



**MOMBASA TO MARIAKANI (A109) ROAD**

Preliminary and Detailed Engineering Design

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)  
REPORT**



**CLIENT:** KENYA NATIONAL HIGHWAYS AUTHORITY (KENHA)

**PROJECT TITLE:** DUALLING OF MOMBASA – MARIAKANI (A109) ROAD

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**AECOM Project No:** JO2028

**Status of Report** Final

**Report Title:** ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)  
REPORT

**Date of this Issue:** October 2014

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#### Acronyms

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ADT	Average Daily Traffic
ADTT	Average Daily Truck Traffic
AfDB	African Development Bank
ARAP	Abbreviated Resettlement Action Plan
ARV	Antiretroviral Therapy
ASAL	Arid and Semi Arid Lands
BOQ	Bill of Quantities
CBD	Central Business District
CBD	Convention of Biological Diversity
CBO	Community Based Organization
CC	County Commissioner
CO <sub>2</sub>	Carbon dioxide
CO	Carbon Monoxide
CFC	Chlorofluorocarbon
CPP	Consultative Public Participation
CSO	Civil Society Organization
CWSB	Coast Water Service Board
dB(A)	Decibel
DC	District Commissioner
DOSH	Directorate of Occupational Safety and Health Services
DO	District Officer
ECD	Early Childhood Development
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EA	Environmental Audit
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Assessment Procedures
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FDG	Focus Group Discussion
FOB	Foot Over Bridge
FRAP	Full Resettlement Action Plan
GDP	Gross Domestic Product
HC	Hydrocarbons
HIV/AIDS	Human Immunodeficiency Virus/ Acquired immune deficiency syndrome
IESIA	Integrated Environmental and Social Impact Assessment
ISS	Integrated Safeguard System
ISPS	Integrated Safeguard Policy Statement
KAA	Kenya Airports Authority
KARA	Kenya Residents Association
KARI	Kenya Agricultural Research Institute
KCAA	Kenya Civil Aviation Authority
KeNHA	Kenya National Highways Authority
KEMFRI	Kenya Marine and Fisheries Institute
KENGEN	Kenya Electricity Generating Company



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KDF	Kenya Defense Force
KDN	Kenya Data Network
KeRRA	Kenya Rural Roads Authority
KETRACO	Kenya Electricity Transmission Company
Km	Kilometer
KPA	Kenya Ports Authority
KPC	Kenya Pipeline Corporation
KPLC	Kenya Power and Lightning Company
KPRL	Kenya Petroleum Refineries Limited
KR	Kenya Railways
KURA	Kenya Urban Roads Authority
LHS	Left hand side
MCA	Member of County Assembly
MDG	Millennium Development Goals
MOR&PW	Ministry of Roads and Public Works
MOWASCO	Mombasa Water and Sanitation Company
MRM	Mabati Rolling mills
NBSAP	National Biodiversity Strategy and Action Plan
ND	Not detectable
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NGO	Non-governmental Organization
NMK	National Museums of Kenya
NMT	Non- motorized Transport
NO <sub>x</sub>	Nitrous Oxide
NPEP	National Poverty Eradication Plan
OCPD	Officers Commanding Police Division
OS	Operational Safeguard
OSHA	Occupation Safety and Health Act
PAP	Project Affected Persons
PEC	Poverty Eradication Commission
PM	Particulate matter
PRSP	Poverty Reduction Strategies Paper
RAP	Resettlement Action Plan
RF	Resettlement Framework
RHS	Right Hand Side
ROB	Rail Over Bridge
ROW	Right of Way
SO <sub>x</sub>	Sulphur oxides
SOP	Standard Operating Procedures
STI	Sexually Transmitted Infections
TB	Tuberculosis
ToR	Terms of Reference
VCT	Voluntary Counseling and Testing
VOC	Volatile Organic Compounds
WHO	World Health Organization



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WRMA	Water Resource Management Authority
WSSD	World Summit for Social Development
FGD	Focus Group Discussion
GA	Gender Analysis
FIDA-Kenya	International Federation of Women Lawyers
KAWOC	Kenya Association of Women Contractors
PWDs	People with Disabilities
OVC	Orphans and Vulnerable Children



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## EXECUTIVE SUMMARY

### **The Project**

*Mombasa-Mariakani road is a section of A109 situated in Mombasa and Kilifi Counties of Coastal Kenya. The project road is approximately 41km and forms part of the 500 km Mombasa-Nairobi highway that also constitutes part of the Northern Corridor linking the Kenyan Coast with the neighbouring countries of Uganda, Sudan and Rwanda. The project road starts at the junction of Kenyatta Avenue (A109) and Digo Road (A14) within Mombasa City. It runs in a northerly direction through Changamwe, Miritini and Mazeras before terminating shortly after Mariakani Weighbridge.*

*This section of A109 is faced with the challenge of rapid increase in traffic volumes including light vehicles and heavy trucks over the years, serious traffic mobility hindrance, intensive land use changes and developments without matching maintenance and expansion of the road. It is currently estimated that the base case vehicle speed is an average 10 – 30km/hr across the road corridor. On a worse situation, it takes an average of 3 – 6hrs to traverse a distance of 16km from Miritini into the city centre. With improved road, the vehicle speeds will change to an average of 50 – 80km/hr with significant improvement on travel time (10 – 20min) for the same distance.*

*Traffic congestion increases, CO<sub>2</sub> emissions (and in parallel, fuel consumption) also increase. In general, CO<sub>2</sub> emissions and fuel consumption are very sensitive to the type of driving that occurs. Traveling at a steady-state velocity results in much lower emissions and fuel consumption compared to a stop-and-go driving pattern. The current situation on the project road is that of stop-and-go scenario that is associated with high carbon emissions and so impacts on Climate Change Mitigation. By enhancing steady-state vehicular flow, traffic congestion will be highly reduced and in turn CO<sub>2</sub> emissions also reduced.*

*The current state of the road section also has challenges of safety, surface drainage, pedestrian mobility, conflicts with services and amenities as well as accesses to institutions. Public parking including rest and holding areas for trucks is also a major concern for road safety, road reserve congestion and environment pollution. Provision for truck parking areas will provide a solution to these concerns in addition to additional income generation for the respective County Government.*

*Due to the above reasons, the current capacity of the road is overwhelmed leading to persistent traffic congestion with far reaching social inconveniences, economic losses, safety risks and environmental degradation to mention a few. It is for this reason that KeNHA has identified the road as deserving rehabilitation and expansion (details on the intervention are in the design drawings and associated notes). A feasibility study and detailed engineering design was required so as to*



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*rehabilitate and upgrade the road in order to increase the capacity and enhance the flow of traffic taking into consideration the proposed works.*

#### **The ESIA Study**

*Implementation of major projects in Kenya is preceded by the Environmental and Social Impact Assessment studies. It is a requirement to undertake the Environmental and Social Impact assessment according to the regulations stipulated in The Environmental Management and Coordination (EMCA) Act 1999 and the Environmental Impact Assessment and Audit Regulations 2003. To ensure that the above project is implemented in an environmentally and socially sustainable manner, Aquaclean Services Limited, an independent Firm of Experts, was sub-contracted to conduct an Environmental and Social Impact Assessment for the proposed project. The ESIA for the proposed project was undertaken simultaneously with the feasibility study of the proposed project before the project implementation so as to identify environmental and social impacts and offer mitigation measures to the anticipated impacts.*

*Rehabilitation and expansion of A109 has notable potential social, economic and environmental linkages. The environmental and social impacts (ESIA) study was designed to identify these linkages and establish enhancement approaches for the positive aspects while developing mitigation measures for the negative impacts. The ESIA was carried out in compliance with the Government of Kenya's Environmental Management and Co-ordination Act of 1999 and the Environmental (Impact Assessment & Audit) Regulations, June 2003, among other relevant laws, regulations and guidelines. It has also taken into consideration the African Development Bank (AfDB) environment and social safeguards in addition to other international requirements. The exercise adopted an integrated approach where data and information evaluation, field investigations, consultations among the consultant team, interviews and discussions with stakeholders and affected parties were undertaken at the same time. The exercise adopted an integrated approach where data and information evaluation, field investigations, consultations among the consultant team, interviews and discussions with stakeholders and affected parties were undertaken at the same time.*

#### **Key Observations**

##### Project Location

*The project road is situated in Mombasa and Kilifi Counties of Coastal Kenya. It starts at the junction of Jomo Kenyatta Road with Digo Road (A14) within Mombasa City to Makupa area adjoining the Makupa Causeway into Changamwe at the Changamwe Roundabout. The road then traverses through Changamwe, Mikindani junction, Kwa Jomvu, Miritini, Mazeras before terminating at approximately 700m after Mariakani Weighbridge area. It also serves local connections of Mombasa mainland, Kilindini Harbour, Moi International Airport and a host of various other public*



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and private premises. The existing single carriageway sections are narrow with poor conditions are therefore a big impedance to flow of the high traffic experienced between Mombasa and Mariakani. The sections are:-

- ✓ Kenyatta Avenue/Digo road Roundabout (A14/A109 junction) to Changamwe 6 Km long and currently dual carriageway
- ✓ Changamwe to Miritini, 8.8 Km long and currently single carriageway
- ✓ Miritini to Mazeras, 4.9 Km long and currently dual carriageway
- ✓ Mazeras to Mariakani Weighbridge, 20.1 Km long and currently single carriageway

#### Social and Economic Indications

Mombasa – Mariakani road can be socially and economically divided into three sections as follows:

- ✓ Urban/Peri-urban sections covering Mombasa island from Digo road through Changamwe to Jomvu as well as the urban centers of Mariakani and Mazeras.
- ✓ The sections are characterized by commercial activities, small scale trading, heavy industries (steel makers, Doshi, Mabati Rolling Mills, Nyumba and Kaluworks among the many) and residential (Changamwe, Mikindani, Kwa Jomvu and Bangladesh slum among others).
- ✓ Rural sections from Mazeras and all sections from the suburbs Mombasa city through Mazeras to Kokotoni to Mariakani,
- ✓ These are characterized with huge tracts of empty land, livestock keeping and scattered homesteads. However, observations show an emerging trend in land development along the corridor mainly commercial.

#### Population Distribution

According to the 2009 Kenya population census, the three counties traversed by the project road had a total population of 2,699,036 persons (Male 1,338,447 and Female 1,360,589). Most of the population in Mombasa County is concentrated in the urban areas while in Kwale and Kilifi, majority of the population is rural and concentrated in high potential areas.

#### Settlement Patterns

Settlements patterns within the project area are mainly influenced by the infrastructure network (roads, water availability, telecommunications and electricity), access to employment opportunities, land tenure as well as cheap housing and agricultural potential (dictated by nature of soils) and the coast line. High population densities are found in the Mombasa metropolitan areas of Island, Changamwe, Bahari and the Jomvu, as well as Mariakani and Mazeras towns including their immediate neighbourhoods.



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#### Land Use

Land use in Mombasa County is diverse depending on the physical location. The major land use is residential development, industrial development, transport and communication, extractive, institutional and for commercial and service purposes among others. Most of the public land is mainly used for institutions development such as religious, health educational, military and the community facilities such as social halls, public gardens, show ground and sports ground.

#### Industrial Setting

The industrial land is not defined although Changamwe division it is mainly considered as an industrial area which has several industries such as Kipevu power generation and the Kenya Oil refinery company. Other industrial set-ups are at the Bamburi cement factory and the Kalu works. The commercial and services area is mainly within Mombasa island characterized by shops, open air markets, hotels, vehicle parking areas, commercial buildings (go downs, construction yards, show rooms) among others.

#### Air Quality

While noting the particulate matter levels are below the occupational health standards ( $10\text{mg}/\text{m}^3$ ), there are notable levels along the corridor within the urban and high economic activity areas. There are lower levels in isolated sections of the corridor with low population and human activities including the end of the project road and the weighbridge areas with an average of  $3 - 4.5\text{mg}/\text{m}^3$ . Sections of the corridor with high human habitation and economic activities, and particularly the Miritini area into the city centre displays high concentration of particulate matter ranging between  $6.5 - 7.3\text{mg}/\text{m}^3$  in the city centre. A significant of the particulate matter is associated with traffic on poor road surfaces.

The trends in other follows the same pattern as the particulate matter, i.e. low along high speed sections ( $25 - 50\text{mg}/\text{l}$ ) and notable along sections with slow moving vehicles. There is an extra high level of  $\text{CO}_2$  at Mariakani and Kokotoni ( $200\text{mg}/\text{l}$ ) and other sections near petrol stations. This is associated with slow moving trucks while the medium levels ( $75 - 100\text{mg}/\text{l}$ ) including city centre locations with interchanges and junction where there is heavy and slow moving traffic. It was also noted that the rate of dispersion is lower in parts of the city.

Sulphur Dioxide ( $\text{SO}_2$ ) levels are extremely low across the corridor (ranging from  $0.01\text{mg}/\text{l} - 0.14\text{mg}/\text{l}$ ) while the outer sections reports less than  $0.1\text{mg}/\text{l}$ . Other gases including Carbon Monoxide (CO), Volatile Organic Carbons (VOC) and Nitrogen Oxides ( $\text{NO}_x$ ) are all below detection levels. These results were obtained through a single measurement session. An intensive monitoring may be required to establish long term trends.

Significant drop in vehicular emissions is predicted on the improvement of the road surface. Notable reductions are noted in  $\text{CO}_2$ , Hydrocarbons, and Nitrogen Oxides. This reduction is associated with





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efficiency in vehicle operations, including travel speeds and time spent on the road section. Particulate matter and Lead tends to remain the same.

#### Noise Characteristics

The section is normally characterized with heavy traffic, mainly goods trucks most moving at slow speeds. At locations with slow speeds, the noise levels are generally low, though the level of light high speed traffic influences noise levels upwards. With cross section noise profile of 57 – 76dBA is within the established maximum level of allowable accelerating traffic noise of 84dBA, but higher than indoor occupational health standards for hospitals, schools and residential facilities. Improved road will facilitate faster moving vehicles and hence slightly elevated noise levels.

#### Materials Sources

An important issue in road construction is the sources of materials. These have been identified as follows (note that Contractor(s) are not bound on these sources and will have the freedom to sources others)

#### **Gravel Material Sites**

*Material Site MS 1: Material site MS 1 is an existing coral gravel borrow area. Its location is off Mombasa – Kilifi road around Kanamai at about km1+900 on the LHS along road B8. The site is 2.5 Km along a track branching to the RHS off road B8 after about 15Km from Km1+900 (Sabasaba). This site is composed of approximately 0.1m thick soil overburden, overlying coral gravel of greater than 10m depth. The site has the potential of producing approximately 200,000m<sup>3</sup> of coral gravel.*

*Material Site MS 2: Material site MS 2 is a new coral gravel borrow area. It is located 11km from the start of the road project (Km0+000 on A109) along the Mombasa – Kilifi Road B8, 1.3km inside, near vascon estates around Kikambala area). This site comprise of 5 – 8 meters thick coral gravel layer under about 100mm thick soil overburden. The site has the potential of producing approximately 30,000m<sup>3</sup> with a higher potential on extension.*

*Material Site MS 4: Material site MS 4 is an existing lateritic gravel borrow area. It is located on the RHS and off the project road at Km21+200 at Mazeras along road C111 to Kaloleni for a distance of about 17km then branch to the RHS for a distance of 4.3km along road E930 towards Kiembeni (Bamburi). This site comprise of 1.5 – 7m thick loose lateritic gravel material in rock boulders matrix under a 200mm – 800mm thick soil overburden. The site has the potential of producing approximately 30,000 m<sup>3</sup> with a higher realizable potential on extension.*

*Material Site MS 5: Material site MS 5 is a new gravel borrow area. It is located on the LHS and off the project road at Km 20+500 just after Mazeras along road D 560 to Kinango (kasemeni area) for a distance of about 6 km on the LHS. This site is composed of 1.2 – 1.5m thick layer of weathered*



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shale rock material under a 100 – 300mm thick soil overburden. The site has the potential of producing approximately 63,000m<sup>3</sup> of gravel.

*Material Site MS 6: Material site MS 6 is an existing gravel borrow area. It is located off km35+900 at Mariakani along C107. The source is about 18.5km towards Kaloleni. The worked area is just behind Kaloleni Law courts. The worked face comprise of over 6.0 meters thick weathered rock overlying lateralsised gravel, to a depth greater than 2.5m, the overburden is 300 – 700mm thick. The site has the potential of producing approximately 7,800m<sup>3</sup> of gravel.*

### **Hard Stone Quarries**

*Identified quarry sites were all commercial and apart from HS 1, HS 4 and HS 5 all others are within reasonable distances from the road corridor. The stone from all the commercial sources sampled is suitable for up to class 2 chippings, concrete, GCS, asphalt concrete and DBM and therefore suitable for use for all sections of the projects road. The sites include the following;*

*HS 1 – Jaribuni Quarry: The source is located 63 km from Km 0+000 along the Mombasa – Kilifi Road. The predominant rocks are the Kambe limestone and are currently being utilized for several road construction projects.*

*HS 2 – Matano Quarry: The source is located off Km 19+400 on LHS. The predominant rocks are the lower Mariakani beds and are currently being utilised as construction materials through commercial quarries.*

*HS 3 – Kokotoni Quarry: The source is located off Km 27+450 on the LHS. The predominant rocks are the lower Mariakani beds and are currently being utilised as construction materials through commercial quarries.*

*HS 4 & 5 – Mugoya Quarry: The source is located 77.6 km from Km 0+000 at Taru. The predominant rocks are currently being used for several road construction projects*

### **Construction Water**

*There are numerous ponds over the Kokotoni area in disused pits of old quarries. Similar ponds exist on the upper Mwache and Kirumbi rivers (both in the general area) where water is available throughout the year locally held by rock outcrop dams. Haulage may proof excessive over some sections. Water from the above sources were sampled and tested and proved suitable for construction purposes.*



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#### Sand for Construction

Sand for construction works within the coastal region is normally sourced from two locations namely:

- (i) Malindi – Sources north of Malindi at Ngomeni with a haulage within 130 – 150Km range.
- (ii) From Voi River in Voi Town – River with a haulage in excess of 150Km.

#### Anticipated Impacts

The environmental and social impacts study is designed to identify these linkages and establish enhancement approaches for the positive aspects while developing mitigation measures for the negative impacts. The key areas of interest included;

Focal Areas	Linkages/Environmental Concerns
Natural Resources (forests, vegetation/plant species, water sources, land, air, etc.)	<ul style="list-style-type: none"> <li>▪ Land degradation through soil loosening and loss through erosion,</li> <li>▪ Siltation of sources of water surface drainage systems</li> <li>▪ Water quality degradation from road construction and use related pollutants (oil, grease, paint and asphalt),</li> <li>▪ Permanent destruction of vegetation cover along the road routes, diversions, contractors camp sites, materials holding areas and/or borrow pit sites (quarries),</li> <li>▪ Emissions into the air of dust (during earth moving and machinery movement) and smoke/hydrocarbons from equipment during construction and increased traffic flow after commissioning,</li> <li>▪ Degradation of hydrological regimes along the route.</li> </ul>
Physical Environment (topography, land forms, geology, hydrology, climate, etc.)	<ul style="list-style-type: none"> <li>▪ Changes in micro-topographic patterns along the route,</li> <li>▪ Interference with the hydrological trends and hence surface runoff,</li> <li>▪ Effects on the drainage systems and hydrological regimes, particularly with increased magnitude in surface runoff,</li> <li>▪ Creation of open quarries materials borrow site, effectively changes land forms in certain areas,</li> <li>▪ Effects on sub-surface geological formations as a result of earth moving and rock breaking activities,</li> <li>▪ Interference with of sensitive features such as old trees, historical buildings, public amenities, cultural features, etc.</li> </ul>
Social and economic environment (Populations trends, settlement, land use, infrastructure, economic activities,	<ul style="list-style-type: none"> <li>▪ Population and settlement trends and projections upon commissioning of the road,</li> <li>▪ Migration of outsiders for construction,</li> <li>▪ Increased moral decay during construction,</li> <li>▪ Changes in land use and urban growth trends,</li> <li>▪ Changes in major economic activities e.g. settlements, trading, etc.,</li> </ul>



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Focal Areas	Linkages/Environmental Concerns
etc.)	<ul style="list-style-type: none"> <li>▪ Benefits of the road to the communities,</li> <li>▪ Gender streamlining</li> <li>▪ Accessibility and efficiency in transport of people and their goods,</li> <li>▪ Changes in socio-cultural practices due to external influence,</li> <li>▪ Potential displacement of persons and livelihoods</li> <li>▪ Cross cutting issues – poverty, youth, persons with disabilities,</li> </ul>
Health, Safety and Security aspects (construction safety measures, role of road in security, road safety and security upon commissioning, etc.)	<ul style="list-style-type: none"> <li>▪ Safety of the construction equipment to the workers general public and the wildlife,</li> <li>▪ Interaction with the construction workers may lead to high HIV/AIDS cases,</li> <li>▪ Noise to the residents living immediately along the road,</li> <li>▪ Signage to road users during construction, especially at night,</li> <li>▪ Increased traffic flow upon commissioning implying higher risks of road accidents to the people and wildlife,</li> <li>▪ Easy access by medical suppliers and security agents to the benefit of the residents,</li> <li>▪ Sanitation from construction sites,</li> <li>▪ Handling of health risk sites and materials (graves, pit latrines, cattle dips, etc.)</li> <li>▪ Easing the persistent traffic congestion characteristics of the road section for many years.</li> </ul>

#### Positive Impacts

The construction works will contribute towards poverty reduction in the affected areas through increased disposable incomes realized from employment of skilled and unskilled local labour, spending by the road contractor(s) as well as road users on purchase of supplies (consumables and road construction materials, e.g. gravel, etc) and accommodation services. Upon completion of the dualling project, the following benefits area envisaged

- ✓ Travel time between Mombasa and Mariakani and vice versa (especially the section between Chagamwe and Miritini (commonly famous for long traffic congestions) will be greatly reduced through improved traffic flow,
- ✓ Vehicle maintenance costs will be lower. This may effectively translate into direct and indirect costs,
- ✓ Security management
- ✓ Reduced environmental pollution from streamlined drains

Overall, the road will be an economic pillar for realization of the Kenya Vision 2030 by enhancing efficient transportation and movement of people and goods. Speedy movement and spurring economic development between Mombasa Port locally, the hinterland of Kenya as well as the neighbouring countries. The construction activities may, however, slow down local traffic movement especially on deviation sections, through that period.



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*The improved road also has a potential to enhance appreciation of land and property values in the road section and the immediate areas. Among the appreciation will include value addition to commercial and economic investments, potential for institutional development and attraction for residential housing development. This may not only reduce the congestion in the city centre but will also create manageable economic and social centers outside the CBD. Other Benefits will include;*

- (i) Efficient transportation locally and regional,*
- (ii) Improved road safety,*
- (iii) Attractive environment for tourism,*
- (iv) Reduced aerial emissions (climate change mitigation),*
- (v) Opportunities for better life for the riparian communities through enhanced movements, trade, security, road safety etc.*

#### Negative Impacts

*Due to the need for focused mitigation initiatives to the negative impacts, this report has identified the issues in details then back-up with the environmental management plan. Most of the impacts associated with the project implementation are expected from the construction phase such as to include:*

- ✓ Environmental pollution from emissions (aerial and dust) into the air from work areas and construction equipment,*
- ✓ 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*
- ✓ Loss of vegetation from material sites as well as limited removal from the road corridor,*
- ✓ Disruption of drainage along the built-up areas. This is specifically noted along some areas including Changamwe – Jomvu – Miritini where natural drainage outfalls have already been compromised by residential and commercial development activities. Increased road surface and surface runoff may pose a challenge to the existing drainage capacity and hence to the adjacent premises as well as to the road itself,*
- ✓ Noise and vibrations to the neighbouring premises arising from construction equipment, deviated traffic and other sources,*
- ✓ Social related infections associated with interactions including HIV/AIDS and other communicable diseases,*
- ✓ Social and economic disruptions during the construction phase involving business facilities, informal livelihoods activities, dwellings and social amenities,*
- ✓ Potential displacement of businesses dependent on demand for expansion or realignment space of the road,*



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- ✓ *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,*
- ✓ *Safety aspects associated with the road usage upon completion, especially in the high populated areas.*

#### **Resettlement Issues**

*The overall objective of the resettlement plan is to identify and develop a mitigation plan to ensure that all kinds of adverse impacts are exhaustively identified so that the community as a whole benefits from the project during and after construction of the road. The scope of the resettlement action plan will ensure that all guidelines of the various lenders are adhered to. Specifically, the African Development Bank's Policy on Involuntary Resettlement, i.e. Involuntary Resettlement Policy (2003); will be adhered to. The Policy requires the borrower to prepare a full resettlement plan (FRP) for any project that involves the displacement of a significant number of people (200 or more persons) who would be displaced with loss of assets, loss of access to cultural assets or reduction in their livelihood.*

*The full replacement plan will be released as a supplement document to the Environmental and Social Impact Assessment (ESIA) summary for the Bank's financed projects involving involuntary resettlement issues. The resettlement plan should be time specific with an appropriate budget incorporated as an integral part of the project design. The Plan shall give details of the compensation for loss of assets, livelihoods and infrastructure and rehabilitation support for those losing their means of livelihoods as a result of the project. The key factors in RAP structure include the following;*

#### Asset Valuation

*The detailed valuation of assets along the project roads has not been undertaken but an estimate has been made for the purpose. For a final valuation to be undertaken, it will be necessary for the land acquisition formalities to be completed in accordance with the provisions of the law governing compulsory acquisitions. This will entail the Gazetting of the affected properties, holding public inquiries to receive claims from the owners and any other interest holder. During the intervening period, an inspection will be carried out to ascertain the condition of the premises affected for assessment purposes.*

*Official searches would also be conducted to verify ownership and any encumbrances attached to the title. After the inquiries are held, an award is made to the registered owner after comparison of his claim and the official assessment by the government valuer. Option is provided to accept or reject the offer and recourse is provided to appeal on the quantum of the award for enhancement by*



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the tribunal or the Environment and Land Court established by provisions of the Constitution of Kenya (2010).

#### Land Acquisition

The function of acquiring land compulsorily for public purposes is vested in the National Land Commission by the Constitution of Kenya (2010) and the Land Act. The Commission is responsible for arranging the Gazetting of the private land to give notice to the affected persons. It arranges for valuation inspections of the affected properties and issues the award after determining the claims submitted at the public inquiries. The act on behalf of the project proponent in arranging for taking possession of the affected land after making the compensation payment to the land-owners.

#### Compensation

The valuation process will provide compensation for loss of land and developments, loss of incomes to both lease-holder and the tenants. Payments will be made for restoration of loss of livelihoods and restitution of affected public institutions facilities that do not receive monetary payments. Other costs that will be considered for payment will include payment of transport costs to the displaced persons to the relocation sites. They will also be considered for assistance to be allocated on priority basis any facilities developed to support their continued livelihoods. A flat rate disturbance allowance will be payable to the property owners over and above the award for any inconvenience suffered as a result of the acquisition.

It is important to note that for purposes of the Resettlement Plan, individual land demarcation was not established and such will be done when carrying out final valuations for the bypass after the land acquisition has been compiled. The estimate of the value given is based on calculation of compensation figures referenced to the diminution in the market value of the land. The effects of severance and injurious affection plus any disturbance element has also been included by the additional 15% of the market value of the properties affected.

It is also important to point out that the value of crops is quite minimal as most of the affected land is under commercial and indigenous trees and subsistence farming of maize, potatoes and beans which for the sake of this estimation is not valued. The values of these subsistence crops have been ignored as they are expected to be harvested within a short time. Perennial crops were also found within the parcels of affected parcels of land which had palm and coconut trees.

#### RAP Monitoring

A monitoring and evaluation (M&E) program is required to be developed to provide feedback to project management which will help keep the programs on schedule and successful. Monitoring provides both a working system for effective implementation of the RAP by the project managers, and an information channel for the PAPs to assess how their needs are being met. RAP monitoring



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shall be conducted in two ways namely Advisory Committee and internally by Grievance Redress Committee.

A monitoring and Evaluation mechanism need to be factored into the project implementation to ensure that the objectives of mitigating the negative impacts in the project are addressed in a timely and effective manner. The process will ensure that the resettlement program delivers on the entitlement benefits. Monitoring and Evaluation will provide a link between the project affected persons/community and the implementers and facilitate the field operatives to take remedial measures with a view to achieve the targets within schedule. The Monitoring and Evaluation process will enhance the delivery capacity of KeNHA and maximize the benefits of the RAP package to the affected persons/communities.

The process will be monitored both internally and externally with the project field staff dealing with the day-to-day operational issues. This will include payment of compensation, physical identification of project affected persons and arrangement for their payments, relocation and resettlement.

#### **Environment and Social Management Plan**

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 Environment and Social Management Plan (ESMP) presents the key management principles that will then define a scope of the plan implementation. Broad indications of the responsibilities have also been discussed along with the possible implementation constraints anticipated. It should also be noted that the ESMP is not complete in itself and continuous reviews would be necessary throughout the project implementation period.

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:

- ✓ Environmental management conditions and requirements are implemented during the construction and post-construction period;





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- ✓ *The social interests of the stakeholders are considered throughout the construction and post commissioning phases of the roads;*
- ✓ *Maximum economic benefits to the project road corridors and the whole country; and*
- ✓ *Precautions against damages to environment, biological diversity and sensitive habitats.*

*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 this valuable information on the environmental trends in the area. Responsibilities for implementation of the project are broadly defined as follows;*

#### KeNHA Responsibility

*The Environment and Social Division at KeNHA will facilitate compliance with environmental regulations. The office advises on the projects on compliance and is also a direct liaison with NEMA. Project issues will reach this office directly or through the supervisor while on the other, NEMA (or any other environmental stakeholder) is expected to address the project related issues through the same office. The office, therefore, is expected to be well informed of all project related issues at all times. KeNHA and the Environment Division specifically will be represented on the ground by the Supervision for the day to day operations and engagements. However, the office will be expected to have a direct representation during monthly progress/site meetings and other consultative forums.*

#### NEMA Functions

*The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory bodies on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programmes, plans and projects.*

#### Contractor(s)

*The contractor is required to establish an environmental office to continuously advise on environmental components of the project implementation. Elements in the environmental and social management plan are expected to be integrated in the project with appropriate consultations with KeNHA through the supervising environmental expert. The environmental officer of the contractor is also expected to full understand the engineering and management aspects of the project for effective coordination of relevant issues. In addition, the Contractor is also expected to bring on*



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board a Sociologist (full time or part-time) to provide a communication link with the communities and other stakeholders. However, Project Manager and the Operations Manager will require to be informed on the environmental and social status for ease of facilitation.

#### Supervisor

The supervisor is engaged by the KeNHA (as the project client) to ensure effective implementation of the environmental management plan. It is expected that supervisor engages the services of an environmental expert who should in return understand the details and more of the environmental recommendations and especially the proposed action plans, timeframes and expected targets of the management plan. The supervisor environmental expert should be the liaison person between the contractor and KeNHA on the implementation of environmental concerns as well as issues of social nature associated with the project. The Supervision (through the Resident Engineer) will also ensure social expert inputs and support in addressing emerging concerns from the communities and the stakeholders.

#### Community Liaison Committees

Affected communities living along the road corridor will be asked to form Project Liaison Committees to collaborate with the Project Management on issues of concern to the people. The Committees to be established under the County Commissioners' office in both Counties (Assistant County Commissioners and the Areas Chiefs) will provide the administrative support for the Committees. Members of the Committees will be drawn from a cross action of the community such as to include local leaders (village elders), landowners, institutions, business people, vulnerable groups, youth, etc. The Committee will comprise of a Chair and a Secretary and will be open a file with the Resident Engineer and the Contractor.

#### RAP Monitoring

A monitoring and evaluation (M&E) program is required to be developed to provide feedback to project management which will help keep the programs on schedule and successful. Monitoring provides both a working system for effective implementation of the RAP by the project managers, and an information channel for the PAPs to assess how their needs are being met. RAP monitoring shall be conducted in two ways namely Advisory Committee and internally by Redress Committee.

