings there is none.

It is proposed that a Traffic Safety Review be carried out to this design before the implementation. This could form part of the design review and supervision consultant terms of reference.

Table 6: Project Proposed Pavement Options To Be Considered For The Entire Road Section

Design Details		Project Road Sections	
		Lesseru – Kitale	Kitale – Marich Pass
Design Traffic class		***T1***	***T2***
Design sub-grade class		S5	
Earthworks		Material used for earthworks shall be minimum soil class S4/S5 quality and be compacted to 95% MDD (AASHTO T99).	Material used for earthworks shall be minimum soil class S4/S5 quality and be compacted to 95% MDD (AASHTO T99).
Improved Sub-grade		The upper 300mm shall be reprocessed and compacted to 95% MDD (AASHTO T99). Minimum sub-grade class S5 (CBR ≥ 18%).	The upper 300mm shall be reprocessed and compacted to 95% MDD (AASHTO T99). Minimum sub-grade class S5 (CBR ≥ 18%).
Pavement option 1 (Standard Pavement Structure Type 5)	Surfacing	100mm thick asphalt concrete (SUPERPAVE) covering the carriageway and the shoulders. The grading of the mixture of coarse and fine aggregates shall be within and approximately parallel to the grading envelopes given in table 16 B-1 of the Standard Specification for Road and Bridge Construction for Type I, 0/20mm binder course covered with 10/14mm single seal surface dressing (pre-coated chippings class 1). The coarse aggregate class for the asphalt concrete shall be Class A.	75mm thick asphalt concrete (SUPERPAVE) covering the carriageway and the shoulders. The grading of the mixture of coarse and fine aggregates shall be within and approximately parallel to the grading envelopes given in table 16 B-1 of the Standard Specification for Road and Bridge Construction for Type I, 0/20mm binder course covered with 10/14mm single seal surface dressing (pre-coated chippings class 1). The coarse aggregate class for the asphalt concrete shall be Class A.
	Base-course	150mm thick Cement Stabilized Natural Gravel (CBR ≥ 160%).	150mm thick Cement Stabilized Natural Gravel (CBR ≥ 160%).
	Sub-base	175mm thick 4% Cement /4% Lime improved Natural Gravel (CBR ≥ 160%).	175mm thick 4% Cement/ 4% Lime improved Natural Gravel (CBR ≥ 160%).
Pavement option 2 (Standard Pavement Structure Type 11)	Surfacing	50 mm thick asphalt concrete (SUPERPAVE) covering the carriageway and the shoulders. The grading of the mixture of coarse and fine aggregates shall be within and approximately parallel to the grading envelopes given in table 16 B-1 of the Standard Specification for Road and Bridge Construction for Type I, 0/20mm binder course covered with 10/14mm single seal surface dressing (pre-coated chippings class 1). The coarse aggregate class for the asphalt concrete shall be Class A.	50 mm thick asphalt concrete (SUPERPAVE) covering the carriageway and the shoulders. The grading of the mixture of coarse and fine aggregates shall be within and approximately parallel to the grading envelopes given in table 16 B-1 of the Standard Specification for Road and Bridge Construction for Type I, 0/20mm binder course covered with 10/14mm single seal surface dressing (pre-coated chippings class 1). The coarse aggregate class for the asphalt concrete shall be Class A.
	Base-course	150 mm thick Dense Bitumen Macadam (0/40mm two layers)	125 mm thick Dense Bitumen Macadam (0/40mm two layers)
	Sub-base	175 mm thick 4% Cement improved Natural Gravel (CBR ≥ 160%).	125 mm thick 4% Cement improved Natural Gravel (CBR ≥ 160%).
Pavement option 3 (Standard	Surfacing	75 mm thick asphalt concrete (SUPERPAVE) covering the carriageway and the shoulders. The grading of the mixture of coarse and fine aggregates shall be within and	50 mm thick asphalt concrete (SUPERPAVE) covering the carriageway and the shoulders. The grading of the mixture of coarse and fine aggregates shall be within and approximately

Design Details		Project Road Sections	
		Lesseru – Kitale	Kitale – Marich Pass
Pavement Structure Type 13)		approximately parallel to the grading envelopes given in table 16 B-1 of the Standard Specification for Road and Bridge Construction for Type I, 0/20mm binder course covered with 10/14mm single seal surface dressing (pre-coated chippings class 1). The coarse aggregate class for the asphalt concrete shall be Class A.	parallel to the grading envelopes given in table 16 B-1 of the Standard Specification for Road and Bridge Construction for Type I, 0/20mm binder course covered with 10/14mm single seal surface dressing (pre-coated chippings class 1). The coarse aggregate class for the asphalt concrete shall be Class A.
	Base-course	150 mm Thick Lean Concrete	150 mm Thick Lean Concrete
	Sub-base	150 mm thick 4% Cement improved Natural Gravel (CBR ≥ 160%).	150 mm thick 4% Cement improved Natural Gravel (CBR ≥ 160%).
Prime coat		MC - 70	
Binder		60/70 penetration grade bitumen for the asphalt concrete and surface dressing	
Tack coat		K1-70 cationic emulsion	
Road Marking Paint		Shall comply to specifications in BS 2523, BS 3262 Part 1	

Source: Draft Final Design Report

2.5 Target Materials Sites

2.5.1 Hard Stone Aggregate

There are three (3No.) hard stone quarry sites identified along the project road as shown below;

Table 7: Hard Stone Quarry Sites

Hard Stone Quarry No.	Name of Hard stone Quarry / Area	Location	Chainage	Offset (Km)	Side	Remarks
HS 1	Milimani	Along Lesseru – Moi's Bridge Road	036 + 400	1.90	RHS	Surface samples Tested, boreholes drilled to confirm quantity and quality.
HS 2	Mowlem	Along the Kitale – Suam Road	064+200	29.0	LHS	Surface samples Tested, boreholes drilled to confirm quantity and quality
HS 3	Chepsertoi Area	Just Past Marich Pass Junction	158+200	1.50	LHS	Surface samples Tested, boreholes drilled to confirm quantity and quality

Source: Design Report

2.5.2 Gravel Materials

Ten (10No.) gravel sources were investigated for improved Base-Course and Sub-Base material.

Table 8: Potential Gravel Borrow Areas

Road Section	Material Site No.	Chainage	Offset (Km)	Side	Type of gravel
Leseru – Kitale	MS1	004 + 500	0.01	LHS	Brown Lateritic Gravel
	MS 2	013 + 300	10	LHS	Brown Lateritic Gravel
	MS 3	019 + 500	2.50	RHS	Brown Lateritic Gravel
	MS 4	046 + 200	0.06	LHS	Brown Lateritic Gravel
Kitale – Chepareria	MS 1	070 + 500	0.60	RHS	Brown Lateritic Gravel
	MS 2	084 + 500	5.00	LHS	Whitish Quartzite Gravel
	MS3	103 + 700	1.60	LHS	Whitish Quartzite Gravel
Chepareria – Marich Pass	MS1	112 + 800	0.01	RHS	Whitish Quartzite Gravel
	MS2	145 + 800	0.04	RHS	Whitish Quartzite Gravel
	MS3	157 + 700	1.80	RHS	Whitish Quartzite Gravel

2.5.3 Sand, Steel and Cement

Two (2No.) sources of sand were identified along the project road corridor as shown in the table below;

Table 9: Sources of Sand

Sand Source No.	Name of River	Chainage	Offset	Side	Remarks
RS 1	River at Moi's Bridge	034+500	Within Road Corridor	LHS	River Sand
RS 2	Upper River Morun	148+140	Within Road Corridor	LHS	River Sand

Source: Design Report

The environmental review proposes that sand should be obtained from the seasonal rivers/streams approved by NEMA to mitigate against potential degradation of the perennial rivers.

Adequate supply of steel and cement will be sourced from the market as long as they meet the construction standards set for the project.

2.5.4 Water

Several water sources were identified along the project road corridor for use during the construction phase. The permanent water sources available for construction include;

(i) Leseru to Kitale include River Chepkoilel (Km8+180), River Kipsangui (Km16+750), Mtoni Polisi (Km26+720), River Singerere (Km34+500) and Nzoia River,
(ii) Kitale – Kapenguria section there is River Kesongon (Km63+480)
(iii) Kapenguria – Marich pass section there is the permanent River Moruny (KM148 + 140) and River Ortum (Km130+080).

The contractor is advised to drill two water boreholes along the Kapenguria – Marich Pass (65 Km) section to supplement the water supply to be used during the construction phase, which later may serve as part of the wider corporate social responsibility of KeNHA to the local community.

2.5.5 Construction Camp Sites

The design stage did not identify locations for camp sites development, deliberately because this is the responsibility of the contractor. It would be expected, however, that the Contractors will identify suitable land and negotiate lease agreements with the landowners. Compliance terms and conditions are, however, outlined under this report.

2.6 Project Implementation Schedule

The project implementation schedule is expected to take a total of 36 months from the date of commencement. The implementing agency for this project will be KeNHA (Kenya National Highways Authority)

2.7 Project Cost Estimates

The total project cost estimates is **KShs. 19,433,129,265 (Kenya Shillings Nineteen Billion, Four Hundred and Thirty Three Million, One Hundred and Twenty Nine Thousand, Two Hundred and Sixty Five**) only

Chapter 3: Policy and Legal Framework

3.1 National Policies

Recent policy and legislative developments have been substantially directed at redefining the role of the state with separation of policy and regulation (state responsibility) from implementation (private sector and/or statutory bodies). At the same time, there has also been movement to redefine the role of the state vis-à-vis the individual and/or community groups. The new constitution and policies such as the National Land Policy have considerably strengthened the community rights. This is critically important as developments such as the proposed project components can create social conflicts with the affected communities or individuals effectively delaying the project. This implies a need to engage the affected communities from the earliest stages of project planning.

3.1.1 The Constitution of Kenya

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

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

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

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

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress. The sub-project should ensure compliance with the constitution in so far as equitable sharing of the resources, between the stakeholders. Further, the project should ensure the sustainability of livelihoods and biological resources within the project areas are protected. Any development proposals should also be cognizant of the increased powers under the Constitution given to communities and individuals to enforce their rights through legal redress.

3.1.2 Kenya Vision 2030

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030 and was developed following on the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which saw the country's economy back on the path to rapid growth since 2002. GDP growth rose from 0.6% to 7% in 2007, but dropped to between 1.7% and 1.8% in 2008 and 2009 respectively. The objective of the Kenya Vision 2030 is to transform Kenya into a middle income country with a consistent annual growth of 10 % by the year 2030". The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This will be achieved by bringing basic infrastructure and services namely roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others.

One of the aims of the vision is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives is critical. The current land use practices in the country are incongruent with the ecological zones. For instance, large portions of land in high potential areas have been subdivided into uneconomic parcels, while some parts of land in the medium and low potential areas are rapidly being converted into agriculture, despite the fragile environment they are located in.

3.1.3 The Land Policy (2007)

Environmental management principles: To restore the environmental integrity the government shall introduce incentives and encourage use of technology and scientific methods for soil conservation and maintain beaches at high and low water mars and put in place measures to control beach erosion. Fragile ecosystems shall be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. Zoning of catchment areas to protect them from further degradation and establishing participatory mechanisms for sustainable management of fragile ecosystems will also be done. It will also develop procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and sharing of benefits with contiguous communities and individuals. Lastly all the national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared fragile ecosystems.
Conservation and sustainable management of land based natural resources: The sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people, and between people and resources. To achieve an integrated approach to management of land based natural resources, all policies, regulations and laws dealing with these resources shall be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA),1999.

The new land policy has a vision of 'efficient, sustainable and equitable use of land'. It designates all land in Kenya as Public, Community or Private; 'Community land' replaces the Trust Land category. It also recognizes and protects customary land rights. Recognition of community land (formally trust land under a County Council control) is provided under section 66(d) (ii) for restitution of illegally acquired as part of trust land to the affected communities and (v) for governing community land transactions using participatory processes.

Some key relevant issues:

(i) The exercise of (these) powers (compulsory acquisition and development control) should be based on rationalized land use plans and agreed upon public needs established through democratic processes (Section 43);

(ii) Ensure that the exercise of development control takes into account local practices and community values on land use and environmental management (Section 51(f));
(iii) Ensure effective public participation in the exercise of development control (Section 51(g)); and
(iv) Strategies for sharing benefits should be developed taking into account the nature of the resources involved and the contribution that diverse actors make to the management of the resources (Section 98).

The policy also addresses land management. Key issues include Section 3.4.3.2 – ecosystem protection (including wetlands). Measures for protection are required with sub-section 135 addressing fragile ecosystems to be managed and protected. Sub-section 137 focuses on Protection of watersheds, lakes, drainage basins & wetlands shall be guided by among other principles prohibition of settlement and agricultural activities in the water catchment areas, identification, delineation and gazettement of all water courses and wetlands as well as integrated resource management based on ecosystem structure. Section 3.4.3.3 addresses urban environment management on the face of the rapid urban development in the country. The section calls for control of waste dumping, regulation quarrying activities and rehabilitation of material dumping sites and land.

3.1.4 National Environment Action Plan

According to the Kenya National Environment Action Plan (NEAP), 1994 the Government recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregarded environmental sustainability. In this regard, establishment of appropriate policies and legal guidelines, as well as harmonization of the existing ones, has been accomplished, while some others are in the process of development. Under the NEAP process Environmental Impact Assessment (EIA) was introduced and among the key participants identified were the institutions dealing with water resources management. Chapter 4 sub-section 4.1.3 the NEAP report recommends that EIA be made a pre-condition for approval of all projects as well as post investment impact assessment for all related operations.

The Environmental Management and Coordination Act (EMCA,1999) provides for the formulation of the National, Provincial and District environmental action plans after the duration of five years. According to the NEAP Framework of 2009 – 2013, Chapter four addresses environmental issues mainly as a result of trade, industry and services which should gear towards achieving sustainable development. Chapter 4 sub-section 4.4.3 addresses the transport sector whose main environmental challenges are noise, air, water pollution, clearance of vegetation, solid and liquid waste disposal. It recommends the completion and implementation of air quality regulations and implementation of Noise and Excessive Vibrations Regulations, 2007 and the enforcement of EMCA,1999 and its subsidiary regulations.

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

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

management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others for decent housing of every family.

3.1.6 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.

3.1.7 National Policy on Water Resources Management and Development

The National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999) was established with an objective to preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way. It also desires to supply water of good quality and in sufficient quantities to meet the various water needs while ensuring safe disposal of wastewater and environmental protection. The policy focuses on streamlining provision of water for domestic use, agriculture, livestock development and industrial utilization with a view to realizing the goals of the Millennium Development Goals (MDGs) as well as Kenya Vision 2030. To achieve these goals, water supply (through increased household connections and developing other sources) and improved sanitation is required in addition to interventions in capacity building and institutional reforms.

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It, therefore, calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. Development projects, therefore, should be accompanied by corresponding waste management systems to handle the wastewater and other waste emanating there from. The same policy requires that such projects should also undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighbourhood and further downstream are not negatively impacted by the emissions.

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

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

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.

3.1.9 Guidelines for Prevention and Control of Soil Erosion in Road Works, 2010

The guidelines main objective is to benefit all persons engaged in the road works (Engineers, consultants, contractors and supervisors) and are not informed on the extent of damages caused by uncontrolled run-off from the road works. It acknowledges that road works potentially result in the spillage of hydrocarbon residuals, contaminating the surrounding land and interference with the drainage pattern hence extensive soil erosion. The guidelines therefore focuses to minimize the damages to the environment through the use of innovative construction methods and procedures which are less damaging to the environment in controlling soil erosion. The guidelines discusses several issues on the soil and water conservation principles which entail;

(i) The design and construction of water ways and soil erosion control measures in road drainage systems;
(ii) Soil erosion control measures needed in upper and lower catchment areas;
(iii) Soil erosion and their mitigation measures against anticipated damages from the road drainage discharge;
(iv) Use of vertiver grass to stabilize and heal erosion damages; and
(v) Indicative cost of soil and water conservation measures for planning purposes.

3.1.10 Environmental Guidelines for Roads and Bridges, 2010

The guideline for roads and bridges provides detailed analysis of environmental issues arising from road works along with mitigation measures that have been used in the national and the international contexts. The main focuses is on simply, fulfilling the law that requires assessing the state of environment before and after the road construction period hence achieving sound environmental management for the road transportation system. It also addresses environmental practices to be followed during the development stages starting from :tender, feasibility, design, construction, operation and maintenance phase.

The guidelines recommend ;

(i) Preparation of full EIA study to be completed at feasibility and updated at the design stage,
(ii) The certificate for environmental compliance should be issued prior to the issuance of certificate of road completion,
(iii) The guidelines are expected to be used in conjunction with existing and future regulations and guidelines developed by the government in particular NEMA,
(iv) Emphasizes on the environmental sustainable guidelines that calls for health and Environmental quality objectives (ecosystem protection, clean air, avoiding mobility and mortality).

3.2 Legal Aspects

3.2.1 The Environment Management and Co-ordination Act, 1999

Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the

environment. In order to partly ensure this is achieved, Part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environmental Management Authority (NEMA), who in turn may issue a license as appropriate.

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

Finally, the environmental impact assessment guidelines require that study be conducted in accordance with the issues and general guidelines spelt out in the second and third schedules of the regulations. These include coverage of the issues on schedule 2 (ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures.

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

- ✓ *Social disruption control*
- ✓ *Waste management*
- ✓ *Effluent discharge practices*
- ✓ *Aerial emissions,*
- ✓ *Excessive noise and vibrations*
- ✓ *Excavations and soil loss*
- ✓ *Adverse interference with natural resources including wetlands and water resources.*
- ✓ *The project cycle should ensure compliance with this statute all the time*.

3.2.2 Environmental Management Regulations

Environmental (Impact Assessment and Audit) Regulations, 2003 (Legal Notice No.101)
Part V Section 31 states that an Environmental audit is expected to be undertaken on the development activities likely to have adverse environmental impacts. The audit exercise is expected to be conducted by a qualified environmental inspector registered in accordance with regulation 14.

Section 31(3) the environmental Audit study is prepared based on the baseline information provided in the Environmental impact assessment report study which will be used as baseline information upon which subsequent environmental control audit studies shall be undertaken.

According to section 31(7) information required to be included in the audit report is mentioned; past and present impacts of the project, responsibility and proficiency of the operators of the project, existing internal control mechanisms to identify and mitigate activities with negative environmental impacts, existing internal control mechanisms to ensure workers health and safety, existence of environmental awareness and sensitization measures including environmental standards and regulations, law and policy for managerial and operational personnel.

Compliance Aspects
Provides a guide to the environmental inspectors and auditors on the requirements during the audit process.

Water Quality Regulations, 2006 (Legal Notice No. 120)

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

Compliance Aspect

Applies anytime there is a discharge of effluent into the environment without meeting the established standards. This requires all time compliance through the project cycle.

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

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

Compliance Aspect

Will apply on disposal of solid wastes into the environmental without complying with the established standards and procedures. Requires all time compliance.

Noise and Excessive Vibration Pollution Control Regulations, 2009

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

Compliance Aspect

Effects of activities with noise and vibrations in excess of the established standards.

Conservation of Biodiversity Diversity and Resources Access to Genetic Resources and Benefit Sharing Regulations, 2006

Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea. Lake or river declared to be a protected natural environmental system in accordance to section 54 of EMCA, 1999.

Compliance Aspect

- ✓ *Has relevance on activities interfering with natural habitats and genetic species therein. This aspect will be potentially notable on the realigned section of Kamatira Forest,*

- ✓ *The affected species need to be identified during an ESIA process and restoration plan established before the sub-project implementation commences.*

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

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

EMCA (Controlled Substances) Regulation, 2007
This regulation controls the production, consumption and exports and imports of controlled substances.

3.2.3 The Water Act 2002

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

Section 25 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act.

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

3.2.4 Water Resources Management Rules, 2007

One of the outcomes of the water sector reforms has been improved regulatory framework for water resource management and use. In addition to the Water Act 2002, the main document outlining the regulations is the Water Resource Management Rules 2007. The rules set out the procedures for obtaining water use permits and the conditions placed on permit holders. Sections 54 to 69 of the Water Resources Management Rules 2007 impose certain statutory requirements on dam owners and users in regard.

Other sections within the rules imply that WRMA can impose water quality sampling requirements from the water sources and impacts to the hydrology, water chemistry and river morphology downstream

basin. Section 16 of the Water Rules requires approval from the Water Resources Management Authority (WRMA) for a variety of activities that affect the water resources, including the storage of water in dams and pans. Approval by WRMA is conferred through a Water Permit. A permit is valid for five years and must be renewed.

Section 104 of the Water Resource Management Rules requires certain water permit holders to pay water use charges. The intention of the water use charges was to raise revenue for water resource management, raise revenue for catchment conservation activities, improve efficiency of water resource abstraction and provide a system of data collection on water resource usage.

Compliance Aspect
Sets the standard procedures and rules to be followed in the utilization of water resources including abstraction controls, modes of use and responsibilities in protection of the resources including effluent treatment standards.

3.2.5 Public Health Act (Cap 242)

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

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

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

Compliance Aspect
- ✓ *For all projects with direct or indirect implications on the health of the workers or the neighbouring communities.*
- ✓ *All health and safety measures should be in place to ensure the workers and the neighboring communities are not exposed to risks*

3.2.6 The Penal Code (Cap. 63)

Section 191 of the Penal Code states that any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along public way, commit an offence.

Compliance Aspect
This statute controls public nuisance including safety and security from construction activities.

3.2.7 Land Control Act (Cap. 406)

This law provides for the control of transactions in agricultural land, especially the machinery of the Land Control Boards. However of interest in this report is the consideration in granting or refusal of consent by the Board based on the impact the transaction is likely to have on the maintenance or improvement of standards of good husbandry within the specific agricultural area.

Government land is land owned by the government of Kenya under the Government Lands Act (Cap. 280). This includes, for example, forests, gazetted national parks and reserves. The Government Lands Act allows the president, through the commissioner of lands, to allocate any un-alienated government land to any individual. In practice, such allocations have often been made without proper regard to social and environmental factors.

Trust land is land held and administered by various local government authorities as trustees under the constitution of Kenya and the Trust Land Act (Cap. 288). National reserves and local sanctuaries as well as county council forest reserves, are in this category. Individuals may acquire leasehold interest for a specific number of years in trust land and can (in theory) be repossessed by the local authorities should the need arise. Local authorities should retain regulatory powers over trust land.

Private land is land owned by private individuals under the Registered Land Act (Cap. 300). On registration as the landowner, an individual acquires absolute ownership on a freehold basis. The use of private land may, however, be limited by provisions made in other legislation, such an Agriculture Act (Cap. 318). For instance, to protect soils the clearing of vegetation may be prohibited or the planting of trees required. Land preservation orders issued by the director of agriculture can cover a whole range of other measures. All private land acquired for the sake of a sub project will have to be compensated for fully as spelt out in the RPF document.

Compliance Aspect
The statutes ensure order in the utilization of public and private land. It serves to protect private land while demanding accountability on public land.

3.2.8 The Lands Act, No. 6 of 2012

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

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

Compliance Aspect

- ✓ *This part of the law seeks to preserve and direct management of fragile public land held by the various public bodies for sustainable development.*
- ✓ *Kenya National Highways Authority is a public body and once land has been acquired for roads, it is vested into their custody as the acquiring body. Thus expected to comply with this statute.*

3.2.9 Physical Planning Act (Cap 286)

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

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

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

Compliance Aspect

Any intervention sub-project is expected to be compatible with the existing physical plans and approved development and land use

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

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

Compliance Aspect
During the road project implementation the contractor is expected to create awareness to the employees and the local communities on the issues related to HIV/AIDs

3.2.11 Traffic Act (Cap. 403)

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

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

Section 52 A forbids any person who, being the driver of a vehicle from leaving the vehicle for a period in excess of the time, failing to comply with any traffic sign or leaving the vehicle in contravention of any traffic sign in any parking bay or parking area. Section 71, gives permission to the authority or the authority representative to close the roads for purpose of preventing damage caused to any road, carry out any works considered necessary in connection with maintenance/improvement of road or close whole or part of road to vehicles of particular type at any time for any period.

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

3.2.12 Kenya Roads Act, 2007

KeNHA is one of the established road authorities which is a corporate body with perpetual succession and common seal. The highway authority has a role of management, development, rehabilitation and the maintenance of the National roads. Part II section 4 of the Act shows the functions of the authority which includes:

(i) Constructing, upgrading, rehabilitating and maintaining roads under its control,
(ii) Controlling the national roads and road reserves and access to the road side development,
(iii) Implementing of the road policies in relation to the national roads,
(iv) Ensuring adherence to the roles and guidelines on the axle load control prescribed under the traffic act (cap 403) and under any regulations under these act ensuring roads quality as prescribed by the minister,
(v) Monitoring and evaluating the use of national roads,
(vi) Liaising and coordinating with other road authorities in planning and operation with respect to roads.

Compliance Aspect
Enactment of the Kenya Roads Act, 2007 shows Kenya National Highways Authority as one of the road agencies and their main responsibilities on the national roads.

3.2.13 Urban Areas and Cities Act, 2011

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

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

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

3.2.14 Occupation Safety and Health Act, 2007

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

Section 21 provides that the employer or self employed person to notify the occupational health and Safety Officer of any accidents, dangerous occurrence, or occupational poisoning which has occurred at the work place. Section 32 gives power to the occupational safety and Health officer to enter inspects examine by day or night, a work place which he has reasonable cause to believe to be a work place and any part of any building of which forms a work place. Section 55 requires all plant, machinery and equipment whether fixed or mobile for use at work place to be used for designed work and operated by a competent person. Section 97 prohibits employers to employ persons below the age of 18 years at the work place or perform work by which its nature its likely to harm the persons safety or health.

Compliance Aspect
This statute handles issues of health and safety especially during the project construction

3.2.15 Work Injury Benefits Act, 2007

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

Compliance Aspect
The contractor is expected to handle issues of safety and work related injuries at the project areas.

3.2.16 Way leaves Act, Cap 292

This act provided for certain undertakings to be constructed e.g rail lines, transmission lines, pipelines, canals, pathways through over or under any lands. Thia project is under the provisions of the act. Section 3 of the act states that the government may carry works through over or under any land whatsoever provided it shall not interfere with the esisting building or structures of an ongoing activitiy. Section 4 states that a notice will be given prior to carrying out of the works with full description of the intended works and target place for inspection.

3.2.17 Public Roads and Roads Access Act, Cap 399

Section 8 and 9 of the act provides for the dedication, conversion or alignment of public travel lines including the construction of access roads adjacent lands from the nearest part of public road. Section 10 and 11 allows on notices to be served on the adjacent land owners seeking permission to construct the respective roads. During the construction phase of the project, access to the site areas will be required for the construction vehicles. Where the existing roads do not exist the proponent shall seek permission from the appropriate authorities to create such access during the construction phase.

3.2.18 The Employment Act, 2007

An Act of Parliament to repeal the Employment Act, declare and define the fundamental rights of employees, to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected with the foregoing. The project proponent will ensure that appointed contractors comply the Act.

3.2.19 Kenya National Gender and Development Policy (2000)

The National Gender and Development Policy provide a framework for advancement of women and an approach that would lead to greater efficiency in resource allocation and utilization to ensure empowerment of women.

The National Policy on Gender and Development is consistent with the Government's efforts of spurring economic growth and thereby reducing poverty and unemployment, by considering the needs and aspirations of all Kenyan men, women, boys and girls across economic, social and cultural lines. The policy is also consistent with the Government's commitment to implementing the National Plan of Action based on the Beijing Platform for Action (PFA). The overall objective of the Gender and Development Policy is to facilitate the mainstreaming of the needs and concerns of men and women in all areas in the development process in the country.

The Policy's concerns cover the following critical areas

(i) Economy - to enable men and women to have equal access to economic and employment opportunities.
(ii) Poverty and Sustainable Livelihoods - to remove obstacles to women's access to and control over productive assets, wealth and economic opportunities, shelter, safe drinking water, and promote measures for conserving the environment.

(iii) Law - to guarantee Kenyan men and women equality before the law, as provided for in the Constitution and under the obligations of the Kenyan State in international law.
(iv) Political Participation and Decision- Making - to enhance gender parity in political participation and decision – making
(v) Education and Training - to enhance and sustain measures to eliminate gender disparities in access, retention, transition and performance in education for both boys and girls
(vi) Health and Population - to achieve the highest attainable standard of health for both men and women through addressing gender inequalities pertaining to access and use of basic health services and facilities at an affordable cost.
(vii) The Media - to increase the participation of women in the media and communications sector and promote gender sensitive portrayal of both men and women in the media
(viii) Policy Implementation Framework and Resource Mobilization- empowering both men and women to be equal partners in development- It focuses on the elimination of existing disparities between the two genders. It also advocates for an affirmative action to address gender disparities.

The Contractor will adhere to this Policy by ensuring that there is inclusion of women in the project through employment opportunities and put in place measures to ensure that the project does not exacerbate the poverty situation of women living around the project.

3.3 The World Bank Safeguards

3.3.1 OP/BP 4.01 (Environmental Assessment)

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

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

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

The World Bank considers environmental impact assessment (EIA) as one among a range of instruments for environmental assessment. Other instruments used by the World Bank include regional or sectoral environmental assessment, strategic environmental and social assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF). The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of environmental assessment.

3.3.2 OP/BP 4.04 (Natural Habitats)

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

3.3.3 OP/BP 4.11 (Physical Cultural Resources)

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

3.3.4 OP/BP 4.12 (Involuntary Resettlement)

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

Involuntary resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The objective of this policy is to avoid or minimize involuntary resettlement, though participation in resettlement planning and implementation and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects. There are notable resettlement issues along the corridor triggering this aspect. The RAP study was being reviewed alongside this ESIA Review.

3.3.5 OP/BP 4.36 (Forests)

The policy on forest safeguards seeks to realize the potential of forests to reduce poverty in sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Among the principles is to screen as early as possible for potential impacts on forest health and quality and on the rights and welfare of the people who depend on them. This aspect is triggered in regard to Kamatira Forest and natural vegetation cover between Ortum and Marich Pass sections.

3.4 Institutional Responsibility

Kenya National Highways Authority (KeNHA) is one of the established road authorities which is a corporate body with perpetual succession and common seal. The highway authority has a role of management, development, rehabilitation and the maintenance of the National roads. Enactment of the Kenya Roads Act, 2007 shows Kenya National Highways Authority as one of the road agencies and their main responsibilities on the highway roads. Part II section 4 of the Act shows the functions of the authority which includes:

(i) Constructing, upgrading, rehabilitating and maintaining roads under its control,
(ii) Controlling the national roads and road reserves and access to the road side development,
(iii) Implementing of the road policies in relation to the national roads,
(iv) Ensuring adherence to the roles and guidelines on the axle load control prescribed under the traffic act (Cap. 403) and under any regulations under these act ensuring roads quality as prescribed by the minister,
(v) Monitoring and evaluating the use of national roads,
(vi) Liaising and coordinating with other road authorities in planning and operation with respect to roads.

Chapter 4: Environmental Baseline Conditions

4.1 General Corridor Characteristics

Lesseru – Marich Pass highway traverses running for 155km traverses four Counties with distinct environmental, social and climatic conditions. The Counties include the following;

(i) Uasin Gishu and Kakamega Counties stretching from Lesseru – Moi's Bridge. It is noted that along this section, the road alignment constitutes the border between Uasin Gishu and Kakamega Counties. It is characterized with farming, urban growth, institutions and human settlements,
(ii) Trans Nzoia County stretching from Mois Bridge to Kapenguria via Kitale town characterized mainly with intensive farming, urban growth, institutional presence and human settlements.
(iii) West Pokot County occupying the rest of the section from Kapenguria to Marich Pass via Chepareria and Ortum markets. Due to low rainfall and elevated temperatures through the year, the section is characterized with low population density, negligible farming activities, low urban growth. However, livestock keeping is the main economic occupation in the section and a large proportion of West Pokot County.

The corridor is characterized with varying features including physiography, drainage and hydrology, water resources characteristics, vegetation cover, wildlife presence and climatic conditions. the sections below presents brief descriptions of these features.

4.2 Topography

The Lesseru point (KM 0+000) of the road corridor in Uasin Gishu County is at an elevation of 2,007m a.s.l rising to 1,790m a.s.l. towards Moi's Bridge (~KM35+000) with an undulating landforms comprising of shallow river valleys and occasional outcrops. The landforms do not have significant influence on the road slope of the road surface. There is then a gradual rise in elevation in Trans Nzoia County towards Kitale town (located standing at1,899m a.s.l near the proposed interchange at ~KM54+600) and into West Pokot County towards Kapenguria at 2,088m a.s.l. (at ~KM90+000m a.s.l. reaching the highest peak of 2,285m a.s.l. within Kamatira Forest about KM96+900.

The section of the road corridor upto Kapenguria area (and upto the highest point in Kamatira Forest) displays a significant level of south easterly slopes influenced by the southern zones of the Cherangany ranges and lake Victoria Basin (indeed the section of the road corridor falls within the Lake Victoria Drainage). Specific topographical features can be described as follows;

(i) Km0+000 – Km28+500 has ragged land form features with steep slopes occurring on approach and exit from river crossings. The river valleys, however are fairly shallow and short distances. Influence of the topography is mainly from Cherangany hills on the western and northern side of the road corridor and rivers rising the same ranges flowing into Lake Victoria basin,
(ii) Km40+000 to Km80+000 is characterized with a gradual increase in elevation and steep slopes towards Kapenguria influenced by Kamatira hill forest,
(iii) There is an extra-ordinary slope commencing from Murkwijit (KM80+000) toward Kamatira forest at the highest point (Km96+000),
(iv) A steep descent commences at KM97+700 towards Chepareria market at 1,717m a.s.l. (~KM109+000), a drop of about 500m over 10km. This illustrates the nature of slope encountered on this section,

(v) The rest of the distance is characterized with ragged surface with fairly shallow river crossings and influence by nearby hills (Km108+500 – Km131+100). The land form is also influenced by Morpus hills and other short outcrop hills along the corridor,

(vi) Km 108+000 – Km145+000 has deep river valleys and notable high rising ridges along the corridor with among the hills including Chepkokarin Ridges, Siwonei Hills, Kasema Hills, Kweka Hills, Soka Hills, Kopro River and Moruny Rivers,

(vii) The remaining section has deep valleys with double influence from Moruny river and a number of hills including Yass Hills, Mtero Ridges and Sikararot Ridges.

Figure 8: Sample Land Forms

Mois Bridge Area

Terrain in Kamatira Forest

Hills after Chepareria Area

Kweka and Yoton Hills near Ortum

Sikararot Ridges at Marich

4.3 Water Resources

Water resources along the corridor include surface water sources and limited ground water sources. Endowment of water resources for the corridor varies on the basis of climatic and relative elevation and could be described in three distinct blocks;

(i) Lesseru – Kitale Area (~Km 0+000 – ~Km50+000) has numerous rivers and streams flowing from the Cheranganyi hills to the east and north of the corridor. The rivers, among them Segoit River. The rivers are faced with serious threat of pollution from intensive agricultural activities in the catchments, settlements and urban development,

(ii) Mto Polisi River (Little Nzoia), Nzoia River and Kipsangui River are among the rivers providing water for the supplies to the nearby towns and markets as well as their surrounding communities (Nzoia is the source of water for Moi's Bridge, Matunda town and the nearby areas, Segoit river provides water for Soy and Nangili market and their immediate surroundings). There is no notable exploitation of ground water sources in this areas, perhaps due to the depths of the aquifers. Intensive social and economic activities in the catchments is also a threat to the water quality in the corridor,

(iii) The zone upto Kapenguria area is characterized with increased categories of surface water sources. In addition to rivers (Kipsaina River, Sabuwani River and Koitobos River, there are notable wetlands among the main ones being Saiwa Swamp, Kipsaina swamp, Namajara wetland and Wandura wetland forest. Again, there are no notable ground water exploitation. While appreciating the potential risks of water pollution in these rivers, the emergence of wetlands in this zones are important moderation features for water pollutants,

(iv) The corridor from Kamatira forest towards Marich Pass end of the road is endowed with a significant number of rivers (among the major ones being Kamatira river, Ortum River, Kapro (Wakor River), Saya river, Sebit river, Morun River and Chepareria rivers). The rivers all are tributaries of Muruny river flowing westwards to constitute part of the Turkwel River Basin system in Turkana County. Muruny river flows almost parallel to the road corridor and generally defines the drainage characteristics of Marich Pass. Overgrazing in most areas, changing land use to food production in the flood plains and sand harvesting activities for construction is leading to serious water quality degradation.

Figure 9: Sample Water Bodies


Nzoia River


Sebuwani River


Wandura Forest Wetland (on Sebuwani River)


Kipsaina River


Kipsaina Wetland


Riverine Wetland (Muruny River)


Chepareria River


Sebit River


Muruny River

4.4 Waste Management

Areas with potential waste management challenges are urban centres and settlement areas (mainly organic matter, papers, plastics and polythene materials and fabrics. Others may include hazardous materials from health facilities, service stations and motor garages). It noted that none of the towns and markets are provided with effective solid waste management system or sewage disposal. Dry vegetation materials generated from agricultural farms are used for soil conditioning.

Road construction activities generates waste materials almost similar to urban and settlement wastes and under the current capacity in the corridor towns, camp sites and other work areas would need to establish own management mechanisms. Spoil earth materials, however, is a unique waste associated with road construction.

4.5 Drainage and Hydrology

4.5.1 Drainage

The road corridor falls into two drainage basins, namely Lake Victoria Drainage Basin (KM0+000 – Km~96+000) influenced by Nzoia River system and Lake Turkana Drainage Basin (Km~97+000 – Km164+000) influenced by Muruny River/Turkwel River system. This implies all the surface runoff, rivers and streams are naturally channeled into the respective river basins.

At the corridor level, the entire is corridor is well drained. The topography is well sloped and characterized with rivers and streams with varying flow capacities with appropriately sub-catchments linkages. However, it was noted that natural drainage systems in the highly habited areas (Km0+000 – Km96+000), has been seriously compromised by human and socio-economic activities. The tendency has been to confine surface runoff into the roadside drainage, especially within the urbanized and settlement areas following collapse and blockage of drainage systems. Similarly, some of the natural drains running through cultivated land has been blocked effectively channeling most runoff onto the roadside drainage. The effect has been conversion of road reserve as the drainage channel compromising the integrity of the road formation and safety.

There is a serious drainage challenge on the section after Kamatira Forest onwards to Marich Pass, especially within Chepareria market, Ortum Market zones and towards Marich Pass. This is a result of runoff generated in the highlands crossing the road corridor towards Muruny river system (the road corridor do not seem to generate significant relative runoff compared to the transit runoff from the hills). The effect noted is serious damages to the road and its reserve by the flash storm water runoff. This is even more destructive on the lower side of the road reserve arising from confinement of the runoff into narrow and far apart culverts creating high hydraulic pressure at the outfalls. Results are significant soil erosion and damaging of vegetated lands and in some instances the receiving river banks.

Figure 10: Drainage Features

Compromised Roadside Drainage (Typical of KM0+000 – Km96+000)

Eroded Spots Associated with Drainage at Culvert Outfalls (Typical of Km96+000 – Km164+000)

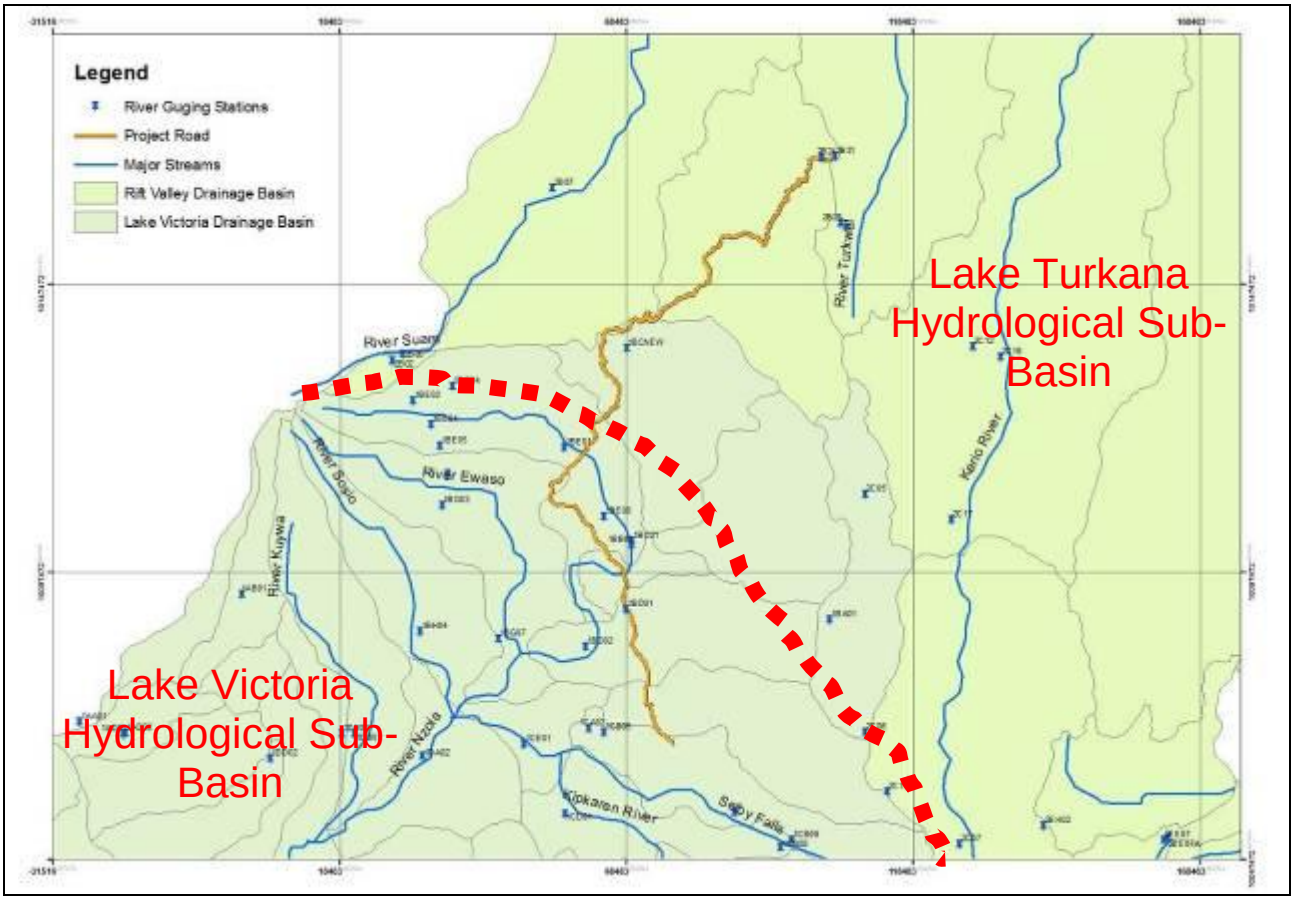
4.5.2 Hydrology

The road corridor is characterized with numerous streams and rivers. The first part of the project road corridor flows into Lake Victoria (Lake Victoria Basin) while the second part is in Lake Turkana Basin. Like drainage, hydrological patterns are determined by the ground slopes characteristics, surface water bodies (rivers and wetlands) and flow regimes as well as the level of precipitation. The two hydrology zones are described as follows;

(i) Hydrological Zone 1: KM 0+000 – ~Km96+000 are highly influenced by River Nzoia hydrological system draining into Lake Victoria. Among key rivers in the upper Lake Basin (not necessarily joined with Nzoia river) include Yala river, Kipkaren river, Sio river, Malaba river and Malakisi River. In addition to the rivers and streams, the basin also features wetlands that plays the role of flood control and catchment water retention points,

(ii) Hydrological Zone 2: Km96+000 – Km164+000 is largely influenced by Muruny River collecting from among others Kamatira river, Chepareria river, Chebit River, Ortum River and Kopro River. Muruny river (running through Marich Pass and onward into Turkana County as River Turkwel having merged with Weiwei river and Turkwel itself.

Figure 11: Hydrological Zones



The key physical feature influencing the slopes and hence the hydrological basin is the Cherangani Ranges that creates the divide through Kamatira Forest areas (also referred to as Kamatira Hills). However, the Hydrological Zone 1 (on Lake Victoria Sub-Basin) is on the windward side and hence tends to receive more over all precipitation compared to the Hydrological Zone 2 on the Lake Turkana Sub-Basin (see 5.10). This implies, while the overall flow is higher and well distributed in the Hydrological Zone 1, Zone discharge is dependent on flows arising from the highlands and occasional flush floods from limited rainfall.

The road crosses the key rivers constituting the Northern catchment basin of Lake Victoria. Most these rivers originate from the Charangani hills and also local springs. Among these include;

(i) Segoit River
(ii) Kipsangui River,
(iii) Ntopolis River
(iv) Little Nzoia
(v) Nzoia River crossing at Mois Bridge
(vi) Sabuwani River
(vii) Kipsaina River associated with the famous Saiwa Swamp
(viii) Koitobos River
(ix) Kamatira river
(x) Ortum River
(xi) Kapro (Wakor River)

(xii) Saya river
(xiii) Sebit river
(xiv) Morun River

There are other numerous dry seasonal river beds on the northern sections of the road, most which are flooded during heavy the heavy rains and quickly run dry thereafter. Sample river crossings are illustrated in the figure below.

Figure 12: Sample River Crossings

Kipsangui River near Soi Market

Nzoia River crossing at Mois Bridge


Muruny River Bridge


Kopro River Bridge


Kipsaina River Bridge

4.6 Geology and Soils

The project road traverses from flat to rolling terrain at Lesseru Junction towards Kitale town at altitude 2,100m above sea level and ranges to 1890m above sea level. This is followed by a gradually rising altitude up to 2,134m above sea level at Kapenguria before dropping down the slopes of the major physical feature in the area the Cherangani Hills. The geology of the Cherangani Hills mainly lies in the Precambrian era and originates from the ancient basement system that was overlain with more recent volcanic flows. The rocks around the Cherangani Hills are Agglomerates and Phonolites as evident from the geological Map of Kenya presented below.

While the surface geological conditions between Km0+000 – Km90+000 seem intact and stable, the situation is different for the rest of the corridor. Steep slopes and hilly zones have un-cohesive soils and loose stones and rocks that were observed to fall onto the road reserve, especially during the rains (this poses a potential safety risk to the road and need to be addressed).

Figure 13: Falling Stones

Falling Rocks at Marich Pass

Falling Rocks near Wakor

Landslide in Kamatira Forest Edges

The soils between Lesseru – Kitale – Kapenguria are predominantly ferrasols rich in organic matter, well drained, reddish brown and adequate for farming. But as the road moves towards Marich Pass the soils become nitisols, friable and susceptible to erosion. The project area lies partly in the Lake Victoria Drainage basin and therefore major rivers flow in a Westward direction towards the lake.

4.7 Biodiversity

4.7.1 Wetlands

There are also notable wetlands systems located along the corridor almost all lying within the lower half of the corridor. However, observations shows only a few are within the road alignment though linked through discharge streams. Among the wetlands along the corridor include the Kipsanai wetland system (also linked to the famous Saiwa wetland with ecological importance including the home to the rare Sitatunga), Wandura wetland forest on Sebwani River and pockets of riverine wetlands along Muruny River (see Figure 8 above).

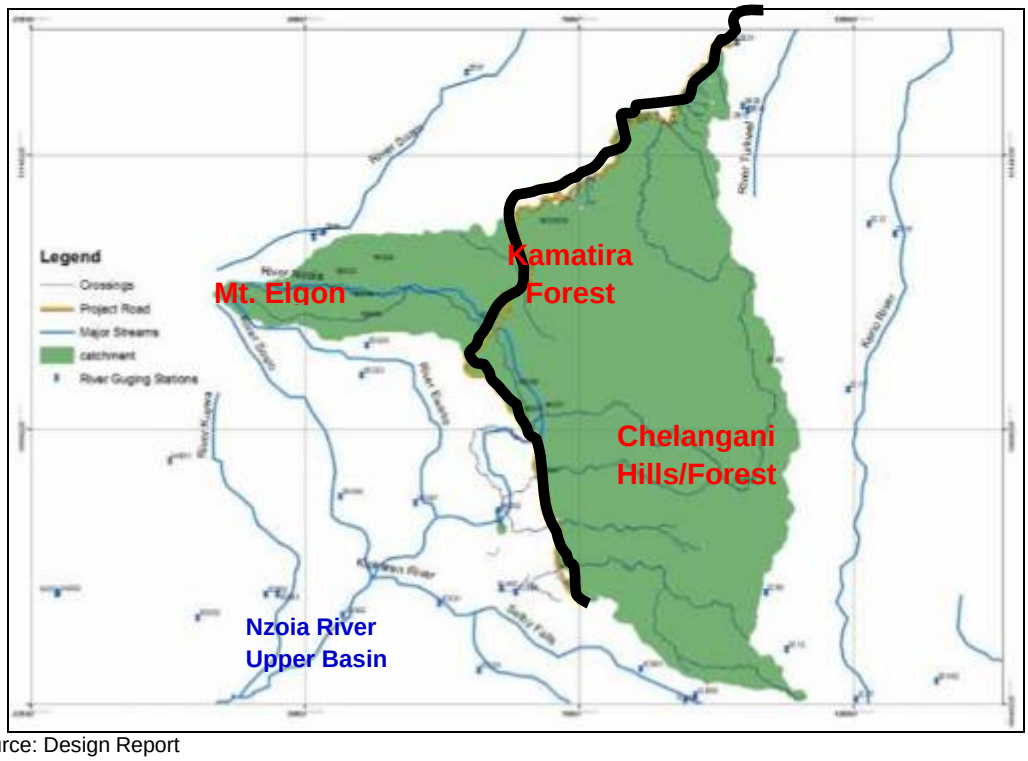
4.7.2 Forests

It is observed that the corridor has a significant tree cover thanks to intensive agro- forestry initiatives. However, there are natural forests also, some with direct linkage to the road. Among the forest units include the following;

(i) Charangani forests though way off to the east of the rod corridor,
(ii) Kamatira forest lying on a sensitive terrain shortly after Kapenguria town towards Chepareria market. This is an extension of the Cherangani forest system,
(iii) Intensive agro-forestry across, especially the Leseru – Kitale – Kapenguria,

There is also intensive agro-forestry, especially between Lesseru – Kapenguria areas that partially compensates the loss of forest cover associated with human settlements and economic activities. However, the agro-forestry mainly involves exotic trees as opposed to the indigenous trees species found in Cherangany and Kamatira forests.

Figure 14: Relative Coverage of Cherangani and Kamatira Forest



Source: Design Report

It is also appreciated that due to the semi-arid conditions between Chepareria and Marich Pass, the vegetation cover is relatively thin but typical of the area. The highlands and ridges, therefore, have a reasonable vegetation cover of indigenous tree and plant species. Trees, shrub and Riverine vegetation noted along the entire road corridor are as follows:

Table 10: Selected Plant Species Observed

Scientific Name	Local/Common Name	Use
Acacia ssp	Cess	Charcoal, timber, firewood
	Mashah	Honey brewing
	Muina	
	Pannan	
	Kwarkwarian	
	Mukungwa	
	Tuyunywa	Leaves used as vegetables
	Karien	Very poisonous
Typha domingensis	Bulrushes	Wetland plant
Echinochloa pyramindalis	Reeds	
Pycrcus Lanceus	Sedge	
Croton Macro		
Albizia		
Ficus Spp		
Warburgia Salutaris		
Sapium Ellipticum.		
Erythrina		
Syzygium Cordatum		

Figure 15: Sample Forest Cover



Sections of Kamatira Forest

Wandura Forest

Forest Cover on Sikararot Ridges

Forest Cover on Soka and Siwonei Hills

Tree Cover at End of Project Road

There is notable threat to natural forests between Km90+000 – Km164+000 (West Pokot side) from intensive charcoal burning, fire wood and timber among other uses. This is especially considering that there were no notable efforts of replanting the trees. However, the status on Km0+000 – Km90+000 is different. Here, indigenous trees have been replaced with exotic trees (mainly commercial through agro-forestry). Tree nurseries observed along the road corridor in this section is an indication of the initiatives towards sustaining the tree cover.

Figure 16: Forest Use


Charcoal Burning

Firewood Cutting

Tree Seedlings Nursery at Kitale

<u>Wildlife</u>

Due to the intensive human settlements and economic activities between Lesseru – Kitale – Kapenguria sections, there is no notable presence of wildlife other than small rodents, snakes and birds species. However, there are limited wildlife species haboured by the wetland systems (e.g. Sitatunga in Saiwa and Kipsaina Wetland Systems, snakes and birds species) and forests (monkeys, hyenas, Leopard, snakes and birds species) in Kamatira forest). For the sections between Kapenguria, Cheparelia, Ortum and upto Marich Pass, there is reported migration presence of elephants, giraffes, zebras, leopards, lions, snakes, monkeys and other types as

influenced from Turkana national park further west from (Turkana County) Marich Pass end of the road section. However, with growing human settlement and socio-economic activities, the available wildlife is also at risk of displacement. Species characteristics and habitats will be identified and discussed during this review study.

Table 11: Some Animal Species in the Area

Animals	Birds	Insects	Primates
▪ Sitatunga ▪ Reed buck ▪ Bush back ▪ Porcupine ▪ Mongoose ▪ Ant bear ▪ Squirrel ▪ Hyenas ▪ Crocodile ▪ Forest Cobra ▪ Boor ▪ Blue Headed Agama Lizard ▪ Chameleon	▪ Yellow billed stock ▪ Ibis ▪ Woodland Kingfisher ▪ Francolins ▪ Tinker bird ▪ Owl ▪ Wahlberg Eagle ▪ Long Crested eagle	▪ Dragon flies ▪ Butterflies(Swallow tails)	▪ Velvet Monkey ▪ Blue Monkey ▪ Debraza Monkey ▪ Baboons

4.8 Air Quality

Air quality along project corridor is influenced by transport activities in addition to agricultural and urban related emissions (farm machinery and domestic emissions). With the high traffic volumes plying the route comprising partly of heavy trucks, vehicular emissions are expected to be relatively high. The key emissions associated with the project road include carbon dioxide (CO_2), carbon monoxide (CO), Nitrogen Oxides (NO_X), Sulphur Oxides (SO_X) and Particulate Matter ($PM_{2.5}$, PM_5 and PM_{10}) which comprises of hydrocarbons, fuel aerosols and soot. However, due to the high dispersal rates and high tree cover in the entire corridor, the overall concentration in the air is expected to be fairly low.

4.9 Noise and Vibrations

Noise levels along the corridor is mainly ambient influenced by human settlement nature. Slight elevated levels are within markets and near urban centres where economic activities including workshops, commercial undertaking and entertainment points are located. Along the corridor, the main sources is vehicular traffic plying the corridor, and especially heavy trucks. The levels, however, are confined within the vicinity of the carriageway.

4.10 Climatic Conditions

As previously noted the project road traverses four counties i.e. Uasin Gishu, Kakamega, Trans Nzoia and West Pokot Counties with varying climatic characteristics. Key variations are in rainfall intensity, humidity, temperatures and of course the influencing factors including altitude and topography. The climatic conditions are briefly described below;

4.10.1 Uasin Gishu and Kakamega Counties

The approximate altitude at Km0+000 is 2,200m a.s.l. with a temperate climate throughout the year. The average night temperatures are ~9^{o}C and day temperatures of ~24^{o}C. The minimum and

maximum temperatures generally range between 16^{o}C and 29.7^{o}C respectively. The conditions are influenced by mixed factors including the Chelangani hills to the north and east, Nandi hills to the south and Mt. Elgon to the west.