A monitoring and Evaluation mechanism need to be factored into the project implementation to ensure that the objectives of mitigating the negative impacts in the project are addressed in a timely and effective manner. The process will ensure that the resettlement program delivers on the entitlement benefits. Monitoring and Evaluation will provide a link between the project affected persons/community and the implementers and facilitate the field operatives to take remedial measures with a view to achieve the targets within schedule. The Monitoring and Evaluation process will enhance the delivery capacity of KeNHA and maximize the benefits of the RAP package to the affected persons/communities.



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*The process will be monitored both internally and externally with the project field staff dealing with the day-to-day operational issues. This will include payment of compensation, physical identification of project affected persons and arrangement for their payments, relocation and resettlement.*

#### **Project Implementation Schedule**

*It is envisaged that the detailed design reports and tender documents will be completed by the end of year 2014. Procurement of the Contractor(s) will take approximately 12 months. This implies the construction could begin in early 2016 on the earliest. The construction period is estimated at 36 months (3 years) upto the end of 2019.*

#### **Project Implementation Costs Estimates**

*Four Alternatives were considered for the design of the project road (the Alternatives with coats are in annex). Alternative 3 including construction of concrete pavement on the heavily loaded road sections (mainly Changamwe – Miritini areas and sections of the slopes towards Mazeras) and asphalt concrete applied for the rest of the road section (Miritini area to the end of the project at Mariakani Weigh Bridge) including the service roads and NMT sections. Alternative 3 as the considered option has been estimated to cost **KShs. 22,518,000,000 (USD 264.923M)**.*

#### **Conclusions**

*The proposed rehabilitation and expansion of Mombasa – Mariakani Road is a national flagship under the Kenya Vision 2030 and has economic benefits to the country as well as the immediate neighbouring states (Uganda, Sudan, Rwanda and to some extent Burundi). At the local level, the road expansion will address the persistent traffic congestion between Miritini and the City Centre (where at time it runs into hours) through streamlining the flow of heavy traffic. It is worth noting that the road is the only gateway into the City of Mombasa from the western mainland.*

*While appreciating the benefits and positive impact associated with the project, there are negative impacts that need to be addressed and mitigated during the construction and post-construction phases. For this reason, a comprehensive environmental and social impact assessment (ESIA) study will be necessary. Equally important will be a comprehensive resettlement action plan (RAP) considering the extent of potential displacements and disruptions along the corridor during the construction.*

*The ultimate goal of this ESIA study was to identify impacts resulting from the proposed project that were determined on the basis of the baseline conditions to be established during the field work and*



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information obtained from the documents reviewed. The environmental and social impact assessment study process was designed to provide a view of the environmental and social status and establishment of the diversity on physical environment, social and ecological status in the area.

Following on the above observations, the conclusions below were arrived at;

- (i) *There is general appreciation of the road improvement by a majority of the residents and stakeholders. This arises from the frequent traffic congestion along the project road leading to high travel times and loss of man-hours and associated social and economic implications. Benefits established under this study ranges from regional and national (goods transit to other parts of the country and the neighbouring states) and local (travel time reduction, road safety enhancement, environmental pollution control, security response improvement, etc.)*
- (ii) *Following previous experiences in road construction where encroachments have been the key focus, there is concern among the communities including landowners and business people adjacent to the road reserve who are anxious to know the extent of the road and level of land acquisition early in advance to enable appropriate agreements and compensations to avoid potential conflicts.*
- (iii) *Encroachments into the road reserve is limited to commercial and small scale traders, mostly with temporary structures and limited permanent structures (there are no notable residential features within the road reserve). The affected persons have been identified through the RAP process for appropriate relocation mechanisms,*
- (iv) *The road expansion from 36.5m to 40m will need appropriate land acquisition ranging between 3 – 4m to meet the space requirements. Land acquisition on areas with interchanges and major junctions may have a higher demand for land space. Again, the RAP process is to provide guidance on the land acquisition and mechanisms of acquiring the same.*
- (v) *The road section harbours public amenities including water pipelines, power lines (underground and above ground), sewer systems, communication lines, drainage systems, etc. it is expected that some of the service lines are likely to be affected during the construction phase. However, a Service Providers forum will be established under KeNHA with a view to identifying collaborative mechanisms of dealing with the services relocation.*
- (vi) *Environmental issues are mainly on environmental health and environmental pollution as opposed to physical environmental destruction due to the urban nature of a larger part of the road. Aerial emissions, noise and vibrations, waste management and safety are the*



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*key environmental concerns during the project implementation. Appropriate mitigation measures have been provided under the EMP for integration during the construction period,*

- (vii) Due to the location of the project road, construction materials will be sourced outside the project areas. The potential sources have been identified through the design process, the Contractor(s) still have an obligation to identify specific sources. In this regard, it is noted that comprehensive ESIA studies will still be required for approval of the material sites chosen by the Contractor(s),*
- (viii) In view of the above observations, the level of environmental assessment has been placed under Category 1 in accordance with AfBD Integrated Safeguards System (ISS) considerations.*
- (ix) This Resettlement and Action Plan will be implemented by compensating the individuals affected by the proposed road activities. The compensation and assistance allowances will enable the PAPs to relocate and pave way for the road construction.*

#### **Recommendations**

- (i) Recommendations presented in the Resettlement Action Plan will be implemented to address the potential social and economic displacements before the commencement of the project.*
- (ii) Involvement of the stakeholders and public during the project implementation, and particularly during the construction and early stages of the road use would be necessary to ensure minimized social impacts.*
- (iii) The Contractor(s) will be expected to develop construction environment and social management plan in line with the one developed under this report for purposes of supervision and continuous monitoring.*
- (iv) All material sites will have comprehensive ESIA undertaken and management plans developed such as to include extraction practices, haulage and materials management rehabilitation plans.*
- (v) As part of the beautification of the road, a comprehensive landscaping component should be integrated into the project implementation.*



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- (vi) *Appropriate safety audit should be undertaken for the road to guide on the implementation and usage of the road thereafter.*
- (vii) *Continuous engagement of the road users and community members on safety will be necessary on the long term management of the road section.*
- (viii) *It is recommended that any planned of the project affected persons precede the construction activities and where cash compensation payments are payable, be done in accordance with the prevailing law.*
- (ix) *KeNHA should ensure that the contractor comply with the applicable gender principles; labour laws encouraging the contractor to employ 30% women, PWDs and the youth in road construction and maintenance; providing safe working conditions for both women and men workers; and ensuring that all civil work contractors engaged under the project, participate in HIV prevention and road safety programmes and; that information reaches the local communities (women, men, the youth and vulnerable groups) living and working along the road corridor.*



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## CHAPTER 1: PROJECT BACKGROUND

### 1.1 Project Overview

Economic development and social growth of a country is significantly dependent on efficient road transport infrastructure for access to resources, delivery of inputs and produce to markets as well as easy access of basic services (health, trading centers, water, etc.) to the people. Overall benefits from efficient road transport are felt at all levels of the society, directly or indirectly, such as to include improved national economy, social income, wealth and job creation, health care, public transport and general service delivery. Improvement in all these areas are desirable for the current national aspirations including enhanced local and international trading, economic empowerment of all, enhanced connectivity and inter-sectoral growth collaborations. Success of the Kenya Vision 2030 initiative and achievement of the Millennium Development Goals (MDGs) are largely functions of available infrastructure (efficient road network being the key unit) among other factors.

The scope of this assignment included performance of the tasks as defined under Terms of Reference including technical studies, field investigations, ESIA, RAP and related services. The assignment was performed in two stages. The first stage was the preliminary design, while the detailed engineering design came in the second stage. The ToR listed the following tasks to be performed in the first stage: -

- (i) Review of the existing data on the proposed road project and social and economic activities in the project study area and producing an economic feasibility study report;
- (ii) Collection of social, environmental, and physical data that is necessary to assist in the design of the project road. This work was carried out by Aquaclean Services Limited (NEMA Registration No. 1899),
- (iii) Preliminary engineering survey and design work for the optimum alignment and design standards including preliminary costs estimates and implementation schedule;
- (iv) Carrying out an environmental impact assessment study of the project area in relation to the proposed project.

While appreciating the benefits of transport infrastructure, it is also necessary to note that development of new roads and improvement of existing ones including the associated components have potential negative effects to the physical environmental and social settings. Among the potential negative impacts from road construction projects could include,

- (i) Environmental pollution from construction activities,
- (ii) Land and soil degradation and loss of vegetation cover and materials extraction,
- (iii) Risks to health and safety of the residents and contractor employees during construction,
- (iv) Displacement of residents and economic facilities as well as loss of productive land,
- (v) Changes in traffic characteristics and trends,

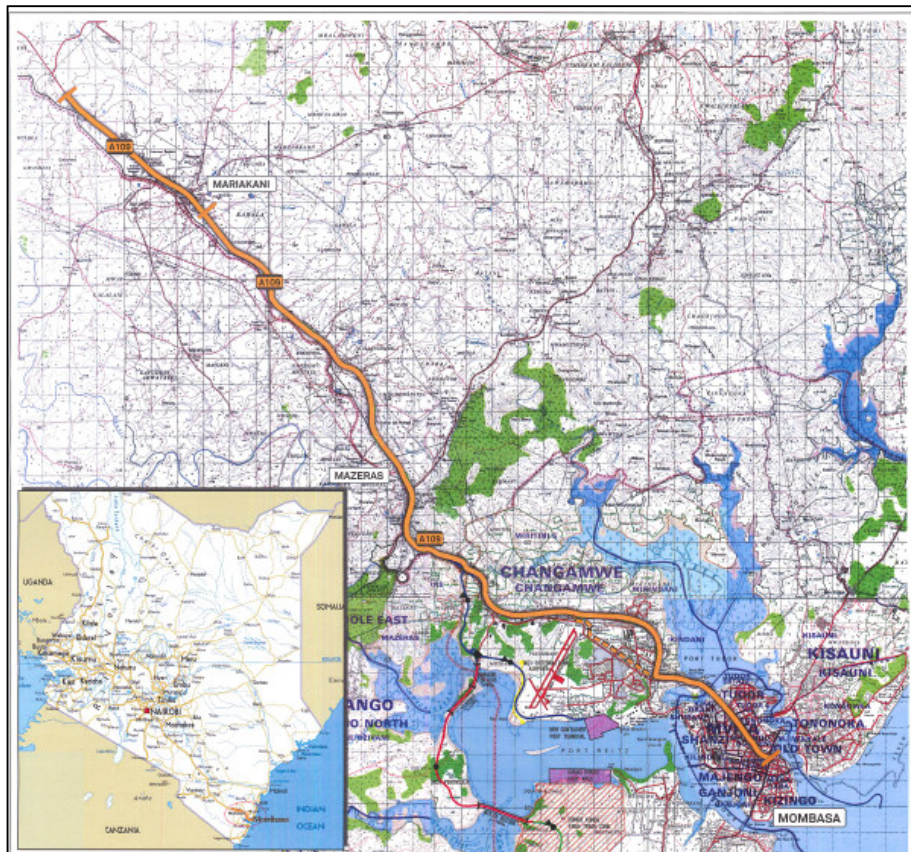
- (vi) Demand for construction materials including water and other resources,
- (vii) Potential to disrupt natural habitats such as grazing and breeding grounds for wildlife,
- (viii) Displacement of species,
- (ix) Introduction of exotic plant species and possible interference with natural eco-balance,
- (x) Conflicts with ecological features

In view of the above observations, comprehensive environmental and social impact assessment study (ESIA) is necessary with a view to evaluating the current environmental status (baseline conditions), obtain opinion of the local communities, establish the potential for social and economic benefits and estimate the project cost. Appropriate remedial actions would also be developed for integration in the project design and implementation.

## 1.2 Project Location

Mombasa – Mariakano (A109) Road is a 41km stretch running from Digo Road on the island through the Kenyatta Avenue, Makupa causeway, Changamwe, Mirtini, Mazeras and ends 1km after the Mariakani weighbridge. The project touches on Mombasa, Kilifi and to a lesser extent Kwale County.

**Figure 1: Project Location Map**







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### 1.3 Project Justification

This section of A109 is faced with the challenge of rapid increase in traffic volumes including light vehicles and heavy trucks over the years, intensive land use changes and developments without matching maintenance and expansion of the road. For this reason, the current capacity of the road is overwhelmed leading to persistent traffic congestion with far reaching social inconveniences, economic losses, safety risks and environmental degradation to mention a few. The vehicular speed at the moment is on average 20 – 30km/hr with an average travel time of between 1 – 2 hours for a distance of 20km (at worst going to 4 hrs). Due to the low vehicular speeds and the state of the road, aerial emissions are high within the urbanized zone of the corridor with above 7 – 8mg/m<sup>3</sup> particulate matter and upto 100 – 200ppm of CO<sub>2</sub> in high human activity zone. It is for this reason that KenHA has identified the road as deserving rehabilitation and expansion (details on the intervention are in the design drawings and associated notes). A feasibility study and detailed engineering design was required so as to rehabilitate and upgrade the road in order to increase the capacity and enhance the flow of traffic taking into consideration the proposed works.

### 1.4 Environment and Social Impact Study

#### 1.4.1 ESIA Objectives

Implementations of major projects in Kenya are preceded by the Environmental and Social Impact Assessment studies. It is a requirement to undertake the Environmental and Social Impact assessment according to the regulations stipulated in The Environmental Management and Coordination (EMCA) Act 1999 and the Environmental Impact Assessment and Audit Regulations 2003.

To ensure that the above project is implemented in an environmentally and socially sustainable manner, KenHA engaged the services of a competent Consultant to conduct an Environmental and Social Impact Assessment for the proposed project. The ESIA for the proposed project was undertaken simultaneously with the feasibility study of the proposed project before the project implementation so as to identify Environmental and social impacts and offer mitigation measures to the anticipated impacts. The Environmental and Social Impact Assessment (ESIA) was to achieve the following objectives:

- (i) Prepare a justification of the proposed upgrading of the road sections with respect to social development, economic growth (local and national) and conservation opportunities.
- (ii) To identify of suitable alternatives with respect to ecological, social and economic suitability as well as political acceptability.
- (iii) To identify all potential significant adverse environmental and social impacts of the road works and post commissioning activities on resources utilization, agriculture, environmental conservation, health and safety and demographic patterns and recommend relevant mitigation measures.



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- (iv) To evaluate road construction materials' (fills and water) sources and their potential as well as human labour.
- (v) To obtain public opinion about the road project with a view to capturing major concerns and fears as well as appreciation with a view to developing appropriate interventions to create more acceptability and enhance awareness on potential values of the road.
- (vi) To verify compliance with the environmental and social regulations and industry's standards,
- (vii) To generate baseline data for monitoring and evaluation of how well the mitigation measures will be implemented during the project cycle.
- (viii) To recommend cost effective measures to be implemented to mitigate against the expected impacts
- (ix) To provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project
- (x) To prepare an Environmental and Social Impact Assessment report compliant to the environmental management and coordination Act (1999) and detailing findings and recommendations

#### 1.4.2 Scope of ESIA

The ESIA was carried out in compliance with the Government of Kenya's Environmental Management and Co-ordination Act of 1999 and the Environmental (Impact Assessment and Audit) Regulations, June 2003, among other relevant laws, regulations, and guidelines standards. The study was also meant to meet criteria for the African Development Bank requirements as well as the World Bank Safeguards. The scope of services to be undertaken by the Consultant included but not limited to the following:

- (i) Description of the baseline environment
- (ii) Detailed Description of the Proposed Project
- (iii) Legislative and Regulatory Framework
- (iv) Identify potential environmental and social impacts that could result from the project:
- (v) Occupational Safety & Health concern
- (vi) Carry out public participation and consultations on the positive and negative impacts of the project
- (vii) Propose Mitigation Measures to the identified environmental and social impacts.
- (viii) Development of Environmental and Social Management Plan to mitigate negative impacts
- (ix) Development of Environmental and Social Monitoring Plan
- (x) Environmental & Social Impact Assessment Report

The extent of involvements in respect of acquisitions and compensation factors (either towards conservation areas or private landowners) was determined reports from the surveyors, the transport



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economists but the actual values were expected to be handled by the Client and Valuers in accordance with the appropriate land acquisition procedures.

**1.4.3 Key Environment and Social Linkages**

Rehabilitation and expansion of A109 will have notable potential social, economic and environmental linkages. The environmental and social impacts study is designed to identify these linkages and establish enhancement approaches for the positive aspects while developing mitigation measures for the negative impacts. The key areas of interest for this project would include;

**Table 1: Environmental and Social Linkages**

Focal Areas	Linkages/Environmental Concerns
Natural Resources (wildlife, forests, vegetation/plant species, water sources, land, air, wetlands, etc.)	<ul style="list-style-type: none"> <li>▪ Land degradation through soil loosening and loss through erosion,</li> <li>▪ Siltation of surface drains,</li> <li>▪ Water quality degradation from road construction and use related pollutants (oil, grease, paint and asphalt),</li> <li>▪ Permanent destruction of vegetation cover along the road routes, diversions, contractors camp sites, materials holding areas and/or borrow pit sites (quarries),</li> <li>▪ Disruption of general biodiversity,</li> <li>▪ Emissions into the air of dust (during earth moving and machinery movement) and smoke/hydrocarbons from equipment during construction and increased traffic flow after commissioning</li> </ul>
Physical Environment (topography, land forms, geology, drainage, climate, etc.)	<ul style="list-style-type: none"> <li>▪ Changes in micro-topographic patterns along the route,</li> <li>▪ Interference with the hydrological trends and hence surface runoff,</li> <li>▪ Effects on the drainage systems and hydrological regimes, particularly with increased magnitude in surface runoff,</li> <li>▪ Creation of open quarries, materials borrow site, effectively changes land forms in target areas,</li> <li>▪ Effects on sub-surface geological formations as a result of earth moving and rock breaking activities along the work sections,</li> <li>▪ Interference with of sensitive features such as old trees, historical buildings, public amenities, cultural features, etc.</li> </ul>
Social and economic environment (Populations trends, settlement, land use, infrastructure, economic activities, etc.)	<ul style="list-style-type: none"> <li>▪ Population and settlement trends and projections upon commissioning of the road,</li> <li>▪ Migration of people into the project area for construction,</li> <li>▪ Increased moral challenges during construction,</li> <li>▪ Changes in land use and urban growth trends,</li> <li>▪ Changes in economic activities e.g. trading, etc.,</li> <li>▪ Benefits of the road to the local communities,</li> <li>▪ Gender issues</li> <li>▪ Accessibility and efficiency in transport of people and their goods,</li> <li>▪ Changes in socio-cultural practices due to external influence,</li> <li>▪ Potential displacement of persons and economic activities</li> <li>▪ Cross cutting issues – poverty, youth, persons with disabilities,</li> </ul>
Health, Safety and	<ul style="list-style-type: none"> <li>▪ Safety of the construction equipment to the workers and the general public,</li> </ul>



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Focal Areas	Linkages/Environmental Concerns
Security aspects (construction safety measures, role of road in security, road safety and security upon commissioning, etc.)	<ul style="list-style-type: none"> <li>▪ HIV/AIDS cases,</li> <li>▪ Noise and vibrations trends along the road,</li> <li>▪ Signage to road users during construction, especially at night,</li> <li>▪ Increased traffic flow upon commissioning implying higher risks of road accidents to the people and wildlife,</li> <li>▪ Easy access by medical suppliers and security agents to the benefit of the residents,</li> <li>▪ Sanitation from construction sites,</li> <li>▪ Handling of health risk sites and materials (graves, pit latrines, cattle dips, etc.)</li> <li>▪ Easing the persistent traffic congestion characteristics of the road section for many years.</li> </ul>

### 1.5 General Approach

In accordance with the terms of reference (in annex) both positive and negative implications of the proposed road project were identified and appropriate measures to abate any adverse effects that may emanate from the road works. The provisions under the Environmental Impact Assessment Regulations as outlined under the Gazette Notice No. 56 of 13<sup>th</sup> June 2003 were adopted. Environmental and Social Impact Assessment (ESIA) was designed to establish a triangular relationship between the road project, natural ecosystems, social setting and co-existence. The study, therefore, related to the project and key environmental, social and economic areas and related linkages for ease of integration in the implementation of the project right from the planning stage through construction, commissioning and eventually long term use.

Identification of the anticipated impacts was determined on the basis of the baseline conditions established and information obtained from the documents reviewed. To enable subjective predictions, the road sections were assessed in their individual capacity for physical environmental variations and social patterns. Each road section was then subjected to screening against the potential nature of impacts, impact targets and the level of impacts.

The ESIA activities were running alongside the preliminary design work such as to involve a series of consultations with the design engineering team authorities, community groups and other organizations in the project area with a view to sharing information and data on environmental resources and social aspects. Effective evaluation of the baseline status comprised of interviews (consultative meetings and discussions) and physical inspections and data gathering of proposed route alternatives. Detailed baseline environmental conditions provided a basis for impacts predictions and benchmarks for the mitigation measures. The exercise adopted an integrated approach where data and information evaluation, field investigations, consultations among the consultant team, interviews and discussions with stakeholders and affected parties were undertaken at the same time. Among the activities are briefly described below:



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#### Documentary Review

Deskwork studies to provide a detailed description of the project road sections with respect to spatial coverage, preliminary design layout, magnitude, implementation schedules and costs as well as human resources. The project documents are among key documents being reviewed. Relevant documents were reviewed to obtain information on the baseline information in general but specifically along the main route corridor. This documentary review provided further understanding of the terms of reference, national and local micro-environmental conditions, data on demographic trends, land use practices, development strategies and plans (local and national) as well as the policy and legal documents among others. Other documents included the African Development Banks and the World Bank social and environment safeguards.

#### Field Assessment

Physical evaluation of the project area was carried out with specific focus on landform trends, land use patterns, biodiversity, natural resources, hydrology and climatic variations through the route. This was also an evaluation of the current environmental status with respect to physical, biological and socio-cultural perspectives. It is a systematic field inspection backed with available documentation and direct interviews. Field evaluation was planned to enable determination of the exact physical environmental features to be affected within the proximity of the road route. In addition to identifying the potential positive and negative impacts, field assessments contributed towards selection of suitable alternative routes and components of the road. The field assessments achieved the following:

- (i) Available information and data gathered from local public offices;
- (ii) Verification of environmental settings and making general observations on topography, land use trends, surface water sources, public amenities, settlements, soils, flora and fauna, etc.;
- (iii) Identify land cover variations along the affected areas;
- (iv) Rapid assessment of population densities, human settlement trends, social and economic activities; and
- (v) Public consultations focusing on landowners, farmers, business people, transporters, institutions and organizations.

#### Public and Stakeholders Consultations

On the social and economic front, structured stakeholder consultation meetings were organized along the route to capture the views of the parties affected. These intensive stakeholders' consultations and public participation (CPPs) were planned to obtain the opinions and views of stakeholders and communities within the project areas with the main focus mainly on social and conservation aspects as well as the perceived associated impacts.

#### Impacts Assessments

Anticipated impacts that may emanate from the road project was analyzed against the baseline conditions and was fully established during the detailed fieldwork and information obtained from the



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documentary reviews. Effects of the project to the environment and social well being was 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

Upon identification of the impacts from the project, appropriate measures were drawn to mitigate the impacts. This then lead to the development of the environmental management plan to guide the project implementation. Having established the impacts and the mitigation measures, integration of the impacts in the project implementation was necessary. This ensured proper integration of the recommended mitigation measures in the implementation process. The monitoring plan will serve as a supervisory schedule with respect of the environmental aspects.

#### Reporting

This involves compilation of the field findings, documentary information and data, results from discussions and public consultations as well as harmonizing the monitoring and environmental management plans. The reporting followed the following steps:

Step 1:Contribution to the Inception Report as part of the feasibility studies and design process.

Step 2:Project Report to be endorsed by KeNHA and approved by National Environment Management Authority (NEMA).

Step 3:Terms of Reference to be prepared by consultant and approved by NEMA for the ESIA Study process (This would be developed upon instructions by NEMA).

Step 4:The ESIA Study Report has to be endorsed by KeNHA and submitted to NEMA

### **1.6 ESIA Study Team**

The key professional cadres involved in the ESIA process included the following:

1. Lead EIA Expert who was also the Team Leader
2. Sociologist
3. Physical Planner as the RAP Expert
4. Design Engineer
5. Marine Ecologist
6. Safety Expert (for air quality and noise measurements)
7. Field Environmentalist Assistant



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## CHAPTER 2: THE PROJECT ROAD DESCRIPTION

### 2.1 Project Location

Mombasa – Mariakani Road (A109) running from Digo Road junction in the City Centre (approximate coordination  $04^{\circ} 03' 30.50''S$ ,  $39^{\circ} 40' 22.22''E$  and elevation  $\sim 10m$  a.s.l.) to Mariakani weigh bridge (approximate coordinates  $03^{\circ} 50' 29.33''S$ ,  $39^{\circ} 27' 10.08''E$  on elevation  $\sim 220m$  a.s.l.). The road section constitutes the main link between Mombasa City Island to the upcountry including among other locations Voi, Nairobi City, Western Kenya, Uganda and other states. The road section upto Mariakani measures about 41km and traverse zones with distinct environment; social and economic characteristics, both along the immediate neighbourhoods as well as the hinterland. In addition to linking the City of Mombasa to the rest of the country, A109 is an important road for the local traffic and moving into residential estates, commercial centers, institutional centers, industrial centers and administrative areas. Most important is the access to Moi International Airport (Mombasa) and the Port of Mombasa from A109. This is an illustration of the importance of the road to the City of Mombasa as well as tourist destinations in the coast region.

**Figure 2: The Project Road Route Map**





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## 2.2 The Road Corridor Features

The project road is situated in Mombasa and Kilifi Districts of Coastal Kenya. It starts at the junction of Jomo Kenyatta Road with Digo Road (A14) within Mombasa City to Makupa area adjoining the Makupa Causeway into Changamwe at the Airport – Port and Nairobi Road roundabout. The road then traverses through the trading centers of Changamwe, Mikindani junction, Jomvu Kuu, Miritini, Mazeras before terminating at Mariakani Weighbridge area. It serves connections of the Mombasa mainland, Kilindini Harbour, Moi International Airport and a host of various other public and private premises. The road corridor may be segmented into four unique zones briefly described as follows;

**Table 2: Distinct Road Zones Features**

Digo Road – Makupa Section (Jomo Kenyatta Highway)	Makupa Causeway Section	Changamwe – Mazeras Section	Mazeras – Mariakani Section
<ul style="list-style-type: none"> <li>✓ It is the main exit road out of the island to the west.</li> <li>✓ The central Business District</li> </ul>	<ul style="list-style-type: none"> <li>✓ Link of Mombasa island to the mainland from Makupa area to Changamwe</li> <li>✓ Access into Moi International Airport and Kilindini Port roundabout.</li> </ul>	<ul style="list-style-type: none"> <li>✓ It is the key industrial zone for Mombasa City and</li> <li>✓ Key export operations zone for the country</li> <li>✓ CFC operations yards</li> </ul>	<ul style="list-style-type: none"> <li>✓ It is the main exit from Mombasa to the country sides</li> <li>✓ Location in Kilifi County</li> </ul>
<ul style="list-style-type: none"> <li>✓ Characterized with heavy commercial and institutional activities.</li> <li>✓ There are residential and industrial features towards Makupa areas</li> <li>✓ Transportation Hub</li> </ul>	<ul style="list-style-type: none"> <li>✓ Characterized by a complex marine setting of mangrove systems with the harbour to the south and residential/commercial premises to the north,</li> <li>✓ Kibarani dumpsite</li> <li>✓ Commercial Buildings</li> </ul>	<ul style="list-style-type: none"> <li>✓ Heavy mixed land use featuring commercial, industrial and residential premises</li> <li>✓ Key installations among them the airport and the Port.</li> <li>✓ Railway Station.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Traverses a semi-urban area and is characterized with open undeveloped areas with scattered commercial and residential premises.</li> <li>✓ A potential expansion corridor for Mombasa City.</li> </ul>
<ul style="list-style-type: none"> <li>✓ Notable Social, economic and environmental issues</li> <li>✓ Transport focus</li> </ul>	<ul style="list-style-type: none"> <li>✓ Significant ecological and commercial issues</li> <li>✓ Kibarani dumpsite</li> <li>✓ Commercial buildings</li> </ul>	<ul style="list-style-type: none"> <li>✓ Significant social, economic and environmental issues</li> </ul>	<ul style="list-style-type: none"> <li>✓ Mainly social and environmental issues</li> <li>✓ Potential commercial and Industrial expansion areas</li> </ul>

The existing single carriageway sections are narrow and in poor conditions and, therefore, a big impedance to flow of the high traffic experienced between Mombasa City and Mariakani The sections are:-





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- (i) Kenyatta Avenue/Digo road Roundabout (A14/A109 junction) to Changamwe 6 Km long and currently dual carriageway
- (ii) Changamwe to Miritini, 8.8 Km long and currently single carriageway
- (iii) Miritini to Mazeras, 4.9 Km long and currently dual carriageway
- (iv) Mazeras to Mariakani Weighbridge, 20.1 Km long and currently single carriageway

The proposed works will involve but not limited to the following;

- (i) Construction and improvement of urban drainage, service roads and off road truck parking.
- (ii) Construction of Non-Motorized Transport facilities including pedestrian footbridges and crossing areas especially Changamwe, Miritini, Mazeras and Mariakani areas,
- (iii) Replacement of flex beam guardrails and other interventions on the median of Miritini – Mazeras section with reinforced concrete barriers.
- (iv) Construction of the dual carriageway up to Mariakani weighbridge or thereabouts to be merged with proposed design for associated station facilities being undertaken by Special Projects Department (KeNHA).
- (v) Rehabilitation of the existing carriageways (mainly in the island section and the Mazeras – Mariakani road section).

### 2.3 Road Physical Conditions

For design purposes, the project road is described into four distinct sections as follows;

#### 2.3.1 Junction A14/A109 – Changamwe (KM0+500 – KM 5+800)

- (i) The section is a dual carriageway with median (approximately 2m and also used as a walkway).
- (ii) The pavement is worn-out with some potholes and deformations observed.
- (iii) The median Island has been used for services including power lines and street lighting.
- (iv) The drainage system is inadequate or not maintained. Some sections, however, do not have proper surface drainage,
- (v) Road markings are worn-out and designated pedestrian crossings are unavailable in most sections,
- (vi) The dual carriageway ends some 600m after the Changamwe roundabout.

#### 2.3.2 Changamwe – Miritini (KM 5+800 – KM 15+500)

- (i) The section is a single-carriageway characterized with high traffic, human traffic and economic activities
- (ii) The section is characterized with by poor drainage while natural drains area blocked with solid wastes, vegetation and others have collapsed,
- (iii) The pavement is also worn-out with potholes and deformations observed.



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- (iv) There are no designated truck parking areas and so trucks park on the shoulders and available road reserve further reducing the road width.
- (v) Sections of the carriageway have completely failed resulting in slow traffic movement contributing to heavy traffic congestion.
- (vi) The section ends at the start of the Miritini – Maji ya Chumvi road.
- (vii) The section is characterized by poor road side drainage while natural drains are blocked with solid wastes, vegetation and others have collapsed.

#### 2.3.3 Miritini – Mazeras (KM 15+500 – KM21+500)

- (i) The section is a dual-carriageway
- (ii) The section has recently been reconstructed as part of the Maji ya Chumvi – Miritini rehabilitation project.
- (iii) The pavement is generally in good condition apart from the block paving on the Nairobi bound lane at Km 19 which is showing signs of failure. A continuous concrete pavement may be considered for this section.
- (iv) The flexible guard rails used to separate the two carriageways have been damaged in many sections. A reinforced concrete separator has been proposed.
- (v) The section through Mazeras has separated service roads but more land may have to be acquired to allow dualling of the main road.