The total annual rainfall ranges between 755mm and 1,478mm with a mean value of 1,124mm. Precipitation occurs mainly during April and May with a dry spell in June, followed by increasing rainfall in July and August. Rainfall tails off in September and October. A dry period with scattered showers of four to five months follows, until the following March. Rainfalls hours are mainly during the afternoon and at night. Most days are generally sunny with a mean sunshine of 7.7hrs. per day.

4.10.2 Trans Nzoia County

Trans Nzoia County is generally at an average altitude of ~1,900m a.s.l. in the highlands and ~1,000m a.s.l. in the low lands which significantly affects the temperatures in the area. During the cold months the temperatures are as low as 10^{o}C and rising as high as 37^{o}C during the hottest months. July is the coldest month while August and January are the hottest months. The average rainfall received in Trans Nzoia County ranges between 1,200mm and 1,500mm per annum.

4.10.3 West Pokot County

West Pokot County experiences moderate climatic and weather patterns due to the average altitude of the county. In the lowlands temperatures rise up to a high of 30^{o}C while the high regions experience 10^{o}C during the cold months. Average rainfall received varies between 400mm and 1,500mm. The highlands experience more rainfall than the lowlands and this in turn determines the economic activities carried out in the region.

Chapter 5: Social and Economic Baseline Conditions

5.1 Administrative Setting

5.1.1 County Administration

The Lesseru – Kitale – Marich Pass road is located in the four counties of Uasin Gishu, Kakamega, Trans Nzoia and West Pokot. The total area for the four counties is 18,043.8 km², where West Pokot has the largest area of 9,169 km² followed by Uasin Gishu with 3,345 km² , Kakamega 3,033.8 km^2 and Trans Nzoia having 2,496 km². The road starts in Kiplobe Location, Uasin Gishu County before crossing Nzoia river where it enters Trans Nzoia County and terminates 164 kms at Ortum location in West Pokot. There are various administrative centers along the project road including Trans Nzoia County headquarters (Kitale) and Police station (Km. 64), West Pokot county headquarters (Kapenguria) and Makutano Police Station (Km. 86) and Morpus Asstant Chief's Office (Km. 134) among the many others. The administrative counties traversed by the project road are presented in the figure below:

5.1.2 Political Units

The project road traverses five constituencies namely Eldoret North, Sabaoti, Cherangani, Kapenguria and Kacheliba. The county assembly wards traversed by the project road include Moiben, Turbo, Soy, Kapenguria, Chepareria, and Kacheliba among others. The project road connects and is the access route to Trans Nzoia and West Pokot county and administrative headquarters; police stations and national government offices. Rehabilitation of the road will therefore enhance access to various services offered by these offices including security.

5.2 Demography Trends

5.2.1 Population

From the Kenya Population and Housing Census 2009 report, the population of the three counties stood at 2,225,626 people comprising of 1,110,993 males and 1,114,633 females. The total female population is higher than that of males owing to high male emigration to other counties and towns in search of employment and business opportunities. The average household size in the three counties is 4.8. The average annual population growth rate was 4.2% against the national average of 3.0%. West Pokot has the highest population growth rate of 5.2% while Trans Nzoia has the lowest of 3.6% per annum. The Table below summarizes the counties' population by gender and annual growth rates according to the Kenya Population and Housing Census 2009 report as well as the 2017 population projections:

Table 12: Demographic Features of the Project Counties

County	Population (2009)					
	Male	Female	Total	No. of Households	population growth rate (%)	population projection by 2017
Uasin Gishu	448,994	445,185	894,179	202,291	3.8	1,211,853
Kakamega	797,112	863,539	1,660,65	398,709	2.5	2,028,325
Trans Nzoa	407,172	411,585	818,757	170,117	3.6	1,092,023

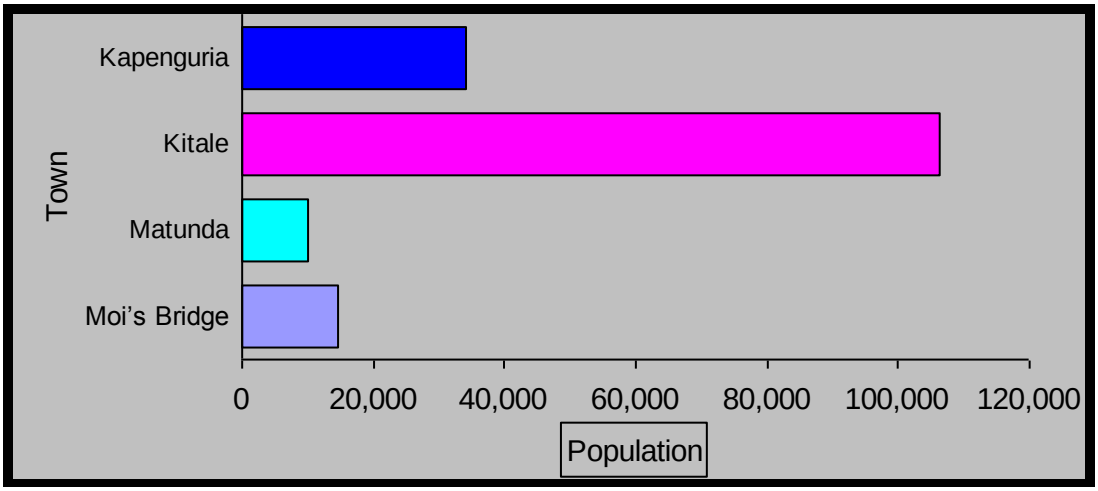
County	Population (2009)					
	Male	Female	Total	No. of Households	population growth rate (%)	population projection by 2017
West Pokot	254,827	257,863	512,690	93,777	5.2	771,180
Total	**1,908,105**	**1,978,172**	**2,225,626**	**864,894**	**3.75**	**5,103,381**

Source: 2009 Kenya Population and Housing Census.

5.2.2 Urban And Rural Populations

On average, 22.4% of the project counties' population total population live in urban areas while 87.6% live in rural areas. Uasin Gishu county has the highest number of urbanized population at 38.6% followed by Trans Nzoia has 20.4% and Kakamega with 15.2%. West Pokot has the lowest urban population of 8.3%. Kitale town has the highest population of 106,187; followed by Kapenguria with a population of 34,046 as demonstrated in the following figure:

Figure 17: Urban Population for Major Towns along the Project Road

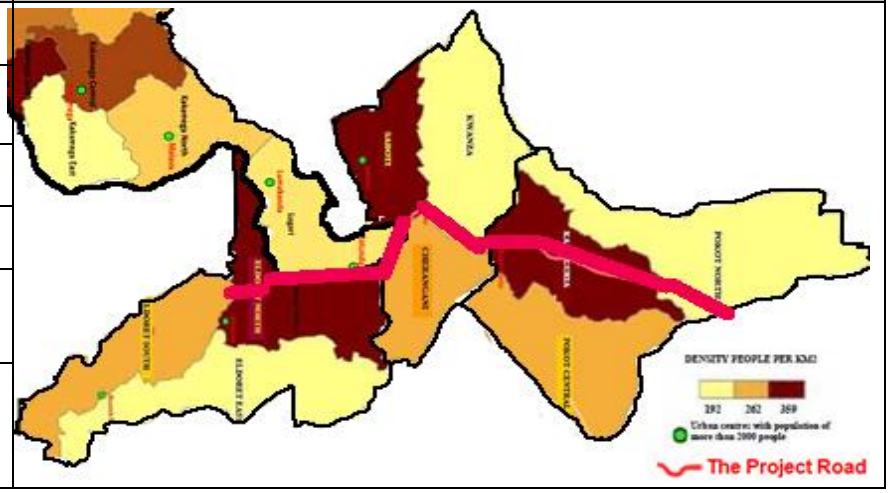


5.2.3 Settlement Patterns and Housing Conditions

Settlement patterns are influenced by ecological and climatic factors including land fertility, rainfall amount and type of farming practiced and crops grown as well as number and intensity of economic activities and access to services (administrative, health and education). For example, cash crops such as tea and coffee attract a high population because residents have a higher preference for cash crops farming compared to food crops. Another reason for clustered settlement is the growth of towns such as Moi's bridge, Matunda, Kitale and Kapenguria where there are many migrant workers and business people.

The above factors have led to emergence of two types of settlements in the counties including clustered and scattered settlements. Clustered settlement patterns are commonly found around towns and farm estates (where workers have common residential quarters) as well as insecurity zones mainly in the drier parts of West Pokot. The Counties' average population density is **217** persons per Km^2 as presented in the table below:

Figure 18: Population Density Variations

County	Population density (persons per sq. Km)	Project Route
Uasin Gishu	267	
Kakamega	544	
Trans Nzoia	328	
West Pokot	56	
Average	**217**	

Source: 2009 Kenya Population and Housing Census.

The figure above shows that Trans Nzoia county has the highest population density of 328 persons per km^2 and West Pokot has the lowest of 56 persons per km^2. Contrary. The rapidly increasing population will provide market for transportation services in the area thereby making the project road even more viable for construction. In the drier parts of Pokot County, the semi-pastoral Pokots live in settlements scattered across the plains. Each settlement consists of an extended family group with the eldest man serving as the leader.

Figure 19: Sample Housing Structures



5.2.4 Labour Availability

Soy, Moi's Bridge, Kitale and Kapenguria towns guarantee availability of well skilled labour. For the Lesseru, Kitale and Kapaenguria section of the road, there is an abundant pool of local semi-skilled and unskilled labour capable of carrying out construction works and supportive activities. The section beyond Kapenguria and up to Marich Pass is sparsely populated and there may not be adequate labour available locally.

5.3 Land Tenure and Land Use

Land Tenure is a system through which land rights are determined and documented while Land

Disposition is the act through which ownership and use may change from one party to another. Different tenure systems exist in Kenya. In general, land in Kenya is classified as government land, private land or trust lands. Trust land refers to land held in trust by the county government on behalf of the residents.

Uasin Gishu, Kakamega and Trans Nzoia Counties has a land tenure system such that there is trust land and leasehold (99 years) in urban centres. There is also leasehold tenure in the rural part of the county where Africans bought the large farms owned by the White Settlers while other parts of the County are under freehold land tenure system. The combination of the tenure systems offers both opportunities and constraints. Areas under freehold tenure pose difficulties in enforcing regulations on land. However, the trust land areas provide the County Governments with sufficient land for future location public facilities and infrastructure.

West Pokot County has insecure Land tenure system where only 11 per cent of the farmers in the county have title deeds. Land adjudication needs to be addressed to increase tenure security and minimize frequent land conflict in the county. Land adjudication will create incentive for improved land management and increased production as well as enable farmers to access credit facilities. Land reforms are critical for successful implementation of projects identified in the integrated plan. Improved land reforms increases investors' confidence and trigger major development investments.

The general land use in West Pokot is characterized by grassland, shrubs and woodlands with scattered human settlements. Other significant land use features include;

(i) Institutional presence along the corridor including, schools and churches, etc.
(ii) Markets and small scale trading activities at some points along the route,
(iii) Public amenities such as Provincial Administration offices

5.4 Public Utilities and Infrastructure

Public utilities include roads, water, telecommunication and other facilities. The distribution and access to public utilities along the project corridor are as presented in the table below:

Table 13: Access To Public Utilities

Access to Infrastructure	Uasin Gishu	Kakamega	Trans Nzoia	West Pokot
Improved water (% households 2009)	88.9	76.1	76.7	37.2
Improved sanitation (% households 2009)	98.0	122.1	96.0	32.8
Electricity (% households 2009)	27.9	5.6	8.9	2.6
Paved roads (as % of total roads)	7.6	4.9	9.3	7.1
Good/fair roads (as % of total roads)	50.6	54.1	50.0	58.1

Source: Kenya County Fact Sheet 2011

5.4.1 Transport, Information And Communication

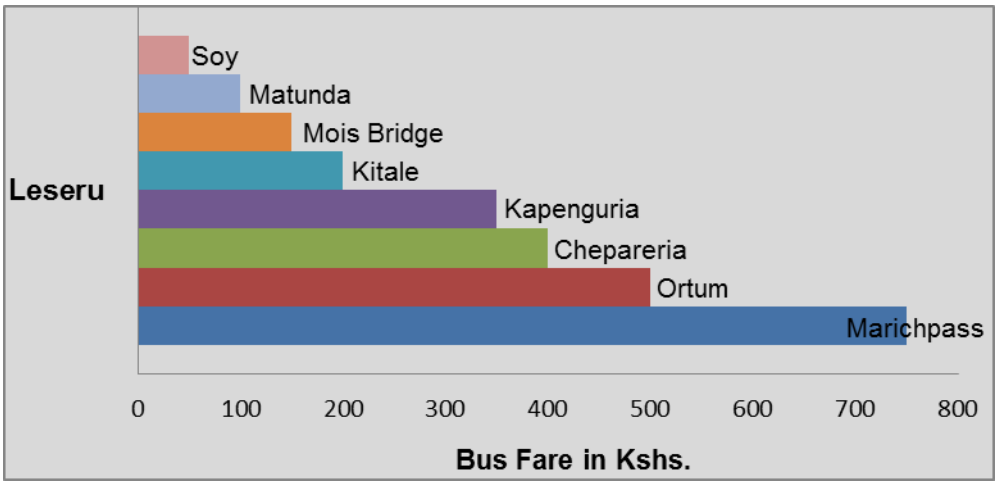
The counties covered by the proposed road project are observed to have well defined infrastructure networks totalling to four airports/airstrips, 148kms of railway (though it is currently not in use) and 7,136.74km of roads. A summary of road distribution in the project counties is presented in the Table below;

Table 14: Infrastructure In The Project Counties

County	Airports and airstrips	Railway Lines	Roads		
			Bitumen	Gravel	Earth
Uasin Gishu	3	179	310	549	377
Trans Nzoia	2	33	142.8	341.9	778.02
Kakamega	0	1		323.8	2,67.3
West Pokot	0	0	151	349	697
Total	5	212	603.8	1239.9	1852.02

Despite having extensive road network coverage, most feeder roads are rugged and impassable, making it hard to communicate and move produce from the rural areas to the markets. The rugged nature of the roads also leads to high vehicle maintenance costs which ultimately translating into high transport costs. With rehabilitation of the road, there may be need to improve interior service roads to the benefit of the area even as the road serves international interest. The cost of travel along the project road varies from KShs. 2 – 4 per kilometer depending on availability of transport, delays on the road, diversity of means of travel and road conditions. The figure below summarizes transport costs along the project road.

Figure 20: PSV Transport fares along the project road from Km 0+00



Source: Field assessment

Construction of the road project will reduce the cost of travel as well as reduction in delays on the road.

The mobile phone coverage stands at 95 percent in Uasin Gishu and Trans Nzoia but lower at 605 in West Pokot County. The counties except West Pokot are also well served with fixed telephone lines though their use has rapidly declined. Other communication facilities in the area include post offices, cyber-cafes and private courier services. With rehabilitation of the road, communication networks and investments is expected to speed up due to easiness of accessibility.

5.4.2 Energy

All towns and urban centres along the project road are connected with electricity whose source is hydro generation and therefore faces frequent power outages and blackouts especially during the

dry spells. Kengen's Turkwel Hydro Power Plant is also situated in West Pokot County. It is a power plant that produces about 105MW of power that is fed to the national grid. Communities around the power plant and the extensive districts of West Pokot and Turkana do not enjoy the benefits coming from the power plant.

Figure 21: Sample Public amenities

Bridge Over Moruny River

Power Transmission Line

Water Supply at Mois Bridge

Animal Transport

Walking

Public Transport (Matatus, Bodaboda)

5.5 Social Welfare

5.5.1 Education

In 2010, number of primary school going children was estimated to be 137,125. This comprised 68,647 males and 68,478 females, a sex ratio of 1:1. The age group is projected to increase to 75.221 males and 75,036 females in year 2002. The number will further increase to 91,968 males and 91,741 females by year 2014. The current enrolment in primary school is 130,427 pupils with boys accounting for 64,264 and girls 65,983. A total of 467 primary schools accommodate this number out of which 353 schools are based in rural areas while 114 are in urban areas. Teachers/pupil ratio is 1:30, which is better than the national average of 1:40.

The secondary age group was 59,838 in 2010 with males accounting for 29,541 and females 30,297 and a sex ratio of 96:100. In the year 2010, it was estimated that there were 32,370 males and 33,199 females in this age group. This number will increase to 39,577 males and 40,589 females by year 2014. The enrolment (2010) was reported to be 8,780 for boys and 8,777 for girls. This number was accommodated in a total of 86 secondary schools of which 74 are public and 12 private. At secondary school, gross enrolment (GER) is estimated at 21.4% for the poor while the Net Enrolment for the non-poor is estimated at 13.2%.

Currently, there are over 470 primary schools and 120 secondary schools in Trans Nzoia. Some of the prominent secondary schools include St. Brigids Girls, St. Monica, St. Joseph's Boys, St. Joseph's Girls, Kitale School and Boma Secondary schools. Trans Nzoia has over 20 tertiary institutions, including a university campus, a nursing training college, a teachers' training college, farmers training institute, youth polytechnic and a number of commercial colleges. The table below summarizes the number of schools in the project counties:

Table 15: Education Institutions In The Project Counties

Health and Education Outcomes	Uasin Gishu	Trans Nzoia	Kakamega	West Pokot
Literacy rate (%)	91.0	58.3	72.7	37.0
Population with primary education (%)	61.6	70.9	70.9	72.0
Population with Secondary education (%)	13.1	10.9	11.0	6.2

There are numerous education institutions (ECDs, Primary Schools, Secondary schools and tertiary institutions) along the project road. The list of education institutions touching the project road are presented in the following

Table 16: Education Institutions along the Project Road

Chainage (KM)	Educational Institutions
3+200	Georgen Academy
5+600	Sunrise Academy,
8+500	Soy Academy, Moi Baracks Academy,
14+900	St. Lucy Educational Centre; St. Lucy Soy Teachers College
17+800	Moi Girls Secondary; Nagili Primary
19+700	Star Rays Educational Centre
36+400	St, Francis Secondary, Kapkoi, Kapkoi Sisal Primary
37+000	Aic Kapkoi Secondary
41+000	Mainek Toro Secondary
43+700	St. Patrick Academy, Epson Academy
46+000	St. John Girls Secondary,
48+000	St. Teresia Secondary; Line Member School; Makusudi Academy
49+800	Aida Star Academy, Robinsons Technical Teachers College; Little Eagles Academy
51+600	Winners Academy
58+000	Kitale School, Faith Community Academy
62+600	Makunga Primary
63+800	St. Bhakita Academy
71+300	Wilton Academy
74+300	Kipsaina High School; Wiyet Girls Secondry; Mlima Mixed Secondary
76+300	Goseta Primary; St. Joseph The Worker Academy
76+400	Milima Mixed High School

Chainage (KM)	Educational Institutions
78+600	Kesogon Primary & Bahati Primary
81+100	Talau Mixed Secondary; Makwalit Primary
86+100	Tomokwou Secondary, The Karegeti School
98+000	Rainbow Academy
102+000	Berea Academy, Kapkoros Primary
108+000	Kamatira Mixed Day Secondary, St. Bredan Chelobai , Kapron Primary,
118+000	Propoi Girls Secondary
120+000	Jerusalem Academy, Chepretin Primary, St. Brendan Chelobai
122+000	Laikong Girls Secondary, Chepkoroniso Youth Polytechnic,
134+000	Morpus Mixed Secondary
138+000	Samor Mixed Secondary
140+000	Sebit Secondary
142+000	Kerewa Primary
150+000	Ngerer Primary
156+000	Wakor Primary

5.5.2 Health and Safety

There are about 78 health institutions in Trans Nzoia County - 2 District Hospitals, 2 Sub-District Hospitals and 33 Dispensaries. The county has 7 health centers, 28 medical clinics and about 6 nursing homes. Among the notable health facilities include Kitale District Hospital and Kapsara District Hospital. The table below summarizes health situation in the project counties:

Table 17: Health Situation In The Project Counties

Health and Education Outcomes	Uasin Gishu	Trans Nzoia	Kakamega	West Pokot
Fully-immunized pop <1yr (%, 2010/11)	76.2	35.7	76.8	54.0
Malaria (as % of all 1st outpatient visits)	18.3	33.6	45.4	49.9
TB in every 10,000 people (2009/10)	124	5	26	57
HIV+ ante-natal care clients (%, 2010)	3.4	5.4	6.2	0.2

Though with limited data, the road corridor is characterized with road safety hotspots while others were evidently observed. The figure below illustrates safety risks observed;

Figure 22: Road Safety Black Spots

Road Safety Risks at Mois Bridge

Road Safety Risks at Kesogon Market


Cattle Crossing at Murkwijit


Road Safety Black Spot at ~Km88+000


Road Safety Black Spot at ~Km112+000 (Kamatira Forest)


Road Safety Risks at Ortum Market


Risks from Shoulder Design (Kamatira Forest)


Risks from Bridges (Muruny River Bridge)

5.5.3 Institutional Distribution

The figure illustrates among the institutional premises and facilities along the corridor.

Figure 23: Sample Institutions


Kitale Conservation Centre

Moi University Kitale Cumpus

Institutions in Kapenguria

Institutions in Kapengria

Institutions at Chepareria

Institutions in Ortum

A School in Wakor Area

Institutions linked to Marich end of the project section

5.6 Socio-Cultural Profile

The Leseru – Kitale – Marich Pass road corridor have high economic potentials arising from the numerous natural resources available including forests (Kamatira forests and those on the highlands in West Pokot). These resources include land, Water, Wildlife, Livestock, Pasture, Forests, Minerals, Medicinal Plants, Solar, Wind Energy, Tourist Attractions: Scenic Sites, Eco-tourism, Escarpments, Kapenguria Museum, Turkwel Hydro-Power Plant. Thus there are many economic activities that contribute to household income and employment in the project counties. These activities include crop growing, livestock keeping (dairying and Nomadic Pastoralism), and trade. Other notable economic activities include tourism, Mining (quarrying), forestry and service provision.

Rehabilitation of the proposed road will facilitate exploitation of the resources and economic development of the area as well as linking the area to economic centers of Kapenguria, Kitale and Eldoret, to the other areas of Kenya including Nairobi, Western and Nyanza.

While Pastoralism was the way of life of the Pokots in West Pokot (and the Turkana in the neighbouring Turkana) for many years, this has changed for the last couple of decades as the people embrace modern life. Due to this change in lifestyles, the community may not be considered indigenous as per the World Banks safeguards (OP/BP 4.10 – Indigenous Peoples). However, though there are no identified cultural features along the corridor to trigger the World Bank Safeguard (OP/BP 4.11 – Physical Cultural Resources), there are limited efforts in conserving the traditional cultural history of the peoples. Notable facilities include the Kitale Museum and Kapenguria Museum (where the First President of Kenya was jailed for many years before independence.

Figure 24: The Two Main Museums

Kapenguria Museum

Kitale Museum

5.7 Economic Aspects

5.7.1 Agriculture

The agricultural sector is characterized with wide variations across the four counties owing to divergent agro ecological zones. Predominantly small scale farming is practiced while large scale farming with very high levels of external inputs is also common. In Uasin Gishu and Tran Nzoia, small scale farming subsector (0-30 acres) accounts for 75% of the total agricultural produce. Crops grown include maize, tea, coffee, horticulture and commercial businesses. The two counties are fondly referred to as the basket of Kenya for its role in food production in the country. In addition, there are a number of companies in the two counties including Kenya seed company and Western Seed Company.

In West Pokot county, Agriculture is practiced in small scale especially along the riverbanks of river Muruny. There is also subsistence farming among the residents of Kamatira forest because of the presence of Simatua Springs in the location. Indigenous fruits/foods are important sources of food, particularly during dry spells. Of the wild fruits, doum palm is the most widely used. It is used for basket and mat making while *acacia tortillas* is used for firewood and charcoal production. However, there is heavy cultivation to the west on the hills where horticulture, maize, beans and millet are grown.

Figure 25: Agricultural Features


Maize growing in Kitale Area


Small scale irrigation farming along Muruny River

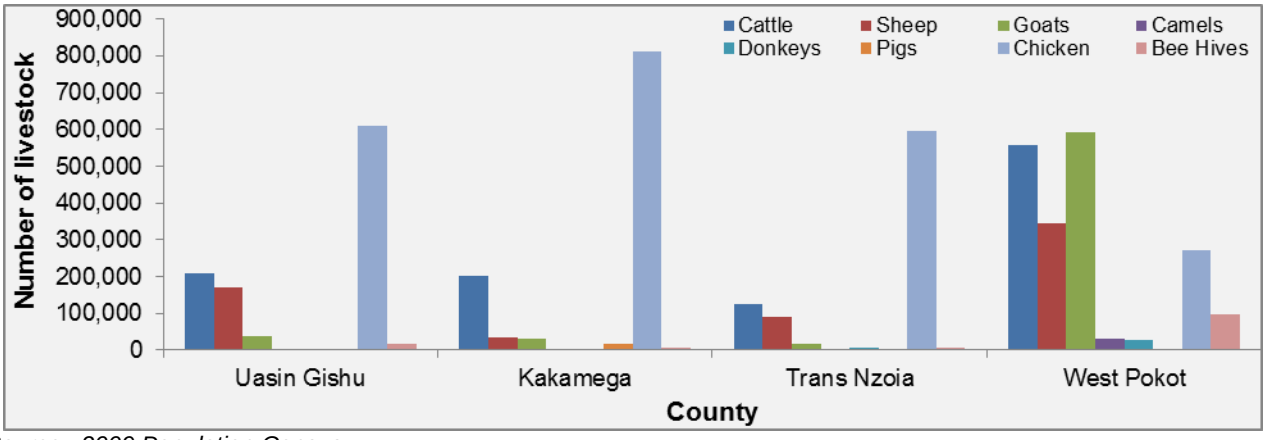

Farm Produce at Mois Bridge

5.7.2 Livestock Keeping

Livestock plays an important economic and socio – cultural role among the Pokot community. The livestock sub-sector contributes to the food and cash needs of the pastoralist and provide employment to 90% of the population of 512,690 (2009 population census). The estimated annual income from livestock in the county is KShs 1.82billion. It is also used as a medium for social exchange in the payments of bride price, fines, and gifts.

Livestock keeping dominates the economy of West Pokot county. It is the most important natural resource and supports the main livelihood system in the county. The main livestock species found in the county in order of importance are cattle, goats, sheep, donkeys, camels and poultry. There is, however, a gradual change in this order in response to population pressure, competition and availability for pasture.

Figure 26: Livestock Population in the Project Counties



Source: 2009 Population Census

The above figure illustrates that in 2009, the project counties had a total of 4,929,959 livestock of which pigs, donkeys and camels were 1% each, beehives 3%, sheep 13%, Goats 16%, cattle 22% and chicken 46%. Chicken dominated as the main livestock in the three counties of Uasin Gishu, Kakamega and Trans Nzoia while goats were the dominant animals in West Pokot closely followed by donkeys.

Figure 27: Livestock Keeping

Dairy Cows Gazing in Kitale Area

Goats Grazing at Marich Pass

Sheep on Transit (Kapenguria)

Nomadism is mainly practiced in West Pokot County where pastoralists ("cow people") move their livestock between the wet season grazing areas (plains and closer to their settlements) during and just after the rainy seasons and to the dry season grazing areas. Another form of Pastoralism is transhumance where people move with herds, but eventually return to their original settlement. In this county, wealth is measured by the number of cows one owns. Cows are used for barter, exchange, and most significantly as a form of bride wealth. A man is permitted to marry more than one woman, as long as he has sufficient number of cows to offer to her family in exchange. This is the primary way for wealth and resources to change hands in Pokot societies. Cows are rarely slaughtered for meat because they are much more valuable alive. They provide milk, butter, and cheese, which provide an important component of dietary needs

The main livestock reared consist of zebu cattle, sheep, camels, goats and poultry. The main livestock products include meat, hides, skins, eggs and honey. The growth of this sector depends on the availability of organized marketing system. The main livestock markets are Chepareria, Kitale, Nairobi, Kolowa, Turkana and Kapenguria among others.