#### 2.3.4 Mazeras – Mariakani (KM 21+500 – KM 41+700)

- (i) The section is a single-carriageway
- (ii) The section has recently been reconstructed as part of the Maji ya Chumvi – Miritini rehabilitation project.
- (iii) The pavement is generally in good condition with adequate road markings and cats-eyes still intact.
- (iv) The Nairobi – Mombasa railway runs parallel to the project road on the Left Hand Side at approximately 40m in some sections.
- (v) The additional carriageway will be provided on the Right Hand Site of the existing carriage.
- (vi) Limited land acquisition may be necessary to allow enough room for the additional carriage way.
- (vii) On approach to Mariakani weighbridge, a new lane is currently being constructed to separate main traffic from queuing trucks.
- (viii) The proposed end of the project is just after the Weighbridge at Mariakani (approximately 1km).



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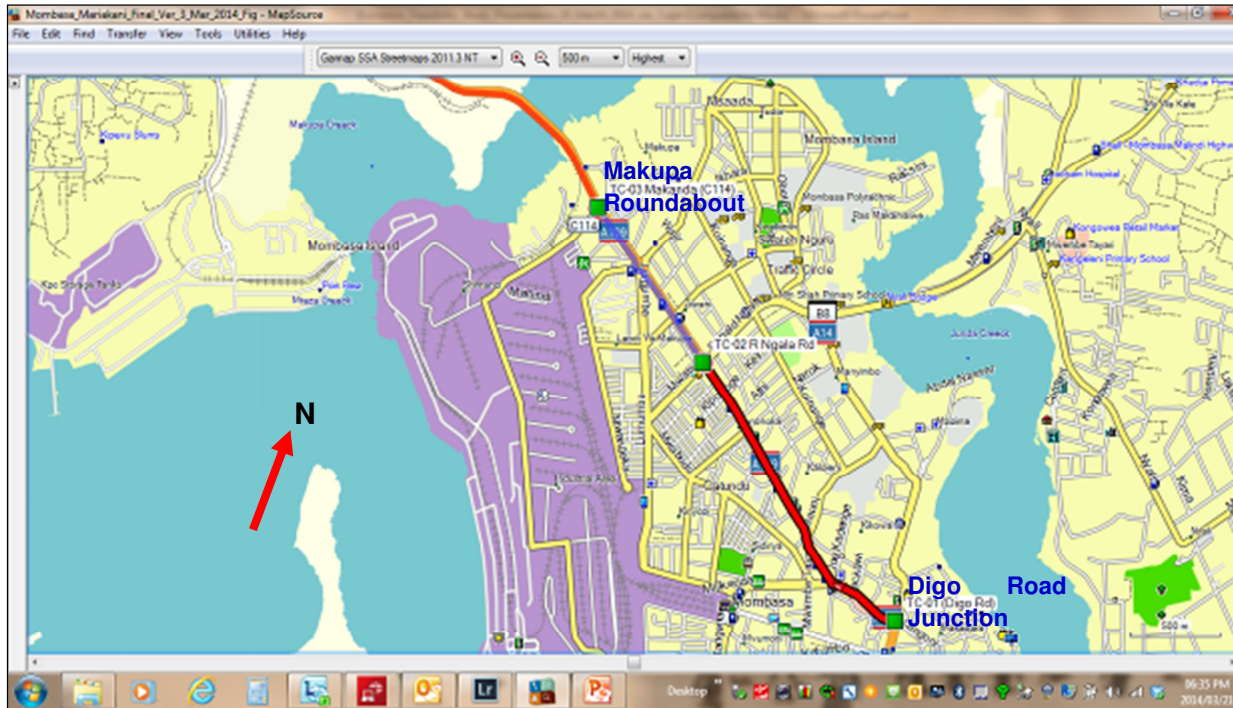
## 2.4 Key Environmental and Social Features

Mombasa – Mariakani road section of A109 traverses four distinct environmental zones described as follows;

### 2.4.1 Digo Road Junction – Makupa Roundabout (Km 0+000 – Km 2+600)

This section stretches for 2.7km constituting Kenyatta Avenue and traverses the main commercial Mombasa Island. The entire section is characteristic with commercial buildings including shops, stores, pharmacies, hardware, eateries, office block stores, hotels and even religious premises. The roadsides are used for peddling various merchandise car parking and bus stops in some areas. Due to the commercial nature of the road section, the area has high population, especially during the day, high traffic and intense economic activities. The following key features include the following,

- (i) Mwembe Tayari (Km 0+500) that is the hub public transport for local and out of city effectively attracting a large population, traffic and social activities,
- (ii) Sabasaba junction (Km 2+000) lying at the main entrance into Majengo Settlement and over to Shimanzi industrial area on the other hand. The north of the junctions runs directly into Nyali bridge,
- (iii) Makupa roundabout (Km 2+600) marks the western end of Mombasa Island CBD leading to the causeway, a short distance further west. Among the feature here include at least one service station, at least three churches, a Mosque and some commercial premises. The roundabout, being the western exit point from the island is a convergence of roads including Kenyatta Avenue itself, Shimanzi road and the adjoining road sections from Kisauni and Tudor areas.



**Figure 3: Digo Road Junction – Makupa Roundabout**

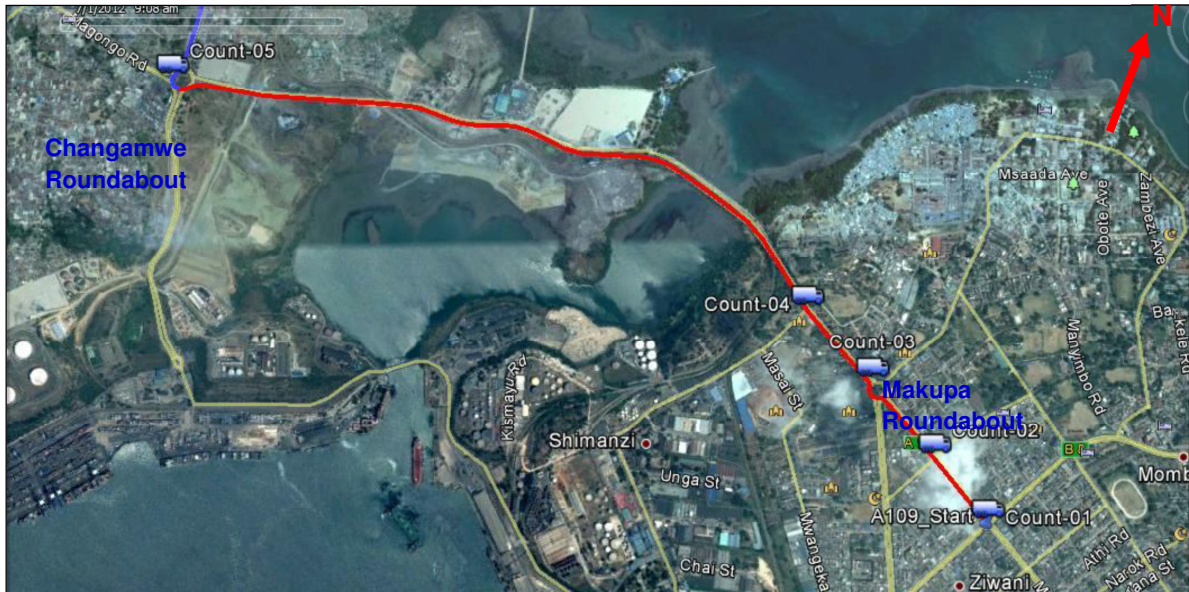
**2.4.2 Makupa Roundabout – Changamwe Roundabout (Km 2+600 – Km 5+800)**

This is a unique zone stretching 3.2 km and traverses the Makupa Causeway linking Mombasa Island and the western mainland. While the island side of the causeway has minimal human activities, the mainland is highly developed with industrial and commercial premises. The causeway is also shared with a railway line, at least 3 no. water pipelines and a power line visibly creating clear conflicts between these service lines and the road carriageways. The key features through this section include;

- (i) Junction into Shimanzi road (Km 3+000) is an important entrance into the industrial area and to the island side of port of Mombasa,
- (ii) There are blocks of residential houses between Km 2+700 – Km 3+400,
- (iii) The main causeway runs from Km 3+400 and Km 3+900 (approximately 500m long) separating sea waters on the Kilindini harbour side and the Tudor creek side with the original link (bridge) at approximately Km 3+700. It was noted that the link bridge was filled up upon the construction of the second carriageway of the road into the city,
- (iv) There is visibly intensive commercial buildings development (go-downs, construction yards, office blocks and show rooms among others) on the mainland side of the causeway. There is a clear interaction between these developments and the road corridor,

- (v) Kibarani solid waste dumping site is situated at approximately Km 4+100 – Km4+200 comprising of a mixture of urban wastes. While it is reported that the Authorities are in the process of relocating the dumpsite, its interaction with road corridor cannot be ignored,
- (vi) The railway line from the central station to Nairobi runs alongside the road over the causeway reaching about 5m at its closest (a clear point of conflict) and later crosses over the road at Km 5+000 in an oblique setting,
- (vii) The road experiences a steep grade towards Changamwe Roundabout overlooking the harbour to the south between Km 5+200 upto Km 5+800 (about 600m). Effect of the gradient to vehicular speeds usually has challenges of traffic pile-up back into the causeway, creating traffic congestion
- (viii) The rail line serving the port of Mombasa passes under the road at approximately Km 5+600 creating a potential direct interaction with the road construction works,
- (ix) The northern side of the corridor section (Km 4+500 – Km 5+500) is characterized with low income residential houses linking to Bangladesh settlements along the Tudor Creek shoreline. However, the settlements have no direct contact with the road corridor,
- (x) Changamwe roundabout at Km 5+800 links the city of Mombasa to the Port of Mombasa, Moi International Airport and the main highway.

**Figure 4: The Makupa Causeway**



Source: Traffic Report

**Figure 5: Features on Makupa Causeway Section**



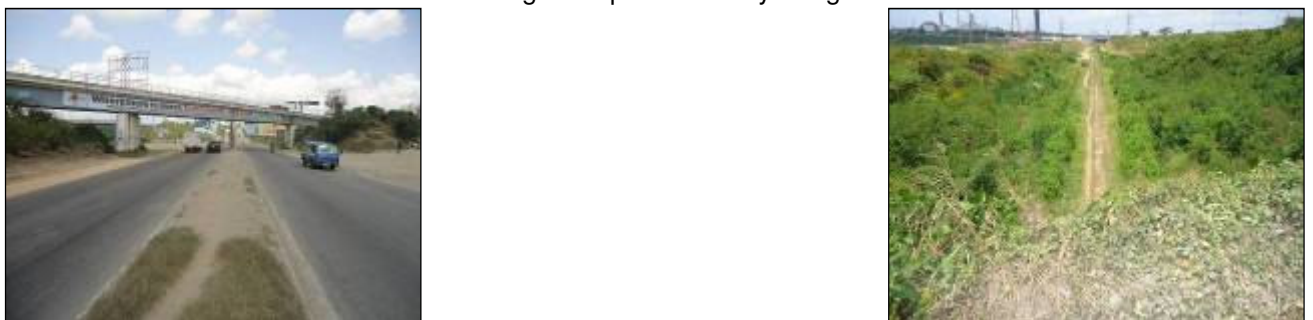
Sections of Makupa Causeway Section (Note the Safety Risks)



Services Mix along Makupa Causeway Section



Existing Makupa Causeway Bridge

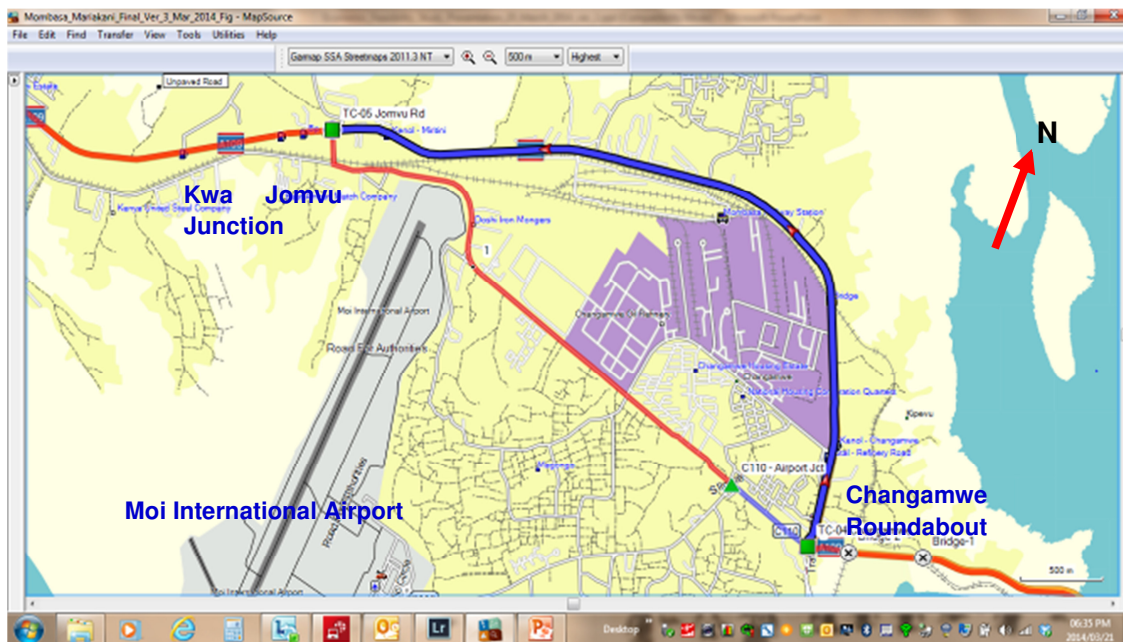


Railway Crossings along Makupa Causeway Section

**2.4.3 Changamwe Roundabout – Jomvu (Km 5+500 – Km 11+700)**

This section stretching about 4.9km is characterized with mixed land use and high population density. The carriageway is largely 2-way single lane (safe for about 1km dual stretch from the roundabout). There is a stretch of commercial activities in building structures as well as open air traders on side of the road while the opposite side comprises of a series of godowns, service stations (Km 6+000 – Km 7+300). All structures are visibly old. Other notable features include the following;

- (i) Km 5+800 is the link point with Magongo road that serves among other residential and commercial areas Magongo, Port Reitz and Chaani estates. This road (also being considered for improvement) links to the Moi International Airport
- (ii) There is an ROB at Km 7+300 for the main railway line from Mombasa to Nairobi before it enters into the main Changamwe Railway Station. The railway line then runs parallel to the road upto Km 9+400, part of which is the railway station,
- (iii) Km 7+300 – Km 8+500 acts as a dividing line from the commercial go-downs and railways station on one side and the informal Bangladesh settlements on the other side. There is a high population, though only limited public crossings were observed,
- (iv) Km 8+500 is a major junction into Mikindani estate, a high population and mixed social, economic and institutional activities. The junction was observed to have notable traffic flow challenges at peak hours,
- (v) The road crosses the flight approach corridor into Moi International Airport (about 500m from the touchdown end of the runway) between Km 10+100 and Km 10+600.



**Figure 6: Changamwe – Kwa Jomvu Section**

**Figure 7: Sections of Changamwe**

View of Changamwe Roundabout



Public Bus Bay at Changamwe



View of ROB at Changamwe

#### 2.4.4 Jomvu – Miritini (Km 10+700 – Km 15+500)

The section marks the busiest, highly commercialized and presence of heavy traffic. Godowns (mainly container depots), truck parking yards, heavy truck packing along the roadside and service stations and a number of industrial premises are dominant features in this section. The carriageway is a 2-way single lane with a highly physically degraded surface. Being the gateway into Mombasa City, traffic conflicts arising from local movements of heavy trucks and through traffic is a major challenge. Key environmental features include the following;

- (i) Junction to Magongo road at Km 11+300
- (ii) Approach into the proposed interchange with Dongo Kundu Bypass,
- (iii) Numerous feeder roads into the commercial centers

Notable environmental features are

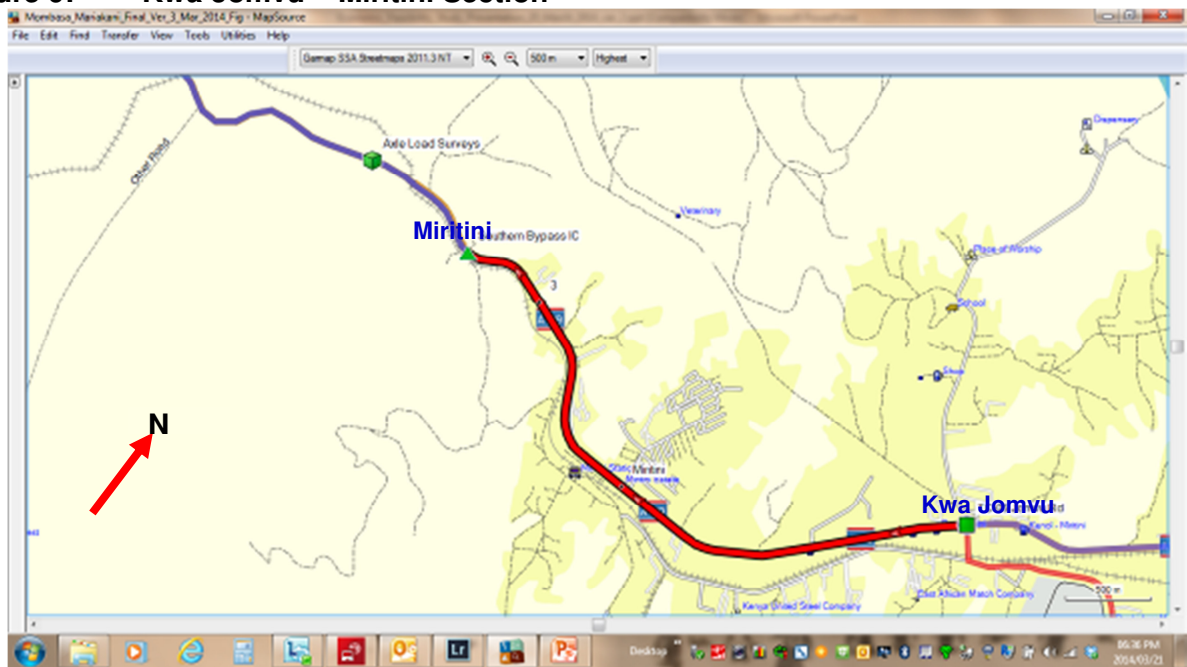
- (i) Enormous waste generation and disposal along the road reserve and the immediate areas. This leads to nuisance risk to safety and blockage of surface drains.
- (ii) Poor roadside drains and drain outfalls from the road reserve arising from a long time of degradation, runoff blockage and changing land use practices,
- (iii) Vehicular emissions arising from high traffic and flow speeds,
- (iv) Dust and particulate matter from the poor pavements that have been reduced to earth surface



**Figure 8: Sections of Jomvu – Miritini**



**Figure 9: Kwa Jomvu – Miritini Section**



#### 2.4.5 Miritini – Mazeras (Km 15+500 – Km 21+500)

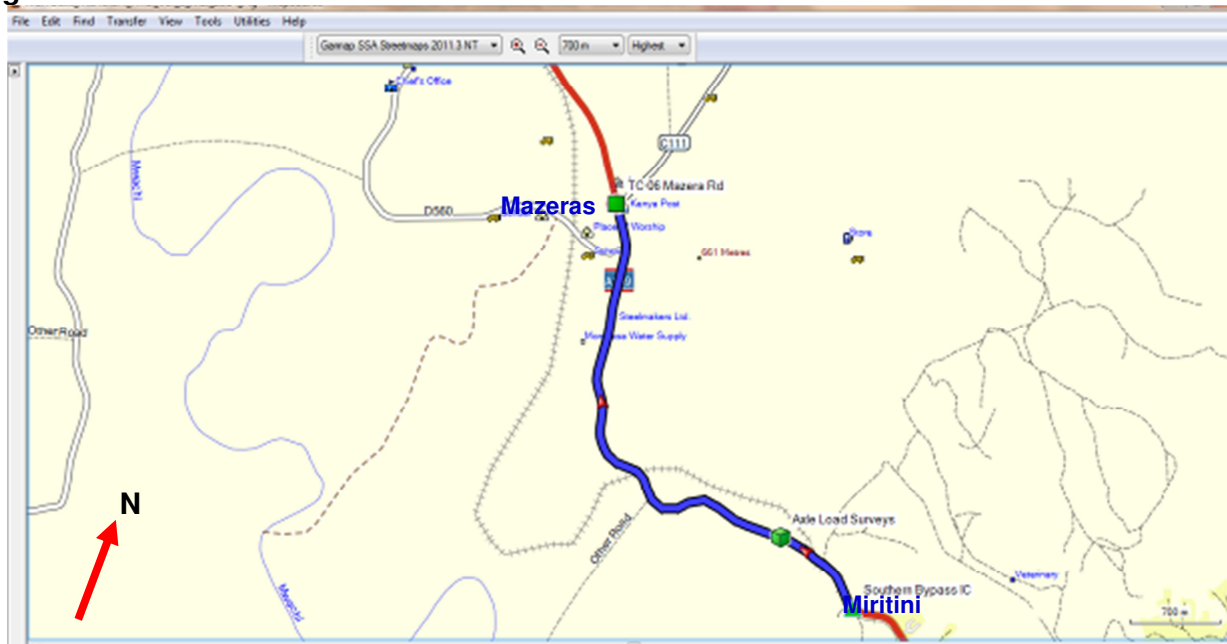
This section is the exit from the busy Mombasa area into a rural – urban zone of Kilifi and Kwale Counties (the carriageway is on Kilifi County though the corridor influence spans the two Counties). The section is characterized with open uncultivated lands with grass cover and sections with coconut trees). The terrain is ragged with steep sections, perhaps the reason why the existing road adopted sharp beds between Mazeras and Miritini. Key features in this section comprise of the following;

- (i) Proposed Dongo Kundu interchange will be situated at Km 15+500 – Km 16+100. This will also serve the proposed Mombasa Northern Bypass. Effects of the interchange may be felt in future.

- (ii) Sharp bends arising from the steep grade with major ones at Km 17+000 – Km 18+300 and Km 18+300 – Km 19+300,
- (iii) Mazeras water storage tanks are located about 1km from the road at Km 19+500, just before the market,
- (iv) The railway line runs parallel to the road all the way at an average of about 50 – 100m and some point coming as close as 60m,
- (v) There are industrial premises at Mazeras on the right-hand side between 19+700 – Km 20+600 with their perimeter fences running on the road reserve,
- (vi) Mazeras Market extends from 20+300 – Km 21+400 characterized with dense commercial activities comprising of shops, eateries, open air traders and transportation services. This is enhanced by the junction to Kaloleni at Km 20+600 and junction to Kinango at Km 20+200 influencing the growth in the town.
- (vii) Mwache forest edges runs along the road from around km 18 +00 – km 20 + 00 and extending to the south. Sections of the forest are sources of building material including hard stone aggregate,
- (viii) The section has a low population density attributed to the terrain and the forest.

**Figure 10: Miritini – Mazeras Section**

**Figure 11: Miritini – Mazeras Section**



**2.4.6 Mazeras – Mariakani (Km 21+500 – Km 41+700)**

Like the above section, Mazeras – Mariakani is also a semi-urban setting though with relatively sparse population density and low economic activities. While the road corridor marks the boundary between Kwale and Kilifi Counties, the road itself lies within Kilifi County running parallel to the Mombasa – Nairobi railway line. The current physical condition of the road carriageway is sound. Most sections of the road corridor have been notably encroached with commercial developments at various levels of implementation. Among the key features include the following;

- (i) The road runs parallel to the railway line all the way with the closest section between Km 27+400 to Km 32+400, coming as close as 50m.
- (ii) There are schools
- (iii) There is a health centers at Mazeras, Kokotoni and Mariakani to serve the local communities,
- (iv) Mabati Rolling Mills (MRM) is located at Mariakani stretching between Km 34+400 to Km 34+500 making the main economic activity in this road section. It provides employment opportunities in addition to its environmental linkages.
- (v) Mariakani market stretches for about 200m between Km 33+700 to Km 36+400 and comprises general trading features, service stations, roadside kiosks and numerous hawkers peddling various commodities,



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- (vi) The junction linking Mariakani to Kaloleni market and Kilifi town is situated right in the middle of the market at Km 35+300. This is a future exit to ease traffic into Mombasa and a link to Kilifi and north coast in general,
- (vii) The road sections ends at Km40+600 near junction to Mariakani Armed Forces Barracks. Though with indication of emerging land development, the area has low population with only a few institutional premises

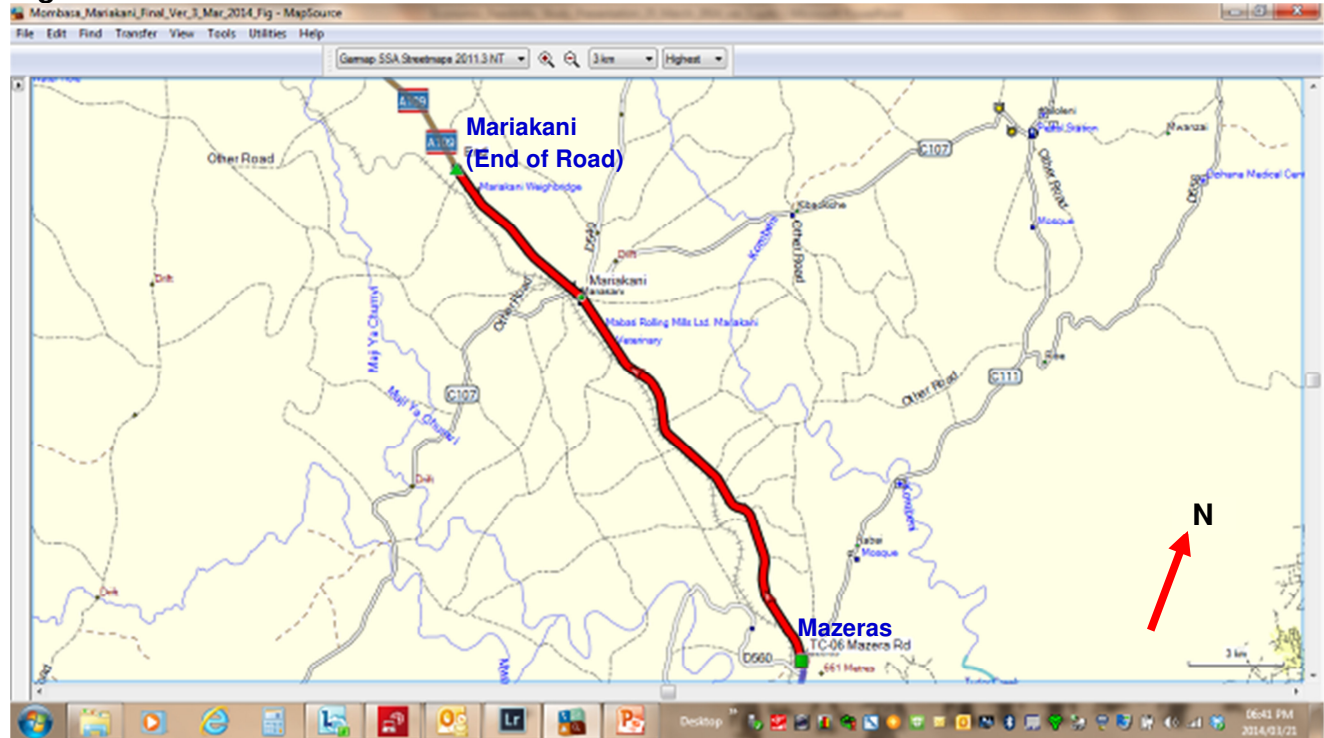
**Figure 12: Mazeras – Mariakani Section**



Mazeras Town Section



Mazeras – Mariakani Road Sections

**Figure 13: Mazeras – Mariakani Section**

## 2.5 Design Concepts

### 2.5.1 Design Standards

The design procedure and the standards adopted are in accordance with the Road Design Manual, Part I: Geometric Design of Rural Roads, January 1979 of the MOR&PW. Circular No. R.5960/ P27 of 12/07/1988 regarding minimum widths of shoulders from the Chief Engineer (Roads) were also used as a reference. The design process also considered the recent policy of the Roads Department in respect of Geometric Design Standards of Roads.

The choice of design speed is dependent on the following factors according to the Road Design Manual among them;

- (i) The classification and function of the road;
- (ii) The nature of the terrain;
- (iii) The density and character of the adjoining land use;
- (iv) The traffic volumes expected to use the road.



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#### 2.5.2 Pavement Widening

Pavements on horizontal curves may require widening to ensure that operating conditions at the curves are compatible with those on tangents. The widening in curves is required for two reasons;

- (i) Vehicles in curves occupy a greater width of carriageway since the rear wheels will track inside the front wheels, and
- (ii) Drivers generally experience some difficulty in holding their vehicles in the centre of the lane, as they tend to shy away from the carriageway edge.

Widening of curves is dependent on the design speed, the carriageway width and curve radius. The short radius curves within the park require widening, but the steep transverse geometry obviates widening due to heavy earthworks and environmental effects. The consultant has therefore not proposed any widening on these curves. Widening was applied in accordance with the guidelines of the geometric design standards.

#### 2.5.3 Road Sections and Geometry

##### Section 1: Moi Avenue/Digo Rd roundabout to Ronald Ngala (B8)

This section runs from Km0+000 to Km2+000. The section lies within Mombasa City Central Business District (CBD) and is a dual carriageway with 2 Lanes per direction. The Lane width varies from 8 – 11m with a 3m central median. The central median contains a number of services including street lights, power lines, data cables and underground service lines. 600mm wide paving blocks have been laid on either side of the median to act as pedestrian walkway. Due to lack of space for expansion, it has been proposed that the number of lanes be retained but pavement rehabilitation and strengthening be carried out as well as new pedestrian Walkways and storm water drainage. A design speed of 50 km/h has been considered for this section but the alignment basically follows the existing one.

##### Section 2: Ronald Ngala to Makande Rd

This section runs from Km 2+000 to Km 3+100, and is situated, within the Mombasa City Central District. Therefore all the parameters mentioned for section 1 also apply for section 2.

##### Section 3: Makande Rd to Changamwe Roundabout

The Section runs from Km3+100 to Km5+900. It is an existing dual carriageway section with two lanes per direction. The Mombasa – Nairobi railway line runs parallel to the Nairobi bound Carriageway between Km3+300 to Km4+000 (700m) with the distance between the edge of the carriageway and the rail track hardly 3m in some sections. The Nairobi bound carriageway also passes over the 100m Makupa Causeway Bridge between Km3+650 to Km3+750. The Mombasa bound carriageway is constructed on a fill over the causeway.



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Due to the railway constraint, it has been recommended that the 2 lanes per direction be maintained through the section. Pavement rehabilitation and strengthening shall however be applied. The design speed has been maintained at 50km/h with the CL maintained through the causeway median. An additional lane has been proposed for the section from km4+100 to Km5+836, resulting in 3 lanes per direction. A 3m raised central median shall be paved with intermittent gaps to allow for tree planting. The Mombasa-Nairobi railway line crosses the project road at Km5+010 (overpass bridge) and at Km5+570 (underpass bridge). A design speed of 50km/h has been proposed for this section but the new centerline follows the existing alignment.

#### Section 4: Changamwe roundabout to Kwa Jomvu Junction

The section runs from Km5+900 to Km11+500. From Km5+836 to Km6+600, the existing road is a dual carriageway with 2 lanes per direction, from Km6+600 to Km11+350 it is a 2 lane single carriageway. A dual carriageway with 3 lanes per direction has been proposed for the entire section. A central median of 3m has been proposed with additional slip lanes at main junctions including Km 6+400, LHS to Oil Refinery and Km 7+100 LHS to UNSOA compound. The Mombasa-Nairobi railway line passes below the project road at Km7+300. A new bridge has been proposed at this location. The section is considered a Peri-urban area with a design speed of 50km/h recommended. A Minimum horizontal curve radius of 100m has therefore been applied.