Access to livestock markets is constrained by inadequate market information, disease outbreaks which result in the closure of livestock markets, poor infrastructure (especially roads, livestock holding grounds, and sale yards). Moreover processing facilities (milk processing plants, coolers, abattoirs, rural tanneries) are inadequate forcing farmers to sell their products with little value addition.

5.7.3 Trade and Industry

Trade, commerce and industry along the project road includes industrial processing, wholesaling, retailing, hotel and lodging/bars, petrol stations as well as transport and communications. The Major Towns along the project road are include Matunda, Soy, Moi's Bridge, Maili Saba, Kitale, Kapenguria, Chepareria and Ortum. There are also many market centres along the project route including: Soy, Matunda, Moi's Bridge, Kitale, Kapenguria, Chepareria and Ortum among the many others. The table below presents the list of markets along the project road and their approximate locations:

Table 18: Markets Along The Project Road

km	Markets
0+000	Leseru Chicken Eateries Market
5+600	Logisa Market
8+500	Soy Market
17+800	Nagili Market
19+700	Logos Market
39+100	Simaweti Market
43+700	Maili Saba Market
58+800	Kitale Town
62+400	Makunga Market
63+800	Taito Market
71+300	Kipsoen Market
75+000	Kiboswa Market
76+300	Siyoi Market
76+400	Aruba Market
78+600	Kesogon Market
98+000	Kapeguria Market
108+000	Kamatira Market
142+000	Ortum market
150+000	Muruny market
156+000	Wakor market
160+000	Chepkoing market
164+000	Marichpass market

Figure 28: Trading Features


A market day at Kesogon Market


Trading at Mois Bridge Town


Trading at Nangili Market


Roadside Kiosk near Wakor


Trading activities at Wakor Market


Trading at Ortum Market

Among the banks found in the counties include Barclays Bank, Diamond Trust Bank, Cooperative Bank, Standard Chartered Bank, Kenya Commercial Bank (K.C.B), National Bank of Kenya and Equity Bank. There are several microfinance institutions in the county including Faulu and SMEP (Small and Micro-Enterprise Programme).

There are also many supermarkets, mini supermarkets and shops in towns along the project road. Some of the most established stores include Khetia supermarkets, Suam Supermarket, Trans Mattresses supermarket, R.B Shah Supermarket and Soy Trading supermarkets, Nakumatt Supermarket and Tuskys Supermarket among others.

5.7.4 Tourism

Most outstanding places of interest include Mount Elgon National Park (Some of the wild animals found here include elephants, buffalos, black and white Columbus, giant forest hog and over 420 bird species), Saiwa Swamp National Park (game viewing and camping), Kitale Nature Conservancy and Kitale Museum (hosting varieties of traditional artifacts, home to different snakes' species and one of the largest crocodile pits in Kenya), Ndura Farm Nature Conservancy and Mount Mtelo in West Pokot County.

5.7.5 Other Economic Activities

Other economic activities in the project counties include mining where quarrying including sand harvesting, murram/gravel, excavation of building blocks and ballast and extraction of clay soil for brick making and pottery. There is brick making as well as charcoal burning and limestone reserves at Sebit where a cement factory is in the offing. A total of 29801.92 hectors is gazetted as forest with 13,183.54 hectors (44%) being under plantation, 16,618.38 hectors (56%) under indeginous

forest cover. Through rural afforestation, woodlots are scattered throughout the area. Plantations of wattle trees used in manufacture by East Africa Tanning and Extract Company have been cleared and land subdivided.779 ha of Manzini Forest was excised in 1996 for resettlement of squatters. Major forests in the region include Nabkoi, Timboroa, Kipkurere, Lurenge, Singalo and Kapsaret. The forests are managed by residents through shamba system with a total of 1158.2 ha of forest being under the same system.

5.8 Cross-Cutting Issues

5.8.1 Livelihoods and Poverty Analysis

The three main livelihoods in the County are mixed farming (food crops and livestock), mixed farming (commercial crops and livestock) and formal/casual employment. Agriculture sector comprises of livestock production, veterinary, agriculture and fisheries departments. Poverty is widespread in the project counties. The major causes of poverty are unemployment, lack of markets for the farm produce, high cost of inputs, insecurity and poor food storage facilities. High population growth rate has contributed to increasing poverty as social facilities such as health, education, transport etc have been over burdened. Poverty is highest in West Pokot (69.8%) followed by Uasin Gishu (51.3%) and Trans Nzoia (50.2%).

Figure 29: Sample Forms of Livelihood


Small Scale Trading


Building Materials Making


Sand Harvesting for Sale

5.8.2 Religious Facilities and Practices

Trans Nzoia and Uasin Gishu Counties were Historically inhabited by the Kalenjin and Bukusu people. After independence many of the farms vacated by white settlers were bought by individuals from other ethnic groups in Kenya. West Pokot county is mainly occupied by the Pokot people with minimal numbers of other tribes who are mainly crop farmers, business persons or employed.

Figure 30: Religious Facilities

Majority of those living in project Counties are Christians. The notable churches in the areas include Anglican (A.C.K.), Roman Catholic and Presbyterians. There are numerous evangelical churches among them the Deliverance, A.G.C, P.E.F.A, Full Gospel and Assemblies of God. Other faiths such as Islam and Hinduism are also professed especially in major towns. In addition, traditional believes and practices are also common in the area. The indigenous Sabaot tribe or the 'Elgon Maasai' who are traditionally pastoralists, believe that their god lived in elevated places where they couldn't reach such as on top of Mount Elgon or up in the sky. However due to influence of Christianity, education and intermarriage, most of these traditions have been replaced by modern culture, a reason why the one time pastoralists are now big farmers in the region.

5.8.3 Gender Issues

The main gender issues are contained under the customary practices where the male vests ownership and control of productive assets. Women in the counties are faced with a number of challenges including inadequate access to credit, lack of technical skills, multiplicity of roles for women and inadequate access to education and training. The tradition delineation of labour persists with women assuming the entire responsibility for childcare, provision of food, water and firewood collection and the general maintenance of the homestead among others.

5.8.4 Vulnerable Groups

People with disabilities were identified to face challenges if the road design does not provide specific facilities for this category of persons. Thus facilities to serve them should be provided adequately including rumps on footbridges as well as signboards.

5.9 Resettlement Issues

A separate full resettlement action plan review is being undertaken separately for the Leseru – Kitale – Marich Pass road and a report will be produced.

5.9.1 Areas Affected

Land acquisition and property removal will mainly occur in areas under the following categories:

(i) Market centres of Soy, Matunda, Mois Bridge, Kitale, and Kapeguria among others mainly due to encroachment especially by informal enterprises where structures will have to be cleared thereby affecting livelihoods of the PAPs. Those to be affected will include hawkers, tree nursery operators, hawkers, partial daylight business persons
(ii) Crops and live fences mainly planted on the road reserve including nippier grass and maize;

5.9.2 The Project Affected Persons

Two categories of people will be affected, these are:

(i) Land owners whose land will be acquired for the proposed road realignment at Kitale, and
(ii) Residents (owners of structures and those operating in the structures) who have encroached on the road reserve.

All the parties will be compensated before the project commences.

Chapter 6: Supplementary Stakeholder and Public Consultations

6.1 Overview

It is a Government policy that beneficiaries and members of the public living near new or improvement project sites (both public and private) are consulted to seek their views and opinions regarding the projects before they are implemented. Consultative Public Participation is therefore an important process in ESIA studies. Through this process, stakeholders have an opportunity to contribute to the overall project design by making recommendations and raising concerns. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation of the project.

6.2 Consultation and Public Participation

Initial Stakeholders Consultations had been undertaken during the initial ESIA Study process as well as the Resettlement Action Plan (details in the Initial ESIA Study Report). The review and ESIA update process designed a forum to verify the findings and capture additional opinions through a supplementary stakeholder consultation arrangement. The supplementary consultation was carried out in two phases namely general interviews followed by sample meetings at 2No. venues along the corridor where meetings were arranged with the support of the County Administrative Officials. The supplementary consultations were conducted with key informants including the County Government and National Government Coordinators (the County and deputy Commissioners, Chiefs and Assistant Chiefs), as well as GoK heads of departments (NEMA and agriculture), civil society, CBOs, farmers, land owners and traders along the road corridor.

The interviews were used as a tool for stakeholder identification and mobilization as well as collection of baseline data and information. In addition, it provided an opportunity to the participants to raise their fears and concerns and make recommendations as pertains to the project road. The persons consulted during the project review activities are presented in the annex.

6.3 Supplementary Stakeholder and Public Consultations

A total of five secondary public/stakeholder participation meetings were held along the project road between 12th and 15th January 2015. The venues of these meetings including dates is presented in the following table while detailed minutes of the proceedings are annexed to this report:

Table 19: Supplementary Stakeholder Venues and Levels of Participation

Location	Date	Venue	Number of participants		
			Male	Female	Total
Leseru	15th January 2015 (2.00 pm)	Leseru village chairman's office – Leseru market	6	8	14
Matunda	13th January 2015 (12.00 pm)	Matunda market committee office, Matunda market	7	6	13
Bartei	14th January 2015 (2.00 pm)	Bartei chief's office, Ortum market	7	0	7
Likuyani	12th January 2015 (12.00 pm)	Soy market	6	0	6
Kipsaina	13th January 2015 (4.00 pm)	Kipsaina market	15	2	17

The following depicts participation levels in each of the CPP meetings on pictorial basis.

Figure 31: Supplementary Stakeholder Meetings


Leseru meeting In the village chairman's office


Matunda Meeting In the executive committee office


Matunda – field discussions to the proposed market site and link roads


Ortum Meeting

6.3.1 Key Fears and Concerns

(i) There are fears associated with potential blasting activities at the material sites and other earth works.
(ii) The stakeholders were concerned if their input will genuinely be taken into account in the project implementation.
(iii) Social and moral interactions, especially with respect to potential influence to the local women with money during construction (construction workers) and use from truck operators,
(iv) Uncertain on the security trends during construction and post construction period.
(v) No clear established mechanisms through which concerns can be channeled and inadequate knowledge of to whom arising issues should be addressed.
(vi) Increase in gully erosion and failure to undertake land scrapping
(vii) Concern on proper civic education to the communities and stakeholders during the construction and post-construction phases for effective participation and ownership,
(viii) Potential displacement of people and destruction of structures and farm products from the road expansion. Call for full compensation of the affected people along the road corridor
(ix) Concern on the level of supervision to ensure compliance and integration of the peoples interests during the construction.
(x) People wondering whether institutions along the road corridor will be provided with link access roads to the main highway.
(xi) Possibility of construction materials residuals in the construction of public institutions along the road including schools, churches and public halls.

6.3.2 Recommendations

Road Construction Standards

The road should provide for adequate bus bays that can accommodate at least four 14-seater vehicles. The road should be constructed to international standards with appropriate materials to avoid rapid deterioration like witnessed before. The road should be expanded to ease movement of high capacity goods vehicles and avoid accidents especially where there are sharp corners and on bridges. Adequate drainage and culverts to be provided especially at access passages to roadside institutions and homesteads

Safety and Security
The project construction should ensure appropriate road safety provisions and furniture including:

(i) Traffic signs on the road sides showing where livestock crossing ramps and pedestrian crossings.
(ii) Provide speed controls on the pavement where necessary, especially near market centres and near institutions,
(iii) High light masts for security in market centres
(iv) Appropriate road markings including zebra crossings, bridges approaches, climbing lanes and speed bumps, especially at road high safety risk spots,
(v) Create adequate bus bays at appropriate locations
(vi) Provide appropriately sized drainage culverts
(vii) Design good and appropriately sized quality in junctions taking into considerations the local needs.

There is need to enhance security during and after road construction through mobile police patrols and strengthening of community policing in Leseru market junction and Kamatira Forest among others.

Employment and utilization of locally available resources
Involve and engage locals providing them in available employment opportunities. Preference should be given to the PAPs, IDPs (e.g. in Leseru Market) and the vulnerable persons (widows and physically challenged) as well as formally organized (e.g. environmental) groups along the road as sub-contractors. Construction materials should be sourced locally and where possible local businesses provided opportunities to supply materials.

Secondary Roads and other associated infrastructures
The road construction should consider providing tarmac to connect to the adjoining roads leading to public institutions notably Likuyani and Ortum chief's /AP camp, Matunda District hospital and open air market and Chepareria DO's offices among others.

(i) Homesteads next to the road should be provided with culverts
(ii) Before construction let there be the road in use beside the main road since we are excelled to services for Kenyans around.
(iii) Undertake public and stakeholder consultations just before and during construction.
(iv) Compensate the displaced businesses.

6.3.3 KeNHAs Response

The Kenya National Highways Authority (KeNHA) representative in the consultation forums responded as follows;

(i) The Project Affected Persons (PAPs) will be compensated through a clear process defined through a Resettlement Action Plan (RAP) prepared alongside this ESIA process
(ii) It is the desire of KeNHA that the local communities along the road corridor are involved during the construction and also be provided with opportunities during use for high ownership,
(iii) All aspects of the road construction will be undertaken as per the design guidelines established under the local and international standards
(iv) A Project Community Liaison Committees will be established for peoples participation.

Chapter 7: Anticipated Impacts and Mitigation Measures

7.1 General Impacts

The overall impact of the rehabilitation project was focused on facilitating traffic movement for the local and transit traffic. Social and economic linkages including accessibility to settlements, public services, institutional growth, security management and delivery of farm inputs and produce are among the key benefits associated with the new road. Employment opportunities and income generation for the local communities were singled out as of major interest during the construction period and use of the road thereafter. On the other hand, efficient transportation of goods and people as part of the Northern Corridor to Northern Kenya and the neighbouring states has been the major justification for the project implementation.

7.2 Positive Impacts

Rehabilitation of the Lesseru – Kitale – Marich Pass – Lodwar – Nandapal road will have an overall benefit to the local social and economic activities, the northern parts of Kenya and the neighblouring countries (Southern Sudan, Ethiopia and Northern Uganda through efficient transit of goods and people. Efficient traffic movement will directly have a direct benefit to the environment (including climate change aspects through emissions reduction) especially through major urban areas such as Mois Bridge, Kitale and Makutano towns. Specific positive impacts of the proposed road improvement project will need to be enhanced. Specific positive impacts associated with the project include the following;

7.2.1 Environmental Benefits

(i) There is a certain level of noise and vibration associated with heavy transit trucks nd other vehicles to the recipients along the corridor that is associated with the nature and conditions of the road. Steep slopes, uneven road surfaces, low speed and location of public service stops are among the factors contributing to elevated noise levels. This will be eliminated with revised design interventions.

(ii) Roadside drainage has a number of challenges to the environment including among others;
- ✓ Transport of road related pollutants to the receiving water bodies,
- ✓ Soil erosion at poorly designed outfalls,
- ✓ Risk to road safety from inappropriately integrated drains

The rehabilitation of the road conditions is expected to address and integrate the roadside drainage systems,

(iii) Like noise, the design speed, nature and conditions of the road as well as traffic volumes are among factors that contribute to the levels of emissions along the road corridor. This aspect will be controlled through the rehabilitation intervention.

7.2.2 Social and Economic Gains

The Northern Corridor Transport Improvement Project (NCTIP) is part of the desired economic infrastructure towards the realization of the Kenya Vision 2030 through improved transportation and movement of people and goods locally and transit to the neighbouring countries. Rehabilitation of the road also has the potential to enhance appreciation socio-economic wellbeing along the corridor and the immediate areas including land use, urban development and industrial opportunities. Other economic benefits will be;

(i) Social benefits associated with the road construction phase will commence during the construction among them being;
- ✓ Employment opportunities, especially for unskilled labour,
- ✓ Supply of construction materials (gravel and hard stone)
- ✓ Demand for essential supplies including food and shelter from the local markets
- ✓ Improvement of life for some families through land acquisition proceeds (where necessary),
- ✓ Income to some families from lease of land for construction camp sites and other construction activities

(ii) Social benefits upon commissioning of the road will be far reaching such as to touch on the immediate riparian landowners as well as the hinterland and the major links. Among these will include;
- ✓ Opening up of the corridor will attract commercial and institutional developers due to easy accessibility. In addition to creating more spatial provisions for people movement, improved environmental quality, enhanced safety and security especially in West Pokot County. However, land use along the corridor will need to be integrated with land use planning aspects,
- ✓ Road safety is a key element in transportation network review. For this reason, black spots prone with frequent accidents, sections traversing markets and institutional frontages as well as areas with intensive livestock crossings will be secured,
- ✓ There will be time saving that could be devoted to other productive activities as jams will be eliminated and high vehicle speeds maintained. Also, there will be faster and efficient movement of goods and services
- ✓ Reduced high rate of depreciation of vehicles and therefore vehicle maintenance costs. This may induce more vehicles to operate through the road and also reduce the cost of travel.

7.2.3 Livelihoods Integration

The construction works will contribute towards poverty reduction in the affected areas through increased disposable incomes realized from the following;

(i) Employment of skilled and unskilled local labour. The estimated number of employment opportunities would be 3,000 – 4,500 through the project implementation period
(ii) Spending by the road contractor(s) as well as road users on purchase of supplies (consumables and road construction materials, e.g. gravel, etc.),
(iii) Accommodation services for the construction workers,
(iv) Lease of land for construction camp sites and other activities will also be beneficial to the local communities,

Upon completion of the road rehabilitation, the benefits envisaged include travel time reduction (including enhanced value of time from efficient movement), security management along the prone areas and easy accessibility and movement by the communities living along the corridor,

7.2.4 Social Transport Utilities

It is anticipated that the road rehabilitation will integrate Non-Motorized Transport (NMT) components and other social utilities associated with transportation especially along the urban centers and other high population zones traversed by the project. The components will be integrated to enhance safety of the pedestrians and other road users such as to include foot paths,

cycle tracks, bus bays and safe pedestrian crossings (crossing rumps, overpasses and underpasses, etc.). Other interventions along with this will include;

(i) Service road loops around the towns to the extent possible an added benefit to the local residents accessing the highway, markets, public services and other commercial facilities around the towns,
(ii) Identified parking yards at strategic locations for use as rest places by truck drivers and other motorists. Such facilities will also attract people and so need for appropriate foot paths and cycle tracks,
(iii) With intensive livestock keeping in West Pokot County and the pastoralist lifestyles, it will be necessary to identify appropriate locations for provision of safe livestock crossing rumps towards watering points and/or grazing areas,
(iv) Safety of part of NMT and so where the provisions are provided, appropriate lighting street lighting and flood lighting) will also be provided.

7.2.5 Drainage Outfalls

The road has significant drainage challenges due to blockage of natural drainage channels by agricultural and settlement activities, damages of existing drainage and culverts by excessive surface runoff and siltation. This is a potential challenge to the rehabilitated road corridor as well as the riparian landowners and development. Storm water generated from the road surface will need to be properly channeled into appropriately designed drainage channels and culverts to discharge into the nearest surface water bodies. This action will also assist in reducing the notable damages to ground on the lower sides of the road that arise from high hydraulic force. Interventions through the road project will provide clear and well designed drainage outfalls at appropriate locations to not only serve the new road reserve but also ensure nil or minimal interference with downstream social, economic and even ecological features.

7.2.6 Other Benefits

(i) Through social responsibility arrangements, the project will expected to intervene on social facilities including schools, health centers and water supplies. This will be in addition to the provision of wellness centers at pre-determined locations.
(ii) While it is expected that the Community Liaison Committees will identify appropriate facilities for improvement, the following areas may be considered improve structural and equipment at health centers, provide access roads to schools, nearby markets and health centers within 2km from the road,
(iii) Proposed wellness centers will be located at the proposed parking areas and be constructed of permanent structures to serve the communities and road users long after the construction is completed. However, the parking areas are to be identified by the respective County Governments,
(iv) Public parking areas could be integrated into the existing market centers to avoid introducing additional market centres considering the associated challenges. These should include appropriate access roads from the main highway, lighting and drainage. Beneficiaries will include local residents and the local traders,
(v) In collaboration with the communities, needy educational facilities could be supported. These will include additional classrooms, libraries, laboratories, power connections, water and sanitation. It is the residents to identify the facilities and the needs,

7.2.7 Climate Change Mitigation

It is commonly known that as traffic congestion increases, CO_2 emissions (and in parallel, fuel consumption) also increase. In general, CO_2 emissions and fuel consumption are very sensitive to the type of driving that occurs. When average speeds are very low, vehicles experience frequent acceleration/deceleration events. Therefore, grams per mile emission rates are quite high. In fact, when a car is not moving, a distance-normalized emission rate reaches infinity. Conversely, when vehicles travel at higher speeds, they experience higher engine load requirements and, therefore, have higher CO_2 emission rates.

The two key pollutants leading to the highest cost in terms of damage to human health in urban areas of developing countries are particulate matter and lead. It would be of value to break down the particulate matter into that smaller than 10 microns in diameter (PM_{10}) and that smaller than 2.5 microns in diameter ($PM_{2.5}$), rather than quantifying the total mass of particulate matter emitted, as these very fine particles are known to have a bigger impact on health than larger soot particles. The emission of lead from vehicles run on leaded petrol is a very significant problem in many developing countries. Lead damages the mental abilities of children, and causes other health problems. Leaded petrol is believed to account for 90% of all lead emissions to the atmosphere in many cities of the developing world.

Transport related emissions along the corridor have not been undertaken under this exercise. However, it is anticipated to be relatively low due to the high vehicular speeds, high dispersal rates and high vegetation cover. It is, however, recommended that a long term data generation be initiated such as to build a platform for climate change modeling.

7.3 Specific Negative Impacts

Negative impacts associated with the road project have been identified and mitigation measures established to ensure the project sustainability, not only for the short term but also on the long term. The impacts have been clustered into construction and road use such as to cover environmental (environmental pollution, water resources degradation, air quality, ground cover, land destruction, drainage management, waste management, etc.), social (health and safety, displacements, access to services and amenities, noise and vibrations, air quality, transportation efficiency, etc.), economic (access to markets, transport costs, appreciation of assets, land use developments, etc.) and cultural issues. The impacts associated with the project implementation are expected from the construction phase such as to include:

(i) Environmental pollution from emissions (aerial and dust) into the air from work areas and construction equipment,
(ii) Damages to land and soil arising from materials extraction, spoil disposal, waste disposal from camp sites and work areas as well as disposal of used oil and grease
(iii) Loss of vegetation from material sites as well as limited removal from the road corridor,
(iv) Noise and vibrations to the neighbouring premises arising from construction equipment, deviated traffic and other sources,
(v) Social related diseases including HIV/AIDS and other communicable diseases,
(vi) Social and economic disruptions during the construction phase involving business facilities, informal livelihoods activities, dwellings and social amenities,
(vii) Conflicts on access roads arising from deviated traffic during the construction phase and may include congestion, potential accidents, damages to the road following increased traffic loadings,

(viii) Safety aspects associated with the road usage upon completion, especially in the high populated areas.

The matrix below presents the detailed impacts and associated mitigation measures.

Table 20: Impact – Mitigation Matrix (Construction Phase)

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
Land Degradation and Soil Loss	✓ Removal of top soils at material sites (normally rich in nutrients and organic matter) and vegetation cover to give way to appropriate road foundation. ✓ Effects to land from establishment of construction camp sites ✓ Land degradation at construction material sources (sand, gravel and hard stone quarries) and construction camps from pollutant deposition and top soil disruption, ✓ Degradation of land from disposal/dumping of spoil and other construction wastes (debris and old asphalt concrete debris as well as scrap arising from existing road)	potential coincidence with other road construction projects (Webuye – Kitale (A1) road works are the immediate case). There are no notable other road works to create impact cumulative conditions)	Gravel borrow areas to be identified by the Contractor(s). Identified sites for construction camp sites,	✓ Comprehensive environment impact assessment study shall be undertaken for all construction camp sites and approved by NEMA before commencement, ✓ Construction wastes (including spoil earth, oils/grease, vegetation and other materials) be disposed off in approved dumping areas, ✓ Prepare environmental management and rehabilitation plan for construction camp sites as well as the materials extraction sites, ✓ Construction camps and materials sites be restored back to their original conditions upon project completion, ✓ Minimize disturbance of wetlands systems during materials extractions (if any is affected)
Air Quality	✓ Emissions from excavations and earth moving activities, construction truck movements (dust), construction machinery and vehicle engines (hydrocarbons, CO_2, NOx, SOx and Particulate Matter). ✓ Emissions from material sites from associated machinery exhaust emissions and dust into the neighbouring areas, ✓ Dust and emissions from materials transit trucks,	✓ Continuous deposition of dust through construction period. ✓ Continuous health risks to the residents through construction period	Construction sections Materials sources and surroundings Materials transit routes Materials batching plants and camp areas	✓ Ensure constant watering of construction sections and dry materials piles to keep dust low throughout the project areas, ✓ Similar measures will be necessary at the material sites as well as the access road for the delivery trucks, ✓ Maintain construction machinery and vehicles at reasonable state of service to minimize unnecessary exhaust emission into the atmosphere.

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	✓ Vehicular emissions from transit traffic during construction, ✓ Dust emissions from materials batching plants			
Noise and vibrations	✓ Potential disturbance to residential, commercial and institutional premises along the proposed corridor, especially along market and urban centers, ✓ Noise and vibrations caused by heavy construction machinery could potentially cause damage to buildings along the construction areas, ✓ Vibrations from blasting at quarry sites has effects to building structures, ✓ Non-compliance with the elevated noise and vibrations regulations is a likely health risk to the immediate residents or business communities. ✓ Non-observance with the occupational health and safety to the construction workers.	✓ Potential damages during the construction phase may be enhanced during the road use ✓ Continued exposure to noise for long periods may permanently destroy hearing capacity of the workers	Focus on market centers and urban areas Housing and institutional premises within the immediate reach of the road Quarry sites surroundings (Contractor to identify sites)	✓ Inform the neighboring communities of any un-usual construction activities with extraordinary noise levels such as to include timing, expected duration and any safety precautions required, ✓ Undertake structural integrity assessment of existing structures along the road as control for damages from vibrations during construction (this will be necessary for market and urban centers), ✓ Utilize low noise machinery for the construction to the extent possible (Noise levels to be below 35dBA to the nearest receptors by day). ✓ Limited blasting for the earth works and at hard stone quarries shall only be done after approval by the relevant authorities and also effective public information. ✓ Provide all construction workers with relevant safety gear including ear corks at all times while at work and enforce application. ✓ Working at night within settled and built-up areas will be upon issuance of necessary permits from the National Environment Management Authority (NEMA).
Drainage	✓ Disruptions of settlements and land use features during development of drainage outfalls,	Accumulated disruptions of the road drainage	Entire road corridor is faced with serious drainage challenges	✓ Integrate drainage system in the overall road planning and construction such as to discharge into the nearest natural water

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	✓ Adequate drainage system and outfalls will require land and perhaps deep cuts to provide for effective runoff flow, ✓ The corridor is endowed with numerous wetlands, some with ecological values, ✓ Potential alteration of the drainage network through obstruction, diversion and culverts construction	during the construction and changing land use along the corridor thereafter will be significant	Special focus on Kamatira Forest and sections of West Pokot County	courses, ✓ Harmonize drainage with all point sources of surface runoff and the pavement surface structure, ✓ All culverts be designed on the basis of hydrological studies such to carry peak runoff. ✓ Drainage outfalls should not be directed into private land or premises. ✓ Ensure protection of soil adjacent to the side drains and the constructed drainage
Topography and Physiology	✓ Aesthetic localized changes to areas in immediate neighbourhood of materials sites (gravel and hard stone quarry sites) and to the immediate landowners who may have developed an attachment with the physiographic conditions to the surroundings, ✓ There are potential deep cuts to allow acceptable geometrics of the road effectively change micro-topographical conditions, ✓ There are potential effects to the current micro-hydrological characteristics (surface flows) that will get disrupted, ✓ Elevated or sunken road sections are likely to affect accesses into premises and other junctions.	–	Steep slopes across main river basins, Terrain towards Makutano town Realigned sections in Kamatira Forest Various sections between Ortum and Marich Pass	✓ Material sites should be rehabilitated and restored to near the original status as soon as they are exhausted to restore the micro-topographical outlook. ✓ Road sections with significant cuttings should be done such as not to lose compatibility with the adjoining land areas. ✓ Road sections with cuts and fills be landscaped appropriately, ✓ Any raised structures should be attractive and easy to use by the road users, e.g. foot bridges.
Surface water sources	✓ Siltation of rivers, streams and wetlands from earth works for bridges and culverts, ✓ There is potential damages of water	Potential damages to surface water bodies including	All rivers crossing the road corridor Kipsaina Wetland,	✓ Protect the main surface water sources from destruction and excessive earth discharge during construction.