#### Section 5: Kwa Jomvu junction to the Southern Bypass Interchange

The section runs from Km11+000 to Km16+000. The existing road is a single carriageway between Km11+350 to Km14+780 and dual carriageway between Km14+780 to Km15+815. A 2-lane per direction dual carriageway has been proposed for this section with a raised 3m central median. The median to be paved with gaps for vegetation. A reinforced concrete New-Jersey central barrier has been proposed for the central median between Km14+780 to Km15+815. The section between Km15+100 to Km15+815 shall be covered under the Southern bypass scope of works. The section is also considered Peri-urban and a design speed of 50 km/h has been recommended.

#### Section 6: Southern Bypass Interchange to Kaloleni Junction at Mazaras

The Section runs from Km 16+000 to Km 20+700. The section is currently a dual carriageway with two lanes per direction. The Central median is 3m and a reinforced Concrete New Jersey barrier has been recommended for the entire section. The section between Km15+815 to 16+460 shall be covered under the Southern Bypass scope of works. The terrain can be classified as rolling. A design speed of 80km/h has been proposed for this section. The minimum horizontal curve radius for 80km/h design speed is 350m. Minimum radius achieved was 250m on three curves and 300m for remaining curve. The two 250m radius curves between Km9+000 to KM10+000 resulted from shifting the alignment to minimize fills and utilize the existing pavement.



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#### Section 7: Kaloleni Junction at Mazeras to Mariakani (End of the Project)

The section runs from Km 20+700 to Km41+638, which is the end of the project a short distance after the Mariakani Weigh-Bridge. The existing road is a single carriageway recently reconstructed. The section is to be dualled with the construction of a new 2-lane carriageway on the Right Hand side of the existing carriageway. The terrain can be classified as flat and the road section is rural. A design speed of 100km/h has therefore been proposed for this section. The minimum horizontal curve radius is 600m and the horizontal geometry has achieved this throughout the road section. The minimum horizontal curve radius for 80km/h design speed is 350m. This has been achieved for all the curves in this section.

#### **2.5.4 Interchanges**

There will be three grade separated interchanges to be provided on the project road. Determination of the interchanges was based on traffic flow conflicts and land availability. The target locations include;

- (i) Grade separated interchanges have been proposed at Changamwe roundabout. A two level Interchange has been proposed at Changamwe roundabout to allow for free-flowing condition for all traffic movements especially Mombasa – Nairobi, access road into the Port and Mombasa – Airport directions which constitute a large proportion of the traffic movements. This will replace the current at grade roundabout.
- (ii) At the Mikindani Junction a full Interchange has been proposed to separate the diverting local vehicles from through traffic. This has been done to improve traffic flow from and into the estate and reduce traffic congestion at that location.
- (iii) At Kwa Jomvu, the existing at-grade T-junction causes significant reduction in the capacity of the junction with A109 road. It causes long delays and has a high accident potential. This is compounded by the numerous trucks and tractors with containers making right turns at the junction on their way to deliver containers to the CFC yards as well as the railway line crossing Magongo road a short distance from the junction. A roundabout with adequate turning-radius has therefore been proposed to improve safety and traffic flow into A109 road. This location will be improved by introducing a full interchange separating through traffic from the diverting and joining vehicles, most of which as heavy trucks.

#### **2.5.5 Junctions and U-Turns**

A number of major junctions occur along the project road that requires interventions for enhanced traffic flow and safety. The improvement proposals have been designed to include deceleration and acceleration lanes to allow for safe turning movements. The following are some of the main junctions considered for design.





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- (i) Improving Sabasaba junction to synchronise traffic turning movement with pedestrian crossings. At the moment, the junction is signal controlled and at times controlled by the Traffic Police,
- (ii) Redesigning Makande road junction to streamline heavy tracks from the Shimanzi area, city outbound traffic and local access roads,
- (iii) Junction to the Port will be integrated into the proposed Changamwe interchange (Km6+400)
- (iv) Improving the Mazeras – Kinango junction and Mazeras – Kaloleni Junctions both at approximately Km20+600
- (v) Improving Mariakani – Kaloleni junction at Km35+260
- (vi) A number of U-Turn locations have also been provided for along the project road.

#### 2.5.6 Pedestrian Foot Bridges

To ensure safety of pedestrians, a number pedestrian Bridges have been proposed at the following locations;

- (i) Km3+100 (Makande Road Junction)
- (ii) Km5+950 (Changamwe)
- (iii) Km8+600 (Mikindani junction)
- (iv) Km20+600 (Mazeras)
- (v) Km35+300 (Mariakani)
- (vi) Cattle crossings have also been proposed at KM24+000 (Mazeras) and KM 34+000 near Mariakani.

Also proposed are pedestrian crossing ramps, especially in the city centre where there is no space for footbridges. Proposed crossing ramps are to be designed as marked humps with at Mwembe Tayari areas (KM1+000), Sabasaba Junction, Makupa Roundabout and Makande junction.

#### 2.5.7 Pedestrian Walkways

New pedestrian walkways have been proposed for the Town sections of Mombasa, Changamwe, Miritini, Mazeras and Mariakani. In addition, pedestrian walkways have been proposed on both sides of the Causeway Km 4+100 to Km 5+800 and only on the RHS (Mombasa-bound Lane) between Km 3+100 and Km 4+100.

#### 2.5.8 Street Lighting

The project road traverses urban section with existing infrastructure including street lighting. The proposed interchanges at Changamwe, Airport junction and Kwa Jomvu will also require street lighting to ensure safe traffic flows. However, the section traversing the flight approach corridor into



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Moi International Airport between Mikindani and Jomvu areas will not be provided with street lighting to avoid conflicts with navigation lights.

## 2.6 Construction Materials Availability

There were no gravel sources identified along the corridor of the project road. A search outside the corridor but within manageable haulage yielded 6 material sites suitable as prospective borrows sites for sub base, base and shoulder material. Most of the material sources are in Kilifi County and a few in Kwale County. The materials sources identified are listed below. However, the full assessment and studies on specific site for use during the construction will be undertaken by the Contractor(s).

Materials demand for the project is estimated as 177,800m<sup>3</sup> gravel and significant volumes of various sized aggregate materials. The volume of water will vary through the project works considering the huge volume that will be applied for dust control. Following is an overview of the materials sources (details are found in the Materials Report).

### 2.6.1 Gravel Material Sites

#### Material Site MS 1

Material site MS 1 is an existing coral gravel borrow area. Its location is off Mombasa – Kilifi road around Kanamai at about km1+900 on the LHS along road B8. The site is 2.5 Km along a track branching to the RHS off road B8 after about 15Km from Km1+900 (Sabasaba). This site is composed of approximately 0.1m thick soil overburden, overlying coral gravel of greater than 10m depth. The site has the potential of producing approximately 200,000m<sup>3</sup> of coral gravel.

#### Material Site MS 2

Material site MS 2 is a new coral gravel borrow area. It is located 11km from the start of the road project (Km0+000 on A109) along the Mombasa – Kilifi Road B8, 1.3km inside, near vascon estates around Kikambala area). This site comprise of 5 – 8 meters thick coral gravel layer under about 100mm thick soil overburden. The site has the potential of producing approximately 30,000m<sup>3</sup> with a higher potential on extension.

#### Material Site MS 4

Material site MS 4 is an existing lateritic gravel borrow area. It is located on the RHS and off the project road at Km21+200 at Mazeras along road C111 to Kaloleni for a distance of about 17km then branch to the RHS for a distance of 4.3km along road E930 towards Kiembeni (Bamburi). This site comprise of 1.5 – 7m thick loose lateritic gravel material in rock boulders matrix under a 200mm – 800mm thick soil overburden. The site has the potential of producing approximately 30,000 m<sup>3</sup> with a higher realizable potential on extension.



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#### Material Site MS 5

Material site MS 5 is a new gravel borrow area. It is located on the LHS and off the project road at Km 20+500 just after Mazeras along road D 560 to Kinango (kasemeni area) for a distance of about 6 km on the LHS. This site is composed of 1.2 – 1.5m thick layer of weathered shale rock material under a 100 – 300mm thick soil overburden. The site has the potential of producing approximately 63,000m<sup>3</sup> of gravel.

#### Material Site MS 6

Material site MS 6 is an existing gravel borrow area. It is located off km35+900 at Mariakani along C107. The source is about 18.5km towards Kaloleni. The worked area is just behind Kaloleni Law courts. The worked face comprise of over 6.0 meters thick weathered rock overlying lateralised gravel, to a depth greater than 2.5m, the overburden is 300 – 700mm thick. The site has the potential of producing approximately 7,800m<sup>3</sup> of gravel.

### **2.6.2 Hard Stone Quarries**

Identified quarry sites were all commercial and apart from HS 1, HS 4 and HS 5 all others are within reasonable distances from the road corridor. The stone from all the commercial sources sampled is suitable for up to class 2 chippings, concrete, GCS, asphalt concrete and DBM and therefore suitable for use for all sections of the projects road. The sites include the following;

#### HS 1 – Jaribuni Quarry

The source is located 63 km from Km 0+000 along the Mombasa – Kilifi Road. The predominant rocks are the Kambe limestone and are currently being utilized for several road construction projects.

#### HS 2 – Matano Quarry

The source is located off Km 19+400 on LHS. The predominant rocks are the lower Mariakani beds and are currently being utilised as construction materials through commercial quarries.

#### HS 3 – Kokotoni Quarry

The source is located off Km 27+450 on the LHS. The predominant rocks are the lower Mariakani beds and are currently being utilised as construction materials through commercial quarries.

#### HS 4 and 5 – Mugoya Quarry

The source is located 77.6 km from Km 0+000 at Taru. The predominant rocks are currently being used for several road construction projects

**Figure 14: Approximate locations of Materials Sites**



Source: Materials Report

### 2.6.3 Construction Water

There are numerous ponds over the Kokotoni area in disused pits of old quarries. Similar ponds exist on the upper Mwache and Kombeni seasonal rivers (both in the general area) where water is available throughout the year locally held by rock outcrop dams. Haulage may prove excessive over some sections. Water from the above sources were sampled and tested and proved suitable for construction purposes.

### 2.6.4 Sand for Construction

The seasonal rivers including Mwache and Kombeni rivers do not bring in adequate sand from the catchments. It is for this reason that sand for construction works within the part of coastal region is normally sourced away from two locations namely:

- (i) Malindi – Sources north of Malindi at Ngomeni with haulage within 130 – 150Km range.



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- (ii) From Voi River in Voi Town – River with a haulage in excess of 150Km.

## 2.7 Construction Activities

The construction project activities have been planned to flow such that conflicts with the environmental setting as well as the social and economic activities along the corridor are minimised. It is expected that upon project commencement, the Contractor(s) will prepare a realistic project activities schedule to share the same with the Client and the supervision. The conceptual activities, however, will be as follows;

### 2.7.1 Construction Camp Establishment

The Contractors will search for appropriate land to set up the construction camp sites to house among others the following;

- (i) Main Camp Sites
- ✓ Consultants' offices,
  - ✓ Contractors' offices,
  - ✓ Workshops,
  - ✓ Materials laboratories,
  - ✓ Stores
  - ✓ Fuel farms
  - ✓ Truck parking yards
- (ii) Materials Holding and Batching plants
- (iii) Pre-cast yards
- (iv) camps may include a workmen camp site for residential quarters,

### 2.7.2 Site Preparation

Construction process begins with the alignment surveying, pegging and clearing. This involves bush clearing, top soil stripping to be followed with earthworks. Bush clearing removes vegetation cover including grass, shrubs and young trees. Often, grown trees will also be removed and the Contractor(s) is expected to maintain a record of the number, species and characteristics of the trees removed for compensation through planting.

### 2.7.3 Earthworks

Earth moving is the removal of the overburden along the alignment to give way for filling with appropriate materials. This generates significant spoil earth materials to be disposed off or reused elsewhere. The activities will involve moving fill materials (gravel) to fill and development of the base on which the road surface will be formed.



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#### 2.7.4 Materials Sourcing and Extraction

Mobilisation of materials will be the main activities such as to include aggregate from the quarry sites, gravel from borrow areas and water from sources. Materials haulage, storage, batching and applications is a major activity of the project.

#### 2.7.5 Pavement Laying

This will be the development of the road pavement layers as per the design specifications.

#### 2.7.6 Structures

Construction of structures including bridges, culverts, interchanges, kerbs, NMT facilities and drainage channels among others

#### 2.7.7 Rehabilitation and Restorations

The Contractor(s) will undertake the following restoration activities;

- (i) Landscaping and beautification of the project road corridor
- (ii) Rehabilitation of spoil disposal areas
- (iii) Restoration of borrow areas
- (iv) Rehabilitation of quarry site
- (v) Decommissioning of camp sites and clean-up.

#### 2.8 Project Implementation Schedule

It is envisaged that the detailed design reports and tender documents will be completed by the end of year 2014. Procurement of the Contractor(s) will take approximately 12 months. This implies the construction could begin in early 2016 on the earliest. The construction period is estimated at 36 months (3 years) upto the end of 2019.

#### 2.9 Project Implementation Costs Estimates

Three alternatives were considered for the design of the project road (the Alternatives with coats are in annex). Alternative 3 including construction of concrete pavement on the heavily loaded road sections (mainly Changamwe – Miritini areas and sections of the slopes towards Mazerias) and asphalt concrete applied for the rest of the road section (Miritini area to the end of the project at Mariakani Weigh Bridge) including the service roads and NMT sections. Alternative 3 as the considered option has been estimated to cost **KShs. 22,518,000,000**.



## **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.



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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 marks 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.





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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



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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



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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.



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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 corridor. It acknowledges that road works potentially result in environmental hazard through the spillage of carbon products, contaminating the surrounding land, dust and noise pollution, 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 focus 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,



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- (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.*



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### 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.



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#### Compliance Aspect

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

#### Noise and Excessive Vibration Pollution Control Regulations, 2009

Part II section 3(1) 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.*
- ✓ *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*



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#### 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.





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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



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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 as 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, 2012 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



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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 Rural Roads 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



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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)**

Section 42 Part 1 forbids any driver to drive a vehicle at a speed exceeding fifty kilometers per hour on any road within the boundaries of any trading centre, township, municipality or city: 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.



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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 highways.*

#### **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.



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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*



### **3.3 African Development Bank Safeguards**

#### **3.3.1 Integrated Safeguard System (ISS)**

African Development Bank has established an Integrated Safeguard System (ISS) for a comprehensive projects review and ensuring a cross the board perspective of environmental and social linkages. The ISS comprises of four components, all that existed separately but with identifiable operational weakness. The components include;

- (i) Integrated safeguard policy statement (ISPS)
- (ii) Operational safeguards(OS)
- (iii) Environmental and social assessment procedures (ESAPs)
- (iv) Environmental and social impact Assessments (ESIAs)

Integrated Safeguard System (ISS) encompasses into five number (5NO) operational safeguards addressing the following fields;

- (i) Environment
- (ii) Involuntary
- (iii) Gender
- (iv) Climate risk management and adaptation
- (v) Civil society engagement framework
- (vi) Health
- (vii) Integrated water Resources management
- (viii) Agriculture and rural development
- (ix) Poverty reduction

The specific safeguards are briefly described below;

#### Operational Safeguard 1 (OS 1)

This is the main safeguard that guides environment and social assessment as well as climate issues. The safeguard governs the process of determining a projects environment and social assessment requirement. OS is designed to identify, access and manage potential environment and social risks and impacts including climate change issues. More specifically, OS1 achieves the following;

- (i) Identify and assess risks and impacts,
- (ii) Avoid and/or minimize, risks and impact,
- (iii) Provide for stakeholders participation.
- (iv) Ensure effective management of risks and impacts
- (v) Contribute to capacity building elements.



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In the categorization requirements under OS1 – 5 are also considered as support safeguards. Under the safeguards environmental and social impacts assessment (ESIA) studies are undertaken on clearly defined projects while environmental and social management framework (ESMF) is prepared for programmes or plans with a multiplicity of uncertain projects.

#### Operational Safeguard 2(OS 2)

The safeguard focuses on involuntary resettlements, land acquisition, population displacements and requirements and compensation. It consolidates the policy commitment and requirements on involuntary resettlements and incorporates improvements operational effectiveness.

#### Operational Safeguards 3 (OS 3)

This safeguard is designed to govern biodiversity and ecosystem services for the conservation and promotion of sustainable use of natural resources. Among the focus is on the integrated water resources management where commitments translated into operational requirements.

#### Operational Safeguard 4(OS 4)

OS4 governs pollution prevention and control, hazardous materials and resource efficiently. It covers a wide range of impacts arising from pollution, wastes and hazardous materials and particularly those under international conventions and regional standards. This also includes greenhouse accounting. The OS4 principles also support OS1 described above.

#### Operational safeguard 5 (OS 5)

Labour conditions, health and safety are a major concern in projects. The Bank therefore, has established OS5 to address requirements concerning works conditions, rights and protection from abuse and/or exploitation.

### **3.3.2 Project Categorization**

Project screening through OS1 and in support of OS 2 - 5 leads to categorization of the project. The project categories are guided by considered linkage levels as follows;

#### Category 1: Bank Operations Likely To Cause Significant Environmental And Social Impacts

Category 1 projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. Some programme-based operations or other regional and sector programme loans that have significant adverse environmental or social risks and are deemed to be Category 1. In some cases, projects are included in Category 1 because of their potential cumulative impacts or the potential impacts of associated facilities.

Any project requiring a Full Resettlement Action Plan (FRAP) under the provisions of the Bank's policy on involuntary resettlement is also deemed to be Category 1. Category 1 programme-based operations or regional and sector loans require a SESA, and Category 1 investment projects require an ESIA, both leading to the preparation of an ESMP. For a project requiring a FRAP, the ESIA





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includes, and if there are no other issues requiring assessment may be limited to, the social assessment needed to prepare the FRAP.

#### Category 2: Bank Operations Likely To Cause Less Adverse Environmental And Social Impacts Than Category 1

Category 2 projects are likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects. Likely impacts are few in number, site-specific, largely reversible, and readily minimized by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards. An operation that involves resettlement activity for which an Abbreviated Resettlement Action Plan (ARAP) is required under the ESAPs is classified as Category 2.

Most programme based operations and regional or sector programme loans designed to finance a set of subprojects approved and implemented by the borrower or client are included in this category unless the nature, scale or sensitivity of the intended pipeline of subprojects involves either a high level of environmental and social risk or no such risk. Category 2 projects require an appropriate level of environmental and social assessment (SESA for programme operations, investment plans, and some corporate loans, or ESIA for investment projects) tailored to the expected environmental and social risk so that the borrower can prepare and implement an adequate ESMP (for an investment project) or ESMF (for a programme operation), to manage the environmental and social risks of subprojects in compliance with the Bank's safeguards.

#### Category 3: Bank Operations With Negligible Adverse Environmental And Social Risks

Category 3 projects do not directly or indirectly affect the environment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment. Beyond categorization, no action is required. Nonetheless, to design a Category 3 project properly, it may be necessary to carry out gender analyses, institutional analyses, or other studies on specific, critical social considerations to anticipate and manage unintended impacts on the affected communities.

#### Category 4: Bank operations involving lending to financial intermediaries

Category 4 projects involve Bank lending to financial intermediaries that on-lend or invest in subprojects that may produce adverse environmental and social impacts. Financial intermediaries

include banks, insurance, reinsurance and leasing companies, microfinance providers, private equity funds and investment funds that use the Bank's funds to lend or provide equity finance to their clients. Financial intermediaries also include private or public sector companies that receive corporate loans or loans for investment plans from the Bank that are used to finance a set of subprojects. Financial intermediary subprojects equivalent to Category 1 and Category 2 are subject to the relevant OS requirements, as if they were directly financed Category 1 or Category 2 projects. However, if a client will use a Bank corporate loan to finance high-risk investment projects known at the time of loan approval, the loan can be considered. Category 1.



### **3.3.3 Key Environmental and Social Components**

While assessment contents depend on the nature and scope of the project, plan or program, there are typical environmental and social components in the human and natural environments that should be considered.

#### Human Environment

The components to consider in the human environment include the elements and characteristics of the Social, Cultural and Economic environments as well as infrastructures and services and land use patterns in the project area and its zone of influence.

- (i) Under the Social Environment, the Proponent must consider issues related to: population, gender, health, civil society, and societal framework.
- (ii) Under the Cultural Environment, consideration should be given to issues such as: cultural heritage, customs and traditions, traditional activities, fundamental values, religious and/or ancestral beliefs, ethnic dialects, leisure, etc.; Right and use of natural resources related to cultural practices (religious sacrifices, traditional medication, etc.); Cultural factors contributing to excluding some groups from development benefits; Major concerns, opinions, interests, and aspirations of local populations; Environmental problem awareness, attitude towards nature; architectural, archaeological and landscape heritage, as well as any other heritage element protected or not by laws or regulations.
- (iii) Under Economic Environment, issues to consider include major economic activities at the local and regional levels and growth trends; Right, use and dependence on renewable natural resources; inequality patterns, economic differences and poverty determinants; Working conditions and employment situation in the region; infrastructure and services; and land use patterns.

#### Natural Environment

The components to consider in the natural environment include:

- (i) Climate, Weather Conditions and Air Quality and regional conditions (microclimate, meso-climate or macroclimate), emphasizing aspects that may affect the project's activities.
- (ii) Geology, Topography and Soil issues the local and regional levels, emphasizing vulnerable or problematic aspects of land and soils, as well as topographic characteristics which may be modified by the project.
- (iii) Water and Hydrologic Cycle including surface water, ground water, near-shore waters, coastal shores and seas.
- (iv) Ecosystems types, functions, protected areas and sensitive zones, integrity, interactions, conservation and protection measures.
- (v) Vegetation types, characteristics, biodiversity, threats, conservation and protection measures.



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- (vi) Wildlife biodiversity ecological and behavioural characteristics, threats, conservation and protection measures.

#### 3.3.4 Environment and Social Impact Assessments

The following provides a summary of the objectives of an ESIA in accordance with the AfDB guidelines; it presents the scope of work to be carried out and the key tasks to be undertaken during the study. Major tasks that shall be highlighted in this section because of their importance in the preparation of an ESIA include among others.

- (i) Describing the proposed project by providing a synthetic description of the project relevant components and presenting plans, maps, figures and tables.
- (ii) Identifying the policy, legal and administrative framework relevant to the project.
- (iii) Defining and justifying the project study area for the assessment of environmental and social impacts.
- (iv) Describing and analyzing the physical, biological and human environment conditions in the study area before project implementation. This analysis shall include the interrelations between environmental and social components and the importance that the society and local populations attach to these components, in order to identify the environmental and social components of high value or presenting a particular interest.
- (v) Presenting and analyzing alternatives to the proposed project, including the “without project” option, by identifying and comparing the alternatives on the basis of technical, economic, environmental and social criteria.
- (vi) For the selected alternative, identifying and assessing potential importance of beneficial and adverse environmental and social, direct and indirect, short and long-term, temporary and permanent impacts, on the basis of a rigorous method.
- (vii) Defining appropriate mitigation/enhancement measures to prevent, minimize, mitigate, or compensate for adverse impacts or to enhance the project environmental and social benefits, including responsibilities and associated costs.
- (viii) Developing an environmental and social monitoring program, including indicators, institutional responsibilities and associated costs.
- (ix) Preparing a resettlement plan, if required.
- (x) Carrying out consultations with primary and secondary stakeholders in order to obtain their views on and preoccupations about the project. These consultations shall occur during the preparation of the ESIA Report to identify key environmental and social issues and impacts, and after completion of the draft ESIA Report to obtain comments from stakeholders on the proposed mitigation/enhancement measures.
- (xi) Preparing an Environmental and Social Management Plan (ESMP). This management plan shall be presented as a distinct document from the ESIA Report.



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#### 3.3.5 AfDB Guidelines on Cooperation with Civil Society Organization

The AfDB considers the African civil society as a primary stakeholder and help to enhance transparency and accountability due to the need to change information disclosure policies and enhance participation of stakeholders in the bank operations. The civil society includes groups such as the; non- governmental Organization (NGO's), community Based Organizations (CBO's), people's organization, trade unions and religion groups among others. The civil society organizations are central to the banks efforts to implement the participatory approaches especially in reaching to the poor people and women which are the priority target groups who have little influence and control over decisions and actions that affect their lives.

Africa Development Bank (AfDB) has adopted an integrated approach to environmental assessment in the so-called Integrated Environmental and Social Impact Assessment (IESIA) guidelines. The Guidelines' major objective is to provide reference material on how to adequately consider cross-cutting themes while assessing the environmental and social impacts of a project. The IESIA Guidelines assist in the project design, as many potential adverse impacts can be avoided or mitigated by modifying or adding certain project components to the initial design. They also provide guidance on how to adequately consider cross-cutting themes in both the preparation and assessment phases. The cross-cutting themes prioritized by the Bank are the following: poverty, environment, population, gender and participation. In addition, the Bank has recently adopted health priorities that are transversal issues by nature: HIV/AIDS and Malaria control. Consequently, health outcomes are also considered as a cross-cutting theme in the IESIA Guidelines. There are several operational principles discussed in the guidelines;

- (i) Gaining and providing information: The bank is expected to make available information to the public and also draw knowledge, information from them. The regional member country authorities are expected to be responsive to the civil societies request, issues and concerns on bank supported programmes and projects,
- (ii) Involvement of the civil society organizations (CSO) in policy making: The bank collaborates with the civil society organizations and the regional member country to factor in the interest of the stakeholders in both policy and project activities. The bank takes deliberate measures to remove barriers such as gender biases and other inequalities to allow effective participation,
- (iii) Civil Society Participation in operation: It's the responsibility of the region member country to give responsibility to the CSO in programs financed by the bank loans,
- (iv) To foster effective CSO involvement the AfDB request the regional member country to provide institutional support to CSO for capacity building purposes,
- (v) The AfDB remains optimistic and committed to effective engagement with the CSO in the future.

#### 3.3.6 AfDB Policy on Poverty Reduction

Poverty is not limited to the lack of the physical resources for development, but also rooted in the inability of poor people to influence forces and decisions that shape their lives. AfDB considers the



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empowering of the poor people to actively participate in the development interventions for sustainable poverty reduction. The main objective of this policy is to provide a framework for action by putting the poverty reduction at the centre of bank lending and non lending activities for the regional member country.

There are several guideline principles highlighted in the policy. These include;

- (i) The bank focuses in the analysis of incidences and in-depth causes of poverty in Africa and these consequently results in formulation of policies and intervention mechanisms,
- (ii) Support of national capacity building, promotion of participatory approach, development on the new forms of partnership and establishment of poverty monitoring systems,
- (iii) Internal policy coherence to strengthen the existing sector policy and fill gaps in specific areas from poverty reduction,
- (iv) Requires a strong partnership that facilitates the consistence between the bank poverty policy and poverty reduction strategies,
- (v) Handles the new conceptual framework that expands the concept of poverty beyond income measures and its causes; addresses the economic and non-economic causes of poverty,

### 3.4 World Bank Safeguard Policies

#### 3.4.1 Environmental Assessment Procedures

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 (siting, 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



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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. Proposed projects are classified into one of three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- ✓ **Category A:** the proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Category A project, the Proponent is responsible for preparing an EIA report.
- ✓ **Category B:** the proposed project has potential adverse environmental impacts on human populations or environmentally important areas such as wetlands, forests, grasslands, and other natural habitats - but these are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A projects. Like Category A the environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
- ✓ **Category C:** the proposed project is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C project.

#### 3.4.2 OP/BP 4.01 (Environmental Assessment)

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental associated with Bank lending operations. The purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable and that potentially affected people have been properly consulted.



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**Table 3: OP/BP 4.01 Environmental Assessment**

Objectives	Operational Principles
To help ensure the environmental and social soundness and sustainability of investment projects. Also referred to as scoping.	Apply the screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken proportional to potential risks and to direct, and, as relevant, indirect, cumulative, and associated impacts. Use sectoral or regional environmental assessment when appropriate.
To support integration of environmental and social aspects of projects into the decision making process.	<p>Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources, including trans-boundary and global concerns, and potential impacts on human health and safety.</p> <p>Assess the adequacy of the applicable legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene such international obligations.</p> <p>Provide for assessment of feasible investment, technical, and siting alternatives, including the "no action" alternative, potential impacts, feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions, and their institutional, training and monitoring requirements associated with them.</p> <p>Where applicable to the type of project being supported, normally apply the Pollution Prevention and Abatement Handbook. Justify deviations when alternatives to measures set forth in the handbook are selected.</p> <p>Prevent, minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and planning that includes the proposed mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.</p> <p>Involve stakeholders, including project-affected groups and local non-governmental organizations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation as necessary to address EA-related issues that affect them.</p> <p>Use independent expertise in the preparation of EA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious or that involve serious and multi-dimensional environmental and/or social concerns.</p> <p>Provide measures to link the environmental assessment process and findings with studies of economic, financial, institutional, social and technical analyses of a proposed project.</p> <p>Provide for application of the principles in this Table to subprojects under investment and financial intermediary activities.</p> <p>Disclose draft EA in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.</p>

By nature of the proposed project, interactions with general environmental and social setting are anticipated. In this regard, this safeguard is triggered.

### 3.4.3 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



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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). Road projects have the potential for disruption of natural ecosystems including habitats. The proposed project is an existing road corridor but has not notable interactions with habitats. However, this aspect is triggered by the limited interaction with the sea at Makupa Causeway.

#### **3.4.4 Operational Policy (OP) 4.10, Indigenous Peoples, 2005**

This policy contributes to the Bank's mission of poverty and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of indigenous peoples. For all projects that are proposed for Bank financing and affect indigenous peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The broad support of the project by the affected indigenous Peoples such as Bank-financed projects include measures, or (b) avoid potential adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive. The project corridor mainly interacts with urban and semi-urban settings with a multicultural and multi-racial social mix is evident. The safeguards therefore will not be triggered.

#### **3.4.5 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. Under the safeguard, the following are achieved;

- (i) Identify Category A (any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes) and/or B (any project located in, or in the vicinity of, a physical cultural resources site) projects that fall under this OP policy
- (ii) Identify the likely physical cultural resources issues, if any, to be taken into account by the EA and develop the ToRs for the EA.





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- (iii) If the project is likely to have adverse impacts on physical cultural resources, identify appropriate measures for avoiding or mitigating these impacts as part of the EA process. These measures may range from full site protection to selective mitigation, including salvage and documentation, in cases where a portion or all of the physical cultural resources may be lost.
- (iv) Develop a physical cultural resources management plan that includes measures for avoiding or mitigating any adverse impacts on physical cultural resources and provisions for managing chance find.

As observed from the baseline conditions, there are no significant sensitive cultural areas along the road corridor since it is an existing corridor. In this regard this safeguard is not triggered.

#### **3.4.6 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 resettlers 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 potential displacements by proposed road project and, therefore, RAP studies will be triggered.

#### **3.4.7 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. It is not expected that the project will removal



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significant number of trees while the nearest forest (Mwache Forest to the south) is outside the project corridor. The safeguard, therefore, is not triggered.

#### 3.4.8 Project Categorization

While appreciating that the project will not trigger issues of cultural and indigenous peoples safeguards, it is evident that there are significant social issues (resettlement issues) and physical environment including drainage, waste management, environmental quality and safety). On this basis the project is classified Category A calling for a full ESIA Study and Full RAP.

#### 3.5 Institutional Framework

The key project responsibilities for the project implementation will be the Contractor due to the physical presence and direct involvement in the project. The Project Manager and the Contractor's Environmentalist and Sociologist will take the full responsibility of analyzing and implementing the ESMP as provided under the Contract by customizing the recommendations to suit the established project implementation plan. The Contractor team will consult and internalize instructions received from the Supervising Environmentalist and Sociologist.

To guide the Contractor, the Supervision Environmentalist and Sociologist will be responsible of evaluating the performance on environment and social aspects with a view to issuing improvement orders through structured instructions. Joint assessments and discussions of the ESMP and compliance will be planned with the Contractors' staff leading upto monthly progress meetings where critical issues will be tabled for consideration and policy guidance.

The overall authority over the Environment and Social implementation will be the Environment Division at KeNHA. While the Supervision represents the face if the Client, the Environment Division will be in constant consultation with the Environmentalist and Sociologist for effective and logical instructions to the Contractor. The Division will also be liaising with NEMA on compliance issues.