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	sources (wetlands and streams) by the abstraction practices for construction activities. ✓ Potential contamination of water sources from oil spills from machinery and leaching from the contractor waste disposal sites ✓ Increased turbidity and sedimentation of the water sources	wetlands and streams during the construction. Cumulative impacts associated with potential changes in land use, especially in market and urban centers where population may increase.	Riverine wetland sections of Muruny River	✓ Allow regeneration of vegetation on affected wetlands and streams. ✓ Water for construction abstracted from any surface water source should be upon issuance of a water abstraction permit from Water Resources Management Authority (WRMA) upon application, ✓ No discharge of pollutants from any point of the construction activities shall be discharged into the rivers or streams. ✓ Any interference with the water bodies shall be sanctioned by the Water Resources Management Authority (WRMA) upon application. ✓ Camp sites, waste disposal and spoil dumping areas should be located away from the surface water sources.
Biodiversity (Forest and Aquatic Systems) ✓ Kipsaina & Saiwa Wetland ✓ Kamatira Forest	✓ Loss of vegetation cover (mainly indigenous trees, shrubs and grasses) ✓ Disruption of associated ecological components (life forms – flora and fauna), etc.), ✓ Loss of organic matter deposits, ✓ There is no physical removal of wetland areas, but interference through siltation and pollution could be significant	Re-aligned and the existing sections will have an overall cumulative impact on biodiversity in Kamatira forest. Construction works will potentially add on the existing quality challenges facing the wetlands.	Kipsaina wetland (linking to Saiwa Wetland) Kamatira Forest West Pokot Hills slopes	✓ Establish the overall land areas required for the clearance (incl. road reserve, working space and drainage outfalls) for tree count and biomass quantification. Collaboration with KFS and KWS for degazettement of the sections, ✓ Maintain a record of trees removed (indigenous and exotic species) for necessary compensation upon project completion, ✓ Consider converting the current alignment into a vegetation cover as part of the compensation initiatives, ✓ Appropriate drainage provisions for the new alignment and compatible to the

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
				natural slopes ✓ Appropriate restoration – re-vegetation, berming the road reserve, drainage, etc. ✓ Avoid direct physical interference with wetland systems, and particularly Kipsaina Wetland that has a link with the conserved Saiwa Wetland. Provide retention measures for pollutants and silt into the wetland system, ✓ Influence other authorities (incl. KFS and the County Government of West Pokot in conservation of forests along the corridor,
Material Sites	✓ Removal of vegetation cover and top soils affects the soil quality at materials sources. ✓ Potential elevated noise emanating from materials extraction activities and delivery trucks to the residents along the routes, ✓ Vibrations from the blasts and crushing at the quarry site(s) has a potential to cause damage to building structures, ✓ Possible over-abstraction of water for construction from public sources of water could compromise on availability of the same for basic social and ecological needs. ✓ Emission of dust and gaseous discharges from material extraction activities creating potential aesthetic pollution, air pollution and risks to health. ✓ Potential health and safety problems to	▪ Cumulative effects to be felt on access roads used for delivery of materials to construction areas ▪ Multiplicity of impacts (land degradation, vegetation loss, soil erosion, dust emission, noise and vibration, health and safety, etc.) are an indication of potential cumulative impacts.	Quarry sites and gravel borrow areas will be identified by the Contractor(s) Muruny River and its tributaries are faced with serious damages from sand harvesting. Limited sand harvesting observed in Nzoia river.	✓ Environmental impact assessments (EIA) to be undertaken prior to extraction of materials from identified sites and approved by NEMA, ✓ Operations of the materials sites to be guided by respective management plans established and approved under the ESIA, ✓ Material extractions and delivery should only be done during the day, ✓ If borrow pits and quarries are operated by the Contractor(s), they be fenced off for safety of the neighbouring residents, ✓ Rehabilitation of materials sites to take place upon exhaustion (Contractors will provide appropriate rehabilitation plans for each material site and will not demobilize until restoration is complete). ✓ Material extraction should be done in dump conditions to keep dust low,

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	the local communities, children and their animals from borrow areas left open. ✓ Sources of sand have potential risks to damage the river beds,. ✓ Discharge hydrocarbons to water sources through storm water drains or infiltration into the ground from oil storage areas in camp sites.	▪ Other users of same materials (gravel, hard stone and sand increases demand on the sources.		especially if it is located within settled areas. ✓ Consider establishment of boreholes to provide construction water as opposed to abstraction from the constraint surface water sources. ✓ Oil storage areas should be slabbed and provided with oil interceptors and clean exit drains from the camp sites and oil storage yards. ✓ Obtain water permit for the identified abstraction point for the construction water. ✓ Ensure adequate provision of personal protective equipment (dust mask, ear plugs) and sensitization on use.
Social Impacts	✓ Potential risks to safety of the road users (mainly during construction phases resulting from behavioral changes, low level of information and inadequate signage). ✓ Dust emissions with potential effects to public health, comfort in work places and residential areas, poor visibility and general aesthetic pollution to the residents, ✓ Social nuisance from dust and emissions as well as noise and vibrations, ✓ Temporary but limited disruption of public amenities and services along the road corridor during construction such as to include public water sources, water	The construction works will increase localized trucks to the existing transit vehicles, hence higher safety risks.	The road project implementation adds into other ongoing projects in terms of social impacts such as employment, income generation and environmental degradation.	✓ Appropriate and adequate awareness creation and social engineering to all stakeholders, especially residents will need to be undertaken. ✓ Signage and information in all public areas on the road corridor will need to be erected during construction including deviations, barriers, hazards, etc.. ✓ There should be continuous watering of the road during construction to control dust, ✓ Dust masks and first aid kits should be provided to the construction workers, ✓ Construction during the nights should be limited,

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	pipelines, power lines, telephone lines and drainage systems, ✓ Risks to security of motorists, especially at night along the deviation routes during construction, ✓ Possible interference with the normal travel times and convenience Possible interference with the normal travel times and convenience as construction activities will lead to creation of jam along the diversions, ✓ Potential conflicts on employment opportunities may arise between the contractor and the local community, ✓ Opportunities for materials supply form local business people, ✓ Demolition of structures resulting to displacement of businesses and institutions such as schools as well as eviction of stall operators along the road reserve. This may lead to loss of livelihoods as well as employment opportunities and therefore decline in incomes for those displaced			✓ Inform the public on unusual emissions and/or noise/vibrations for necessary precautions, ✓ Provide motorable deviation routes that are accessible and usable during construction, ✓ Provide alternative accesses across the construction areas to residential and social facilities, ✓ There should be public announcements as to when and where key public amenities are to be affected (e.g. bridges). ✓ In addition, the relocation of public amenities and services along the road corridors need to be done timely and speedily. ✓ Local community should be given first priority for employment and consider all genders,
Safety	✓ Effects of construction dust and gaseous on public health, ✓ Potential risks to safety on access roads from trucks transporting construction materials to the road sections, ✓ Potential safety risks of the construction workers (injuries from equipment, snake bites, hazardous insect stings, etc.)	Inadequate provision of safety provisions during construction could get enhanced during the road use	✓ Quarry sites ✓ Borrow areas ✓ Deviation routes ✓ construction work areas	✓ Ensure continuous watering of work areas to prevent dust emissions, ✓ Ensure driving discipline among the drivers and other construction workers with respect to the public safety, ✓ Equip workers with PPE and enforce application of the same. Best practices also be observation on safety risk

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	✓ Risks to pedestrians moving within the road corridor during the works (pedestrian – traffic conflicts, slips and falls into drains and embankments, etc.). ✓ Risks of public safety from active or abandoned materials sites (e.g. quarry sites), ✓ Risk of fire accidents at construction camp sites ✓ Potential accidents along deviation routes, especially at night,			mitigations, ✓ Enhance information and appropriate signage at all time along deviations and work areas, ✓ Ensure Occupational Health and Safety (OHS) requirements are observed at all times during the construction, ✓ Identify appropriate locations for installation of cattle and pedestrian crossings as part of the road project (footbridges, underpasses, crossing rumps, etc.), ✓ Provision of fences around the quarry and camp site areas, ✓ Provision of fire extinguishers to fuel storage areas especially at the camp site, ✓ Install appropriate information signage in all deviation routes showing direction, barriers and risk warnings,.
Health	✓ Potential ponding from disrupted drainage system leading to and hence attracting vectors breeding (e.g. mosquitoes), ✓ Potential health risks from sanitation and hygiene challenges in camp sites, ✓ HIV/AIDS prevalence that may arise from interaction of the workers and the local communities ✓ Potential increase on cases of other communicable diseases (STIs, TB, etc.),	HIV/AIDS, STIs, TB and eye infections, malaria could have long term effects during and after the construction phase	Camp sites Work areas	✓ Facilitate flow of surface runoff along the project road to avoid unnecessary flooding, ✓ Provide wellness centres along the pre-identified locations along the road corridor ✓ The Contractor to engage immediately appropriate HIV/AIDs expert for awareness, prevention and training activities ✓ Provide acceptable sanitation facilities in all work areas,

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	✓ Public health problems associated with dust emissions (eye problems, bronchitis, etc.).			✓ Establish emergency medical action for the workers during construction period.
Traffic Management including traffic deviations	✓ Potential conflicts with people movements along the deviation routes (mainly residents), ✓ Degradation of access passages abutting from the Road serving the adjacent residents, ✓ Risks to safety of the users from materials delivery trucks on the abutting access roads into the residents.	_	All project corridor (especially active work sections and through market and urban centers)	✓ Avoid to the extent possible deviating traffic into the private land to minimize conflicts (confine deviations within the road corridor to the extent possible), ✓ Affected deviation roads should be maintained well for the period of construction. ✓ Appropriate signage and information be provided at all the deviations.
Waste Management	✓ Potential degradation of land and physical environment at spoil disposal sites, ✓ Aesthetic degradation at spoil disposal sites. ✓ Potential damages to water sources (rivers, streams and wetlands from), ✓ Dumping of associated solid wastes should be on approved public disposal sites.	Disposal of spoil and other waste materials have a long term effects to the affected locations	✓ Camp sites ✓ Spoil from work areas ✓ Materials batching plant yards	✓ Spoil generated be disposed off on pre-identified and approved locations (impact assessment should be completed for the locations). ✓ Involve the local residents on the removal and disposal of the spoil and solid wastes to approved dumping areas. ✓ Camp sites shall be provided with appropriate solid waste holding receptacles to be regularly emptied for disposal. ✓ Construction camp management to provide an inventory of waste and an acceptable waste management plan.
Economic Aspects	✓ Temporary disruption of access to residential and commercial centers along the road during the construction phase. ✓ Temporary disruption and displacement of small-scale informal traders along sections of the road corridor through	_	Market and urban centers	✓ Enhance facilitated accessibility into premises whenever need arises. ✓ Provide liaison person with landowners on timing and approach directions for effective flow of general traffic at all times.

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	markets and urban centers during construction. ✓ Temporary and permanent disruption of agricultural land and livestock grazing areas, ✓ Temporary disruption and inconveniences on transit goods and people.			✓ Make provisions for small-scale traders along the road corridor as part of the long terms physical planning of the area.
Displacement Issues	✓ Challenges on adequacy of information on landownership. ✓ Potential disaffection from PAPs. ✓ Inadequate or delayed compensation to the PAPs. ✓ Potential resistance from those encroaching road reserves.	Effects could long term into the project implementation	Areas identified under the RAP Report.	✓ Complete the RAP report and verify provisions therein in collaboration with key stakeholders. ✓ Undertake comprehensive compensation process and ensure compensation before commencement of the project works. ✓ Ensure livelihoods restorations where disrupted, ✓ Institute legal provisions for acquisition of encroached road reserve.

Table 21: Impact – Mitigation Matrix (Post-Construction)

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
Road Safety and Public Health	✓ Potential increased traffic related accidents, injuries and deaths over time as vehicular volume and speed increases. ✓ Potential high noise and vibration levels to the riparian residents with more traffic and higher speed ✓ Increased emissions (vehicular emissions).	Every safety and health incidence associated with the road use goes into record	There is likely to be an exponential increase in accidents, noise and emissions over time with increasing vehicular traffic volumes and improved speeds. Main Centres – Mois Bridge, Kitale and Makutano	✓ Provide speed controls (speed control measures, information and law enforcement), especially at high population areas. ✓ Ensure NMT facilities in the market and urban centers are secured from vehicular encroachment and clear at all times. ✓ Provide foot bridges OR underpasses at high population areas as appropriate (key market and urban centres. ✓ Display appropriate road signage/information and enforce compliance with requirements. ✓ Enhance compliance plans for public transport vehicles plying the routes. ✓ Encourage road safety campaigns to create awareness on road safety, ✓ Sensitize landowners on appropriate land use practices and compatible development structures. ✓ Integrate compliance in vehicular maintenance into the national regulations.
Land Use Changes	✓ Potential unplanned developments along the corridors attracts by easy transportation. ✓ Increased demand for residential, schools, recreation facilities and health facilities effects on public resources.	Land use changes is a long term aspect to be continuously addressed		✓ Involve the respective County Governments and the Physical Planning Departments in appropriate land use planning regulations along the corridors, ✓ Influence appropriate land use planning in view of future traffic management aspects,

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	✓ Potential increase in traffic flow and categories into the road corridor.			
Aesthetic Conditions	✓ Challenges in visual beauty of the road corridors. ✓ Local weather moderation including heat and wind drought along the road reserve ✓ Lack of dust and emission control.	Aesthetic conditions varies with road age and use over time unless constant attention	Al road sections	✓ Design and implement appropriate landscaping plan for all sections of the project road, especially through market and urban centers. ✓ Influence developments along the corridor to uphold acceptable beauty and cleanliness.
Rivers, streams and wetland crossings	✓ Potential excessive solid loading into the bridges and culverts during heavy rains. ✓ Potential damages to the bridges and culverts from heavy flows.	Extent of water sources degradation increases with time of road use	All rivers, streams and wetlands	✓ Maintain the bridge rails at all times. ✓ Ensure clear flow channels of the rivers and streams at all times.
Biodiversity Integration (Wetlands and Kamatira Forest)	✓ Increased transport related pollutants into the wetlands and Kamatira forest, ✓ Safety and security of road users in the forested section (wildlife and criminals), ✓ Ecological damages from drainage outfalls	combined effects of the existing and new road pavements to have a higher overall drainage impacts	Realigned section of Kamatira forest	✓ Provide adequate drainage systems with sizeable outfalls to contain runoff (including the springs outputs) into Kamatira river, ✓ Install warning signs for road users on potential dangers from wildlife and criminals, ✓ Establish strategic view points for road users with solid waste collection to influence appropriate droppings by road users,
Drainage Management	✓ Outfalls potentially discharges into private land. ✓ Potential erosion of the road shoulders and adjacent sections. ✓ Potential pollution transport to the water bodies. ✓ Risks to safety of the road users,	With potential increasing commercial, institutional and residential land use, generation of surface run-off will also continuously increase		✓ Ensure no drainage outfall leads into private property. ✓ Develop a policy for the roads regard drainage outfall management, e.g. acquisition of the outfalls. ✓ KeNHA to develop a policy guidance for the project on securing natural drainage outfalls without significant land use

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	particularly the riparian landowners. ✓ Washing of trucks and other vehicles along the roadside and road reserve risking stability of the road foundation and pollution transportation through the surface drains			conflicts. ✓ The road surface shall discharge surface runoff such as to avoid roadside flooding or discharges into adjacent residential plots. ✓ Consider imposing heavy penalties to truck drivers and operators found washing trucks and other vehicles along the road reserve and other undesignated sections of the road. ✓ Provide adequate drainage system at the truck parking yards to cater for washing water.
Road Reserve Management	✓ Potential encroachment into the roads' reserves challenging the traffic flow and other public service amenities. ✓ Road safety risks from excessive information (advertisements) that compromises visibility of road safety signage and information ✓ Challenges on the maintenance of the road furniture risks road safety.	Demand for land along the corridor is a permanent threat to the road reserve.	✓	✓ Define and secure the road reserve in all roads' sections. ✓ Keep vigil for any encroaching social and economic activities. ✓ Ensure no adverts compromises the road safety signage and information. ✓ Liaise with the County Governments on the control of advertising billboards that may affect visibility of the road signage and information.
Social Interactions	✓ Potential challenges to public use of the road (road safety, noise, emissions, security, etc.) ✓ Influence on land use changes (expansion of markets and urban centres, changes of agricultural land to commercial and institutional purposes, etc.)	The existing road use linking social and economic functions in northern Kenya and neighbouring states is already exerting pressure on social setting between Eldoret	All towns, especially Eldoret, Mois Bridge, Kitale, Makutano, Chepareria and evidently Ortum Market. Institutional premises along the corridor	✓ Integrate Non-Motorized Transport (NMT) components at all market and urban centres as well as high population points, ✓ The project should integrate land use planning in collaboration with the respective County Governments

Environmental and Social Issue	Anticipated Impacts	Cumulative Effects	Areas Affected	Mitigation Measures
	✓ Population increase following influx of transport oriented investments (hospitality and support services), ✓ Demand on social amenities (health services, water supplies, power, etc.)	(and indeed from NairobI). Improvement of the same will have significant cumulative social effects.	Outcrops of other new market centres at strategic locations along the corridor.	

Chapter 8: Environmental and Social Management Plan

8.1 An Overview

While appreciating the benefits on the social and economic front, it will be necessary to recognize the negative implications on the biological diversity and habitats along the route with specific focus on the sensitive ecosystems. The foregoing chapters of this report shows that the project poses issues of concern related to social and economic development as well as environmental conservation and for this reason, a comprehensive management plan outline would be necessary on the project implementation. The plan would provide the key environmental and social concerns, appropriate preventive actions and responsibilities, targets to be achieved and where possible estimate of the respective costs. The plan will also provide basic success indicators for monitoring purposes.

This management plan presents the key management principles that then defines a scope of the plan implementation. Broad indications of the responsibilities have also been discussed along with the possible implementation constraints anticipated while detailed actions are tabulated in a matrix for ease of reference and review. It should also be noted that the matrix is not complete in itself and continuous reviews would be necessary throughout the project implementation period.

8.2 Guiding Principles

The guiding principles behind the road project are based on the national objective of enhancing environmental, social and economic benefits to the affected persons as well as sustainable national development and in compliance with the environmental laws (EMCA, 1999 and associated regulations as well as relevant sectoral statutes). To achieve these objectives, the project should be acceptable to the majority and ensure minimal effects to the physical environment through integrated stakeholder consultations, evaluations and review of the design aspects throughout the project route and a sustained monitoring of the road upon commissioning.

The broad factors that need to be considered in the project implementation and its post evaluations initiatives could include the following:

(i) Being an urban based road, the road corridor has far reaching integration with economic activities. Preservation of the physical land forms and natural beauty of the area;
(ii) Control of soil erosion and siltation of the river;
(iii) Enhancing integration of environmental, social and economic functions (hydrology, climatic conditions, topography, geology, population trends, settlement patterns, land use systems, etc.) in the project design and implementation;
(iv) Protection and conservation of biological diversity along route corridor;
(v) Incorporating all safety provisions in the road design and construction including accessibility by the users, speed controls, signage, river crossings, etc; and
(vi) Clear demarcation of road reserve that will ensure reduced encroachment by the adjoining landowners.

8.3 Scope of the Management Plan

The scope of this environmental and social management plan (ESMP) is to give guidelines to all parties involved during construction, maintenance and utilization of the road in fulfillment of environmental and social requirements. The management plan has a long-term objective to ensure that:

(i) Environmental management conditions and requirements are implemented during the construction and post-construction period;
(ii) The social interests of the stakeholders are considered throughout the construction and post commissioning phases of the roads;
(iii) Maximum economic benefits to the project road corridors and the whole country; and
(iv) Precautions against damages to environment, biological diversity and sensitive habitats (where present).

8.4 Responsibilities

In view of the above objectives and scope, the project management system is expected to commit itself on the following aspects:

(i) The Contractor(s) will engage environmental services to monitor the implementation of the management plan on a pre-agreed schedule;
(ii) Take into consideration the Stakeholders' desires and interests where the road extent touches on private property;
(iii) The project implementation shall uphold national policies and legal requirements on environment at all times during the project implementation;
(iv) Ensure the proposed environmental protection measures stipulated in chapter 8 are integrated in the project implementation plan to the extent possible;
(v) Resolve problems and complaints arising from damages and property losses within reasonable timeframes to ensure a smooth flow of construction operations and reduce social conflicts; and
(vi) Implement and continuously review this Environment and Social Management Plan for the benefit of acceptability of the project to all stakeholders.

Precautions to ensure that damages to the environment are minimized calls for a concerted effort from the project management, the Contractor(s) and all stakeholders. The Resident Engineer is expected to discuss and convey the contents of this management plan, recommended mitigation/interventions outlined under the impact, instructions from National Environment Management Authority (NEMA) as well as the wishes of the affected stakeholders to the Contractor and construction workers for integration in the construction process. The local NEMA Offices will also be involved to take advantage of the valuable information on the environmental trends in the area.

Some Stakeholders might find the road construction period an inconvenience to their daily activities and safety, though the opinion on the long term benefits from the road project is positive. In this regard, they will need to be involved in the project monitoring framework through good relations between the contractor and the stakeholders and through timely information on the construction schedules, duration of construction works, potential interference with their daily activities and other issues arising. This will also help in resolving of problems related to construction and prevention of possible social conflicts associated with the project. Communication channels should always be open to ensure proper and timely responses to any complaints that may arise from the road project.

8.5 ESMP Matrix

Table 22: ESMP Construction Phase

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
1	**Degradation of water sources** Construction water abstraction practices; ▪ Surface water quality degradation ▪ Siltation of rivers, streams and wetlands along the corridor. ▪ Lost opportunity to other water dependants **Sources:** ▪ Fuel storage yards and vehicle service platforms ▪ Oil and grease; ▪ Deposition of asphalt concrete; ▪ Construction camps and maintenance areas.	▪ Ensure valid permits on construction water abstraction; ▪ Establish a mechanism for construction solid waste collection, storage, transfer and disposal, ▪ Ensure the public gets priority on surface water sources ▪ Prepare and review Effluent Discharge Control Plan (EDCP) for all camp sites as required by the Water Rules.	Contractor(s) Resident Engineer **During Construction period**	▪ Minimal silt discharging; ▪ Effective collection and disposal of road construction solid wastes. ▪ Minimal social conflicts on water sources	Approx. KShs. 5M for the whole project period.	▪ Water quality ▪ Social conflicts ▪ Quality of discharging effluent
2.	**Air quality:** ▪ Dust and particulate matter; ▪ Visual disruption; ▪ Surface depositions (vegetation and houses); ▪ Public health problems **Sources:** Construction activities (excavations, machinery operations, construction vehicles and trucks, materials extraction, road use).	▪ Ensure deviations and dry materials are kept damp at all times; ▪ Materials extraction under damp conditions ▪ Establish information flow process to the communities on dusty conditions. ▪ Vehicles to comply with established emission standards	Contractor(s) Resident Engineer **During Construction Period**	▪ Low visible particulate matter in the air through the road corridor. ▪ Focus on entire road corridor and specifically on ongoing work sections.	Approx. KShs. 5M for information and watering of work sections.	▪ Construction related dust level within the project; ▪ Exhaust fumes from construction machineries. **This is a Project wide situation.**

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
3	**Vegetation Cover Degradation:** Loss of vegetation cover on agricultural land, material sites, wetlands and woodlots **Sources** ▪ Tree removal for road construction, camp sites and material sites ▪ Top stripping removing grass and shrubs coverage ▪ No agricultural crop cover	▪ Plan for landscaping and a beatification programme for the project corridor upon completion of the project, ▪ Only the immediate required section of the acquired road corridor shall be cleared of vegetation, ▪ No wetland section are anticipated to be removed or destroyed. However, silt and pollution discharge to be controlled, ▪ Undertake a tree count throughout the corridor for compensation purposes through planting (Kamatira Forest to include indigenous and exotic species count), ▪ Provide a tree planting programme as part of the CEMP)	Contractor(s) Resident Engineer Adjacent and affected Land Owners ▪ Remove vegetation where construction is taking place ▪ Tree Count be carried out at the initial construction stages (preparatory stage)	▪ Vegetation cover along the road reserve that is also safe to the road users. ▪ Landscaping and grassing on road reserves and especially on steep slopes ▪ Recovery of tree cover lost in Kamatira Forest	~KShs. 50M for landscaping, grassing and tree planting	Greenery along the road corridors should be a priority. Landscape outlook Restoration of Kamatira Forest sections Regeneration of wetland sections from siltation and pollution
4	**Waste Management:** ▪ Construction waste disposal (spoil, dry vegetation, concrete residues, asphalt concrete residues, etc.) ▪ General Wastes (garbage, papers and cartons, plastics and polythene, wood and scrap metals); ▪ Sensitive Wastes (oil, grease and associated materials)	▪ Develop Standard Operating Procedures (SOPs) and schedules for the project works, ▪ The Contractor(s) to develop waste management plans and provide appropriate facilities for their operations ▪ Prepare signed agreements with landowners where spoil is to be disposed indicating	Contractor(s) Waste handling Contractor(s) where available Resident Engineer **Throughout the**	Minimal disruption to physical and biological environmental quality throughout the route. Focus on entire	Estimated cost SOPs development KShs. 2.5M	Particular attention on pollutants from camp sites, service yards and material preparation yards.

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
	▪ Liquid effluents ▪ Aerial emissions. **Sources:** ▪ Excavation areas ▪ Camp sites ▪ Batching plant yards and workshops ▪ Construction equipment	conditions and responsibilities. ▪ The spoil disposal sites should be approved before dumping commence, ▪ Landowners are free to request for the spoil but on acceptable terms and agreements	**Construction Period**	road corridor. Construction waste holding areas.		
5	**Land Use:** ▪ Land use changes along road corridor is inevitable ▪ Material sites land use may change. ▪ Land values appreciation **Source:** ▪ Disruption by construction activities; ▪ Social and economic benefits associated with the bypass road, ▪ Relocation of commercial and institutional premises to the bypass corridor	▪ Monitor land use trends along the rehabilitated road corridor in liaison with planning departments of the County Governments, ▪ Encourage the respective County Governments on the provisions of social amenities along the corridor in light of social and economic development, ▪ Outcropping of new market and urban centres should be avoided or controlled to the extent possible.	The Contractor(s) Resident Engineer Landowners County Governments **Throughout the project period**	Planned social and economic activities leading to commissioning of the bypass All bypass sections.	No direct costs are anticipated on this item, it is an administrative aspect. See item 3 above.	Land use trends. Along the project corridors, camp sites and material sources.
6	**Health and Safety** ▪ Personal injuries (construction employees and residents); ▪ Communicable diseases (including HIV/AIDS); ▪ Potential accidents at material borrow areas and quarries; ▪ Environmental diseases (bronchial and eye	▪ Provide safety programmes for material sites and working areas; ▪ Safety provisions (signage and lighting) for the work areas along the road corridor; ▪ Appropriate information and warning signs shall be provided along all the deviation roads for enhanced safety;	Contractor(s) Resident Engineer KeNHA to provide guidelines **Throughout the Construction**	▪ Information flow and dissemination on health and safety. ▪ Specific response to HIV/AIDS issues.	Approx. KShs.10M on HIV/AIDS awareness and Wellness Centre services KShs. 20M for the provisions of medical care as per	Complaints on health safety aspects related to the road construction activities. Trends in HIV/AIDS cases

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
	problems). ▪ Accidents involving construction trucks. **Sources:** ▪ Construction dust and emissions; ▪ Interaction of construction workers with communities; ▪ Pollution of water from construction activities; ▪ Material sites; ▪ Traffic deviations; ▪ Construction camp sites.	▪ Awareness, prevention and training on HIV/AIDS and other social diseases; ▪ Provide wellness centers at the construction camp sites and selected locations along the road corridor such as to include selected sites for parking, ▪ Identify and consult on selected health centers for improvement as a social benefits from the construction phase. They may also act as Wellness Centers, ▪ Provide medical and personal Protective Equipments (PPEs) for the construction workers and ensure application.	**period**	▪ Safety provisions and enforcement mechanisms .	Contractors Insurance Cover.	along the corridor, Special focus on material sites, road diversions routes, major settlements and economic areas.
	Impacts of Deviation Routes ▪ Conflicts with residents and local motorists on the movement disruption. ▪ Potential physical damages to the local access roads. ▪ Risks of safety to the residents (especially children) and local motorists. ▪ Dust emissions	▪ Confine construction traffic to the construction road reserve to the extent possible (there is 80m corridor available). ▪ If deviations are unavoidable, inform the road users and residents in advance seeking for cooperation. ▪ Install appropriate signage and information (including reflective barriers and signs) on the construction road and deviations for reduced conflicts and accidents.	Contractor(s) Resident Engineer	Minimal conflicts with the deviation road users and local residents. Minimal disruptions and accidents.	No direct costs (integrated into the construction budgets).	▪ Public complaints ▪ Dust, ▪ Noise ▪ Conflicts (accidents, congestion levels, conditions of the deviation roads).

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
		▪ Maintain the deviation roads in good motorable conditions at all times for efficient traffic flow. ▪ Deviation roads should be maintained wet for dust control at all times (constant watering).				
7	**Social and Economic:** ▪ Temporary disruption of business activities along the road corridor; ▪ Social relationships and contacts during construction; ▪ Access into and out of adjacent premises; ▪ Limited displacement of small-scale traders; ▪ Safety issues; ▪ Noise to residents living along the route. ▪ Potential interference with cultural facilities and resources **Sources:** ▪ Construction machineries; ▪ Public access passages; ▪ Construction campsites; ▪ New road and public facilities.	▪ Ensure at least 60% of the casual employment is drawn from the local communities, ▪ Provide economic opportunities to the communities through supplies, services, land leases and employments, ▪ Enhance consultations with communities on activities affecting them and collaborate on the impacts reduction; ▪ Provide deviations and slips accesses to premises during construction; ▪ Ensure effective signage and information to road users; ▪ The contractor to establish and manage environmental and social initiatives to oversee mitigation measures. ▪ Cultural features including the museums and Kamatira Forests to be protected	Contractor(s) Resident Engineer	An acceptable, sustainable and economically viable road with long term benefits. Special attention along the high population sections of the project corridors.	Approx. KShs. 3M on communication, information dissemination.	Trends in socio-economic dynamics along the project road and its catchments.

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
8	**Provision of Road Reserve:** ▪ Encroachments; ▪ Acquisitions; ▪ Relocation of small scale traders. Only limited land take will take place as most of the road sections follows the existing alignment.	▪ All the PAPs should be identified and their livelihoods restored before the project commences (RAP process has been undertaken), ▪ Consider monetary options for livelihood restoration of the PAPs on the face of shortage of free land space. ▪ Avoid public institutions to the extent possible (schools, churches and health centers) ▪ Avoid established markets to the extent possible	KeNHA National Land Commission	Compensation of all PAPs before commencement of the works	Actual costs as per the RAP report.	The design of the road is confined within the reserve corridor that is already available.
9	**Camps and Material Sites:** ▪ Land degradation; ▪ Loss of land vegetation cover; ▪ Surface hydrology changes; ▪ Access roads' damages; ▪ Degradation of water sources.	▪ Undertake environmental and social assessments on all material sites. Obtain relevant approvals and licenses from the National Environment Management Authority (NEMA) for all material and construction camp sites. ▪ Undertake environment and social impact assessments for all construction camp sites. ▪ Obtain appropriate abstraction permits for construction water from WRMA. ▪ Landowners entering into lease agreements on materials extraction should to reflect the responsibility for rehabilitation	The Contractor(s) **Throughout Construction Period**	Quarry sites Borrow areas Water abstraction points Camp operations. Material sites, preparation and construction camps.	~KShs. 10M for the assessments and rehabilitation.	Sustainability Parameters in the rehabilitation plan.

Item No.	Anticipated Linkages and Sources	Management Actions	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
		of the material sites; ▪ Prepare suitable rehabilitation plans for the materials sites with landowners to maintain land usability;				
10	**Decommissioning of Construction Installations:** ▪ Removal of construction camps. ▪ Rehabilitation of material sites and preparation yards. ▪ Equipment removals.	▪ Carry out decommissioning audits for the camp sites. ▪ Prepare and submit for approval by NEMA rehabilitation plans for all materials sites (quarry sites, borrow pits and spoil dumping areas). ▪ Rehabilitate all material sites and preparation yards in accordance with the approved rehabilitation plans. ▪ Remove all construction equipments and excess materials from the site.	Contractor(s) Resident Engineer	Rehabilitated material sites, cleared material preparation yards and camps.	No direct cost estimate.	Usability of the affected camps' and material sites.

Table 23: ESMP Road Use

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
1	**Environmental Pollution:** ▪ Water quality degradation; ▪ Air pollution from vehicular emissions; ▪ Solid waste dumping (road litter); ▪ Vehicular related scraps; **Sources:** ▪ Surface runoff drains from the road; ▪ Oils spills on road surface; ▪ Road litter (from road users and roadside clearing); ▪ Poorly maintained vehicles – higher related emissions.	▪ Introduce clean-up responsibilities for the road users (e.g. spills from accident vehicle owners); ▪ Provide public waste receptacles at strategic locations along the route (bus stops and crossing areas); ▪ Drainage channels be kept clear at all times to prevent overloading with polluting materials; ▪ Harmonization of waste drains from premises along the road.	KeNHA County Governments of Uasin Gishu, Kakamega, Trans Nzoia and West Pokot (Roads and Infrastructure) Throughout the road use	No direct costs are anticipated (Initiative part of the road administration).	Compliance with established environmental standards including waste management regulations.	Complaints on the utilization of the roads. Environmental quality trends. Compliance with road transport regulations.
	Ecological Interactions ▪ Damages from outfalls of surface drainage, ▪ Waste dumping from road users ▪ Potential introduction of foreign species, ▪ Illegal intrusion into Kamatira Forests, ▪ Influence into highlands clearance and soil erosion (highlands in West Pokot)	▪ Create view points at Strategic locations to discourage uncontrolled stop-over points, ▪ Provide waste receptacles at the view points to influence controlled waste disposal by road users, ▪ Consider monkey ladders across selected location within Kamatira forest ▪ KFS and KWS to enhance surveillance through Kamatira Forest and adjoining ecosystems	KeNHA KFS KWS NEMA County Government of West Pokot Continuous	No direct costs from KeNHA	Ecological integration into the road use and management	reported conflicts across the corridor

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
		▪ Influence relevant authorities into controlling charcoal burning in West Pokot and catchment management to control soil erosion and hence the road corridor destruction				
2	**Health, Safety and Security:** ▪ Noise and vibrations; ▪ Increased road accidents; ▪ General security aspects; ▪ Cases of HIV/AIDS and other social diseases. ▪ Road safety issues. **Sources:** ▪ Increased traffic and driving style along the routes; ▪ Social interactions; ▪ Inadequate road safety signage and facilities.	▪ Draw strategies for road safety measures and sensitize residents within risk areas; ▪ Liaise with appropriate department to ensure compliance with road regulations; ▪ Ensure maintenance of signage, crossings, speed breaks and other facilities at all times; ▪ Maintain pedestrian crossings (footbridges, underpasses and crossing rumps at all times; ▪ Ensure road furniture is in place at all times.	KeNHA An all time compliance	No direct costs are anticipated (Initial part of the road administration).	effective information and signage to enhance safe movement and use of the road	Complaints from the residents and business operators. Recorded cases and categories of road accidents. Replacement of signage continuously.
	Cultural Issues Potential interference with traditional cultures conservations	▪ Contribute towards sustaining museums along the corridor (e.g. Kitale and Kapengurai Museum) ▪ Continuous consultation with the communities for culture conservation initiatives)				

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
3	**Social and Economic Aspects:** ▪ Land use changes due to efficient transport; ▪ Increased population; ▪ Higher traffic volumes; ▪ Mixed economic activities (general trading, industrial, institutional, etc.); ▪ Road safety issues.	▪ Collaboration with physical planning departments to enhance roadside planning and use; ▪ Increase the number of social facilities; ▪ Collaborations for sustainable social and economic development; ▪ Include environmental aspects in scheduled road audits.	KeNHA County Governments of Uasin Gishu, Kakamega, Trans Nzoia and West Pokot	No direct costs are anticipated	Compatibility of the road with social and economic interests of the local business community, residents and other road users.	Land use trends in time and along the route. Population trends.
4	**Road Maintenance:** ▪ Blockage of drainage and hindrance to free storm water flow; ▪ Accumulating roadside litter collection; ▪ Effects on road safety from inadequate facilities and signage maintenance; ▪ Encroachment into the road reserve; ▪ Illegal roadside land development practices.	▪ Establish modalities for the involvement of the residents in the maintenance of the road; ▪ Install and maintain appropriate road signs; ▪ Collaborate on the control of roadside billboards that are a safety risks; ▪ Maintain trash bins at strategic locations along the roads including bus stops, foot bridge landings, under pass exits.	KeNHA County Governments of Uasin Gishu, Kakamega, Trans Nzoia and West Pokot	KShs. 3M for the initial maintenance period. Other costs within the road maintenance budgetary allocations.	Maintained high level quality of road surface, installations and components. Focus on the entire road corridor.	Complaints received from the local communities and the road users in general.
5	**Decommissioning Phase:**	Undertake a decommissioning audit of part, sections or entire road and establish appropriate measures for prevention of environmental pollution and public safety risks.	KeNHA	No direct cost estimates at this stage.	None or minimum impacts to the environment and social well being.	_

8.6 ESMP Monitoring

Table 24: ESMP Monitoring Parameters (Construction Phase)

Issue	Monitoring Parameters	Expected Output	Responsibility
Physical Environment	✓ Drainage management ✓ Drainage outfall orientation ✓ River and wetland crossings management	Drainage systems that are compatible with the land use features along the corridor	Contractor Resident Engineer
	✓ Spoil management and disposal ✓ Other waste management and disposal	✓ Disposal of spoil in accordance with regulations and conditions on signed agreements ✓ Waste management in accordance with the regulations	Contractor Resident Engineer
	✓ Materials sites management (restoration plans) ✓ Road corridor finishing (rehabilitation/restorations)	✓ Materials rehabilitation plans ✓ Road reserve landscaping plans	Contractor Resident Engineer
	✓ Air quality ✓ Water quality ✓ Noise and vibrations	✓ Air sampling and measurements ✓ Water sampling and analysis ✓ Noise measurements	Contractor Resident Engineer
Biological Environment	✓ Vegetation cover ✓ Wildlife disruption ✓ Aquatic features (wetlands and rivers)	✓ Rehabilitation plans ✓ Conservatory construction practices	Contractor Resident Engineer
Social Aspects	✓ OHS and Public Safety ✓ Security and emergencies ✓ HIV/AIDS and communicable diseases ✓ Health and Sanitation ✓ Waste Management	✓ Compliance with established regulations ✓ Provision and operations of wellness centers ✓ Operations of VCT Centers ✓ Training, Awareness and prevention programmes	Contractor Resident Engineer HIV/AIDS Consultant KeNHA
	✓ Displacements of people ✓ Compensation and settlement ✓ Employment and income generation	✓ Compensation to the PAPs before project commencement	
	✓ Accessibility to homes, services and institutions ✓ Traffic management	✓ Clear information, signage and barriers for safety	

Chapter 9: Conclusions and Recommendations

Table 25: Conclusions and Recommendations

Conclusions	Recommendations
It is appreciating that the initial ESIA Study Report provided a strong basis on the project area characteristics, especially at the County levels. However, it did cover specific linkages to environment and social aspects along the project corridor. Due to this status, impacts and management aspects had to be updated based on reviewed environment and social baseline conditions	The ESIA Study Report to be updated by integrating the revised environment and social baseline conditions as well as the re-established impacts and mitigation measures. An environmental and social management plan is also to be updated to provide for a guided Construction Environmental Management Plan (CEMP) during the construction phase.
Demand for efficient transportation corridor to Northern Kenya (driven by the County requirements and the promising oil production) as well as the regional transport integration linking Southern Sudan, Ethiopia and Northern Uganda is justification enough for rehabilitation of Lesseru – Marich Pass as part of the Northern Corridor Transport Improvement Project. This is an existing road transport corridor and with already existing heavy transit goods movement activities. The expansion will only bring on additional volumes and potential expansion of social and economic activities, especially around the towns and markets.	The environment and social management plan developed under this report is an indication of the monitoring parameters to ensure long term sustainability of the highway. The same should be customized for actual construction works through a Construction Environment Management Plan (CEMP)
It is observed that significant portion of the road pavement is in fair condition but requires strengthening or improvement. The other portion is generally worn out or just a gravel surface calling for total reconstruction. The works, therefore, demand for intensive supply of construction materials including gravel, hard stone aggregate, sand and water among others. The materials has to be sustainably sourced locally. Similarly, identification and acquisition of construction camp sites, workmen camps and materials holding and preparation areas will be the responsibility of the Contractor(s). The site have potential implications to the environmental and social settings.	While the design process have identified potential areas with material deposits, it will be necessary for the Contractors to carry out comprehensive ESIA studies and seek approvals from NEMA before extraction. These will include gravel borrow areas, hard stone quarries, water sources and sand harvesting sources. Equally important will be undertaking ESIA studies and seeking approvals for all construction camp sites. Agreements between the Contractor(s) and the landowners hosting material areas and camp sites will need to agreements with clear responsibilities on restorations upon completion and the restoration quality.
Going by the design, there will be minimal realignment of the existing carriageway, apart from limited expansions (within the existing road Right of Way, especially through market centers) and portions within Kamatira Forest. It is anticipated that the existing RoW will be adequate for deviation routes.	The Resettlement Action Plan (RAP) report is to provide the level of social disruptions. The affected persons (PAPs) should be compensated fully before the commencement of the works.

Conclusions	Recommendations
No significant displacements of people are anticipated though notable disruptions to social and economic activities are likely to occur through the market centres. It is noted that a RAP review was running parallel to this study. The limited realignments also have environmental effects including soil loss, interference with delicate steep slopes, vegetation removal and damages to river banks.	Environmental compensation will require effective restoration for damages and re-vegetation programmes (grassing and tree planting in pre-selected areas). The construction works, should, therefore, establish and maintain a count and record of all trees (indigenous and exotic species) removed during the construction for replanting accordingly.
The road corridor is characterized with significant numbers of road safety spots, especially market centers, steep slopes and sections with sharp bends. Others include sections adjacent to schools, religious premises, livestock crossing points, river crossings (bridges) and sections with potential falling stones and landslides. Traffic Management during the construction through the existing pavement and deviation routes constitutes part of the safety interventions. This will be the responsibility of the Contractor(s). The safety of workers, road users and the riparian communities is an important factor during the entire works period.	The rehabilitation should give high priority to effective safety signage and information. Traffic Management Plan including scheduling of deviation routes shall be prepared. Clear safety signage and information will be provided in all the work areas at all times. Provide all workers with personal protection gear and enforce application at all times, Cordon off work areas from the public including material sites, materials preparation sites and structural sites for their safety.
Air quality arising from dust and machinery equipment is an issue of concern to the affected residents and road users.	Maintain constant watering of the corridor to the extent possible to keep the dust low, Hard stone crushers to be equipment with dust control mechanisms Materials haulage trucks be covered to reduce dust

References

Annexes

Annex 1: Terms of Reference

Kenya National Highways Authority
Quality Highways, Better Connections
Blue Shield Towers, Hospital Road, Upper Hill P.O. Box 49712 – 00100 Nairobi
Tel 020 – 8013842 Email dg@kenha.co.ke / info@kenha.co.ke Website www.kenha.co.ke

Ref: KeNHA/910/2014 **24th October, 2014**

1. Mark Owuondo
2. Harrison W. Ngirigacha
3. OGUBA Philip Wandera

Dear Sir,

PACKAGE 1-CONSULTANCY SERVICES FOR REVIEWING AND UPDATING OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED REHABILITATION OF LESSERU-MARICH PASS ROAD (A1), 164 KM

INVITATION TO SUBMIT TECHNICAL AND FINANCIAL PROPOSALS

The selection procedure stipulated for the assignment is selection of Individual Consultants (IC). In accordance with the " Guidelines Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011("Guidelines")

In accordance with clause 5.3 of the aforementioned Guidelines, you are hereby invited to submit a combined technical and financial proposal for the assignment. If your proposal is responsive and acceptable, you will thereafter be invited to negotiate a contract. You may make comments on the TOR as deemed fit.

Your proposal should be sent by post, courier or hand delivered so as to be received at the address below not later than **1100hours local time on Friday 31st October, 2014**

Secretary/Tender Committee
Kenya National Highways Authority
Blue shield Towers, Upper Hill, first floor, Procurement Office
Hospital Road,
P.o Box 49712-00100,
Nairobi, Kenya

Further information may be obtained from the address below

SOUTH SUDAN – EASTERN AFRICA REGIONAL TRANSPORT, TRADE AND DEVELOPMENT FACILITATION PROGRAM (SS-EARTTDFP) – Phase 2

PROJECT ID (P148853)

PACKAGE 1: CONSULTANCY SERVICES FOR REVIEWING AND UPDATING OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED REHABILITATION OF **LESSERU-KITALE-MARICH PASS 164 KM (A1) ROAD A1:**

1.0 Introduction

In 2013 KeNHA prepared a draft Environmental and Social Impact Assessment (ESIA) for the **Lesseru-Kitale-Marich Pass** road section. This is a call for a consultant to verify, review and update the ESIA to ensure that the reports present an independent assessment of potential environmental and social impacts of the proposed project, ensure that it is implemented is implemented in an environmentally and socially sustainable manner., The assessment for the proposed project is to be undertaken before the project is implemented so as to identify Environmental and Social impacts, offer mitigation measures to the anticipated impacts and propose updates to the design to increase sustainability of the project.

This Terms of Reference (TOR) covers the review and updating of the draft Environmental and Social Impact Assessment (ESIA), for the proposed rehabilitation of **Lesseru-Kitale-Marich Pass (A1) road** component. The revised ESIA shall be prepared in a manner consistent with World Bank standards and procedures and Kenya National Highways Authority requirements.

2.0 Objective

The overall objective of the ESIA is to ensure that all environmental consequences of construction and operation of the road are evaluated and addressed as part of the mitigation measures incorporated into the road's final design. The specific objectives of the assignment are:

- To review and update the draft ESIA report to confirm with World Bank operational policies and Kenya National Highways Authority requirements;
- To identify gaps in the draft ESIA report and address them in the revised version;
- To conduct second public consultation to sensitize all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the proposed project;

3.0 Environmental Assessment Requirements

The ESIA will be updated following the Government of Kenya legislation or/and regulations, World Bank Operational Policy 4.01 (Environmental Assessment) and requirements for environmental due diligence of the proposed financiers of this project

(e.g. EU, JICA). The ESIA will be updated simultaneously with Resettlement Action Plan (RAP) review and updating.

4.0 Study Area

The ESIA covers the road section of 164 km from **Lesseru-Kitale-Marich** Pass. The section is overall in dilapidated condition.The road traverses Uasin Gishu,Trans Nzoia and West Pokot Counties..

This road section of the project road was constructed to bitumen standards in the early 1990s, and was not adequately maintained despite a continuous increase in the traffic volume and loading. During identification of the project, the observed traffic volumes were found to be high and mainly consisting of trucks travelling to South Sudan, buses and pick-ups serving regional traffic demand.

The proposed project is part of the International Trunk road A1, which is one of the major corridors identified for support under the Northern Corridor Project. This is part of the link road from South Sudan to the port of Mombasa and forms part of Corridor 3 of the high priority trans-national road corridors under the East African Community Road Network.

5.0 Scope of Work

The consultant shall review and re-write the draft ESIA scope to ensure it covers but not limited to the following:

Task 1. Description of the baseline environment: The Consultant is required to collect, collate and present baseline information on the environmental and socioeconomic characteristics of the existing situation in the proposed route. This description involves:

a) *Physical environment* (topography, landforms, geology, soils climate and meteorology, air quality, hydrology, etc.).
b) *Biological environment* (i.e., flora and fauna types and diversity, endangered species, sensitive habitats, etc.).
c) *Social and cultural environment*, including present and projected, where appropriate (i.e., population along the target road corridor, land use, planned development activities, community structure, gender, employment and labour market, sources and distribution of income, cultural properties, etc.).

Task 2. Detailed Description of the Proposed Project: The Consultant is to concisely describe the proposed project (based on the latest project design), its geographic location, ecological, general layout of facilities including maps at appropriate scale where necessary.

Task 3. Legislative and Regulatory Framework: The Consultant shall review all pertinent regulations and standards governing the environmental quality, use of water resources, solid and liquid waste management, health and safety, protection of sensitive areas, land use control at the national and local levels and ecological and socio-economic issues. Compliance issues should also be stated. The international agreements and treaties should also be discussed. The World Bank Operational Policies and policies of other relevant development partners (e.g. EU, JICA) that are applicable to the project should also be identified.

Task 4. Identify potential environmental impacts that could result from the project:
The Consultant shall review and validate all potential environmental and social impacts attributed to the proposed project. These would encompass environmental, ecological and social impacts, both positive and negative, as a result of interaction between the proposed project and the environment that are likely to bring about changes in the baseline environmental and social conditions discussed in Task 1. The Consultant shall differentiate between (a) short, medium and long-term impacts; (b) reversible and irreversible impacts. During the analysis, the consultant shall consider both biophysical and socio-economic factors that will include the impacts of: Population change and migration; Socio-economic characteristics of the difference target groups along the proposed route; Forms of social organization and co-operation; Physical and social infrastructure; Change in economic activities; Development resources; Vegetation clearance; Mechanical disturbance; Removal of structure /sites; Effects on flora and fauna; Air quality; Improved access; Accident rates; and Visual/aesthetic change. Where necessary, refer to the project's Social Assessment and Resettlement Action Plan reports to avoid duplication of the effort.

Task 5.In particular, the Consultant should focus on the points along the study area that have with higher environmental and social risk profile, such as:

- Impacts of Kamatira Hills , Identify and predict the cumulative impacts of the entire project on the Environment.
- Wildlife crossings and propose a technical solution (e.g underpasses, speed calming measures, increased monitoring during construction and operation phases, etc), based on the data and consultations with Kenya Wildlife Service.
- Availability of resources for construction to avoid pressures on already existing resources: (1) alternative water sources, with references to JICA study on ground water in Turkana; (2) alternative fuel sources to avoid excessive clearing of vegetation to serve construction camp.

Task 6. Occupational Safety & Health concerns: The Consultant shall review all occupational health and safety concerns likely to arise as a result of construction and operations of the proposed facility. The Consultant shall make recommendations on corrective and remedial measures to be implemented under

the environmental management plan. The Consultant will include emergency/disaster preparedness plans for the project as an annex to the report.

Task 7. Analysis of Alternatives to the Proposed Project: Review alternatives that were examined in the course of designing the road project. Review alternative designs for construction and operation which were examined. That includes the "no action" alternative of the road not being constructed, but continuing with the existing state of the road. The consultant should compare the alternatives in terms of potential environmental impact (which are irreversible, unavoidable and which can be mitigated); capital and operation costs; sustainability under local conditions; and institutional, training and monitoring requirements. To the extent possible, quantify costs and benefits of each alternative.

Task 8. Carry out second level public participation and consultations on the positive and negative impacts of the project: The Consultant shall carry out a verification of social due diligence measures described in the report, which involves describing the social, economic and cultural status of the project area. The Consultant to organize forums for public participation to enable interested & affected parties to present their concerns and opinions regarding the proposed project, the stakeholders should include County officials, relevant Government agencies (e.g. KWS, WRMA), community groups, and NGOs. The views of the public will be solicited and incorporated in the ESIA report. The consultant should document and keep records of these meetings, which should be included into the ESIA as an annex.

Task 9. Propose Mitigation Measures to the identified environmental and social impacts. The consultant shall come up with the feasible mitigation measures for the negative impacts that could result from the proposed project. The mitigation measures should be reviewed and revised based on the outcomes of public consultations.

Task 10 Review of Environmental and Social Management Plan to mitigate negative impacts: The Consultant shall review and update a comprehensive Environmental and Social Management Plan (ESMP). The plan should recommend a set of mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of adverse environmental impacts and/or maximize socio-economic benefits. The Consultant shall provide responsibilities, schedule and cost outlays for the proposed measures as well as their institutional and financial support.

Task 11. Development of Environmental and Social Monitoring Plan: The Consultant is required to review specific descriptions, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, and definition of thresholds that will signal the need for corrective actions as well as deliver monitoring and reporting procedures. The Consultant will provide time frames and

implementation mechanisms, reporting responsibilities, staffing requirements and cost outlays.

6.0 Reporting

The environmental assessment report shall be concise and limited to significant environmental and social issues. The main text must focus on findings, conclusions and recommendations, supported by summary of data collected and citation for any references used in interpreting those data. The updated ESIA report shall have the following outline:

a) *Executive summary*. Concisely discusses significant findings and recommended actions.

(b) *Policy, legal, and administrative framework*. Discusses the policy, legal, and administrative framework within which the ESIA is carried out. This section should identify relevant international environmental agreements to which the Kenya is a party.

(c) *Project description*. Based on the latest technical design, concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). It should indicate the need for any resettlement plan or indigenous peoples development plan. A map showing the project site and the project's area of influence should be included.

(d) *Baseline data*. The consultant should assess the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigatory measures. The section should indicate the accuracy, reliability, and sources of the data.

(e) *Environmental and social impacts*. Predict and assess the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental and social enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.

(f) *Analysis of alternatives*. The consultant should systematically compare feasible alternatives to the proposed project site, technology, design, and operation--including the "without project" situation-in terms of their potential

environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, quantify the environmental impacts to the extent possible, and attach economic values where feasible. States the basis for selecting the particular project design proposed and justify the choice.

(g) *Environmental and social management plan (ESMP).* Ensure the ESMP includes the following components.

1. *Mitigation*-The ESMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. Specifically, the ESMP should:

(a) Identify and summarizes all anticipated significant adverse environmental impacts (including those involving indigenous people or involuntary resettlement);

(b) describe with technical details each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;

(c) estimates any potential environmental impacts of these measures; and

(d) provides linkage with any other mitigation plans (e.g., for RAP, vulnerable and marginalized groups plan, physical cultural resources plan, or biodiversity assessment) required for the project.

2. *Monitoring*- The ESMP should identify monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed. Specifically, the monitoring section of the ESMP should provide (a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and (b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.