Other responsibilities will be defined as follows;

Organization	Responsibilities
Ministry of Transport	Provide policy guidance on national transportation infrastructure
Department of Occupational Health and Safety	Surveillance on the implementation of health and safety plans for the construction workers and members of public coming into contact with the construction activities.
County Governments	<ul style="list-style-type: none"> <li>✓ Support of the project from a social and political principles</li> <li>✓ Provide land for social facilities including markets., parking areas, drainage and access roads,</li> <li>✓ Collaborate on physical planning for relevance of the improved road</li> <li>✓ Review master plans for compatibility with the improved roads,</li> </ul>



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Health	<ul style="list-style-type: none"> <li>✓ Surveillance on public health with respect to the workers and associated communities, especially in regard to HIV/IDS and other communicable diseases,</li> <li>✓ Identify suitable linkages of the road with health facilities such as emergency access,</li> <li>✓ Advise on roadside health facilities including wellness centres.</li> </ul>
Water (WRMA)	<ul style="list-style-type: none"> <li>✓ Control on the usage of water resources for construction and other requirements without compromising the demand for the public</li> <li>✓ Provide appropriate water abstraction permits</li> <li>✓ Ensuring non-pollution of water from the construction of water</li> </ul>
Lands, Housing and Urban Development/National Land Commission	<ul style="list-style-type: none"> <li>✓ Facilitation for land acquisition</li> <li>✓ Protection of the road reserve after the construction</li> <li>✓ Initiating the process of land use zoning along the road corridor to avoid early congestion</li> </ul>



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## CHAPTER 4: ENVIRONMENT SETTING

### 4.1 General Topography

Mombasa County is within coastal lowland rising gently from flat zones of between 6 – 50m above sea level and becoming undulating westwards on the mainland to about 100m above sea level at Mariakani area. The City of Mombasa Central Business District (CDB) lies wholly on Mombasa Island with commercial and residential areas extending into the mainland areas via Likoni (Mombasa – Lungalunga road), Mombasa – Malindi road and Changamwe (Mombasa – Nairobi road). These areas are fairly developed with commercial and human settlements effectively affecting the surface topography and interfering with the surface drainage.

### 4.2 Geology and Soils

The geology of the Kenyan coast is dominated by rifting and breakup of the Paleozoic Gondwana continent and the development of the Indian Ocean. The Proterozoic gneisses of the Mozambique belt form the basement of an intracratonic basin, filled with continental permo- Triassic classics. The sea level changes, isostatic readjustments and the tectonic movements contribute to the geomorphology of the Kenyan coast. The region is divided into three main physiographic belts namely the flat coastal plain which includes; Island division, Kisauni on the North mainland and Mtongwe to the South. Next are the broken severely dissected and eroded belts that consist of the Jurassic Shale overlain in places by residual sandy plateau found in Changamwe division. Finally there is the undulating plateau of sand stone that is divided from the Jurassic belt by a scarp fault.

Areas around the sea have Pleistocene coral reef mainly used as a source of limestone for the cement industry and source of building stone. The sea shore of the Kenyan coast has extensive sand beaches which makes a town an attractive tourist destination area. The mineral sands occur in various parts of the Kenyan coast in almost similar geologic environments. Geochemically, mineral sand deposits contain ilmenite, rutile, zirconium as well as other minerals and trace elements that could be of radioactive nature, such as thorium.

Previous reports carried out elsewhere in the region shows that top soil gradually changes to sandy clayey gravel at depths of 2 – 2.5m deep. The soil types have a strong correlation with the geology and topography of the region and differ widely in depth, texture, physical and chemical properties with variations running parallel to the coastal line due to sedimentation process. The significance of this geological and soil characteristics is the porosity associated with the sedimentary type of soils. Infiltration to the groundwater aquifers of polluting substances from the ground surface is also highly likely. Mombasa soils are varied both physically and chemically depending on their geographical location. There are five main categories namely;



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Soils developed on higher level lagoon deposit (Kilindini sands, these are light soils with very low fertility, they are excessively drained and very deep. These soils are found at Port Reitz and Changamwe areas

- (i) Soils in the mangrove swamps, they are poorly drained soils, very deep and excessively saline, the soil texture is medium to heavy,
- (ii) Soils developed in shales, they are well drained to imperfectly drained, they are shallow to moderately deep soils found near Mtwapa to the North and Mazeras to the North west,
- (iii) Soils developed on raised coral reef limestone with mixture of lagoon deposit; these are light soils, medium to heavy texture and of low fertility found at Likoni along the coastline.
- (iv) Soils developed on the lower level lagoonal deposits are variable and of low fertility. They are complex of very deep soils of varied drainage, colour texture and salinity. Found in Mtongwe and Nyali.

It was observed that soil is increasingly getting contaminated along the corridor from sources not directly from the road use. These include industrial activities, motor garages, fuel service stations, waste dumping sites and roadside parking of trucks. Pollutants include among others hydrocarbons (oil and grease residuals), various chemical residuals, organic matter and heavy metals. There are also scrap materials including metals, timbers and plastics/polythene that progressively release polluting materials into the soil.

#### 4.3 Mineral Resources

The project area is reportedly endowed with limited minerals' deposits though not significantly exploited has due to the low economic deposits but appropriate investigation however, is yet to be carried out. Among the minerals present in Kwale County include Titanium (found around Mdumba and Ngulwa areas and currently being investigated for exploitation), Lead, Zinc and Copper (found in Dumbule, Mwale and Mkarigbe). Gemstones are usually found in Kuranze, Chidi and Mtsunga areas while Silica sand is found in Dalgabe, Ramisi and Msabweni areas and Barite in Lungalunga. Economic deposits of building sand are found in most of the riverbeds and particularly in Ramisi, Matuga, Tiwi and Msabweni. Lead, Zinc and Copper are among the minerals reportedly found around the project area. Mazeras sandstone slabs cover a large section of Kinango District commonly extracted and used for construction purposes, found on the western end of the project.

**Figure 15: Sample Geological Nature and Economic Value**



Typical Geological Formations at the towards Mariakani Site



Mazeras Slabs on Sale at Maji ya Chumvi



Soil Profile near Mazeras

#### 4.4 Water Resources

Mombasa County is among the major urban cities in Kenya faced with serious scarcity of clean drinking water, there are no sources of fresh water in the area. The challenge on water is as a result of absence of permanent surface water sources, increased population growth, rapid urbanization and industrialization activities and poor maintenance of the existing water supply. The main water supply for Mombasa and the surrounding areas is mainly from the Mzima springs located 300 Km in the Chyulu Hills, Baricho and Sabaki well field in north coast and also Tiwi Boreholes in south coast. Mzima pipeline and Marere Pipeline are the main transmission systems interacting with the project. There are several water distribution points such as;

- (i) Mombasa Island receives water from Marere and Mzima springs through Mazeras and Changamwe water reservoirs
- (ii) Northern mainland receives water from Sabaki pipeline and the Mzima line through the Guu Tatu water reservoir
- (iii) Western mainland which covers the Changamwe Division receives its water from Mzima springs through Mazeras reservoir and Marere Springs through Marere pipeline

Despite the availability of the water pipelines in areas such as in Mariakani, Mazeras, Mikindani, Jomvu kuu and Miritini, the local population still encounters the water shortages. Inadequate water supply contributes to the deteriorating sanitation status. A significant proportion of the population relies on the ground water sources from shallow wells mainly favoured by the geology of the area which has high water table. The ground water supplements the provision from the Mombasa Water and Sanitation Company (MOWASCO) although the exploitation is limited by the salinity caused by the sea water intrusion and pollution from the dumping of industrial and domestic waste especially since the soils are pervious.



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#### 4.5 Hydrology and Drainage

Indian Ocean is the largest water mass in the area and influences the general surface drainage pattern with all land sloping towards the ocean hence all the surface run-off is expected to drain to the sea through the natural drainage systems. However, due to the dense human settlements and activities of the natural drainage systems have been interfered with resulting to frequent flooding. The drainage of the coastal zone generally adjusts to the original slope towards the east that is typical of the general tilt of the Eastern African margin that has been altered by human activities.

It should be noted that due to the rugged topographic nature upstream and the relatively high soil porosity, drainage is efficient with no possibility of flooding during rains. However, due to dense settlements between Mombasa and Miritini, natural drainage systems and channels have been destroyed or blocked by human settlements, roadside economic activities and waste materials. In effect surface runoff and available space, damaging land and outfalls onto private land.

Significant sections of the road are in the urban environs of Mombasa (about 6km), Mariakani and other villages or built-up areas along the road. Indications during the inspections were that the drainage should be divided into two separate systems (street drainage and road drainage) because the design approach for each system is different. The existing street drainage comprises underground drains (storm water pipes) and surface drains (canals). Maintenance of the system has been neglected and is non-functional in places.

Surface drains are highly contaminated from sources including fuel surface stations (mostly discharging oil residuals into open drains), industrial effluents and domestic sewage (open sewers or direct discharge from unsewered areas) as well as storm water transporting pollutants into the drains.

Side drains have been provided along the short section of road that has already been upgraded to a dual carriageway. The road drainage along the remainder of the single carriageway will have to be replaced to suit the dual carriageway. Cross drainage has been provided along the road by means of culverts (large diameter conduits). The catchment areas on the higher side of the road are relatively small, therefore, no bridge structures will be necessary. It is anticipated that the existing structures will have adequate capacity as the mean annual precipitation has not drastically changed since the structures were originally constructed and the subsequent development surrounding the structures may only have a marginal effect on the run-off from the associated catchment area.

**Figure 16: Hydrological and Drainage Features**



Sections of Makupa Causeway



Existing Status of Surface Drainage

#### **4.6 Ecological Features**

The project area is inhabited by human settlement and economic activities (industrial and commercial features) and no wildlife was noticed apart from smaller species of birds, rodents and reptiles (mainly snakes) but the whole range of organisms could not be established under this assessment. Arabuko Sokoke forest (situated about 50km to the north) and the lower fringes of Tsavo National Park have a nature influence on the animal species in Mombasa and its surroundings, though this situation has been changed by social and economic interests.





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Plant species are dominated by coconut trees being the main agricultural crop. Other lesser agricultural plants noted includes cassava, cashew nuts, and isolated food crops towards inland zones (Miritini, Mazeras, Mariakani and the surrounding transition areas). Most of the land in the area is covered with grass species, shrubs and in some places ornamental plants and flowers. Tree species seems stunted, perhaps due to the geological formations, soil characteristics and water shortage. Indigenous plant species are fast being replaced by human social and economic activities including commercial and settlements. Like the animal species, plants in the surrounding areas are influenced by ecosystems in the coastal region including Arabuko Sokoke, Shimba Hills, Tsavo forest and coastal mangrove forests.

Mombasa and its surroundings is placed mid-way between major influencing ecosystems, though the level of influence has declined over the years due to intensive human activities and the distances. Vegetation of the project area are influenced by the ecosystems namely Mwache forest, Coastal vegetation, Shimba hills system (~50km to the south in Kwale County) as well as Arabuko Sokoke forest system (~50km to the north). The ASAL conditions to the west (Tsavo National Park) also influences the western zones of the project area and the part of the watersheds. Among the trees and plant species noted around the project influence area are

- (i) Tamarind tree,
- (ii) Neem tree,
- (iii) Flame Tree,
- (iv) *Acacia ssp*,
- (v) *Diospyros ssp*,
- (vi) Cynometra – Manilkara type,
- (vii) Cashew nut.
- (viii) Others in local languages Mwawa, Mwanga, Mkanju, Mporojo, Kikwata, Mkone, Mnyubu, Mkilifi, Mbuyu (Boabab), Mfunu, Mchonge Mahana and Mkwakwa among others.

Mangroves species namely;

- (i) *Aricennia marina*,
- (ii) *Bruguera gymnorhiza*,
- (iii) *Rhizophora mucronata*,
- (iv) *Ceriops tagal and Sonnerata alba*.
- (v) *Rhizophora mucronata*,
- (vi) *Ceriops taga*

These are reportedly the predominant species across the Kenyan Coastal zone and highly used for construction and other purposes. Around 50 % of the 159 rare plants in the project area are found in Shimba Hills and Arabuko Sokoke Forests (the two, however, are about 50km away from the project corridor).



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#### 4.7 Ecology at Makupa Causeway

The Makupa Causeway area is located at the shallow confluence of the two Tidal Creek systems surrounding Mombasa Island: the Kilindini-Port Reitz creek on the one hand, and the Tudor Creek on the other. These two Creek systems discharge into the open sea at about 8 km from the location of Makupa Causeway. There exists some rich natural resource heritage, particularly mangroves in the upper intertidal areas of these two creek systems. There are also a number of ecologically significant areas and the entire area has been classified as priority area that needs protection, particularly against pollution Makupa Causeway runs midway between Port Reitz Creek (the harbor side) and Tudor Creek to the north. Mwache, Mambone and Chasimba rivers feed into Port Reitz Creek from as far as Taita and Shimba Hills bringing in huge loads of silt.

On the other side Kombeni, Tsatu and Mtsapuni seasonal rivers flow into Tudor Creek though the catchment is much smaller. The creek is characterized with mangrove systems harbouring pockets of ecological areas requiring protection against pollution and destruction. The importance of mangrove systems and the adjoining areas is in the provision for fish and shrimps breeding and nursery grounds as well as establishing the shoreline for mitigation against coastal erosion. This process has developed a standalone report providing an outline of the ecological characteristics of Makupa Causeway. The current changes to Makupa ecosystem are;

- (i) Operations at the harbor discharging heavy metals, hydrocarbons, nutrients observations shows stunted growth of mangrove and other plants on the side.
- (ii) Municipal solid waste disposal at Kibarani, a short distance from the road. Direct discharge of solid waste runoff with the leachate and infiltration into the ecosystem,
- (iii) Discharge of domestic sewage and waste water from residential estates and industrial sites into the system,
- (iv) Wash down of roadside litter and hydrocarbon residuals from road surface,

**Figure 17: Ecological Features through Makupa Causeway**

Ecological Features along Makupa Causeway (mangrove vegetation and shoreline deposition)

#### 4.8 Climatic Conditions

##### Rainfall

The coastal region receives an average annual convectional and bimodal rainfall of about 900mm with a marked decrease in intensity in the north and into the hinterland. The average annual mean rainfall in Mombasa District ranges from 400mm to 1,100mm. The rainfall pattern is influenced by proximity to the Indian Ocean, relatively low altitudes, temperature and trade winds with the seasons being more pronounced in the south. Long rains occur between the month of April and June (peak in May), while the short rains occur from October to December.

##### Temperature

The annual minimum temperatures in the area range between 22.5°C and 24.5°C while the maximum temperatures vary between 26°C and 30°C along the coastal belt. The district is generally hot and humid all the year round with a relative humidity of about 60% along the coastal belt due to the high evaporation rate and availability of surface water. From an environmental angle dispersal of aerial pollutants increases the span of coverage with higher temperatures. This may not directly apply for the construction phase, but is significant on aircraft activities associated with the airport.

#### 4.9 Air Quality

Most urban cities have a common phenomenon of poor deteriorating air quality mainly attributed by increased residential areas, energy consumption by industries, power generation, transport and the domestic sectors. The major air pollutants in the road corridor is due to emissions from vehicles and the diesel driven trucks especially with increased traffic congestions. Presence of both light and heavy industries such as oil refineries, cement factories, power plants and solid waste decomposition at uncontrolled landfills.

Some emissions are related to the amount of fuel consumed, for example emissions of sulphur dioxide and lead, which depend on the percentage of sulphur or lead in the fuel, and the amount of fuel consumed. In addition, the total emissions of carbon, in the form of carbon monoxide, carbon



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dioxide and hydrocarbons, will depend on fuel consumption, although the ratios of the different emissions will vary according to engine and operating conditions and the addition of catalytic converters.

According to a recent research (David Pearce, 1996) 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 in the developing world (Fred Pearce, 1996). Levels of pollutant emissions can therefore also be related directly to changes in road condition, as well as vehicle mix and mileage. Key emissions associated with vehicular exhaust contain the following

- (i) Hydrocarbons (HC),
- (ii) Carbon monoxide (CO),
- (iii) Oxides of nitrogen ( $NO_x$ ),
- (iv) Particulate matters (PM),
- (v) Carbon dioxide ( $CO_2$ ),
- (vi) Sulphur dioxide ( $SO_2$ ), and
- (vii) Lead (Pb).

Air Sampling and Measurements established that while noting the particulate matter levels are below the occupational health standards ( $10mg/m^3$ ), there is significant levels along the corridor. There are lower levels in isolated sections of the corridor with low population and human activities including the end of the project road and the weighbridge areas with an average of  $3 - 4.5mg/m^3$ . Sections of the corridor with high human habitation and economic activities, and particularly the Miritini area into the city centre displays high concentration of particulate matter ranging between  $6.5 - 7.3mg/m^3$  in the city centre. A significant of the particulate matter is associated with traffic on poor road surfaces.

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Location/Site		Measured concentration levels (mg/m <sup>3</sup> )
1	Mariakani Area (Kenya Army Baracks Junction)	3.30
2	Mariakani Weighbridge area	4.40
3	Mariakani Sky Energy Petrol Station area	6.355
4	PCEA Kokotoni Church	8.05
5	Mazeras/Kaloleni Junction	6.45
6	Miritini area	6.35
7	Total petrol station – Jomvu area	4.50
8	Total Petrol Station Junction to Magongo/Miritini Road	6.45
9	Corrugated Sheets Ltd Factory area-Jomvu	6.60
10	Changamwe Roundabout	7.35
11	Saba Saba Area-Junction	6.25
12	Coast Bus Area Kenyatta Avenue	7.35
13	Kenyatta Avenue/Digo Road Junction	6.56

Sources: Spot Measurements

**Table 5: Measures Aerial Emission Levels**

	Location	Carbon Monoxide (CO)	Sulphur Dioxide (SO <sub>x</sub> ) ppm	Carbon Dioxide (CO <sub>2</sub> ) ppm	Volatile Organic Compounds (VOC)	Nitrogen Dioxide (NO <sub>x</sub> ) ppm
1	Mariakani (Kenya Army Barack Junction)	Below detectable limit	<0.01	25	Below detectable limit	<0.5
2	Mariakani Weighbridge area	Below detectable limit	<0.01	75	Below detectable limit	0.51
3	Mariakani Sky Energy Petrol Station area	Below detectable limit	0.12	200	ND	ND
4	PCEA Kokotoni Church	Below detectable limit	0.02	200	ND	ND
5	Mazeras/Kaloleni Junction	ND	0.01	25	ND	ND
6	Miritini area	ND	0.01	100	ND	ND



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	Location	Carbon Monoxide (CO)	Sulphur Dioxide (SO <sub>x</sub> ) ppm	Carbon Dioxide (CO <sub>2</sub> ) ppm	Volatile Organic Compounds (VOC)	Nitrogen Dioxide (NO <sub>x</sub> ) ppm
7	Total petrol station – Jomvu area	ND	0.04	100	ND	ND
8	Total petrol Station junction to Magongo/Miritini road	ND	0.02	25	ND	ND
9	Corrugated Sheets Ltd Factory area – Jomvu	ND	0.02	30	ND	ND
10	Changamwe Roundabout	ND	0.14	50	ND	ND
11	Saba Saba Area – Junction	ND	0.01	100	ND	ND
12	Coast Bus Area Kenyatta Avenue	ND	0.2	55	ND	ND
13	Kenyatta Avenue/Digo Road Junction	ND	0.01	100	ND	ND

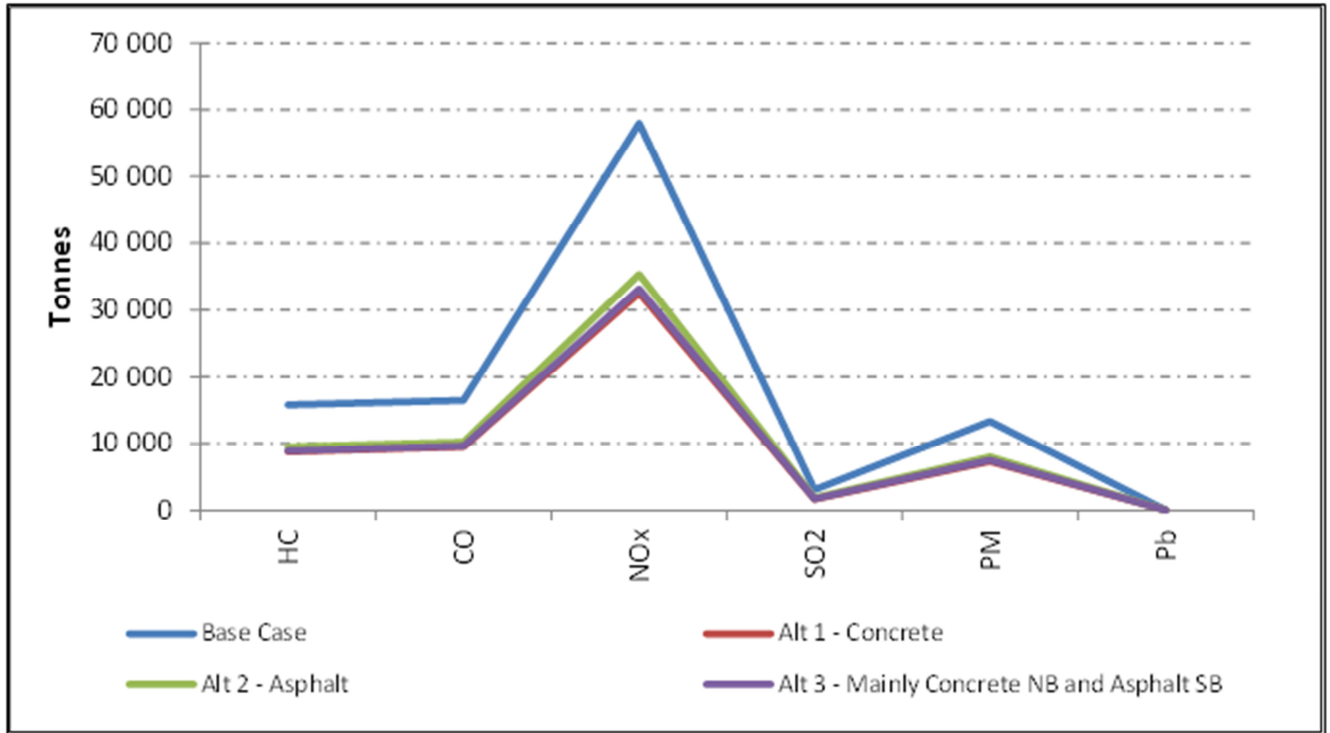
Source: Spot Measurements ND – Not Detected

The most dominant gaseous emission is Carbon Dioxide (CO<sub>2</sub>) associated with traffic activities. The trends follows the same pattern as the particulate matter, low along high speed sections (25 – 50mg/l) and notable along sections with slow moving vehicles. There is an extra high level of CO<sub>2</sub> at Mariakani and Kokotoni (200mg/l) and other sections near petrol stations. This is associated with slow moving trucks while the medium levels(75 – 100mg/l) including city centre locations with interchanges and junction where there is heavy and slow moving traffic. It was also noted that the rate of dispersion is lower in parts of the city.

Sulphur Dioxide (SO<sub>2</sub>) levels are extremely low across the corridor (ranging from 0.01mg/l – 0.14mg/l) while the outer sections reports less than 0.1mg/l. Other gases including Carbon Monoxide (CO), Volatile Organic Carbons (VOC) and Nitrogen Oxides (NO<sub>x</sub>) are all below detection levels. These results were obtained through a single measurement session. An intensive monitoring may be required to establish long term trends.

The predicted trends in emissions as estimated from the HDM traffic models are illustrated in the figure below. It is noted that there is significant drop in vehicular emissions following the improvement of the road surface. Notable reductions are noted in CO<sub>2</sub>, Hydrocarbons, and Nitrogen Oxides. This reduction is associated with efficiency in vehicle operations, including travel speeds and time spent on the road section. Particulate matter and Lead tends to remain the same.

**Figure 18: Emissions Predictions from HDM4 Model**



Source: Traffic Report (Dualling of Mombasa – Mariakani A109 Road)

#### 4.10 Noise and Vibrations

Noise pollution is predominant along the major transport corridors especially along the Mombasa – Nairobi road, Mombasa – Lunga Lunga road and Mombasa – Malindi Road. These highways attract all categories of traffic as well as intensive social and economic activities. This scenario is the source of elevated noise levels to the extent of raising concerns of public health and value of investments. Aircrafts into and out of Moi International Airport also contributes to the noise levels at the intersection of the flight and the corridor corridor. The use of ‘tuk tuk’ as a major means of transport has contributed to increased noise levels within the city. Spot measurements of noise along the corridor established the results below.

A spot measurement of noise was carried out on 27<sup>th</sup> February between 10.30 am and 12.00 noon with selected locations along the corridor established the results in the table below. It was a normal day with high temperatures and no cloud cover.

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**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)  
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Position		Ambient Noise Levels Leq Db(A)	Remarks
1	Mariakani Area (Kenya Army Barack Junction)	57.3	Low and fast moving traffic
2	Mariakani Weighbridge area	70.3	Slow/stationary trucks
3	Mariakani (Sky Energy Petrol Station area)	70.8	High but slow traffic (workers and support equipment)
4	PCEA Kokotoni Church	76.8	High and fast moving traffic
5	Mazeras/Kaloleni Junction	73.4	High and slow traffic flow
6	Miritini area	66.3	High but slow traffic
7	Total Petrol Station-Jomvu area	76.2	High traffic
8	Total Petro Station Junction to Magongo/Miritini Road	74.4	High traffic. Other sources of noise
9	Corrugated Sheets Ltd Factory area-Jomvu	68.2	high slow traffic. Multiple sources of noise
10	Changamwe Roundabout	74.2	high slow traffic (mainly trucks moving uphill)
11	Saba Saba Area-Junction	76.4	very high traffic. Other noise sources
12	Coast Bus Area Kenyatta Avenue	76.8	High traffic. Multiple sources of noise
13	Kenyatta Avenue/Digo Road Junction	73.3	High traffic. Multiple sources of noise

The section is normally characterized with heavy traffic, mainly goods trucks most moving at slow speeds. At locations with slow speeds, the noise levels are generally low, though the level of light high speed traffic influences noise levels upwards. With cross section noise profile of 57 – 76dBA is within the established maximum level of allowable accelerating traffic noise of 84dBA, but higher than indoor occupational health standards for hospitals, schools and residential facilities. Improved road will facilitate faster moving vehicles and hence slightly elevated noise levels. The table below illustrates the comparative standards for NEMA, WHO and DOSHS.





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**Table 7: Comparison Between WHO, NEMA and DOSHS Noise Guidelines**

Specific Environment	Critical Effects	Health	LAeq dB(A) WHO	Time base (hours)	LAeq dB(A) NEMA	Time base (hours)	LAeq dB(A) DOSHS
Outdoor living area	Serious annoyance Moderate annoyance		55 50	16 16	45 35	14 14	-
Indoor dwelling	Speech interference		35	16	-	-	-
Inside bedroom	Sleep disturbance		30	8			
Outdoor bedroom	Sleep disturbance		45	8	35	-	-
School classroom	Speech and communication		35	During class time	Day 60 Night 35	14 14	-
School playground outdoor	Annoyance External		55	During play	45	During day	-
Hospital, treatment room indoor	night time daytime		30 30	8 16	-	-	-
Industrial, Commercial and traffic areas	Hearing impairment		70	24	60	12	-
Ceremonies, festivals entertainment events	Hearing impairment		100	4	-	-	-
Public address system indoor and outdoor	Hearing impairment		85	1	-	-	-
Occupational workplace	Hearing impairment		90	8	90	8	90
Impulse noise from toys, firearms, fireworks	Hearing impairment		140	-			140
Traffic accelerating	Hearing impairment		-	-	84	-	-
Construction site	-		-		60	14	90
Other areas, Factories	Hearing impairment		90	8	75	14	90

#### 4.11 Waste Management

The solid waste management in Mombasa has challenges mainly as a result of inadequate capacity and use of undesignated dumping sites especially along the road sides and storm water drainage channels. Collected solid waste within Mombasa municipality is dumped at uncontrolled landfill in Kibarani site next to the Makupa Creek and at the Mwakirunge dump site off north coast. The Kibarani site is an eye sore and causes environmental problems on air and marine water pollution. Liquid waste and chemicals leached from the solid waste dump site at Kibarani pollutes the marine environment.



**Figure 19: Solid Waste Dumping at Kibarani and other Roadside Sections**



Kibarani Dumping Site



Roadside Dumping along Jomvu – Miritini Sections





## CHAPTER 5: SOCIAL AND ECONOMIC SETTING

### 5.1 Background

The Mombasa – Mariakani road can be socially and economically divided into three sections as follows:

- (i) Urban/Peri-urban sections covering Mombasa island from Digo road through Chagamwe to Jomvu as well as the urban centers of Mariakani and Mazeras. The sections are characterized by commercial activities, small scale trading, heavy industries (steel makers, Doshi, Mabati Rolling Mills, Nyumba and Kaluworks among the many) and residential (Chagamwe, Mikindani Jomvu and Bagladesh slum among others).
- (ii) Rural sections from Mazeras and all sections from the suburbs Mombasa city through Mazeras to Kokotoni to Mariakani. These are characterized with huge tracts of empty land, livestock keeping and scattered homesteads. However, observations show an emerging trend in land development along the corridor mainly commercial.

#### 5.1.1 Administrative Setting

Mombasa – Mariakani Road (A109) running from Digo road junction constitutes the main link between Mombasa City Island to the upcountry including among other locations Voi, Nairobi City, Western Kenya, Uganda and other states. The road connects the Port of Mombasa, the largest in East Africa and a vital gateway for imports (mainly petroleum, oil and lubricants and maize, clinker, wheat, iron and steel) to Kenya and its neighboring countries.

The road starts in Mombasa Island of Mombasa County before entering Kilifi County where it ends. It starts in Mombasa sub – county and traverses through the four sub-counties of Chagamwe, Rabai and Kaloleni. The road traverses nine administrative location and ten administrative sub-locations. The administrative locations and sub-locations traversed by the project road are presented in the table below:

**Table 8: Administrative Units Traversed**

County	Sub-county	Location	Sub-Location
Mombasa	Mombasa	Majengo	Majengo
		Railway	Railway
	Chagamwe	Chagamwe	Chagamwe
		Chaani	Chaani
		Miritini	Miritini
		Mikindani	Birikani
		Jomvu	Jomvu kuu
Kilifi	Rabai	Rabai	Mugumo Patsa/Mazeras
			Kaliangombe/jiba



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County	Sub-county	Location	Sub-Location
	Kaloleni	Mariakani	Mtangoni/Mariakani
<b>TOTAL</b>	<b>4</b>	<b>9</b>	<b>10</b>

Source: Sub-county commissioner's offices

### 5.1.2 Political Units

Politically, the project starts in Mvita and traverses through Changamwe and Jjomvu constituencies in Mombasa County and Rabai and Kaloleni constituencies in Kilifi County. The road cross over Port Reitz, Kipevu, Airport, Changamwe and Chaani wards in Changamwe constituency and Jomvu Kuu, Miritini and Mikindani wards in Jomvu constituency. In Kilifi County, the road traverses Rabai/Kisurutuni in Constituency and Mariakani in Kaloleni Constituency.

## 5.2 Demographic Features

### 5.2.1 Population Trends

According to the 2009 Kenya population census, the two counties traversed by the project road had a total population of 2,049,105 persons (Male 1,022,450 and Female 1,026,655). Mombasa County had 939,370 (486,924 Males and 452,446 Females) while Kilifi County had 1,109,735 (535,526 Males and 574,209 Females). The female population (50.1%) in the project counties slightly outstripped the male population (49.9%) by 0.1%. In Kilifi County, the female population (52.3%) outstripped the male population (47.7%). In Mombasa County, the male population (51.8%) was higher than the female population (47.5%).

The road traverses the four sub-counties of Mombasa, Changamwe, Rabai and Kaloleni. The eight locations traversed by the project road had a total population of 708,420 in 2009 while the ten sub-locations traversed by the project road had a total population of 489,812 in the same year. The table below summarizes the population of administrative locations and sub-locations traversed by the project road.

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**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)  
REPORT****Table 9: Population Trends by Administration Locations**

Location	Sub-Location in Project Corridor	Male	Female	Total	Households
Majengo		14,943	15,977	30,920	6,933
	Majengo	14,943	15,977	30,920	6,933
Railway		4,580	3,808	8,388	2,110
	Railway	4,580	3,808	8,388	2,110
Changamwe		5,584	5,429	11,013	2,914
	Changamwe	5,584	5,429	11,013	2,914
Chaani		31,268	26,970	58,238	19,492
	Chaani	31,268	26,970	58,238	19,492
Miritini		33,618	31,082	64,700	18,453
	Miritini	13,644	12,290	25,934	8,159
	Jomvu kuu	19,974	18,802	38,776	10,294
Mikindani		27,305	25,472	52,777	16,579
	Birikani	8,664	7,856	16,520	5,937
Rabai		20,787	22,357	43,144	8,272
	Mugumo Patsa/Mazeras	7,669	8,240	15,909	3,723
	Kaliangombe/jiba	4,518	4,824	9,342	1,545
Mariakani		21,496	21,703	43,199	8,909
	Mtangoni/Mariakani	15,179	14,687	29,866	6,895

*Source: 2009 Kenya Population and Housing Census.*

The average number of members per household in Mombasa is 4 while in Kilifi it is 5. Majority 27.3% of the households in the project counties have over seven members. Kilifi County has 33% of the households having one to two members compared to 20% in Mombasa County. In Mombasa County, 19.7% of the households have over 7 members compared to 35% in Kilifi. Majority of the households 77.3% in Mombasa County are male headed compared to 67.4% in Kilifi County. In Kilifi County, 32.6% of the households are female headed compared to 22.7% in Mombasa County.

Mombasa County has a transitional population structure due to a shrinking child population, where 0-14 year olds constitute 33%. The county also has a high youthful population, where 15-34 year olds constitute 46% of the total population. This is a result of low fertility rates among women as shown by the highest percentage household size of 0-3 members at 59%. Labour migration from the rural areas in search of jobs has also increased the proportion of the working age population of those aged between 15-64 years old which is very high at 65%.



### 5.2.2 Urban Population

According to the 2009 population census, the entire county population in Mombasa is urbanized. In Kilifi county, 62.2% (866,371) live in rural areas while the rest 36.8% (243,364) live in urban areas. There are three urban centres served by the project road namely Mombasa, Mazeras and Mariakani. The total population in each of these towns is presented in the following table:

Table 10: Urban Population Trends

Town	Population by sex								
	2009			2015 (Projections)			2017 (Projections)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Mombasa	486,208	451,923	938,131	595,705	559,978	1,155,683	638,314	600,034	1,238,348
Mariakani	12,133	11,922	24,055	14,608	14,354	28,962	15,433	15,165	30,598
Mazeras	3,259	3,627	6,886	3,924	4,367	8,291	4,145	4,614	8,759
<b>Total</b>	<b>501,600</b>	<b>467,472</b>	<b>969,072</b>	<b>614,237</b>	<b>578,699</b>	<b>1,192,936</b>	<b>657,892</b>	<b>619,813</b>	<b>1,277,705</b>

Source: 2009 Kenya Population and Housing Census.

The above table reveals that there is increasing number of people that migrate from rural to urban areas resulting in the physical growth of urban areas. The high and ever increasing urban population along the project corridor can be attributed to numerous industries where many people seek for employment, education and investment opportunities and also accommodation in the residential estates. These combined put more pressure on infrastructure, hence the need to expand it.

### 5.2.3 Population Density and Distribution

Population distribution and settlement patterns in the project area are influenced by infrastructural network (roads, water availability, telecommunications and electricity), climate and availability/accessibility to employment opportunities, affordable housing and security. Mombasa County has the highest population densities of 4,289 persons per km<sup>2</sup> while Kilifi has a low population density of 88 persons per km<sup>2</sup>. High population densities are found in the Mombasa metropolitan Island, Chagamwe, Mikindani and Jomvu. In Kilifi County, main population densities concentrate along the main road leading from Mombasa to Nairobi and Malindi with a deviation along the road to Kaloleni.

Sparsely populated areas along the project road include the sections between Miritini through Bonje and Kokotoni to Mariakani. The low population areas are mainly rangelands and less productive agriculturally. These areas are also least developed in terms of access infrastructures such as road



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network, electricity and water supply. The project counties are a major destination for people migrating from parts of Kenya seeking employment opportunities and education in tertiary institutions. Specifically, Mombasa County and the urban areas of Mariakani and Mazeras in Kilifi County experiences labour immigration from the rural areas in search of jobs in that has led to increase in the proportion of the working age population of those aged between 15 – 64 years olds.

Along the Mombasa – Mariakani project road, the highest population density of 21,361 persons/km<sup>2</sup> is found in Majengo location while the lowest density of 337 persons/km<sup>2</sup> is found in Mariakani location. The table below summarizes the population densities' of locations and sub-locations traversed by the project road;

**Table 11: Population Density Trends**

Location	Sub-Location	Population Density
Majengo	Majengo	21,361
		21,361
Railway	Railway	2,450
		2,450
Changamwe	Changamwe	2,906
		2,906
Chaani	Chaani	13,793
		13,793
Miritini	Miritini Jomvu kuu	2,199
		2,496
		2,036
Mikindani	Birikani	8,540
		7,484
Rabai	Mugumo Patsa/Mazeras Kaliangombe/jiba	891
		1,451
		553
Mariakani	Mtangoni/Mariakani	337
		365

Source: 2009 Kenya Population and Housing Census.

### 5.3 Housing and Settlements Patterns

The main types of houses in the counties are individual-owned, Government-owned and Local Authority-owned. The houses are categorized by the type of material used; namely; wall, floor and main roofing material. In Mombasa County, 77% of residents have homes with cement floors, while 14% have earth floors. Less than 1% has wood and 5% have tile floors. In Kilifi County, 32% of residents have homes with cement floors, while 65% have earth floors. Less than 1% has wood and just 1% has tile floors.



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In Mombasa County, 71% of homes have either brick or stone walls. 24% of homes have mud/wood or mud/cement walls. Less than 1% has wood walls. 1% has corrugated iron walls. Less than 1% has grass/thatched walls. 5% have tin or other walls. In Kilifi County, 33% of homes have either brick or stone walls. 62% of homes have mud/wood or mud/cement walls. 2% have wood walls. Less than 1% has corrugated iron walls. 1% has grass/thatched walls. 1% has tin or other walls. In Mombasa County, 9% of residents have homes with concrete roofs, while 75% have corrugated iron roofs. Grass and makuti roofs constitute 4% of homes and less than 1% has mud/dung roofs. In Kilifi County, 2% of residents have homes with concrete roofs, while 42% have corrugated iron sheet roofs. Grass and makuti roofs constitute 52% of homes, and none have mud/dung roofs.

In the 2009 Kenya population census, the County of Mombasa was an administrative district while the sub-county of Kaloleni (including Rabai sub-county) in Kilifi County was a district administrative unit. Analysis of the housing situation in these areas was as tabulated here below:

**Table 12: Distribution of Household by Building Materials Used**

Sub-County	Building material (%)										
	Walling					Floor			Roofing		
	Mud/wood	Brick/block	Stone	Mud/cement	Others	Earth	Cement	Others	CIS	Makuti	Others
Kaloleni	53.6	22.8	10.4	8.1	5.2	13.6	77.1	9.3	41.7	44.5	13.0
Mombasa	10.4	40.6	30.4	13.1	5.4	65.0	32.4	2.6	75.0	4.3	20.7
<b>Average</b>	<b>32</b>	<b>31.7</b>	<b>20.4</b>	<b>10.6</b>	<b>5.3</b>	<b>39.3</b>	<b>54.8</b>	<b>6.0</b>	<b>58.4</b>	<b>24.4</b>	<b>16.9</b>

Source: 2009 Kenya Population and Housing Census.

#### 5.4 Land Tenure and Land Use

Land ownership in the coast region and along the project corridor has remained a thorny issue as most of the residents do not legally own land and most of the land is owned by absentee landlords leaving many of the residents as squatters. In addition, many of the people in the rural areas own land communally.

In Mombasa County, only 30% of the residents have title deeds to their land compared to 40% in Kilifi County. The proposed project road traverses land whose tenure is mixed including privately owned land (dominant in the area), trust land and government land. Many of the large land owners do not live in the project area leaving the land for use by squatters and roaming livestock. Ownership of land to be affected by the road can only be ascertained through a Resettlement Action Plan (RAP). Currently, the value of land along the project road varies from kshs 40,000 in the rural setup in Kokotoni to over 30 million an acre in Mombasa depending on its commercial potential and proximity to infrastructures.





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Land use in Mombasa County is diverse depending on the physical location. The major land use is residential development, industrial development, transport and communication, extractive, institutional and for commercial and service purposes among others. Most of the public land is mainly used for institutions development such as religious, health educational, military and the community facilities such as social halls, public gardens, show ground and sports ground.

The industrial land is not defined although Changamwe division it is mainly considered as an industrial area which has several industries such as Kipevu power generation and the Kenya Oil refinery company. Other industrial set-ups are at the Bamburi cement factory and the Kalu works.

The commercial and services area is mainly within Mombasa island characterized by shops, open air markets, hotels, vehicle parking areas, commercial buildings (go downs, construction yards, show rooms) among others.

The commercial and services area is mainly within Mombasa island characterized by shops, open air markets, hotels, vehicle parking areas, commercial buildings (go downs, construction yards, show rooms) among others.

### 5.5 Economic Features

The project counties are endowed with numerous natural resources that have determined their economies. These include Mombasa Marine National Park & Reserve, Nature Trail, Arable Land, Indian Ocean Tourist Attractions as Beach Tourism, Game Parks, Historical and Cultural sites and Tourist Hotels. Thus the main Economic Activities include: Tourism, Farming, Fishing, Livestock farming, Chrome Ore, Cement, Salt, Sand, Food Processing and Various Manufacturing Firms. The Counties has a strong industrial sector with the Mabati Rolling Mill and the Athi River Cement Factory contributing heavily to the region's economy both in employment provision and income generation. Opportunities exist in agriculture particularly dairy and crop farming thanks to fertile soils and a good weather pattern.

**Table 13: Distribution of Income Generation Activities by Industry**

County	Agriculture, Forestry And Fishing	Mining	Manufacturing	Wholesale, Retail Trade	Finance, Insurance Services	Electricity, Gas Water	Community Social Services	Not Classified
Kilifi	33.2	8.9		48.1	0.8	1.7	4.6	2.8
Mombasa	-	-	1.1	77.2	0.2	0.5	14.1	7

The average household incomes in Kilifi County is Ksh 706.9. The sectoral contribution to household income are

- (i) Agriculture: (80.6%),
- (ii) Rural self-employment: (1.85%),



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- (iii) Wage employment:( 6.2%) and
- (iv) Urban self-employment: (11.4%).

#### 5.5.1 Crop Production

The project falls within two Agro Ecological Zones:

- (i) CL3 Coconut/Cassava Zone Agro Ecological Zones where the major farming activities are tree cropping, (mango, citrus, cashew nuts and coconut), Vegetables (Chilli, Brinjara and Okra), Food crops (Maize, Bananas, cowpeas and green grams) and dairy farming.
- (ii) CL5 Lowland Livestock/Millet Zones suitable for dry land farming and livestock keeping

Mombasa district especially Island and Changamwe Division is heavily urbanized and has limited agricultural activities hindered by the climatic conditions. The section where agriculture is practiced is mainly in the inland zones of Mazaruni and Mariakani on small scale. Kilifi district has a bigger population of around 90% which relies on agriculture. The major food crops planted include maize, cowpeas, fruits, vegetables, sisal, sugarcane and cassava. The cash crops grown include; coconut, cashew nut, sim sim, sunflower, mangoes and citrus. The significant markets specifically for food crops, from outside the county, are Kongowea market in Mombasa, Malindi, Kilifi, Mtwapa, Gongoni and Marereni within the formal employment.

#### 5.5.2 Livestock keeping

Livestock production is a significant contributor to the coastal economy and is a significant source of livelihood. The major livestock reared is mainly dependent on the rainfall patterns and the availability of vegetation in an area. In Mombasa County, the major livestock kept is poultry that is more preferred since less space is required. However in Kilifi County where there are large tracts of pastureland, livestock keeping of cattle, sheep, goats, poultry and pigs is dominant. The major challenges encountered in livestock keeping include; frequent droughts, poor management, wildlife invasion, inadequate infrastructure, poor marketing of ranch products and insecurity. The major livestock traded in the market are goats, poultry and cattle in Mariakani.

#### 5.5.3 Fishing

These include Deep Sea Fishing: for Marlin or fly-fishing for Sailfish, shark, swordfish, wahoo and tuda. Deep-sea fishing is a lucrative venture due to high demand for fish from the hotel industry. Kilifi county has 14 landing beaches (including Mnarani, Uyombo, Mtwapa and Takaungu) and over 5,000 fishermen. The main landing beaches in Mombasa county are Kitanga Juu, Bamburi, Ferry ya zamani and Old town. The figure below presents the fish landing beaches and the distribution in Kilifi and Mombasa Counties.

**Figure 20: Fish Landing Beaches in Mombasa and Kilifi Counties**


Sport fishing has also taken root, with fishing clubs established at various spots associated with tourist hotels and resorts. The main fishing craft-gear types include Hori, Ngalawa, Mtori, Mashua, Mtumbwi, Foot-fisher and Dau. Improvement of the proposed project road will increase access to markets within brief time for the perishable fish and fish products thereby reducing costs incurred in rotten fish. It will also enhance access into the area by many buyers increasing competition and better prices for fish. Both of these impacts will lead to reduction of poverty in the area especially for the fishing population.

**Table 14: Quantity and Value of Fish Landed**

Types	2008		2009		2010		2011	
	Quantity (Tons)	Value (KShs 000)	Quantity (Tons)	Value (KShs. 000)	Quantity (Tons)	Value (KShs. 000)	Quantity (Tons)	Value (KShs. 000)
Mombasa	927	113,125	886	106,491	913	109,803	908	144,061
Kilifi	899	13,519	912	75,909	962	80,559	969	68,869
Malindi	1,509	144,283	1,403	121,269	1,556	154,487	1,608	177,205
<b>Total</b>	<b>3,335</b>	<b>270,927</b>	<b>3,201</b>	<b>303,669</b>	<b>3,431</b>	<b>344,849</b>	<b>3,485</b>	<b>390,135</b>

Source: Kenya National Survey 2014



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The table above reveals that the Quantity of fish landed including fresh water fish, crustaceans and other marine fish along the coast of the two counties was 13,452 tons between 2008 and 2011. This production generated a total of KShs. 1,309,580,000 directly to the fishermen.

#### 5.5.4 Tourism

Tourism is very important for the country. It creates opportunities for employment in the service industries associated with it, such as transport, entertainment and advertising. The warm temperatures in most parts of the region attract tourists making tourism the main stay of the economy in the Coastal region. In addition, the counties' coastal shore is re-known for its vibrant 24 hour entertainment that includes both family entertainments (water parks, cinemas, bowling, sports (water sports, mountain biking and go-skating), restaurant and night life. Other attractions include historical sites such as the Mnarani ruins that dates back to between the fourteenth and seventeenth century; Indian Ocean, Rabai Church, Old Mombasa Town and Fort Jesus. The table below presents the number of visitors to coast region Parks and Game Reserves 2009.

**Table 15: Visitors to Game Reserves, National Parks and Museums (2008 – 2013)**

	2008	2009	2010	2011	2012	2013
<b>Reserve/Park</b>						
Shimba hills	13,527	19,360	21,233	29,376	26,139	23,200
Malindi marine	29,736	43,385	46,853	49,534	40,799	41,900
Kisite marine	28,069	39,956	50,566	59,487	48,446	44,700
Mombasa marine	26,592	27,872	37,896	38,341	34,599	36,800
Watamu marine	17,394	16,542	25,388	37,263	36,305	35,100
<b>Museums</b>						
Lamu Museum	3,334	4,188	4,470	4,949	2,638	2,800
Fort Jesus	12,871	69,093	154,685	138,639	146,300	152,100
Gedi	30,973	44,457	47,634	54,003	43,131	54,600
Kilifi mwarani	793	1,822	1,153	2,351	1,615	800
<b>Total</b>	<b>163,289</b>	<b>266,675</b>	<b>389,878</b>	<b>413,943</b>	<b>379,972</b>	<b>392,000</b>

Source: Kenya National Survey 2014

The table above reveals that the visitors to game reserves, National parks and museums increased from 163,289 hitting an all time high in 2011 (413,943) before dropping to 379,972 in 2012. This represents 6 – 7% of the total number of tourist visitors to Kenya. Since the project road is the gateway into Kenya's hinterland and the East and Central Africa, the proposed project road will ease access for especially road and air tourists as it will eliminate the ever persistent jam.



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#### 5.5.5 Trade and Industry

There are various types of trade in the project area including retail, wholesale, distribution and hawking. The wholesale businesses are few and are located mainly in the major Trading Centres of Mariakani, Mazaras and Mombasa. The small-scale retail outlets include canteens, kiosks, hawkers and newspaper vendors. The main goods offered for trade include;

- (i) General consumer goods such as sugar, maize flour, wheat flour, rice, salt, cooking fat and oil,
- (ii) Body care products such as hair shampoo, body creams and lotions,
- (iii) Cleaning and hygiene products such as detergents and laundry soaps,
- (iv) Medical drugs,
- (v) Hardware products for building and constructions,
- (vi) Electronics in the main shopping centers,
- (vii) Agricultural sector products such as cereals, legumes, tropical fruits such as pineapples, mangoes and coconuts,
- (viii) Sea foods such as fish,
- (ix) Forest products such as timber, charcoal, building poles, herbs, etc.
- (x) Livestock products such as meat, chicken, raw milk and eggs among others.

Mombasa – Mariakani Highway has served as the main corridor along which many manufacturing firms have established their processing plants and warehouses. The main establishments along the project corridor include Athi River Mining Cement Factory, Mabati Rolling Mills, Pwani and Kapa Oil Refinery.

There are a number of organizations, SMEs, youth and women groups who are engaged in Commercial Crafts some as exporters selling on order basis and others as local entrepreneurs selling to tourists. Some of the organizations and groups, majorly SMEs, engaged in making textiles and garments, household items and upholstery, African jewellery, leather and leather products, wooden carvings, articles from soap stones and basketry, are clients of the Export Promotion Council who have benefited from export leads, trainings and product development.

The proposed project road improvement will speed up trade and trading activities along the project corridor and into the hinterland. This will also result to reduction in prices of goods and services and redistribution of wholesales in markets where none existed.

#### 5.5.6 Mining and Manufacturing

Kilifi County is rich in minerals; mainly titanium and iron ore, that have spurred extensive industrial mining activities. Other minerals extracted include barites, galena, rubies, pozzolana, gypsum and limestone. Salt mining and sand harvesting have been carried out over the years to take advantage



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of the sandy, salty waters. While these are economically lucrative, they are equally responsible for destruction of its mangrove forests. As for manufacturing sector there are:

- (i) Two Cement factories in Kaloleni (Bamburi Cement and Athi River mining)
- (ii) Salt extracting companies in Malindi
- (iii) Milly fruit processing at Mtwapa
- (iv) Sandal factory in Kikambala
- (v) Milk processing factory in Kilifi

#### 5.5.7 Other Economic Features

Other economic activities include mining of chrome ore, cement, salt, sand, burning and selling of charcoal (sold at numerous points along the road reserve).

#### 5.6 Infrastructure and public utilities

In the project counties, basic services such as healthcare and banking, as well as major trading markets are concentrated along the road networks. This has resulted in unequal distribution of basic amenities and services within the County, and hampered easy access to these services by the far-flung rural communities.

The Mombasa and Kilifi counties have several public utilities and infrastructure available although not in all areas. These includes: Electric power lines, oil Pipeline transport, drainage structures sewerage disposal, water supply and transport infrastructure (Road, railway line, sea transport and airport). The availability of the public utilities and infrastructure do not adequately cover all the areas. Among the utilities include the following;

##### 5.6.1 Roads Use and Traffic

There are several modes of transport within Mombasa and the Kilifi counties, these includes both the motorized and the non motorized means of transport. Motorized transport includes; tuk tuk, motorbikes, heavy trucks, matatus while the non-motorized transport; hand carts and bicycles. The present transport infrastructure is insufficient to handle the increasing traffic demand along the Mombasa Mariakani (A109) road. The congestions are also attributed by the road side parking of heavy trucks and the weighbridge at Mariakani area. The heavy traffic congestions and lack of parking spaces along the Mombasa – Nairobi highway has led to increased inconveniences to motorists, noise and air pollution.

Accident black spots sections along the project road that are listed as risky for motorists due to the number of accidents that have occurred in their vicinity include Mazeras – Miritini, Kibarani - Changamwe Makande, Saba-Saba Lights, Kibarani Area and Sportsman Changamwe Area<sup>1</sup>.

<sup>1</sup> <https://www.facebook.com/SafeRoadsSaveKenya>

**Figure 21: Sample Traffic Status**

City Centre (Island)



Mazeras Market



Trucks Queuing into the Mariakani Weighbridge

### 5.6.2 Rail Line

Mombasa County has a railway line from Mombasa to Nairobi that branches to Voi and Taita Taveta Township. Railway network is concentrated in the industrial area, railway depot and the port warehouses. The train ferries passenger and is best for handling bulky goods from Mombasa port to the hinterland.

**Figure 22: Sample Rail Lines Interactions**

Makupa Causeway



Changamwe ROB



Miritini – Mazeras Section

### 5.6.3 Sea Transport

Mombasa has a principle sea port that serves several countries such as Uganda, Rwanda, Burundi, Southern Sudan and the Democratic republic of Congo. Sea transport is convenient for the transport of heavy and bulky items. There is still no notable utilization of water transport around Mombasa City where there is a huge potential for both revenue generation and easing public transport.

Mombasa County has a railway line from Mombasa to Nairobi that branches to Voi and Taita Taveta Township. Railway network is concentrated in the industrial area, railway depot and the



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port warehouses. The train ferries passenger and is best for handling bulky goods from Mombasa port to the hinterland.

#### 5.6.4 Airports

Moi International Airport is located at Port Reitz area on the mainland and serves both the international and domestic air traffic. The availability of air transport promotes tourism industry, employment opportunities, and transport of perishable export and the development of the regional integration. The road traverses a section of the airport landing corridor between Km10+400 and KM10+700.

Moi International Airport is located at Port Reitz area on the mainland and serves both the international and domestic air traffic. The availability of air transport promotes tourism industry, employment opportunities, and transport of perishable export and the development of the regional integration. The road traverses a section of the airport landing corridor.

**Figure 23: View of Airport and Seaport Installations**



Approach Corridor into the Airport



The Port of Mombasa Viewed from the Road



#### 5.6.5 Communication Service Lines

The communication infrastructure includes various channels and modes for facilitating the exchange of information. Among the communication infrastructure available include fibre optic, Telkom Kenya and mobile operations among others. There are major intercontinental under sea telecom cables reach the shore in Mombasa, connecting East Africa to the rest of the world and supporting a fast growing call centre in the area.



### 5.6.6 Power Transmission Lines

There are overhead power transmission lines along the entire route into the substations and to consumer areas. Most of the lines runs along the road reserve with a few crossing. In additions, sections of the road (Digo Road – Changamwe – Miritini have underground power cables, mainly along the median and roadsides close to the carriageway.

**Figure 24: Sections of Power Transmission Lines**



City Centre Overhead Lines



Mazaras Market



Mariakani Area

### 5.6.7 Water Pipelines

Mombasa region has several sources of water pipeline namely:

- (i) Baricho and Sabaki well field which are the main source of water supply to Mombasa. It supplies water to Malindi, Kilifi and the neighbouring areas,
- (ii) Mzima pipeline is the second biggest and supplies to Mombasa, Voi, Maungu, Taru, Mariakani, Mazaras and Kaloleni regions,
- (iii) Marere pipeline is the oldest pipeline and it serves Mombasa, Kwale and Kinango regions,
- (iv) Tiwi boreholes supplies to Mombasa town and also serves Ukunda, Diani, Matunga and the Tiwi areas.

**Figure 25: Water Pipelines**



Makupa Causeway



Jomvu Area



Miritini Area



### 5.6.8 Sewer Lines

Mombasa has two main sewerage treatments at Kizingo and Kipevu. The functional sewerage treatment plant is the Kipevu which serves residents of Changamwe, Port Reitz, Magongo and Jomvu areas.

## 5.7 Social Welfare

### 5.7.1 Education and Literacy

Education is key to socio-economic and political empowerment. The project counties have a total of 1,877 education institutions. Mombasa County hosts several higher learning institutions including Kenya school of government, four youth polytechnics, and the technical University of Mombasa, a research institution – Kenya Marine and fisheries Research Institute and satellite campuses of public and private universities as well as other universities. Kilifi County also hosts major higher learning institutions including Pwani University, Bandari College, 13 Youth polytechnics and Kilifi Medical training college. Majority of the education institutions are ECD centres as presented in the following table:

**Table 16: Education Institutions**

Type and Number	Mombasa	Kilifi	Total
ECD centres	254	935	1,189
Primary schools	100	418	518
Secondary schools	42	86	128
Youth Poly techniques	2	13	15
Tertiary institutions	17	10	27
<b>Total</b>	<b>415</b>	<b>1,462</b>	<b>1,877</b>

Source: Mombasa and Kilifi County Development Profiles

The literacy level, consisting of those who can read and write in Mombasa is 86.3%. The overall literacy rate in Kilifi County stands at 68% of this number, 51% are men while 49% are women. School enrollment rate stands at 38% in Kilifi County while dropout rate is 8%. In Mombasa County, school enrollment rate stands at 95% while dropout rate is 12%. The following table reveals the school enrollment rates in Mombasa and Kilifi counties.



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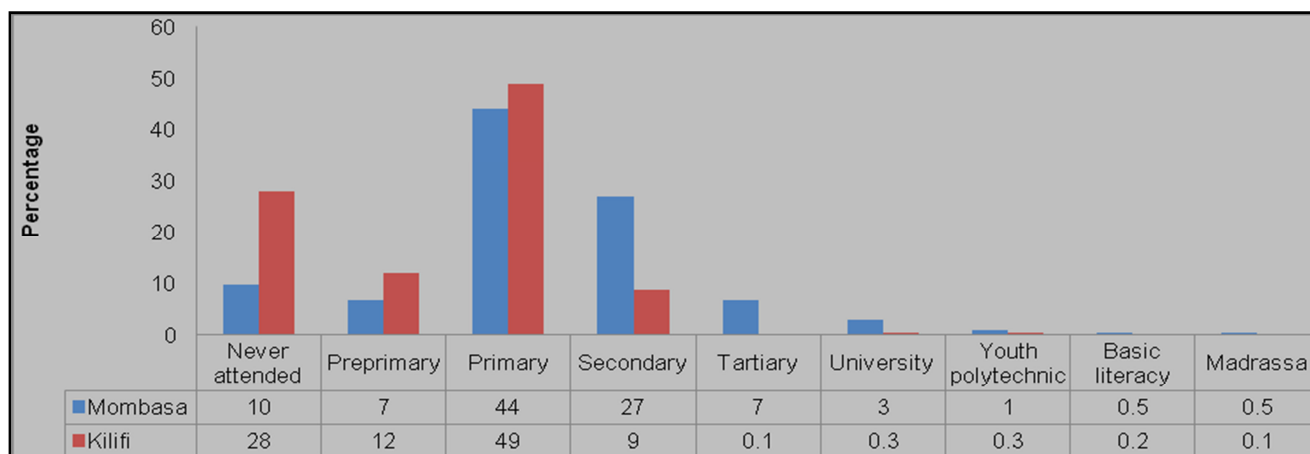


**Table 17: Schools and Enrollment by County**

County	2007	2008	2009	2010	2011	2012
<b>Primary Schools</b>						
Mombasa	81,333	83,293	101,411	105,987	111,372	83,655
Kilifi	266,488	272,910	275,126	280,401	294,649	331,762
<b>Secondary Schools</b>						
Mombasa	9,856	11,155	12,297	13,806	15,466	16,046
Kilifi	22,339	25,285	27,872	31,293	32,855	36,233

Some 17% of Mombasa County residents have no formal education compared to 36% in Kilifi County. A total of 46% of Mombasa County residents have a primary level of education compared to 52% in Kilifi County. 37% of the residents in Mombasa County compared to 13% in Kilifi County have a secondary level of education or above. The figure below show the total number of population by education attainment in the project Counties.

**Figure 26: Population Aged 3yrs and above by Sex and Education Level Attained**



Source: 2009 Kenya Population and Housing Census.

Dropout rate for girls is higher compared to that of boys. The main reasons for the high girls dropout were early marriages, prostitution and pregnancy while boys mainly dropped out to engage in casual labour. In Mombasa County, the pupils moving from primary school to secondary schools is 34% while the number moving from secondary school to universities is 21%. In Kilifi County, transition rate from primary to secondary is 65%.



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Some 17% of Mombasa County residents have no formal education compared to 36% of Kilifi County residents. A total of 46% of Mombasa County residents have a primary level of education only compared to 52% in Kilifi County. Among the constituencies traversed by the project road, Kaloleni constituency has 47% with a primary level of education. A total of 37% of Mombasa County residents have secondary level of education or above. Only 13% of Kilifi County residents have a secondary level of education or above.