3. *Capacity Development and Training*-To support timely and effective implementation of environmental project components and mitigation measures, the ESMP should draw on the EA's assessment of the existence, role, and capability of environmental units at KeNHA and ministry level. If necessary, the ESMP should recommend the establishment or expansion the units, and the training of staff, to allow implementation of ESIA

recommendations. Specifically, the ESMP should provide a specific description of institutional arrangements-who is responsible for carrying out the mitigation and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training).

4. *Implementation Schedule and Cost Estimates*-For all three aspects (mitigation, monitoring, and capacity development), the ESMP should provide (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the ESMP.

5. *Integration of ESMP with Project*-The plan should be specific in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project's overall planning, design, budget, and implementation.

(h) *Appendixes including:*

(i) List of EA report preparers-individuals and organizations.

(ii) References-written materials both published and unpublished, used in study preparation.

(iii) Chance find procedures to provide protocol for discovery of cultural sites or graves along the road corridor during construction.

(iv) Record of interagency and consultation meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs. The record should also include the sign-in list of people who attended consultative meetings.

(v) List of associated reports (e.g., Resettlement Action Plan, design reports, Social Impact Assessment etc.)

(vi) any other relevant annexes with background information for this report.

E: Reports and Time Schedules

Commencement

The Consultant shall commence the ESIA review and updating within seven (7) calendar days of the effective date of signing of the contract with the Client.

Reports

The Consultant shall prepare and submit the following reports to the Client. All reports shall be in English and prepared on A4 metric size.

I. **Inception Report:** This report shall summarize the initial findings and give defined proposals covering the methodologies to be employed for different tasks for the ESIA, and a detailed work program of all major activities of the assignment *(3 No. Hard copy and 2No. Soft copy to Client for each report)*.

II. **Draft Final Reviewed and Updated ESIA Report:** This report shall summarize the findings, analyses, results and recommendations of the study, and shall contain all supporting materials - *(3 No. Hard copy and 2 No. Soft copy to Client for each report)*.

III. **Final Reviewed and Updated ESIA Report:** This report shall incorporate all revisions deemed necessary arising from comments received from the Client and the Financier following discussions and agreement from the client and the Consultant – *(6 No. Hard copy and 3No. Soft copy to Client for each report)*.

Format of the Reports

The reports shall be provided in CD-ROM in Microsoft Word for text, Microsoft Excel for tables/graphs and spread sheets and AutoCAD for drawings.

Submission of Reports

The above reports shall be submitted to:

General Manager (Special Projects)
Kenya National Highways Authority
Blue Shield Towers
P.O Box 49712-00100
NAIROBI

Implementation Time Schedule

The expected schedule of the assignment is as follows:

a) The Consultant shall commence the ESIA review and updating within seven (7) calendar days of the effective date of the contract. The effective date shall be the date on which the Consultancy agreement shall be signed by the Client.
b) The review and updating Consultancy will take a total of Eight (8) weeks
c) The following tentative time schedule shall be observed in carrying out the studies:

	Activity	Month	Responsibility
(i)	Effective Date of Contract	M+0	KeNHA
(ii)	Commencement of Services Consultant	M+0.25	
	(Reviewed and Updated ESIA Reports)		
(iii)	Inception Report	M+0.5	Consultant
(iv)	Draft Final Report	M+1.5	Consultant
(v)	Final Report	M+2	Consultant

The consultant is expected to indicate clearly assignment critical milestones, with timing for each activity; taking into account the duration of the entire project implementation period.

In addition to the above, the Consultant would, however, outline the scheduling of activities for the ESIA.

Annex 2: Selected Design Concept Extracts

5.0 GEOMETRIC DESIGN

5.1 General

The project road falls within two classifications, the International Trunk road Class A and National Trunk road Class B respectively in the national road network hierarchy.

5.2 Design Standards and Specifications

The design of the project roads has been carried out based on the current standards contained in the MOR&PW Road Design Manuals (Part 1 & 3) and Manual for Traffic Signs in Kenya (Part 1 & 2).

The methodologies used in the design of pavements, earthworks, drainage and structures have been in conformity with the latest international techniques in order to ensure that the most economical use is made of available materials and that a balance is kept between capital and maintenance costs.

The design and construction specifications for the road are in accordance with the Ministry of Transport & Communications Standard Specification for Road and Bridge Construction (1986).

5.3 Design Philosophy

In carrying out the geometric design, the Consultant has been guided by the following general design philosophy:

- To ensure that scarce funds available for road works are used to the best advantage and therefore aim to strike an optimum balance between the cost of construction and overall road user cost.
- To investigate alternative alignments, pavement and structural design proposal with a view to obtaining the optimum alignment that is commensurate with the MOR&PW Road Design Manuals standards.
- Aim to provide a road alignment that is aesthetically pleasing and that maintains harmony between the road and the surrounding environment, while minimising any negative impact on the environment.

5.4 Design Criteria

5.4.1 General

This section looks at specifications on traffic flow, design speed and cross-sectional elements in line with the Road Design Manual Part I recommendations for the design of horizontal and vertical alignment. The following basic design parameters and criteria have been evaluated and applied in the geometric design of the road.

5.4.2 Design Speed

The design speed determines the design stopping and passing sight distances, and therefore plays a major role in the operational and safety characteristics of the road. A single design speed is therefore not be appropriate in the light of changing topography, roadside development and traffic volumes.

The project roads traverse terrain that varies from flat to rolling and hilly and mountainous towards the end of the project. The Road Design Manual Part I recommends design speeds ranging from 100 – 120km/h in Level terrain, 70 – 100km/h in Rolling terrain and 50 – 70km/h in Mountainous terrain for Class A and B roads. In view of the fact that the primary function of the project road is to provide access and mobility to the road users the adopted design speeds for respective sections of the road have been based on the predominant terrain and land use.

5.4.3 Road Cross-Section

The design cross section to be used for a road, as described in Chapter 4 of the Road Design Manual Part 1, is dependent on many factors, which include the traffic flow volume, the road design speed, the terrain traversed and the predominant function of the particular road.

Table 5.1 below shows the criteria used in selecting the recommended cross-section type for two-lane rural roads, such as the project road:

Table 36: Recommended Cross-Section Types for Two-Lane Rural Roads

AADT or DHV in Year 10 (PCU)	Cross-Section Type
AADT < 150	V, VI, VII, OR VIII
150 < AADT < 500	IV, V OR VIII
500 < AADT < 2000	III OR IV
1000< AADT < 4000 or 250 < DHV <500	II OR III
AADT > 4000 or DHV>500	II

** Ref: Road Design Manual Part I - Table 4.2.2)*

Note: From RDM I, table 4.2.1;

Dual carriageway comprises of a 14 m carriageway and 1.5 m shoulders on both sides. Cross-section Type II comprises of 7.0 m carriageway and 2.0m shoulders on both sides.

The traffic flow forecasts discussed in Chapter 4.0 generated tenth year traffic volumes as follows:

Road Section	**Low Growth**		**Medium Growth**		**High Growth**	
	AADT (pcu)	Cross section type	AADT (pcu)	Cross Section Type	AADT (pcu)	Cross section type
A104/B2 Junction - Nangili	6,369	II	7,825	II	10,400	II
Nangili – Moi's Bridge	5,846	II	7,265	II	9,445	II
Moi's Bridge – A1/B2 Junction	6,724	II	8,340	II	10,919	II
A1/B2 Junction - A1/C45(1) Junction	20,896	Dual carriageway	25,476	Dual carriageway	33,786	Dual carriageway
A1/C45(1) Junction - A1/C48(1) Junction	4,497	II	5,505	II	7,065	II
A1/C48(1) Junction - A1/C48(2) Junction	11,545	II	13,959	II	18,542	Dual carriageway
A1/C48(2) Junction – Maili Saba Link	7,070	II	8,566	II	11,414	II
Maili Saba - Makutano	3,982	II	4,946	II	6,479	II
Makutano - Kapenguria	5,074	II	6,290	II	7,997	II
Kapenguria - Ortum	3,157	II	4,011	II	5,068	II
Ortum – Marich Pass(A1/B4) Junction	2,816	II	3,599	II	4,542	II

Section 3.6 of RDM I recommends a dual carriageway where the design volume exceeds 8,000 pcu especially if the road is located in a rural area. It further states that if the road is close to a major town, then a single carriageway may carry a design volume of up to 15,000 pcu.

The Consultant therefore recommends a dual carriageway for the section between A1/B2 Junction to A1/C45 Junction and cross-section type II for the remainder length of the project road.

The cut slopes for the road cross-section will generally be 1:2 in soft and intermediate material and 4:1 in rock where encountered. For large fills or cuts (>4m), a slope of 1:1.5 is adopted.

The fill slopes will be 1:4 where fill is less than 1m and 1:2 for fills between 1 and 4m and 1:1.5 for larger fills.

5.4.4 Horizontal Alignment

The design speed was divided into sections of either 100kph or 50kph and they were as follows

CHAINAGE	DESIGN SPEED (Kph)
0+000 to 8+000	100
8+000 to 9+500	50
9+500 to 17+000	100
17+000 to 18+400	50
18+400 to 23+800	100
23+800 to 24+800	50
24+800 to 27+200	100
27+200 to 34+500	50
34+500 to 47+700	100
47+700 to 60+500	50
60+500 to 67+000	100
67+000 to 69+900	50
69+900 to 73+900	100
73+900 to 81+000	50

- The minimum horizontal radius when design speed is 50 kph is 90. Minimum horizontal radius when design speed is 100 kph is 435.
- The maximum grade/gradient is 6%.
- The maximum superelevation is 6%.
- The superelevation charts are as follows:

DESIGN SPEED OF 50 KPH

Radius(m)	Superelevation
700	NC (Normal crown)
600	2.5 (Reverse crown)
500	2.8
400	3.3
300	3.9
250	4.2
200	4.7
175	5.0
150	5.3

140	5.4
130	5.6
120	5.7
110	5.8
100	6
90	6

DESIGN SPEED OF 100KPH

Radius(m)	**Superelevation**
3000	NC (Normal crown)
2500	RC (Reverse crown)
2000	2.5
1500	3.1
1400	3.3
1300	3.5
1200	3.7
1000	4.2
900	4.5
800	4.9
700	5.2
600	5.6
500	5.9
435	6

- For the vertical profiles the minimum k values are
- **Stopping sight distance**
  Design speed –50 Kph- minimum k value =7
  Design speed -100 kph –minimum k value = 52
- **Passing sight distance**
  Design speed –50 Kph- minimum k value =138
  Design speed -100 kph –minimum k value = 520
- **Headlight sight distance**
  Design speed –50 Kph- minimum k value =13
  Design speed -100 kph –minimum k value = 45
- Climbing lanes have been introduced at the Kamatia hill section in accordance with the Kenyan road design manual section 5.23 / Pg 75.

MOROKWIJIT-MARICH PASS (SECTION 2)

These chainages are based on the older alignment/existing road and do not take into consideration any realignments to be done at Kamatira (the very steep section).
The towns are as follows:

- Murukwijit - km 0+000
- Makutano - km 8+000
- Ngombe Moja - km 11+000
- Chepareria –km 27+400
- Chepkoniswo-km 34+500
- Sebit- km 49+800
- Ortum -km 56+100
- Wakor- km 65+600
- Marich pass –km 74+260

The following towns will require service lanes

- Makutano – km 7+400 to km 10+500
- Chepareria –km 27+100 to km 27+600

6.3.2 Material Sources

6.3.2.1 General

The material sources investigated and described below are all within this area and were selected on the basis of their potential yields, ease of acquisition and haul distances.

All potential borrow areas were investigated by excavation of test pits dug at a grid of 30 metres to assess variability and available quantities. Samples were taken from representative test pits (Large Samples) as well as from other positive test pits (small samples). Testing was conducted at the "The Testing was conducted at the "Britech Materials Testing Laboratories in Karen, Nairobi".

Large samples were subjected to the following tests.

- Atterberg Limits
- Standard Compaction Test (BS Heavy compaction)
- Sieve Analysis of the compacted sample to 0.075 mm size.
- Determinations of four days soak CBR at 95% MDD and at OMC.

Selected large samples were in addition subjected to the following:

- 3 point CBR and swell at 90%, 95% and 100% MDD and OMC.
- CBR and swell at 95% MDD and OMC after 7 days cure followed by 7 days soaking on cement (2%, 3%, 4% and 5%) improved mixtures to determine the amounts of treatment additives required to make them suitable for the various pavement layers.

The results of the above tests give an indication of how materials from the selected sites are to be used in the project. The summary of test results obtained is presented in ANNEX E.

6.3.2.2 Gravel Sources

Ten gravel sources were investigated as prospective sites for improved sub grade, sub base and base material. The sites were identified within the road corridor of the project road. Materials were sampled by digging trial pits at an approximate 30m grid. The specific details of each gravel source are summarised in the table below:-

Road Section	Material Site No.	Chainage	Offset (km)	Side	Type of Gravel
Lesseru - Kitale	MS1	004 + 500	0.01	LHS	Brown Lateritic Gravel
	MS2	013 + 300	10.0	LHS	Brown Lateritic Gravel
	MS3	019 + 500	2.50	RHS	Brown Lateritic Gravel
	MS4	046 + 200	0.06	LHS	Brown Lateritic Gravel
Kitale - Chepareria	MS1	070 + 500	0.60	RHS	Brown Lateritic Gravel
	MS2	084 + 500	5.00	LHS	Whitish Quartzitic Gravel
	MS3	103 + 700	1.60	LHS	Whitish Quartzitic Gravel
Chepareria – Marich Pass	MS1	112 + 800	0.01	RHS	Whitish Quartzitic Gravel
	MS2	145 + 800	0.04	RHS	Whitish Quartzitic Gravel
	MS3	157 + 700	1.80	RHS	Whitish Quartzitic Gravel

6.3.2.3 Hard Stone Sources

Three possible hard-stone quarries whose details are summarized in the table below were identified for use on the roads:-

Hardstone Quarry No.	Name of Hardstone Quarry/ Area	Location	Chainage	Offset (km)	Side	Remarks
HS 1	Mlimani	Along Lesseru – Moi's Bridge Road.	036+ 400	1.90	RHS	Surface samples Tested, boreholes drilled to confirm quantity and quality.
HS 2	Mowlem	Along the Kitale – Suam Road	064+ 200	29.0	LHS	Surface samples Tested, boreholes drilled to confirm quantity and quality.
HS 3	Chepsertoi Area	Just past Marich Pass Junction	158+200	1.50	LHS	Surface samples Tested, boreholes drilled to confirm quantity and quality.

Three sources in the above areas were investigated through sampling from outcrops and boulders and the samples subjected to the following laboratory tests:

- Los Angeles Abrasion (LAA);

- Aggregate Crushing Value (ACV);
- Aggregate Impact Value (AIV);
- 10% Fines Aggregate Crushing Test (10% FACT);
- Chloride and Sulphates Content
- Sodium Sulphate Soundness (SSS);
- Specific Gravity and Water Absorption;
- Bitumen Affinity using 60/70 penetration grade bitumen, MC3000 cut back bitumen and K1-60/70 emulsions.

Results of these tests are attached in appendix.

6.3.2.4 Sources of Sand

Samples of sand were collected from two sources summarized in the table below:-

Sand Source No.	Name of River	Chainage	Offset	Side	Remarks
RS 1	River at Moi's Bridge	034 + 500	Within Road Corridor	LHS	River Sand
RS 2	Upper River Moron	130 + 080	Within Road Corridor	LHS	River Sand

The samples were subjected to the following Laboratory tests and the results appended overleaf:-

- Grading to 0.075mm sieve.
- Clay, Silt and Dust content.
- Sulphate content as SO_3(%m/m).
- Chloride content as cl^-(%m/m).
- Organic content.
- Sodium Sulphate Soundness (SSS).
- Sand Equivalent Value.

6.3.2.5 Water for Construction

Several rivers both permanent and seasonal were identified along the project corridor crossing the road at different locations as summarized in the table below. Two samples were obtained for laboratory testing and analysis as to the suitability for road construction. The results are appended overleaf.

River	**Chainage**
River Chepkoilel (Permanent)	008 + 180
River Kipsangui (Permanent)	016 + 750
Mtoni Polisi (Permanent)	026 + 720
River Singerere (Permanent)	034 + 500
River Kesongon (Permanent)	063 + 480
River Ortum (Seasonal)	130 + 080
River Morun (Permanent)	148 + 140

The findings from the detailed inspection and evaluation of the drainage structures and the subsequent recommendations derived are presented in the preceding sections of the report.

7.6.3 Inventory of Crossings

There are approximately 40 streams and river crossings and several small and localised drainage paths and swampy areas not discernible on the topographical maps. Topographical characteristic and catchment description of the crossings are presented below. Figure 6.2 show the general drainage characteristic of the existing structures across the project road. Detailed inventory including picture is attached in Appendix I.

Table 38: Catchment Details

Catchment	Length (Km)	Name of Waterway	Type of Existing structure	Area (km^2)	Length (Km)	Slope (m/m)	Catchment Description
C1	5+22	Chepkoilel Stream	Pipe Culvert	11.50	2.40	0.025	Gently sloping agricultural soil, heavily cultivated
C2	8+18	Sergoit River	Bridge	601.10	82.30	0.009	Gently sloping agricultural soil, heavily cultivated
C3	16+75	Kipsangui River	Bridge	135.30	34.90	0.008	Gently sloping agricultural soil, heavily cultivated
C4	26+72	Little Nzoia River	Bridge	289.50	43.40	0.010	Gently sloping agricultural soil, heavily cultivated
C5	34+50	Nzoia River	Bridge	3078.00	123.30	0.011	Gently sloping agricultural soil, heavily cultivated, Several tributaries rising from forested areas
C6	63+48	Chebwan /Koitopos	Bridge	708.40	65.50	0.032	Gently sloping agricultural soil, heavily cultivated,
C7	72+92	Nyanjau	Box Culvert	7.60	3.60	0.017	Gently sloping agricultural soil, heavily cultivated
C8	73+70	Kipsain	AMCO Pipe	111.80	16.40	0.005	Gently sloping agricultural soil, heavily cultivated
C9	103+86	Lounou	Trapezoidal Box Culvert	7.60	2.30	0.130	Gently sloping agricultural soil, heavily cultivated
C10	107+20	Ephemeral	Pipe Culverts	4.10	2.70	0.063	Gently sloping agricultural soil, heavily cultivated
C11	109+44	Chepareria	Box Culverts	15.60	6.10	0.080	Gently sloping agricultural soil, heavily cultivated
C12	109+72	Ephemeral	Box/Pipe Culverts	2.35	2.00	0.030	Gently sloping agricultural soil, heavily cultivated
C12	119+62	Ephemeral	Pipe Culverts	0.71	1.40	0.014	Steep Mountainous, forested at the tops
C13	122+28	Ephemeral	Box Culvert	5.73	4.53	0.013	Steep Mountainous, forested at the tops
C14	122+72	Ephemeral	Pipe Culvert	1.20	1.23	0.293	Steep Mountainous, forested at the tops
C15	123+80	Ephemeral	Pipe Culverts	0.26	0.56	0.054	Steep Mountainous, forested at the tops

Catchment	Length (Km)	Name of Waterway	Type of Existing structure	Area (km^2)	Length (Km)	Slope (m/m)	Catchment Description
C16	124+46	Ephemeral	Pipe Culverts	1.53	1.31	0.092	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C17	125+86	Ephemeral	Pipe Culverts	2.02	1.20	0.067	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C18	127+78	Ephemeral	Pipe Culverts	0.39	0.65	0.277	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C19	130+08	Morun	Bridge	523.10	60.00	0.028	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C20	130+96	Sebit	Bridge	60.80	19.70	0.094	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C21	131+80	Sebit	Bridge	58.30	18.80	0.098	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C22	132+34	Ephemeral	Pipe Culvert	1.30	1.56	0.115	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C23	134+16	Ephemeral	Pipe Culvert	0.37	0.80	0.125	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C24	135+90	Ephemeral	Pipe Culvert	0.34	0.63	0.317	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C25	136+90	Ephemeral	Pipe Culvert	0.22	0.80	0.088	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C26	137+10	Kereiwa	Box Culvert	17.60	9.50	0.115	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C27	137+42	Ortum	Box Culvert	11.69	6.30	0.187	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C28	138+00	Ephemeral	Box Culvert	10.80	6.20	0.194	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C29	139+64	Ephemeral	Pipe Culvert	0.77	1.30	0.200	Steep Mountainous, sparse covered with

Catchment	Length (Km)	Name of Waterway	Type of Existing structure	Area (km^2)	Length (Km)	Slope (m/m)	Catchment Description
							vegetation with exposed rock, loose gravel
C30	140+65	Ephemeral	Pipe Culvert	1.40	0.90	0.156	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C31	141+24	Ephemeral	Pipe Culvert	2.42	2.42	0.314	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C32	143+10	Ephemeral	Box Culver	0.70	1.32	0.121	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C33	144+10	Ephemeral	Pipe Culvert	10.40	5.56	0.183	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C34	145+04	Ephemeral	Pipe Culvert	1.81	2.62	0.260	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C35	145+54	Ephemeral	Pipe Culvert	0.78	1.12	0.250	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C36	146+65	Ephemeral	Pipe Culvert	0.91	1.92	0.313	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C37	148+14	Kopro	Bridge	28.30	10.03	0.121	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C38	149+03	Ephemeral	Box Culvert	3.51	2.90	0.207	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C39	151+34	Ephemeral	Pipe Culvert	2.14	2.40	0.283	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel
C40	152+76	Morun	Bridge	1335.20	85.10	0.025	Steep Mountainous, sparse covered with vegetation with exposed rock, loose gravel

7.8 Design of Proposed Drainage Structures

7.8.1 Drainage Capacity Analysis

The following hydrological standards are generally used and where exceptions occur, these are explicitly noted. The recommended flood occurrence return periods for the various types of structures are shown below.

Table 40: Hydrological standards

Type of Structure	Size	Hydrological Standards
Pipe Culvert	Minimum 0.9m dia.	1 in 10 year flood, check for overtopping against 1 in 25 year flood
Box Culvert	Minimum 2m (width) x 1m (height)	1 in 25 year flood, checked for overtopping against 1 in 50 year flood. Invert to be a minimum of 1.5D below the road surface
Bridges	Dependent on catchment, river/stream channel geometry	1 in 50 years checked against 1 in 100 years

7.8.2 Design Floods

Design floods have been determined using the flood analysis methods detailed above. 24 hour rainfall intensity from the Kenya rainfall frequency atlas was used to estimate peak rainfall. The table below shows the rainfall frequency for two satiations derived form the atlas, Kitale and Cherengani, for the various design periods.

Table 41: 24 hour Rainfall frequencies

Frequency	Rainfall intensity (mm/hr.)	
	Kitale	Cherengani
5	3.2	2.3
10	3.8	2.7
25	4.6	3.2
50	5.2	3.6
100	5.6	4.0

Annex 3: Initial ESIA Report Non-Technical Summary

NON TECHNICAL SUMMARY

Introduction:

The Government of the Republic of Kenya has received a credit from the International Development Association (IDA) towards the cost of the Northern Corridor Transport Improvement Project. Parts of the credit have been allocated to fund Engineering Services on the Eldoret - Kitale - Juba Road, linking Kenya and Sudan and forming one of the backbones of Corridor 3 of the high priority trans-national road corridors under the East African Community Road Network.

The government of the Republic of Kenya is applying part of the fund under the contract for the "Consultancy Services for Feasibility Study, Environmental Impact Assessment, Resettlement Action Plan, Detailed Design and Tender Document preparation of the Lesseru - Kitale - Marich Pass Road Rehabilitation Project".

KOCKS CONSULT GMBH in association with MAX & PARTNERS Limited and SURTECH Limited has been commissioned by the Government of Kenya through the Kenya National Highways Authority (KeNHA) to carry out the consultancy services. To undertake the Environmental Impact Assessment KOCKS CONSULT GMBH in association with MAX & PARTNERS Limited and SURTECH Limited have engaged the services of ENVILEAD Limited – a firm of NEMA – Kenya certified Environmental Experts.

EIA Study:

This ESIA Study, was conducted in line with the provisions of Kenya's Environmental Management and coordination Act (EMCA) of 1999 and its subsidiary regulations such as the Impact Assessment and Audit Regulation, 2003; Waste Management Regulations, 2006, Water Quality Regulations, 2006; Controlled Substance Regulations, 2007; Noise and Excessive Vibration Control Regulations,2009; Emissions Control Regulations,2006; Wetlands, River Banks, Lake Shores and Sea Shore Management Regulations, 2009; Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing Regulations,2006. Additionally, relevant national legislations such as the Land Act, 2012; the National Land Commission Act, 2012, the Land Registration Act, 2012, the Explosives Act, the Water Act among other key laws and policies relevant to road development in Kenya. Additionally, noting that this project is partly execution is partly funded by IDA – an arm of the World Bank, we reviewed World Bank's Safeguard Policies.

The WB safeguard policies taken into consideration during project impact evaluation are Operation Policy (OP) / Bank Procedure (BP) for Environmental Assessment (4.01); OP/BP for Natural Habitats (4.04); OP / BP for Forests (4.36); OP / BP for Pest Management (4.09); OP / BP for Indigenous People (4.10); OP / BP for Physical Cultural Resources (4.11); OP / BP for Involuntary Resettlement (4.12); and OP / BP for Public Disclosure 17.50.

The EIA study was conducted by a multidisciplinary team of experts through collection of baseline information on the environmental status of the project area through field studies and consultation of key stakeholders (Interested and Affected Parties).

The Road Project:

The road between Lesseru and Marich Pass may be divided into the following three sections based on the current road condition;

(i)	Lesseru – Kitale	53 km
(ii)	Kitale – Kapenguria	40 km
(iii)	Kapenguria – Marich Pass	65 km
	Total road length	**158 km**

The GPS Coordinates of Lesseru (KM 00) are: Longitude 35^{O} 11' 46.151" and Latitude 0^{O} 36' 23.175" and Marich Pass (KM 158) are: Longitude 35^{O} 26' 47.803" and Latitude 1^{O} 32' 2.867".

The road section between Lesseru and Kitale is in fair condition but shoulders have been completely eroded in most areas. Between Kitale and Kapenguria is also in fair condition with a few potholes on the carriageway. The most damaged section is between Kapenguria and Marich Pass which is in poor condition with most areas being beyond routine maintenance operations.

Apart from Lesseru (KM 0+000) and two points at Kitale Town (KM 55+000 and KM 57+100) where land will be acquired for the proposed Interchanges, the proposed road rehabilitation will be limited within the existing 40 metres wide road reserve. However, it is worth noting that it will not be possible to reduce the existing steep grades (of between 6 - 11 percent) of road at Kamatira Hills to a maximum grade of 5 percent within the existing 40 metres wide road reserve, we are of the view that a realignment of the road at this section is necessary.

The preliminary estimated project cost is Kenya Shillings Nineteen Billion Four Hundred Thirty Three Million One Hundred Twenty Nine Thousand Two Hundred Sixty Five (**Kshs. 19,433,129,265**), accordingly, the EIA Fees payable to NEMA is Kenya Shillings Nineteen Million Four Hundred Thirty Three Thousand One Hundred Twenty Nine and Thirty Cents (**Kshs.19,433,129.30**) – which is 0.1 percent of the estimated project cost.

Positive impacts:

There are a number of positive benefits associated with the proposed project. The following are some of the positive benefits anticipated:

(i) Provision of employment opportunities during both construction and periodic maintenance phases of the project – in undertaking rehabilitation works, there will be some direct employment opportunities for both skilled and unskilled labor on the project road. Furthermore, indirect employment opportunities are bound to arise from the provision of services to the construction teams.