Specific educational facilities are found as follows;

**Table 18: List of Schools along the Corridor**

Left Side of Road	Specific Area and Access Road	Right Side of Road	Specific Area and Access Road
<ul style="list-style-type: none"> <li>✓ Guru Nanak Pri Sch</li> <li>✓ Mombasa Secondary School</li> <li>✓ Arya Pri. Sch</li> <li>✓ Mombasa Baptist Highschool</li> <li>✓ Abu Hureira Academy Secondary School</li> </ul>	Muyaka Road	Shigog Academy Pri	Kisauni Road
		Island Pri Sch	Narok Road
Happy Day Pri Sch	Ronald Ngala	<ul style="list-style-type: none"> <li>✓ Fahman Academy - Pri</li> <li>✓ Alfa Academy Pri</li> <li>✓ Triza Junior Sch Pri</li> <li>✓ The Tawfiq Muslim Pri Sch</li> <li>✓ Mombasa Technical University</li> <li>✓ Iqra Academy - Pri</li> <li>✓ New Shamy Sch Pri</li> </ul>	Ronald Ngala
Makupa Pri Sch	Tom Mboya Road	Luhar Pri Sch Bhadala Pri Sch	Tom Mboya Road
Makande Pri Sch	Edge Of Makupa Causeway	<ul style="list-style-type: none"> <li>✓ P.C.E.A. Makupa Academy Pri</li> <li>✓ Hartridge Academy Pri</li> <li>✓ Tudor Pri Sch</li> <li>✓ Aipca Makande Academy Pri</li> </ul>	Edge Of Makupa Causeway
<ul style="list-style-type: none"> <li>✓ Kipevu Pri Sch</li> <li>✓ ABC Mixed Day Secondary</li> <li>✓ St. George Academy Pri</li> <li>✓ Teras Girls Secondary</li> <li>✓ Chaani Gateway Academy Pri</li> <li>✓ St. Charles Lwanga Secondary</li> <li>✓ Changamwe Baptist Pri Sch</li> <li>✓ Changamwe SDA Secondary</li> <li>✓ Changamwe Secondary School</li> <li>✓ Kimbilio Academy Pri</li> <li>✓ Bishop Mkala Academy Pri</li> <li>✓ Brightons Academy Pri</li> <li>✓ St. Lwanga Pri Sch</li> </ul>	Changamwe Round About around railway	<ul style="list-style-type: none"> <li>✓ Bethsaida Academy Pri</li> <li>✓ Birikani Care Pri Sch</li> <li>✓ Gift School Pri</li> <li>✓ St. Consolata Academy Pri Sch</li> <li>✓ St. Angeline Maraluot Academy Pri</li> <li>✓ St. Kevin Mikindani Hill Academy Pri</li> <li>✓ Mikindani Royal Comprehensive Sch Pri</li> </ul>	Changamwe Round About around railway
		<ul style="list-style-type: none"> <li>✓ Living Word Pri Sch</li> <li>✓ St. Cecilia Green Hill Academy – Pri</li> </ul>	In Mikindani Area



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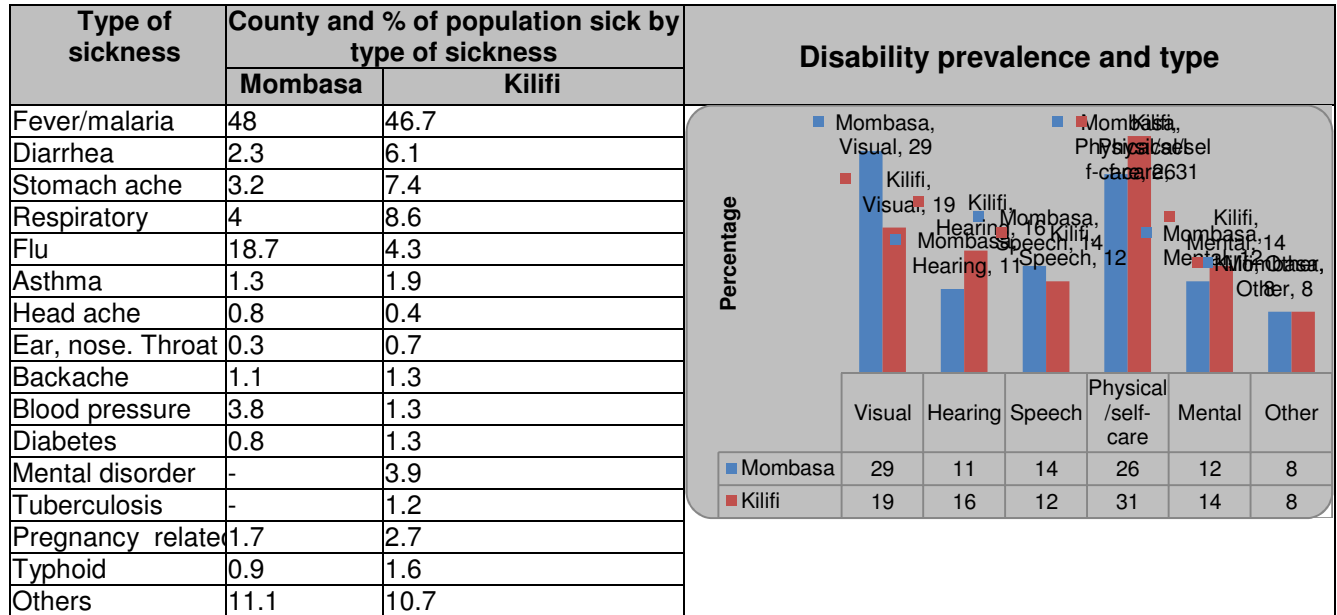
Left Side of Road	Specific Area and Access Road	Right Side of Road	Specific Area and Access Road
<ul style="list-style-type: none"> <li>✓ High Hope Junior Academy Pri</li> <li>✓ Miritini Pri Sch</li> <li>✓ Abu Ubedia Pri Sc</li> <li>✓ Miritini Secondary</li> <li>✓ Mama Mlai Academy Pri</li> <li>✓ Glory Academy Pri</li> <li>✓ Top School Pri</li> <li>✓ Holy Tree Community Sch Pri</li> <li>✓ Mwamdudu Pry Sch</li> <li>✓ Vision Of Hope Pri Sch</li> <li>✓ St. Johns Kings Academy Pri</li> </ul>	In Miritini	<ul style="list-style-type: none"> <li>✓ New Life Academy Pri</li> <li>✓ J Marwa Academy Pri</li> <li>✓ Marben Highschool Sec.</li> <li>✓ New Mikanjuni Hill Academy - Pri</li> <li>✓ Nuru Community Based Rehab Sch Pri</li> <li>✓ Sunshine Junior Academy</li> <li>✓ Iyale Junior Academy Miritini - Pri</li> <li>✓ Miritini World Bank Pri Sch</li> <li>✓ Buni Pri</li> </ul>	In Miritini
<ul style="list-style-type: none"> <li>✓ Mazeras Junior Pri Sch</li> <li>✓ Mazeras Pry Sch</li> <li>✓ Mazeras Highschool</li> </ul>	Mazeras	<ul style="list-style-type: none"> <li>✓ Mwatsama Pri</li> <li>✓ Rabai Junior Pri</li> <li>✓ Mwangutwa Pri</li> <li>✓ Mgandini Pry Sch</li> </ul>	Mazeras
<ul style="list-style-type: none"> <li>✓ Mgandini Pry Sch</li> <li>✓ Kaliang'ombe Pri</li> <li>✓ Mariakani High School</li> <li>✓ Kafuduni Pry Sch</li> <li>✓ Mariakani Junior Academ</li> <li>✓ Mariakani Pri</li> </ul>	After Mazeras	<ul style="list-style-type: none"> <li>✓ Misufini Pri</li> <li>✓ St Peters Academy</li> <li>✓ St Kings Academy</li> <li>✓ Rasul Al Amin Academy</li> <li>✓ Mariakani Star Academ</li> </ul>	After Mazeras
<ul style="list-style-type: none"> <li>✓ Our Lady Of Angels Academ</li> <li>✓ Gwasheni Pry Sch</li> <li>✓ Shangia Pri</li> <li>✓ Birikani Care Pri Sch</li> </ul>	Mariakani to End Of The Road	<ul style="list-style-type: none"> <li>✓ Mwareni Pri</li> <li>✓ Rejoice In The Lord Academy</li> <li>✓ Our Grace Academ</li> <li>✓ Mariakani Garrison Pri</li> </ul>	Mariakani to End Of The Road

### 5.7.2 Health

Mombasa County hosts the Coast Level five referral hospitals. Other major health facilities in the county include Mombasa Hospital, Agha Khan Hospital, Bomu Hospital Port Reitz, Tudor and Padya memorial hospital. In addition, the county has fifteen private hospitals, four nursing homes, nine health clinics, twenty seven dispensaries and 106 private clinics. Kilifi County hosts 8 hospitals, 12 public health centers and 69 dispensaries. In addition, the county has fifteen private hospitals, five nursing homes and 107 private clinics. Despite existence of many health facilities within the counties, these are unevenly distributed and mainly located along major roads. This is further complicated by the fact that there is lack of permanent health workers operating within the communities,

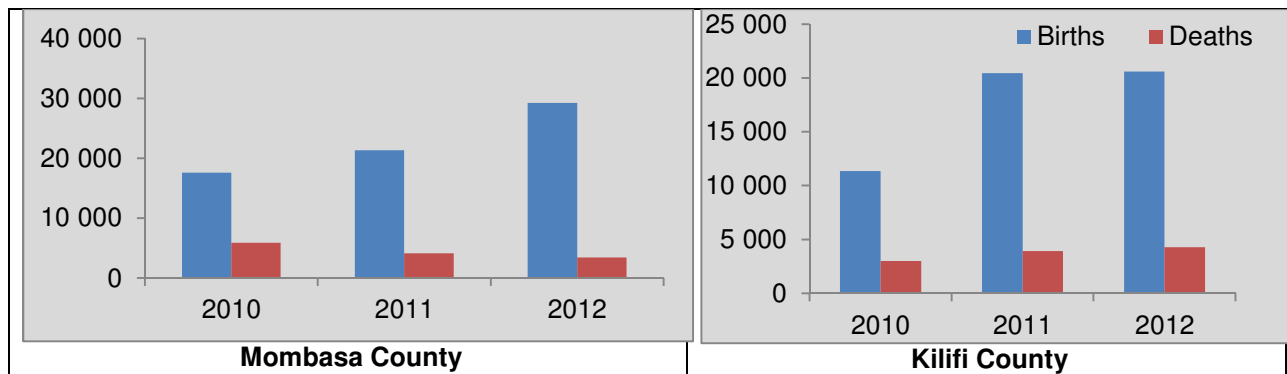
The average morbidity rate in Mombasa County is 12.9% and 15% in Kilifi. Malaria/fever, lower respiratory infections, stomach ache, diarrhea and flu are the leading morbidity causes. The table below presents a summary percentage of population sick by type of sickness while the jointed figure show disability prevalence and type in the two counties:

**Figure 27: Percentage of Population Sick by Type of Sickness**



Immunization coverage in Mombasa County stands at 73% compared to higher immunization coverage for Kilifi County at 78%.

**Figure 28: Reported Births and Deaths by County**



Among the health facilities found include the following;



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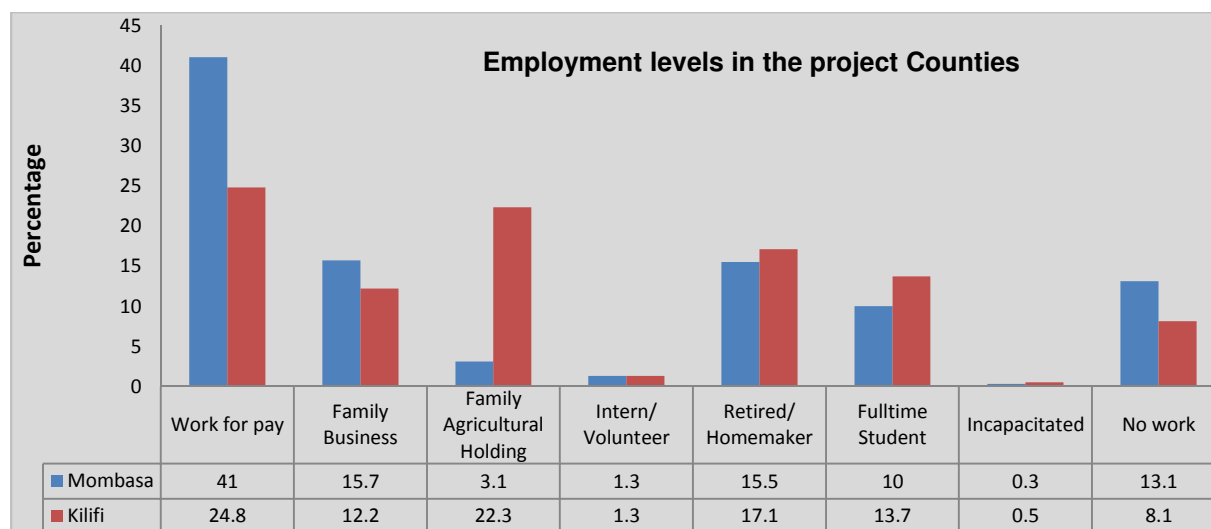
**Table 19: List of Health Facilities along the Corridor**

Left Side of Road	Specific Area and Access Roads	Right Side of Road	Specific Area and Access Roads
<ul style="list-style-type: none"> <li>✓ Ngomen Disp</li> <li>✓ Eliza Medical Rent Disp</li> <li>✓ Bakarani Mat. &amp; Nursing</li> <li>✓ Mow Shimanzi Disp</li> <li>✓ Kpa Kipevu Disp</li> <li>✓ Railway Disp</li> </ul>	Km. 00 to Edge Of Makupa Courseway	<ul style="list-style-type: none"> <li>✓ Makupa Mnh</li> <li>✓ Tudor Nursing Home</li> <li>✓ Kenya Breweries Disp</li> </ul>	Km. 00 to Edge Of Makupa Courseway
<ul style="list-style-type: none"> <li>✓ Huduma Medical Clinic</li> <li>✓ Bomu/Mkomani Clinic</li> </ul>	Near Port Reitz/Changamwe	<ul style="list-style-type: none"> <li>✓ Changamwe Health Care Centre</li> <li>✓ Mkomani Clinic</li> </ul>	Mikindani
<ul style="list-style-type: none"> <li>✓ Miritini Disp</li> <li>✓ A.V.A Medical Clinic</li> </ul>	Miritini	Citizen Med Clinic	Mazeras
Kafudini Disp	Mariakani	Bomu Hospital	Mariakani

## 5.8 Labour and Employment

Kenya is often faced with challenges in meeting the country's employment needs. Unemployment Rate in Kenya increased to 40 percent in 2011 from 12.70 percent in 2006 for the people aged 15-64 years. 67 percent of the unemployed in the country are the youth. Access to jobs is essential for overcoming inequality and reducing poverty. The unemployed are therefore among the most vulnerable in society and are prone to poverty. The population aged 15-64 years is categorized as economically active. In the project sub-counties, the activity status of the population aged 5 years indicated that 40% of the population in 2009 was employed, 9% were seeking work and the rest (51%) were categorized as economically inactive. The highest portion of the employed were those in Mombasa (45%) compared to 36% in Kaloleni. Kaloleni had 57% of its population being economically inactive compared to 45% in Mombasa. In the project counties, the main sources of incomes and livelihoods are formal employment, petty trading, and the sale of livestock, casual labour, sale of wood products and remittances. The following figure illustrates overall engagement levels in Mombasa and Kilifi Counties:

**Figure 29: Overall Employment Levels in Mombasa and Kilifi Counties**



## 5.9 Cross-cutting issues

### 5.9.1 Culture

The main communities residing in the project Counties include the Mijikenda sub-groups (Giriama, Chonyi, Jibana, Kambe, Kauma, Rabai and Ribe), the Bajuni, Swahili, and people of Arab, Indian and European descent. Specifically, Mombasa is a cosmopolitan urban town well reflected by the diversity in ethnic composition from all parts of the country and beyond. The main religions dominating the area include Christians, Traditionalists and Muslims. The Swahili culture is dominant along the project road where the main attire is a mixture of models including the Swahili Buibui, Arabic Kanzu, Kitenge and Khanga/Lesso.

### 5.9.2 HIV/AIDS

Kenya is one of the six HIV 'high burden' countries in Africa where about 1.6 million people were living with HIV infection by the end of 2011. There are approximately 91,000 new HIV infections among adults and about 13,000 among children annually. Stable and married couples are the most affected, accounting for 44% of the new adult infections. The prevalence among women stands at 8% compared to 4.3% for men. HIV and AIDS in Kenya accounts for an 29% of annual adult deaths, 20 per cent of maternal mortality and 15 per cent of deaths of children under the age of five. The epidemic has lowered the per capita output by 4.1%<sup>2</sup>.

<sup>2</sup> HIV and AIDS profile in Kenya





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According to the data available by the Ministry of Health, the prevalence of HIV and AIDS in Mombasa County is 6.5% and 3% in Kilifi. The table below summarises the state of HIV/AIDS in the two Counties:

**Table 20: HIV/AIDS Burden in Mombasa and Kilifi Counties (2011)**

	County	
	Kilifi	Mombasa
Total population (2009)	1,109,735 40	939,370 33
HIV adult prevalence (overall)	3.7%	11.1%
Number of adults living with HIV	20,832	66,542
Number of children (below 14 years) living with HIV	3,328	10,630
Total number of people living with HIV	24,161 27	77,172
New HIV infections annually	Adult	1,400
	Children	196
Annual deaths (2011)	Adult	700
	Children	190

As a result of high incidences of HIV/AIDS, household expenditures on health care has increased, reducing savings and investments, pressure on the health services has increased reducing the quality of services offered; people especially women and children spend more time in caring for the sick, further affecting productive activities at the household and community levels. There has also been an increase in school dropout rates and or irregular attendance as affected children look after ailing parents thus lowering education quality and standards. The proposed road construction may lead to an increase in HIV/AIDS mainly resulting from “imported” prostitution.

Survey on HIV/AIDS prevalence in the country as per Counties released by the Government through the Commission for Revenue Allocation (CRA) revealed that the total number of people living with HIV/AIDS in the two project Counties was 101,200 (77, 100 in Mombasa County and 24, 100 in Kilifi County)<sup>3</sup>. The new infections in Mombasa County in 2011 were 4,930 while in Kilifi there were 1,600 new infections. The HIV prevalence rate is highest among married couples, a finding that experts believe has been fuelled by rampant infidelity in marriages popularly known as “Mpango wa Kando” and “Swing Couples”. Under the proposed roads project therefore, there is therefore dire need for control of the spread of HIV/AIDS programmes using the following strategies:

- (i) Soliciting for strong political and community leadership will for a multisectoral HIV response
- (ii) Mobilizing additional local resources to increase and sustain the HIV response
- (iii) Expanding HIV treatment programmes and increasing community involvement in driving demand for increased uptake and adherence among both adults and children. This will include Improving access to and uptake of sexual and reproductive health services for girls and women as well as enhancing education among young people to reduce sexual risks by

<sup>3</sup> The Kenyan Daily Post, Monday July 29, 2013



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delaying sexual intercourse and Keep girls in school to help delay sexual debut, pregnancy, and marriage;

- (iv) Increasing social welfare services to HIV-positive persons and others affected by HIV
- (v) Expanding HIV prevention services among sex workers, men who have sex with men, and injecting drug users

### 5.9.3 Gender issues

Culture, literacy levels and religion dictates gender issues which are reinforced by society values, norms and roles to males and female. These disparities including marginalization of women in education, income and property rights and lack of credit in turn will dictate the levels of participation in decision making and roles played as well as contribution of resources during and after construction of the road.

In terms of productivity, women play the primary role in farming while most men engage in fishing. females are mainly involved in cooking while males undertake grazing, fishing, woodwork driving and, tourism related activities. Both gender is involved in crop Farming.

The proposed road construction will involve both genders where men will participate in key decision making, authorize use of land and where to relocate/reconstruct, break ballast and undertake heavy manual works. Men would also provide security as watchmen on campsites and machines. Women will participate in preparing meals for the workers and could provide water where needed in small quantities as well as undertake light manual jobs such as pouring water on constructed culverts and secretarial duties.

Details are in a standalone Gender Streamlining Report. The report observes women are less educated and therefore less informed than men. Most of the women were married and live within male-headed households, and culturally have limited decision-making power. Single women and female-headed households have limited livelihood options while the youth are largely unemployed.

Gender roles and responsibilities are well defined. Women are generally engaged in home care, and reproductive roles in the households. They are also engaged in other income generating activities – trading along the road corridor, selling and buying merchandise and foodstuff. Men on the other hand are more engaged in marketing running businesses as traders, and employed in both formal and informal sectors. While men own most of the valued household assets; women traditionally do not own large assets in the family, neither are they allowed to make decision on the same. Women headed households have limited decision-making power especially if the assets are not family –based.

Women were also found to travel for economic reasons related to their informal, employment, going to the markets or shopping centres. Since they have fewer work opportunities and transportation choices, in order to be employed, women tend to find work close to home while men will spend



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more on average to get to work. The most predominant mode of travel for women therefore remains walking and head loading with less mobility overall. Generally, women make more trips than men; they make shorter commute trips, more non-formal work trips and are more likely to trip chain- one way to and from work to home. As a result, they found that regular use of public transport in particular was prohibitive, spending a higher share of their income on average than men. Generally, men spend more to get to work while women tend to stay closer to home beyond a fixed transport cost threshold. Mobility patterns of women thus relate to domestic, economic and social tasks.

Other than using the road to travel and carry out their businesses a large percentage of those interviewed play no role in the transport sector. Most of the respondents use public transport in the form of boda boda's (motorcycle) or matatu's (mini public vans). Women were more likely to walk to and from their homes to the stops designated for public transport. Members of the community have greater positive expectations with regards to the road improvement in terms of better livelihoods, businesses and employment opportunities. Women especially are looking forward to cheaper fares, faster access to health facilities and enhanced business opportunities. However, their fears include among others; reallocation or displacement; and interference with their trades along the road.

#### 5.9.4 Livelihoods

Poverty in the project counties manifest itself, in the inability by the majority of the people to access basic needs such as food, shelter, clothing, health, water, education, land and good roads due to geographical, economic and social cultural barriers. A household is defined poor if it cannot attain the recommended daily food energy intake of 2,250 calories per adult. The average urban poor (mainly those in the slums of Bagladesh as well as street urchins) are more 61% than the average rural poor 60% (consisting mostly of farmers). Poverty is mainly influenced by social-economics activities, marketing accessibility, land productivity, health status, education and technical skills, infrastructural development, governance and political will, gender disparity, security, occurrence of natural disasters and other externalities.

In Mombasa County, the poorest areas are found in Changamwe and the Island. The segment of population mostly affected by poverty include the women, youth, disabled, the sick especially HIV/AIDS victims, minority and marginalized groups and vulnerable group such as orphaned children.

Causes of poverty include climatic conditions, low levels of education, landlessness (as the poor are squatters who live on land owned by absentee landlords - government/private or in the slums), high cost of living, inherited poverty, lack of credit facilities, lack of technical and entrepreneurial skills, unemployment, low income and HIV/AIDs. The effects of high poverty levels include high rate of school drop outs, deteriorating health conditions, worsening literacy levels etc.



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#### 5.9.5 Poverty Issues

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Poverty in the project counties manifest itself, in the inability by the majority of the people to access basic needs such as food, shelter, clothing, health, water, education, land and good roads due to geographical, economic and social cultural barriers. The segment of population mostly affected by poverty include the women, youth, disabled, the sick especially HIV/AIDS victims, street urchins, minority and marginalized groups and vulnerable group such as orphaned children.

In Mombasa, 37.6% of the population lives below the poverty line. In Mombasa county, the poorest areas are found in Changamwe and the Island. The average urban poor are more 61% than the average rural poor 60%. Kilifi is one of the counties in Kenya facing high poverty rates. Food poverty, for instance, stood at 66 percent in 2010.

#### 5.9.6 Security

The project corridor has several security establishments including Mariakani, Mazeras, Changamwe and Mombasa police stations. In addition, there are a numerous Administration Police Posts.



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## CHAPTER 6: PROJECT ALTERNATIVE ANALYSIS

### 6.1 Alternative Criteria

The rehabilitation and upgrading of Mombasa – Mariakani road will follow the existing corridor to the extent possible with dualling, widening and junctions improvement as well as drainage enhancements. The alternatives considered for the project, therefore, were mainly based on the design options and economic implications as opposed the alignment. Other alternative factors include material sources, locations of construction camps, deviation routes and safety options. The following sub-sections outline the project alternatives as proposed under the Economic Feasibility of the project;

### 6.2 Improvement Alternatives

Criteria for the improvement of the project was based on the following considerations (detailed analysis outlined in the Design Report);

#### 6.2.1 Improvement Alternative 1: No Project Option

This implies that the road be left as is such as to undergo repairs of the pavement. This implies no investments but the existing maintenance budgetary allocation will be adopted for the road corridor. With this option, the current challenges facing the A109 road section including traffic congestion, drainage problems, road safety risks and other associated problems facing social and economic setting along the corridor will continue. This is against the Kenya Government's desire to facilitate the Tourism Industry in the Coast Region, improvement of the social and economic performance in Mombasa City and its surroundings as well as achieving the Kenya Vision 2030 where the road section as a flagship project being part of the Northern Corridor Improvement Project. This alternative, therefore, is not desirable.

#### 6.2.2 Improvement Alternative 2: Perpetual Pavement Strategy:

This will generally involve widening and geometric improvement of the existing road cross-section to a 4 X 6 lane dual carriageway standard. It will also strengthen and widen the road carriageway through perpetual pavement strategy requiring minimal periodic maintenance and zero strengthening during the pavement design life. Other actions will include laying pavement of various layer thicknesses, Continuously Reinforced Concrete base layers (CRC), continuously graded hot-mix asphalt binder courses (BC), cement stabilized sub-base layers, crushed stone material respectively and natural gravel selected layers.



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#### 6.2.3 Improvement Alternative 3: Phased Pavement Strategy

The alternative will be widening and geometric improvement of the existing cross-section to 4 X 6 lane dual carriageway standard. It will also consider pavement strengthening and widening by means of phased pavement strategy requiring regular periodic maintenance and strengthening during the pavement design life.

#### 6.2.4 Improvement Alternative 4: Optimal Pavement Strategy

The road will be widened and geometric improved of the existing cross-section to 4 X 6 lane dual carriageway standards. Pavement strengthening and widening by means of perpetual pavement strategy requiring minimal periodic maintenance and zero strengthening during the pavement design life for HIGH RISK road sections, i.e. typical the northbound sections of the project road. Pavement strengthening and widening by means of phased pavement strategy requiring regular periodic maintenance and strengthening during the pavement design life for LOW RISK road sections.

The pavement improvement Option 2 is the most preferable.

### 6.3 Pavement Design Alternatives

According to the design report, the following pavement design alternatives were considered.

#### Design Alternative 1

The proposal here is to construct a concrete road surface for Km 0+000 – KM15+500 (i.e. Digo Road – Miritini) where heavy traffic and industrial activities is experienced. The rest of the road section (Miritini at KM15+500 to Mariakani at KM 41+700) will be designed for stabilized Asphalt for as the traffic count shows lesser traffic.

#### Design Alternative 2:

This is a proposal to design Asphalt concrete surface pavement all the way from KM0+000 – KM 41+700 (Digo Road to Mariakani).

#### Design Alternative 3:

Construction of concrete pavement on the heavily loaded road sections (mainly Changamwe – Miritini areas and sections of the meandering slopes towards Mazeras) and then applies asphalt concrete for the rest of the road section (Miritini area to the end of the project at Mariakani Weigh Bridge) including the service roads and NMT sections.

The Alternatives are illustrated in the Figure 30 below. From the Economic analysis, Alternative 3 has been adopted from the two conclusions below;

- (i) It makes reasonable logic to provide a strong pavement, especially outbound traffic.
- (ii) The cost differential with Alternative 2 (asphalt concrete all through) is minimal.



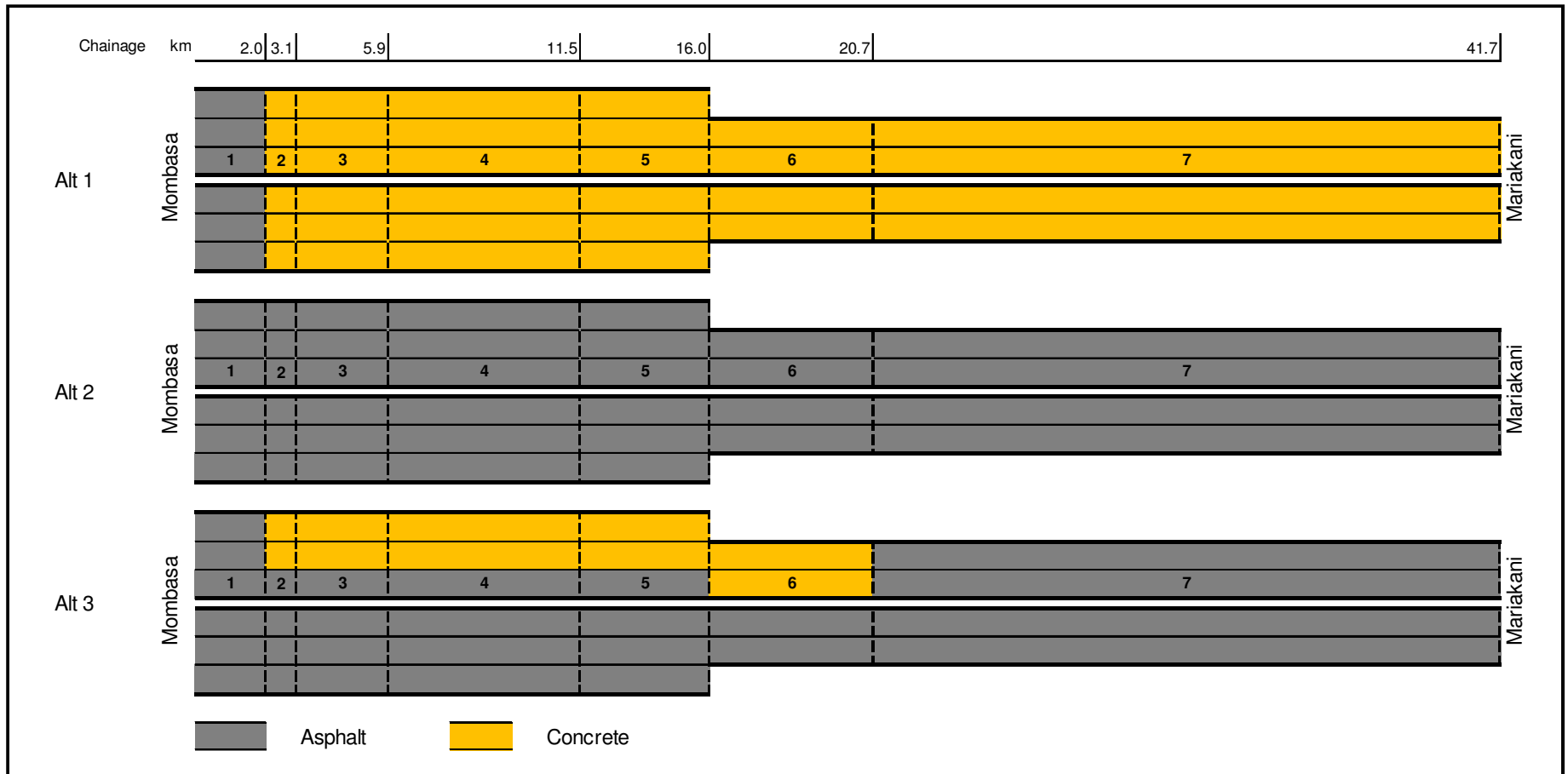
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**Figure 30: Illustration of Pavement Design Alternatives**



Source: Design

Report



CHAPTER 7: STAKEHOLDER AND PUBLIC CONSULTATIONS

7.1 Overview

It is a Government policy and indeed that of the AfDB that beneficiaries and members of the public living within 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 and the public 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. This was the objective of these consultation forums. During this process, the consultations followed the schedule illustrated below;

Table 21: Schedule of Stakeholders and Public Consultations

Table with 4 columns: Activity, Dates Undertaken, Locations or Venues, and Stakeholders Category. It details four consultation activities: Initial Briefings to County Authority (Sept 2013), Stakeholder Participation (May 2014), Field Groups (May 2014), and Public consultations (June 2014), listing specific locations and stakeholder groups involved in each.





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## 7.2 Initial Briefings to County Officials

### 7.2.1 Objectives

The proposed project road Mombasa – Mariakani (A109) is located in 3 counties; Mombasa, Kilifi and Kwale counties. The initial stakeholder consultations involved briefings of the County Governors' offices and County Commissioners' offices. The mission was done from 3<sup>rd</sup> September to 6<sup>th</sup> September, 2013. The briefings were on the design concepts, social and environmental issues on the proposed upgrading of the Mombasa – Mariakani road project. The main objective of the briefing was to present the scope of the assignment to the County Governments who are the main influencers of the local people for sensitization purposes. The team comprised of Experts from BKS/CAPE Consult Company including Design Engineers, Lead Environmentalist/ESIA, Sociologist and Support Assistants. The main discussions entailed the following;

### 7.2.2 Design Concepts

- (i) Designs of Dual Carriageway up to Mariakani weigh bridge,
- (ii) Rehabilitation of existing carriageway in sections with dual carriageway already in existence,
- (iii) Investigate a grade separated interchange at Changamwe,
- (iv) Take into account Mombasa Southern bypass interchange at Miritini,
- (v) Improvement of the Urban Drainage, service roads and off road truck parking,
- (vi) Provision of pedestrian underpasses/foot bridge/foot paths at Changamwe roundabout, Sabasaba section, Miritini, Mazeras and Mariakani to cater for the non- motorized road users,
- (vii) Replacement of guard rail between Miritini and Mazeras with a reinforced concrete barrier,
- (viii) Expansion of the ROB at the Bangladesh railway crossing.