(ii) Socio-Economic benefits: Improvement of this road which is a key component of Northern Corridor Transport Corridor links Kenya and Southern Sudan and the counties of Uasin Gishu, TransNzoia, West Pokot , Turkana to the major towns such as Kisumu, Kakamega, Kitale and Eldoret, these will boost economic development in the regions to be served by the road;
The upgrading of the roads will lead to improved access to and from the trading centers of Soi, Nangili, Matunda, Moi's Bridge, Kitale, Makutano, Chepareria, Serbit, Ortum, and Marich Pass. Such developments will reduce transport times for goods, services, and the public from the town centers to the A104 and A1 highways, and encourage further development of the town centers.
There are numerous sociological and socio- economic benefits, resulting from improved access to schools, health facilities and trade centers associated with road projects. The improved road will contribute to increased productivity and thus an ultimate improvement in standards of living. Improved access means these institutions can be better staffed and equipped. Better access will inevitably increase the price of land along the roads.

(iii) Improved road motarability and reduced road accidents at Kamatira Hills as the existing road alignment has steep grades (of between 6 - 11 percent) this may be a major contributing factor to the frequent road accidents at Kamatira Hills, the proposed road realignment will have a maximum grade of 5 percent, this will make the road safer.

Negative Impacts and their Mitigation Measures:

The project will result in some negative impacts (for which we have proposed mitigation measures) as summarised in table 1 below:

ENVIRONMENTAL CONCERNS	MITIGATION MEASURES
Involuntary resettlement	▪ Commissioning a RAP; ▪ Full compensating the PAPs; and ▪ Lesseru interchange will be located in the open field (farms) opposite the densely occupied Lesseru Informal Centre.
Material Sites a) Un-rehabilitated	▪ Rehabilitation of the Material sites; and ▪ Training of supervisory personnel in proper Quarry Techniques.

b) Temporary Mosquito Breeding Site	▪ Where possible avoid materials' extraction in human settlement areas; ▪ Rehabilitate Material sites; and ▪ Create awareness on the dangers posed by stagnant water.
Changes in Hydrology and/or Drainage.	▪ De-siltation; ▪ Installation & repair of drainage structures; and ▪ Facilitation of off-road drainage to eliminate ponding.
Soil Erosion	▪ Construction activities have to be organized in a very efficient manner; ▪ Soil and gravel should be shaped and compacted immediately after transport to its final destination; ▪ Construction activities should be carried out during the beginning and or towards the end of the rainy season; ▪ Landscape and plant vegetation on disturbed surface on completion of the construction phase of the project; and ▪ Provision of suitable storm water drainage channels to effectively discharge water safely; ▪ Soil erosion control measures e.g. grassing; scour Checks; culverts; gabion Works and Stone pitching; and cut-water Drains.
Air pollution	▪ Regular watering of dusty sections of the road project; ▪ Use of PPEs e.g. dust masks; ▪ Regular servicing of machinery and vehicles; and ▪ Buy fuel from authorized dealers.
Noise Pollution	▪ Regular servicing of work machinery; ▪ Use of PPEs e.g. dust masks; and ▪ Enforcement of standards.
Pollution of the natural water causes	▪ Channel washouts/runoffs through silt precipitation ponds before discharge into the natural watercourses.
Conservation of Bio-Diversity (Vegetation)	▪ Compensate owners of trees to be cleared; ▪ Create awareness on importance of bio-diversity among the maintenance workers; ▪ Selective site clearance beyond the road reserve; and ▪ Locate diversions within the road reserve or through the shortest route possible beyond the road reserve.
Contamination of soil and water through accidental spillage of oil, grease and fuel in the mechanical plant workshop and along the road	▪ Collect , store waste oils awaiting collection by a certified waste oil handler; ▪ Avoid accidental spillage through good mechanical practices and proper storage; ▪ Repairs of machinery to be undertaken at designated places with concrete surface; and ▪ Training and sensitization of mechanical staff.
Increased vehicular traffic	▪ Drivers sensitization on road safety; ▪ Speed limits; and ▪ Signage.
Road Safety (e.g traffic accidents visual intrusion)	▪ Provision of proper road safety elements such as adequate shoulders, road signs and furniture.
Public & Occupational Safety and Health	▪ Fence off work active sites; ▪ Use of PPEs; ▪ Provide adequate location and maintenance sanitary facilities; ▪ Camps housing to be in accordance with approved site plans ; ▪ Create awareness on HIV/AIDs and other sexually transmitted diseases; ▪ Avail health care services; ▪ Provide safe drinking water points; and ▪ Control of Malaria.
Prevention of encroachment along the Road Reserve.	▪ Awareness campaigns; and ▪ Enforcement Section 91 of the Traffic Act.
Waste along the roadside.	▪ Create awareness on the importance of a clean environment; and ▪ Install permanent litter bins (concrete) as part of the road furniture as intervals to be emptied regularly.
Possible Collusion of Vehicles with livestock.	▪ Erect animal crossing signs ▪ Establish livestock crossing corridors; and ▪ Erect bumps before and after the livestock crossing corridor.
Water use	▪ Obtain WRMA's permit for water extraction; and ▪ Water conservation.
Energy use	▪ Regular servicing of machinery and vehicles; ▪ Switch off idle machinery and vehicles; and ▪ Use energy efficient machinery

Conclusions:
The primary objective of the study was to document the present condition of the environment and identify positive and negative impact that may result from the proposed rehabilitation of the Lesseru – Kitale - Marich Pass Road.

The improvement works on the project roads will no doubt contribute to promoting economic development in the study area. In addition, socio-economic benefits, such as improved access to health care centre and schools, and better communication between settlements and market centre are also expected.

As the project roads already exist, the natural environment has already been considerably altered. Therefore any major impact has already occurred and additional disturbance due to construction works will be relatively minor.

An important negative impact will result from a number of issues including soil erosion during earth and excavation works and construction of structures, e.g. culverts especially at the river crossings. Soil erosion, particularly as a result of excavation works at the gravel pits, can be mitigation through proper supervision and efficient operation activities. Pollution due to vehicles fumes, dust, noise, as sediments will occur during construction and continue during the operation phase. This will also impact on public health.

Workmen camps should preferably be located at the various towns. Workmen's camps must not stress the local resources (such as fuel wood and water supplies) at the expense of the local population, and livestock.

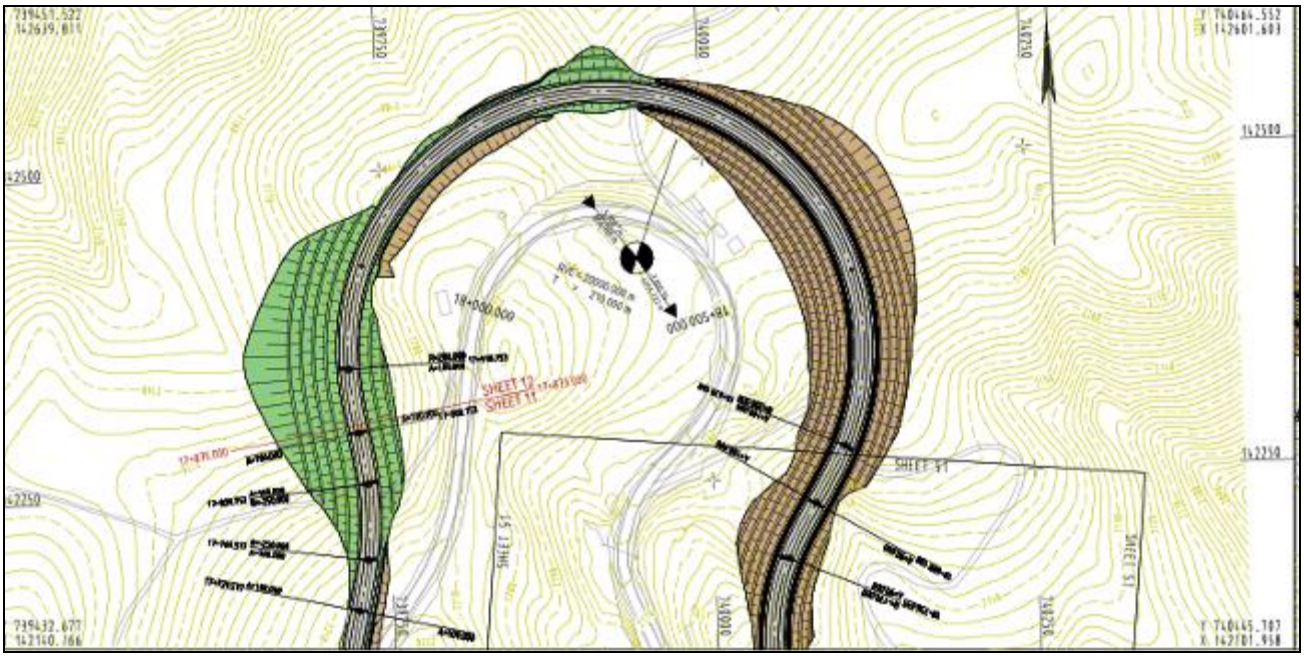
The project road are a danger to be designed for improved access and are likely to result in higher speeds, which pose a danger to non-motorized traffic. The provision of bumps and installation of directional and warning signs will help to mitigate this impact.

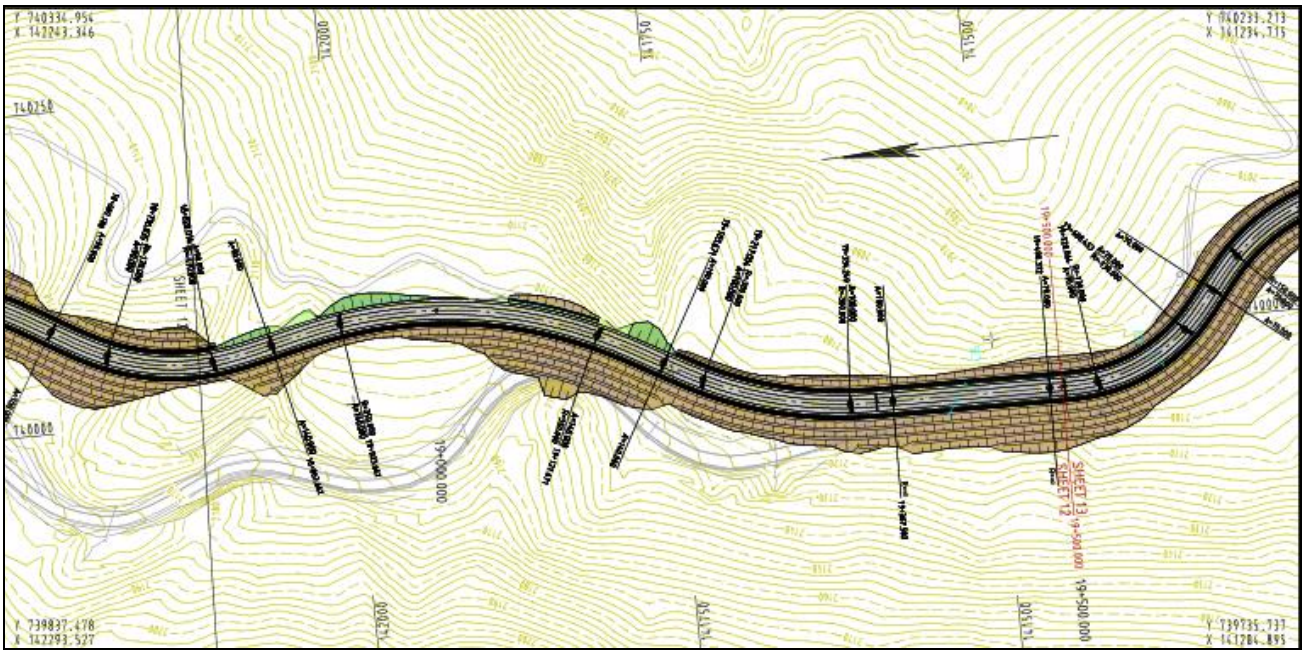
Recommendations:

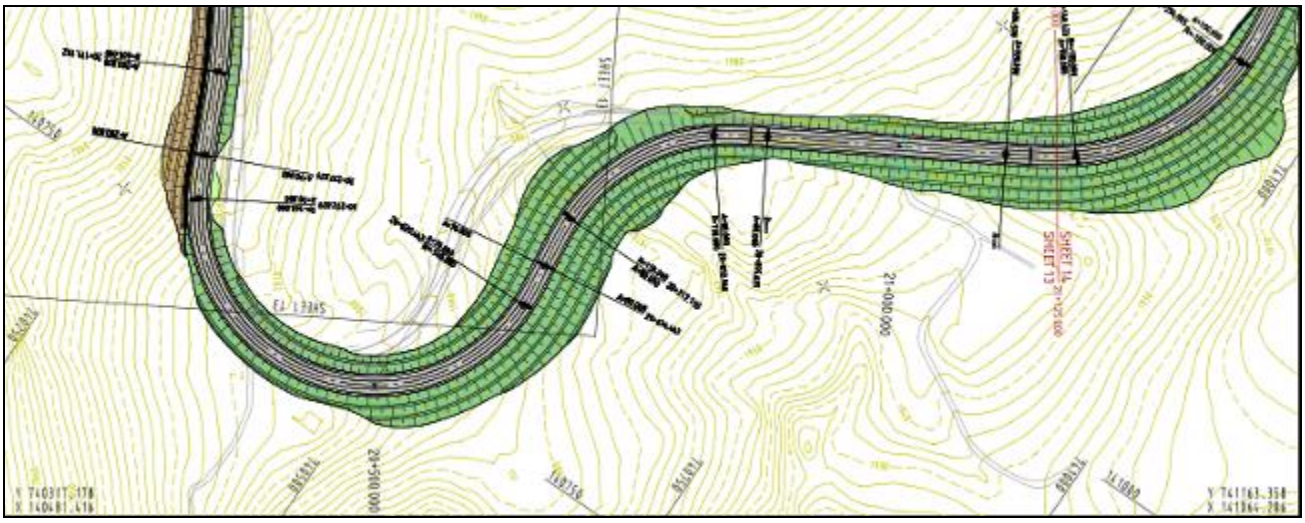
Recommendations for the prevention and mitigation of adverse impacts are as follows:

i. New gravel pits must be cordoned off or fenced during use, and rehabilitated after use as per the equipments of the landowners.
ii. Trees and shrubs should be planted along embankment to prevent erosion. Trees improve visual aesthetic and act as filters for particulate matter.
iii. Unnecessary clearing of vegetation should be avoided to in order to reduce soil erosion.
iv. The local people must be informed of the details of the project prior to construction.
v. Where possible local residents should be used during construction works.
vi. A copy of the environmental management and monitoring plan must be given to the contractor prior to construction. The contractor needs to draw up an environmental management plan of his own to show how he will address all the mitigation measures. The supervising Engineer is responsible for the assessing the contractor's environmental management plan.
vii. Compensation through direct negotiation and agreement between the Client/contractor and the landowners who must relinquish their land for the road project must be fair, and payments have to be made promptly. Compensation should cover affected land, crops, and all structures (permanent and mud-and –wattle structures, pens, sheds, fences, etc) that are located outside the road reserve.
viii. Diligence on the part of the contractor and proper supervision by the Engineer during construction and the initial operation phase is crucial mitigating impacts. However all mitigation measure need to be specified in tender and contract documents, and must be in the Engineering Drawings, specifications and bills of quantities.
ix. Periodic environmental monitoring would ensure that measures that have been implemented in order to prevent or avert any negative impact have been carried through.

Annex 4: Realigned Sections through Kamatira Forest








SHEET 15
SHEET 14

Annex 5: Supplementary Stakeholders Consultations

List of Persons Consulted In Supplementary Stakeholders Consultations

NAME	LOCATION	ORGANISATION	CONTACT
Jacinta Cheptoo	D.O's Office, Chepareria	National Government	0711598499
Eng. Michael Obop	Eldoret	KeNHA Regional Office	0722644975
Daniel Toros	Leseru	Village elder	0726701692
Sammuel P. Lamureng	Chief, Bartei	National Government	0726658424
Emmanuel Lomiu	Assistant Chief, Ortum	National Government	0706883065
Stephen Seger	Seger	Chicken trader	-
Mama Kamau	Bartei	MOL&UP, Surveyor	0710760999
Kiprono	Chief, Soy	National Government	-
Mary Wambui	Trader, Matunda	Trader	-
Andrew mulongo	Mois Bridge	Village elder – matunda market	0722975081
Eliud kositany	Assistant Chief, Matunda	National Government	-
Senior langat	Mois Bridge	Village elder - Natuono	-
Sammuel langat	Mois Bridge	Mois bridge market chairman	0711989489
Mercy Kiyapyap	Kapenguria	Manager Cabesi CBO	-
Joseph Kiprotich Koech	Leseru	Business person	0725339805
Silas Kipchonge Keroney	Leseru	Business person	0713943381
Daniel Kiprotich Tirop	Leseru	Business person	0726701692:
Elizabeth Jelangat	Leseru	Business person	0714487885
Robert Metto	Leseru	Business person	0713093332
Oliver K Samoei	Leseru	Business person	0726214934
Ronald Wanyela	Leseru	Business person	0703344595
Clement Lingango	Ortum	Others	0710360451
Cyrus Chesore	Ortum	Business person	0728271498
Samuel P. Lempene	Ortum	Others	0726658424
Omwoha Kennedy	Matunda	Resident	0727348403
Erac Muthoi	Matunda	Business person	0710185841
John Mwai	Matunda	Business person	0721177694
Jackson Kemei	Matunda	Business person	0721537200
Evans Momanyi	Matunda	-	0722409909
Daniel S. Limapus	Ortum	Resident	0715690225
Patrick Nabutete	Matunda	Resident	0722921046
Joseph loporeng	Ortum	chairman Ortum market	-
Wilson chemjor	Ortum	Business person	0729940481
Emmanuel lingasia	Ortum	Business person	-
Mastayit lokiles	Ortum	Elder/Chairman, Pokot South	-
Mr Oyanda	Mois Bridge	Moi's Bridge Air market Chairman	0723329574

Minutes of Supplementary Stakeholder Meetings

Meeting With The County Director Of Environment Trans Nzoia County Mr. Jasper Omwenga.

He mentioned that the main problem facing most of the projects is acquisition of resources. Rehabilitation of borrow sites and material extraction points. Most contractors sign contracts with residents to abstract materials and then fail to rehabilitate after they are finished which poses a huge health and safety risk.

He recommended that all the trees that will be cut down along the road reserve to be disposed as per the procedures of the laws of Kenya. He requested that compensation be done accordingly. He mentioned that the camp sites are also a major area of environmental concern. He pointed out that the existing contractors' camps have a major problem with solid and liquid waste management. He pointed out that many camps are located near sensitive environment like wetlands.

Stakeholders (Committee) Meeting Held At Matunda Market On 13th January 2015

Members present

(i) Constituency manager
(ii) Committee members
(iii) Consultants

Min. 1: Introductions

Opening prayer from Grace Muthoni

The chairman led a round of introduction by all the members in attendance The chairman mentioned that the committee is involved in the development of all projects that affect Matunda market.

He mentioned that access roads for the markets are in a poor state and they would appreciate if KeNHA would consider the market by supplying a loop road.

Min. 2: Project Briefing By The Consultant

The project starts from Lesseru to Kitale to Marich Pass. The proposed project will affect the environment in specific areas like, the Kamatira forest, various rivers and streams. There are issues of safety in that the gradient is steep and bridges have no guard rails. Huge trunks of land may be affected in the process of realigning the road Waste management is a major problem and suggested that as part of CSR it would be suggested that they put up concrete waste receptacle at the markets and then coordinate with the county government for their disposal. KeNHA is responsible for the construction of the road but they work hand in hand with the county government in the construction of the various public amenities.

Comments

The road is a major source of income for the traders and also a means of transport for both passengers and goods. There is a market place under construction approximately less than 1 acre for the traders by the roadside to trade at. The market area is expected to carry approximately 63 traders and more than 250 persons to be affected by the road will be left out.

They requested, whether the available space can be expanded to accommodate more traders at the proposed market place, can it be considered

Proposed idea that the area proposed for putting up toilets can be used for expansion of the market. The area to be used as a temporary measure as the county government finds an alternative area for the traders

They also requested that the tarmac be extended to the hospital and the high school
They mentioned that they need proper drainage to be done so that safety is considered, traders to be considered especially when there are heavy rains.

They requested that they be provided with a bus stage, near the upcoming market and the stages by the road to be expanded to accommodate all vehicles since vehicles stop in the road to drop passengers which is a risk

Meeting Held on 14th January 2015 with Bartei Location Chief and Stakeholders in Ortum in Respect to Leseru – Kitale-Marich Pass Road.

Meeting started at 10.45 am after a word of prayer from Pastor William Masait. After which the area chief welcomed the few individuals who could avail themselves to deliberate one or two issues in respect to proposed rehabilitation of A1 road to Marich Pass from Leseru.

The chief together with the stakeholders presented a few recommendations that they thought should be integrated into the road during construction.

(i) Two bus stops within Ortum i.e. Muriani and Chesoton.
(ii) Several waiting sheds along the road for sheltering during the rainy seasons and from the sun.
(iii) Bumps at three specific locations
(iv) All the box culverts within Ortum to be replaced with bridges for efficient surface run off flow.
(v) Homesteads along the road to be served with culverts for easy access
(vi) Part of CSR road to consider Saya Primary and Ortum Boys for tarmac from the highway to the respective institutions.
(vii) Requested for leveling of several school grounds as well as the Chiefs office.
(viii) Individuals who have constructed on the road reserve to be compensated.

Brief from the consultant

The consultant started by noting he's from Aquaclean Services Limited (a Consultant) contracted by KeNHA to carry out an ESIA review for the Leseru-Kitale –Marich Pass road. He pointed out the following.

(i) People who have encroached into the 60 meters road reserve will not be compensated for loss of structures or land but intern they will receive monetary compensation for loss of livelihood.
(ii) Part of CSR public institutions like hospitals, schools and public offices can be considered for improvements through provision of tarmac and depending on the demand the can build several classrooms.
(iii) Requested all to be vigilant during construction and to own the project.

Supplementary Stakeholder and Public Consultations

Overview

It is a Government policy that beneficiaries and members of the public living near new or improvement project sites (both public and private) are consulted to seek their views and opinions regarding the projects before they are implemented. Consultative Public Participation is therefore an important process in ESIA studies. Through this process, stakeholders have an opportunity to contribute to the overall project design by making recommendations and raising concerns. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation of the project.

Consultation and Public Participation

Initial Stakeholders Consultations had been undertaken during the initial ESIA Study process as well as the Resettlement Action Plan (details in the Initial ESIA Study Report). The review and ESIA update process designed a forum to verify the findings and capture additional opinions through a supplementary stakeholder consultation arrangement. The supplementary consultation was carried out in two phases namely general interviews followed by sample meetings at 2No. venues along the corridor where meetings were arranged with the support of the County Administrative Officials. The supplementary consultations were conducted with key informants including the County Government and National Government Coordinators (the County and deputy Commissioners, Chiefs and Assistant Chiefs), as well as GoK heads of departments (NEMA and agriculture), civil society, CBOs, farmers, land owners and traders along the road corridor.

The interviews were used as a tool for stakeholder identification and mobilization as well as collection of baseline data and information. In addition, it provided an opportunity to the participants to raise their fears and concerns and make recommendations as pertains to the project road. The persons consulted during the project review activities are presented in the annex.

Supplementary Stakeholder and Public Consultations

A total of five secondary public/stakeholder participation meetings were held along the project road between 12th and 15th January 2015. The venues of these meetings including dates is presented in the following table while detailed minutes of the proceedings are annexed to this report:

Supplementary Stakeholder Venues and Levels of Participation

Location	Date	Venue	Number of participants		
			Male	Female	Total
Leseru	15th January 2015 (2.00 pm)	Leseru village chairman's office – Leseru market	6	8	14
Matunda	13th January 2015 (12.00 pm)	Matunda market committee office, Matunda market	7	6	13
Bartei	14th January 2015 (2.00 pm)	Bartei chief's office, Ortum market	7	0	7
Likuyani	12th January 2015 (12.00 pm)	Soy market	6	0	6
Kipsaina	13th January 2015 (4.00 pm)	Kipsaina market	15	2	17

The following depicts participation levels in each of the CPP meetings on pictorial basis.

Supplementary Stakeholder Meetings


Leseru meeting In the village chairman's office


Matunda Meeting In the executive committee office


Matunda – field discussions to the proposed market site and link roads


Ortum Meeting

Key Fears and Concerns

(xii) There are fears associated with potential blasting activities at the material sites and other earth works.
(xiii) The stakeholders were concerned if their input will genuinely be taken into account in the project implementation.
(xiv) Social and moral interactions, especially with respect to potential influence to the local women with money during construction (construction workers) and use from truck operators,
(xv) Uncertain on the security trends during construction and post construction period.
(xvi) No clear established mechanisms through which concerns can be channeled and inadequate knowledge of to whom arising issues should be addressed.
(xvii) Increase in gully erosion and failure to undertake land scrapping
(xviii) Concern on proper civic education to the communities and stakeholders during the construction and post-construction phases for effective participation and ownership,
(xix) Potential displacement of people and destruction of structures and farm products from the road expansion. Call for full compensation of the affected people along the road corridor
(xx) Concern on the level of supervision to ensure compliance and integration of the peoples interests during the construction.
(xxi) People wondering whether institutions along the road corridor will be provided with link access roads to the main highway.
(xxii) Possibility of construction materials residuals in the construction of public institutions along the road including schools, churches and public halls.

Recommendations

Road Construction Standards
The road should provide for adequate bus bays that can accommodate at least four 14-seater vehicles. The road should be constructed to international standards with appropriate materials to avoid rapid deterioration like witnessed before. The road should be expanded to ease movement of high capacity goods vehicles and avoid accidents especially where there are sharp corners and on bridges. Adequate drainage and culverts to be provided especially at access passages to roadside institutions and homesteads

Safety and Security
The project construction should ensure appropriate road safety provisions and furniture including:

(viii) Traffic signs on the road sides showing where livestock crossing ramps and pedestrian crossings.
(ix) Provide speed controls on the pavement where necessary, especially near market centres and near institutions,
(x) High light masts for security in market centres
(xi) Appropriate road markings including zebra crossings, bridges approaches, climbing lanes and speed bumps, especially at road high safety risk spots,
(xii) Create adequate bus bays at appropriate locations
(xiii) Provide appropriately sized drainage culverts
(xiv) Design good and appropriately sized quality in junctions taking into considerations the local needs.

There is need to enhance security during and after road construction through mobile police patrols and strengthening of community policing in Leseru market junction and Kamatira Forest among others.

Employment and utilization of locally available resources
Involve and engage locals providing them in available employment opportunities. Preference should be given to the PAPs, IDPs (e.g. in Leseru Market) and the vulnerable persons (widows and physically challenged) as well as formally organized (e.g. environmental) groups along the road as sub-contractors. Construction materials should be sourced locally and where possible local businesses provided opportunities to supply materials.

Secondary Roads and other associated infrastructures
The road construction should consider providing tarmac to connect to the adjoining roads leading to public institutions notably Likuyani and Ortum chief's /AP camp, Matunda District hospital and open air market and Chepareria DO's offices among others.

(v) Homesteads next to the road should be provided with culverts
(vi) Before construction let there be the road in use beside the main road since we are excelled to services for Kenyans around.
(vii) Undertake public and stakeholder consultations just before and during construction.
(viii) Compensate the displaced businesses.

KeNHAs Response

The Kenya National Highways Authority (KeNHA) representative in the consultation forums responded as follows;

(v) The Project Affected Persons (PAPs) will be compensated through a clear process defined through a Resettlement Action Plan (RAP) prepared alongside this ESIA process
(vi) It is the desire of KeNHA that the local communities along the road corridor are involved during the construction and also be provided with opportunities during use for high ownership,
(vii) All aspects of the road construction will be undertaken as per the design guidelines established under the local and international standards
(viii) A Project Community Liaison Committees will be established for peoples participation.