### 7.2.3 Environmental Issues

Feasibility study of the project also entails the undertaking of the Environmental and Social Impact assessment. Typical environmental issues will be addressed such as health and safety, excavations, spoil dumping areas, potential material sources, and disposal of the construction materials and the main sources of water for construction purposes

One option regarding the existing Makupa Causeway was to construct a new bridge structure. This was not included in the ToR and the environmental impact need to be further assessed. The opening of the cause way will contribute to cross transfer of the industrial waste from the area with the land fill and the domestic waste from the other side with human settlement. The Causeway has a railway line, water pipes and has a great challenge to the NMT users. This project will also entail the undertaking of the environmental study of the cause way, determining of the ecological linkages



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as a result of opening up of the causeway and give detailed recommendations regarding the location.

Part of the study will also entail the engagement of developers and other stakeholders for acceptance and ownership of the project, all these will be integrated within the land use planning of the project area. Finally appropriate mitigation measures will be prepared during and after the construction period.

#### 7.2.4 Social Issues

The Environmental and social Impact Assessment is expected to be participatory through engagement of the locals and the stakeholders. The purpose of the visit is to have an early strategic plan from different departments. The consultants require local information, identification of the stakeholders (county government, head of departments and civil societies) so as to capture their recommendation and concerns, attitudes and practices. There will be scheduled meetings planned around 8 – 10 sessions of consultations mainly to sensitize the locals on the proposed project along the road corridor. The team requires the members of county assembly to deal with issues of public and the county government. Resettlement action plan will be undertaken to capture encroachment in the road reserve. Following is a summary outline of the briefings.

#### 7.2.5 Briefing Outcomes

**Table 22: Opinions from Briefings**

DATE	County	Persons Briefed	Organization	Comments
3/09/2013	Mombasa	Eng. K.O Nyabuto (Regional Manager)  Samuel Odoyo (Surveyor)	KeNHA – CST	<ul style="list-style-type: none"> <li>✓ The road has a great challenge especially during the rainy season and requires upgrading to dual carriageway,</li> <li>✓ Provision of bus bays near Changamwe roundabout should be considered,</li> <li>✓ County government should consider provision of truck parking yards for income generation while decongesting the main highways,</li> <li>✓ The service providers (Kenya pipeline, Kenya Power, water company) should be engaged early for consultations on the design components,</li> <li>✓ Land requirements for certain design components is an issues for a wide consultations at the County levels,</li> <li>✓ Improvement of the weighbridge should be done on both sides of the road at Mariakani to avoid traffic movement conflicts,</li> <li>✓ Direct access to properties from the main highways should be avoided, the design should provide for accesses from the back yards,</li> <li>✓ The steel bollards and guard rails along</li> </ul>

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DATE	County	Persons Briefed	Organization	Comments
				<p>drainage are easily destroyed or vandalized, hence recommends provision of concrete barrier at the median,</p> <ul style="list-style-type: none"> <li>✓ The section near the flight path cannot be raised, since may result to conflict with the Moi international airport,</li> <li>✓ The street lighting component not in the scope but worth to be considered,</li> <li>✓ Provision of the NMT at the Sabasaba area and other selected sections with high population</li> <li>✓ The consultant should work closely with the surveyor KenHA during the design phase,</li> </ul>
03/09/2013	Mombasa	Dennis N. Mutiso	Administration Officer 1 (Regional Coordinator Office Coast)	<ul style="list-style-type: none"> <li>✓ The improvement of the proposed project road is a great idea and will be accepted by the county government and taken as a priority,</li> <li>✓ Opening of the new port will contribute to more goods on the road and hence requires better infrastructure,</li> <li>✓ The consultant should inform the relevant offices (DC/DO/ County Government offices, regional coordinator offices) regarding the activities on the ground while undertaking preliminary &amp; detailed design (survey, environmental and social assessments) for facilitation of sensitization and security,</li> <li>✓ Ensure due diligence during identification of the project affected persons and compensation since most locals have no land ownership documents. Some projects have stalled because of the resettlement action plan,</li> <li>✓ Potential displacements of persons between Changamwe and Miritini due to road realignment and encroachments,</li> </ul>
03/09/2013	Kwale	Martin M. Mwaro  Eng. C. M. Mukuva	County Secretary Kwale  KeRRA Kwale	<ul style="list-style-type: none"> <li>✓ Assured the consultants of the good will of the local leadership on the improvement of the project road which is a great investment and may help to reduce the challenges encountered by the motorized and NMT road users,</li> <li>✓ There are potential challenges such as dealing with the encroachments onto the road reserve by private investors, land issues,</li> <li>✓ The construction period of the proposed project road should take a short duration to the extent possible through dividing the road to different contractors for faster completion during the construction period,</li> <li>✓ Vandalism is a major challenge in the urban towns and recommended the consultants to use other alternative materials for road signage,</li> </ul>
03/09/2013	Kwale	Evans M. Achoki	County Commission	<ul style="list-style-type: none"> <li>✓ Dualling of the proposed road will facilitate increased capacity for movement and ease in</li> </ul>

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DATE	County	Persons Briefed	Organization	Comments
			ner Kwale	<ul style="list-style-type: none"> <li>accessing the social amenities,</li> <li>✓ Noted that the section at the weigh bridge and road side truck parking at Miritini contribute to traffic congestion,</li> <li>✓ Ensure employment of the local people for involvement and ownership of the project,</li> <li>✓ The issue of resettlement of the project affected persons should be handled diligently to avoid conflicts or delay of the project implementation, the land issues in the county are very sensitive,</li> <li>✓ The public consultation exercise in Kilifi and Kwale counties can be jointly held. The consultant should send the schedules early for proper planning process,</li> <li>✓ The off road truck parking with access from the backyard is a noble idea will benefit the county government from the revenue generation and reduce highway congestion,</li> </ul>
04/09/2013	Kilifi	Elias K. Chipa  Eng. G. Saburi	County Governme nt of Kilifi  County Secretary Roads Transport and public works	<ul style="list-style-type: none"> <li>✓ The location for trucks parking may be around the Mazeras area where there are a lot of trucks along the road side. The identification of the parking zones should be identified earlier before the lands are occupied by the investors.</li> <li>✓ The identification of these parking locations will help the consultant to design for the provision of the access roads to the potential parking areas,</li> <li>✓ Provide bus parks at Mazeras and Mariakani areas,</li> <li>✓ Encroachment along the project road is visible due to failure of protection of the road reserve. The issues on how to handle the project affected persons should be handled professionally to reduce on conflict,</li> <li>✓ The provision of facilities of the non-motorized transport (pedestrian crossing) should be followed with enforcement measures to reduce on ignorance (provision of a barrier).</li> <li>✓ Advise the contractors on the proper traffic management during the construction period. Encourage a participatory role, there should be serious consultations with the contractor, Regional engineer and the motorist,</li> <li>✓ Enhance road safety in sections with high population (markets, mosques,) Mazeras and Mariakani.</li> </ul>
04/09/2013	Kilifi	Wilfred Sigei	Ministry of Interior and coordinatio n of National Governme nt (Kilifi)	<ul style="list-style-type: none"> <li>✓ The railway line is the boundary between Kilifi and Kwale county hence most of the proposed road sections are in Kilifi County,</li> <li>✓ The issue of resettlement of the project affected persons should be handled well especially because of the nature of land ownership at the coast,</li> </ul>



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DATE	County	Persons Briefed	Organization	Comments
				<ul style="list-style-type: none"> <li>✓ The administrative leaders should be informed when there are activities taking place in regard to the project so as to facilitate security of the consulting team,</li> <li>✓ The locals should be physically engaged in the available job opportunities.</li> </ul>
05/09/2013	Mombasa	Rose Ngowa Eng. Albert T. Keno	County Government Mombasa County Government Mombasa	<ul style="list-style-type: none"> <li>✓ The design should have limited accesses from the main highway to reduce on the conflicts. The off road truck parking area should not have direct access to the main highway,</li> <li>✓ The airport road should also be considered for improvement since it has a great impact to the proposed improvement of Mombasa – Mariakani road,</li> <li>✓ The area around the Makupa cause way has several services that need to be considered; pipeline, water and the railway line during construction. The design of the area need to be provided with a climbing lane to increase on the capacity,</li> <li>✓ The areas around Mazeras need to be considered for realignment to reduce the curves,</li> <li>✓ Recommend the provision of concrete barriers at the median instead of guard rails to avoid the vandalism cases,</li> <li>✓ Concerns on the increased levels of culture erosion and immorality,</li> <li>✓ Community social responsibility should be enhanced in this project may build or improve the existing schools or hospitals</li> <li>✓ The proposed designs of the foot over bridge should be improved and security issues addressed so that they are fully utilized,</li> <li>✓ The locals should be employed in the implementation of the project road so as to own the project.</li> </ul>

## 7.3 Stakeholders Forum

### 7.3.1 Participation

The Stakeholders forum was conducted on the 14th May 2014 at the Mombasa Beach Hotel. The meeting, that was preceded by formal invitations (sample invitations in the annex), involved all senior members of the society such as to include the following participation (full listing is in Annex VI of this report)

1. The County Governors, Senators and Commissioners of Mombasa, Kilifi and Kwale;
2. The County Commissioners of Police – Mombasa, Kilifi and Kwale Counties;
3. OCPDs/OCSs of all Police Stations along the project corridor,



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4. Base Commander, Mariakani KDF Barracks,
5. Members of Parliament – Mvita, Changamwe, Jomvu, Rabai, Kinango and Kaloleni
6. The District Lands Officers - Mombasa, Kilifi and Kwale;
7. The County Directors of Environment - Mombasa, Kilifi and Kwale;
8. Managing Director, Kenya Ports Authority (KPA)
9. Airport Manager, Moi International Airport (KAA)
10. The CEO, Kenya Marine and Fisheries Institute (KMFRI)
11. General Managers of: Kenya Pipeline Company (KPC); Kenya Petroleum Refineries Limited (KPRL); Kipevu Power Generation Plant (KENGEN); Mabati Rolling Mills (MRM) and Kenya Ferry Services Limited
12. Key Civil Society Groups
13. Managing Directors of: Kenya Railways (KR); Coast Water Services Board (CWSB) and Mombasa Water and Sewerage Company (MOWASCO);
14. Regional Managers of: Kenya Urban Roads Authority (KURA); Kenya Rural Roads Authority (KeRRA), Water Resources Management Authority (WRMA), Kenya Power and Lighting Company (KPLC) and Kenya Transmission Company (KETRACO)
15. Representatives from:
  - Kenya Civil Aviation Authority (KCAA)
  - Kenya Hotel Keepers Association
  - Telkom, Jamii, KDN, etc.
  - Transporters Association (Track Owners),
  - CFAs
  - Kenya Association of Tour Operators (KATO)
  - Primary and Secondary Schools
  - Matatu Owners Association,
  - Matatu Welfare Association
  - Bus Operators
  - Kenya Association of Residents (KARA)
  - Ministry of Tourism
  - National Museums of Kenya (NMK)
  - Religious Organisations (Christian, Muslim, Hindu, etc.)

### 7.3.2 Emerging Issues

The project background and design concepts were presented jointly by KeNHA Officials and the Consultants to ensure appropriate information and awareness to all the participants. The Participant of KeNHAs efforts in improving highways across the country called upon all stakeholders to come on board in support and contribution with ideas on how best the improvement should be undertaken. The Participants were also asked to engage the Kenyan society at their various levels in education and awareness towards enhanced ownership of road facilities. This was to enable the Participants contribute effectively towards the project implementation policy and improvement to the

design. Among the key issues that arose from the discussions included (sample submissions are in Annex VI while proceedings and minutes are in Annex V of this report).

- (i) The County Government expressed desire to be involved at a very early stage in the project planning to ensure minimal disruptions in operations around the city. The Government also desires to integrate the evolving infrastructural development around the city and particularly on the streamlining of public transport and goods movement patterns.
- (ii) Representatives from the Airport indicated that the design and associated installations across the flight corridor should minimize potential conflicts with the safety of aircrafts whose touchdown is only a short distance from the road. Approval by KAA and KCAA would be necessary on proposed installations along the section.
- (iii) It is necessary to identify if there are any conflicts with potential archeological sites along the corridor including special cultural sites, grave yards, old historic sites, etc.,
- (iv) Land acquisition is a major issue in road development. While appreciating landowners on releasing required land sections for the projects, the Developer (KeNHA) was asked to ensure timely and adequate compensations for the affected landowners,
- (v) The need for integration of security considerations in the design and construction stages of the project,
- (vi) Consider possibility of dedicated lanes for the trucks in some sections to ensure free flow of other traffic.

**Figure 31: Stakeholders Participation Sessions**



## 7.4 Sensitization Meetings

### 7.4.1 Participation

The four stakeholder sensitization meetings were conducted from 14th to 16th May and on 10th June 2014 at various venues. The meetings were preceded by mobilization through the state government. These sessions were used for sensitization, information sharing and soliciting comments from the participants as well as enhancing project ownership among the general public. The meetings involved participation of leaders and their communities along the road corridor



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through their key local leaders and the Administration. The sensitization meetings were held at different locations with varying participation levels as tabulated below:

- (i) Assistant County Commissioners
- (ii) Area Chiefs
- (iii) Members of County Assemblies
- (iv) Village Elders
- (v) Community Group Leaders (Youth, Women, Disabled, etc.)
- (vi) Business Community Representatives
- (vii) Property Owners
- (viii) Local small scale traders
- (ix) Institutional Heads
- (x) Local religious leaders

Participation was as follows

**Table 23: Participation by Gender (Sensitization Forums)**

Date	Venue	Males	Females	Total
14/05/2014	Dam View Hotel, Mariakani	15	6	21
15/05/2014	Mazeras club	29	8	37
16/05/2014	DO'S Office, Changamwe	28	3	31
10/06/2014	Worget Centre, Makupa	26	4	30

#### 7.4.2 Emerging Issues

The general issues arising from these meetings include the following (sample submissions are in Annex VI while proceedings and minutes are in Annex V of this report);

- (i) There is a potential of negative social impact during the project implementation notably, increased spread of HIV/AIDS and other social evils. This will be mitigated through enhanced police patrols and community policing. An all-inclusive HIV/AIDs programme would be incorporated into the road construction so as to address prevention and access to HIV/AIDs information.
- (ii) There are increased chances of insecurity inform of fuel siphoning and loss of essential commodities within the project during project implementation. There is therefore need to enhance community policing through increased police patrols, sensitization and education.
- (iii) The current drainage system at Mariakani is inadequate as it is wide making crossing difficult and exposing the residents to accident dangers. In the current road design





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- therefore, the drainages should be covered for safety especially in case of children and women crossing the channels.
- (iv) During construction, there will be chances that several public utilities including sewer lines/power lines/water pipelines may be affected. Such services should be relocated promptly without delays. In addition, service ducts should be provided within reasonable span of distances.
  - (v) There are very many trucks along the project road and these may not be provided with adequate parking space. The lorries if not catered for may thereby end up parking along the road reserve further making the road impassable. There should therefore be combined efforts between KeNHA and the county governments to provide parking facilities between Mariakani and Mazeras. The truck parking zones should be designed and provided with sanitation and other public utilities. In addition, there will be need to establish appropriate wellness centers which will act as health centers and will be beneficial even after the project implementation stage.
  - (vi) Thus interventions into Community needs through Corporate Social Responsibility (CSR) at both KeNHA and the Contractor(s) will be necessary. Among the recommended interventions are in sanitation, health and education that would enhancing ownership of the project at the community levels.
  - (vii) There is need to create awareness on issues in as far as the road is concerned. Among the issues for which awareness creation will be undertaken will include HIV/AIDs and Sensitization to ensure the facilities (road signage) are not destroyed by the people. In addition, community policing should be enhanced through patrols. Community liaison committees should be constituted and operationalised to handle specific issues as they arise during road construction in consultation with the resident engineer and contractor.
  - (viii) The road design should incorporate a specific extra lane for the trucks from Mariakani to the weigh bridge to reduce congestion in that section;
  - (ix) The communities in the rural ranching areas between Mazeras and Mariakani keep livestock and they normally bring them to the markets in the area. In addition, livestock is brought to slaughtering in Mazeras from KARI, Kwale and Kilifi counties. There is therefore need for cattle crossing areas tunnels and erection of signboards in this road section;
  - (x) The past road construction did not consider bus bays and bus stops. Under this design therefore, there is need to provide bus bays with adequate space and at appropriate points with the help of local leadership. The bus bays should also be fitted with street lighting to help light the sections. Further, the county government should construct a market near the bus bay to avoid use of the main highway that results to road accidents. The design should also have designated spots for the boda boda parking facilities to reduce conflicts;
  - (xi) Speed control measures should be provided near hospitals, Schools, road junctions, major market centres and bus bays sections. These speed control measures will include zebra crossing and speed bumps;

- (xii) Most of the motorists are not aware of the junction of Mariakani/Mazeras Kaloleni road and these have caused a number of accidents. The road design should therefore entail reduction of speed at such major towns of Mazeras, Mariakani and Miritini. In addition, appropriate designs such as flyovers and exchanges should be established at these junctions while providing foot bridges to cater for pedestrian crossings at such sections;
- (xiii) The bills of quantities should provide for construction of access roads to nearby public utilities including schools and hospitals. Where this goes beyond the proponent's mandate, there will be need to partner with the County government to provide the access infrastructures.
- (xiv) During the project development the contractor should identify the traffic diversion routes to be used for example there is the Bonje – Miritini side where there is route diversion that requires rehabilitation for use;
- (xv) The project affected persons should be identified early, paid in advance and then given adequate time to move. This will be realized through establishment of the community liaison committee will unite the people and prepare a project request for budget allocation;
- (xvi) The road design should consider reduction of the sharp bends at Bonje area through route alignment. In addition, guard rails should be constructed at the road edges along the Bonje road section to limit accidents on the steep slopes.
- (xvii) Top on every session was employment and income opportunities for the local communities, especially the youth, during the construction phase. The Contractor(s) were asked NOT to bring casual workers from outside the project areas.

**Figure 32: Sample Participants (Sensitization Forum)**



FGD Session at Mariakani



FGD Session at Mazeras



FGD Session at Changamwe

## 7.5 Public Consultations

There were 7No. public consultation meetings organized and executed on various venues along the project corridor. Notices to the public were posted in the media between 1 and 2 weeks prior to the meetings with clear schedules and details of the venues and timelines. The schedules are outlined in the table below;



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**Table 24: Schedule of Public Consultation Meetings**

Date	Venue	Time	County	Sub-County
11/06/2014	Mariakani Milk Scheme, Mariakani	10.00 am	Kilifi	Kaloleni
12/06/2014	Kaliang'ombe Assistant Chief's Office	10.00 am	Kilifi	Rabai
13/06/2014	Botanical Garden, Mazeras	10.00 am	Kilifi	Rabai
16/06/2014	Jomvu Madavuni	2.00 pm	Mombasa	Changamwe
17/06/2014	Chief's Office, Chaani	2.00 pm	Mombasa	Changamwe
18/06/2014	Catholic Hall, Changamwe	10.00 am	Mombasa	Changamwe
19/06/2014	Assistant Chief's Office, Mbirikani	2.00 pm	Mombasa	Changamwe
20/06/2014	Worget Centre, Makupa	10.00 am	Mombasa	Mombasa

#### 7.5.1 Participation

These meetings were chaired under the Chairmanship of the area Chiefs and District officers. Participants included the following;

- (i) Assistant County Commissioners
- (ii) Area Chiefs
- (iii) Members of County Assemblies
- (iv) Village Elders
- (v) Community Group Leaders (Youth, Women, Disabled, etc.)
- (vi) Business Community Representatives
- (vii) Property Owners
- (viii) Local small scale traders
- (ix) Institutional Heads
- (x) Local religious leaders
- (xi) General public

The consultative public participation meetings were held at different locations with varying participation levels as tabulated below:



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**Table 25: Public Consultations Participation by Gender**

Date	Venue	Males	Females	Total
2/06/2014	Mariakani Milk scheme, Mariakani	116	42	158
3/06/2014	Kaliang'ombe assistant chief's office	68	30	98
4/06/2014	Botanical Garden, Mazeras	48	17	65
5/06/2014	Jomvu Madavuni	52	19	71
6/06/2014	Chief's office, Chaani	45	30	75
7/06/2014	Good News Church of Africa, Changamwe	80	52	132
9/06/2014	Assistant Chief's office, Mbirikani	71	51	122

### 7.5.2 Emerging Issues

The general issues arising from these meetings are presented under the following sub-topics (sample submissions are in Annex VI while proceedings and minutes are in Annex V of this report):

#### Linkages with other Infrastructures

- (i) Investors who had privately constructed acceleration and deceleration lanes feared that these could be destroyed leaving them with no adequate accesses while those who planned to improve entry into their premises wondered if they should proceed. However, the existing accesses will be rebuilt if interfered with but the planned ones should be shelved pending consultations with KeNHA.
- (ii) There were concerns that linkage between the proposed road and railway could lead to conflicts. However, each has its own and adequate railway and where they cross one another, the road will be built over the railway. Further, there is need to provide access to the hospitals, schools and trading centers
- (iii) Interconnections between the proposed project road and other roads especially Magongo road at Jomvu junction should be appropriately designed. As such, an interchange will be done to join Magongo road and acceleration lanes to connect to other roads.
- (iv) Roads have in the past been destroyed to provide for services that run across including water lines, sewer lines and optic cables. The project road should therefore incorporate service ducts to avoid the cutting of the road to pass the services.
- (v) There is traffic jam from Mariakani market to the weighbridge. This calls for provision of a dedicated service lane from the weigh bridge up to Mariakani market.



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- (vi) Water pipes passing below the road great care should be taken so as not to disrupt services. There will be dedicated tunnels on the road for service line like water and fiber cables.

#### Provision for Non Motorized Transport

- (i) There is need to construct pedestrian bridges at Bangladesh, Jomvu crossing point. These bridges should be designed in a way so as to serve the physically challenged including the elderly who might have hardship in using them. Ramps will be provided on the foot bridges to provide for the challenged.
- (ii) Further, the pedestrian foot bridges design should be high so as to serve the tall containers. In addition, a service lane or bus stop should be provided near the pedestrian bridges
- (iii) As part of the road project, it will be necessary to provide for non motorized transport infrastructures such as a 2 meters wide foot path along the full section of the road. Once provided, enforcement strategy should be put in place to ensure the residents use them. Such strategies will include sensitization by the local leaders and the administration on the use of the facility.
- (iv) Other services that may need to be designed and provided will include Sanitation facilities, Matatu stages and bus parks (Mariakani, Mazeras and Jomvu) under KeNHA's Corporate Social Responsibility

#### Resettlement Issues

- (i) Resettlement, especially for public utilities could be a major challenge leading to resistance towards the project. As such, ensure that there is minimal land acquisition (e.g. on school grounds as these might disrupt learning for the students). The side of the road to be acquired during construction will depend on the survey maps.
- (ii) In addition, thorough investigations should be undertaken when it comes to issues of compensation to halt people from being conned. In addition, the County Government should be prohibited from evicting traders from the road reserve while adequate notice of 9 months should be given. However, traders should not any further encroach into the road reserve.
- (iii) Properties close to the road reserve could be affected by vibrations as a result of constructions works. In such cases, the contractor will take responsibility and pay accordingly.

#### Safety and Security

- (i) In the past, contractors have left behind open and unattended borrow pits which pose a safety concern. There is therefore need to ensure that an agreement is signed with the contractor stipulating clearly the state at which the borrow pits and material sites should be left,



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- (ii) Accidents are common at specific points including Mazeras, Mariakani, Bonje. In such areas, provide for bumps around. Specifically at Bonje area, the current road has very sharp bends and there is therefore need to reduce the gradients of the bends and produce a safe road. Safety will further be enhanced by constructing a reinforced concrete wall to separate both sides of the road rather than steel ones which are prone to vandalism. As such, the contractor will use plastics and concrete to reduce theft and vandalism. In addition to the reinforced concrete wall separating two sides of the road, there is need to provide for barriers on the southern edge of the road to reduce accidents and ensure safety.
- (iii) Construction of reinforced concrete barriers between Miritini and Mazera may however be an obstruction to residents who often criss-cross the road in efforts to access common natural resources notably firewood, grass and water or for social purposes. Thus, there is a need to further explore the possibility of acquiring more land and widely separating the dual lanes. At Kibarani, there is need to consider putting a divider wall and leveling the area to reduce accidents.
- (iv) At points of public institutions including religious, health and education, there is need to enhance safety by providing safe crossing facilities. During construction, insurance and medical bills for accident victims as well as damages to property should be met by the contractor. In addition, adequate bumps should be provided at livestock crossing points mostly near slaughter houses in Mariakani.

#### Drainage

It is important that adequate drainage facilities be provided and storm water channeled off farms and residential areas. In this line, if need rises land for acquisition of outfalls will be undertaken and compensations effected accordingly. Thus, there will be dedicated channels to direct water to the closest catchment, and if necessary outfalls will be acquired and they will be compensated accordingly.

#### Employment

- (i) Employment opportunities for the locals should be ensured. There is need to employ at least 60% percent of the unskilled labor from within the project corridor. In order to ensure procedural employment take place, it will be important that this is undertaken through an all inclusive community established structures such as community liaison committees and the local leadership.
- (ii) During the public consultation meetings, participants strategized on how to form committees that will liaise with the Local leadership and the contractor for employment.
- (iii) The employment policies during road construction should considered the elderly and vulnerable sections o the populations including the youth. The different job categories will be availed for the different age groups. However, child labour should be avoided.

### Challenges during Construction

- (i) There is likelihood that during construction of the road, traffic snarl-ups will be common. This could be reduced if Mpeponda Road is revived and used as a diversion road. In addition, a ring road to join Dongo kundu road should be constructed as an alternative route.
- (ii) It is however important that the contractor does the road in phases rather than closing the entire road and thus leave parts of the road being operational.
- (iii) Contractors in endeavoring to save fail to regularly water road diversions. Thus adequate measures should be put in place to control dust during construction which might adversely affect businesses close to the road.
- (iv) The contractor should also do high quality work.

### Awareness creation

Before the contractor commences his work he should hold a meeting such as the consultative public participation meetings to enlighten the residents and stakeholders. As such, the contractor is supposed to hold meetings quarterly but in case of anything, the affected should consult the resident engineer. To be aware of the final design, the stakeholders can access it from AfDB websites.

**Figure 33: Public Consultation Meetings**





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Public Meetings at Changamwe Area



Stakeholder Meeting at Woget Centre



Field Study Mission Meetings





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## CHAPTER 8: RESETTLEMENT ISSUES

### 8.1 Overview

The Kenya National Highways Authority (KeNHA) in its mandate to construct and maintain national highways with a view to spur economic growth has decided to improve the Mombasa-Mariakani Road section of the Northern Corridor (A109) to a dual carriage-way. The road section is characterized by heavy traffic jams that slow down traffic movements into or out of Mombasa. Mombasa County is the Port Town with the biggest and busiest port along the Eastern African coastline north of South Africa. The Port of Mombasa handles import and export cargo for Eastern and Central African countries such as DR Congo, Burundi and Rwanda; South Sudan and northern Tanzania.

The Government of Kenya, through the Kenya National Highways Authority (KENHA) has earmarked Mombasa-Mariakani Road project within the coastal region for improvement and dualling. The project road traverses a densely populated area characterized by residential, heavy and light activities (ware-housing and container storage facilities). The proposed road improvement project is approximately 41km long from Digo Road junction to Mariakani Weigh-Bridge. Currently, the road is single carriage-way with two (2) short sections built as dual carriage-way.

Intensive documentation and field investigations were undertaken along the road corridor to appreciate potential impacts to people living within the immediate area of the project road. The African Development Bank (AfDB) has expressed interest in funding the improvement and dualling of the Mombasa-Mariakani Road project. The existing road between Mombasa Island and Mariakani is characterized by heavy slow-moving traffic comprising of commercial trucks and private vehicles. Mombasa City is the second biggest town in Kenya after the City of Nairobi. The distance between the two (2) towns is approximately 480kms without any significant centre in-between. Mombasa Island is home to Kilindini Port, the biggest port on the eastern coast of Africa north of South Africa. Although the port is being expanded with new berths being developed in Mwache Creek of West mainland, the main access to the harbour is through Changamwe round-about and Makupa Causeway that form part of the project road.

Mombasa Town is the centre of tourist industry with arrivals and departures through Moi International Airport located in Port Reitz in the West Mainland. Access to the Airport is through Changamwe and Makupa Causeway. Due to the high cargo traffic volumes between Kenyatta Avenue and the Airport mainly around Changamwe round-about, there are a lot of disruptions for traffic to and from the airport causing a lot of inconveniences.

Due to lack of space on the Island for industrial expansion with competing commercial and residential developments, the Changamwe/Miritini areas became the first phase for relocation. With increased cargo and demand for storage, this has required additional space that is only available along the project road. The area between Changamwe and Miritini is characterized by a mixture of



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container storage, industrial developments and low/medium income residential developments. Much of the residential population in this area is still dependent on the existing facilities and employment opportunities on the Island, hence the high commuter traffic at peak hours.

Mombasa Town is the principal regional centre for coast geographic region with its influence spanning the whole of Kenya coastline from Tanzania Border to Somali border with its tourist industry. There is no direct connection between up-country and the north coast, therefore all vehicular traffic has to pass through Makupa Causeway and the Island (project road) to access the north coast with its numerous tourist hotels. Until the realization of the Southern Bypass through Mwache Creek, traffic to the south coast will remain part of the vehicular traffic using the project road through Likoni Ferry and reducing further the road existing road capacity between Mazaras and Mariakani.

#### 8.2 Scope of the Re-Settlement Framework.

The Mombasa – Mariakani Road Dualling Project entails an improvement to the existing section of the Northern Corridor that is partially single-carriageway. It is characterized by heavy traffic mainly cargo and private vehicles. The project covers a distance of approximately 40km and traverses a heavily built-up area within Mombasa County and sparsely developed area within Kilifi County. The main objective of the project is to improve traffic flow from the Port City of Mombasa at Kilindini Harbour destined for the hinterland that extends as far as DR-Congo, South Sudan and Southern Ethiopia and also enhance regional integration. Other countries in the region that depend on the road for their exports/imports include Uganda and Rwanda; northern Tanzania and the whole of Kenya. The road section also serves as the main collector for traffic from Kilifi, Kwale and Taita/Taveta Counties that depend on Mombasa town as their principal Town.

The design concept of the project is based on minimization of displacement of the people and their developments, therefore there will be minimal land acquisition. The public forums that have already been held for the environment and socio-economic impact assessment has enlightened the potential PAPs on their rights and obligations. The main objective of the Resettlement Plan is among others to:-

- (i) Identify the affected persons in order to determine those likely to be adversely affected by the project works, the severity and extent of the impacts. An assessment of the impacts on their assets, infrastructure and livelihoods within the road reserve of the road sections will be made including their income and assets survey;
- (ii) Identify the poor and vulnerable groups so as to develop strategy to ensure that they proactively benefit from the project benefits;
- (iii) Review the legal and other institutional framework;
- (iv) Develop mitigation measures in consultation with the affected people;
- (v) Prepare detailed entitlement matrix and an implementation plan;
- (vi) Prepare a resettlement budget; and



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- (vii) Put in place a Monitoring and Evaluation and reporting system for the Resettlement Plan.

The overall objective of the resettlement plan is to identify and develop a mitigation plan to ensure that all kinds of adverse impacts are exhaustively identified so that the community as a whole benefits from the project during and after construction of the road.

The scope of the resettlement action plan will ensure that all guidelines of the various lenders are adhered to. Specifically, the African Development Bank's Policy on Involuntary Resettlement, i.e. Involuntary Resettlement Policy (2003); will be adhered to. The Policy requires the borrower to prepare a full resettlement plan (FRP) for any project that involves the displacement of a significant number of people (200 or more persons) who would be displaced with loss of assets, loss of access to cultural assets or reduction in their livelihood. The full replacement plan will be released as a supplement document to the Environmental and Social Impact Assessment (ESIA) summary for the Bank's financed projects involving involuntary resettlement issues. The resettlement plan should be time specific with an appropriate budget incorporated as an integral part of the project design. The Plan shall give details of the compensation for loss of assets, livelihoods and infrastructure and rehabilitation support for those losing their means of livelihoods as a result of the project.

Due consideration will be given to all legal instruments and national policies that govern the payment of compensation for loss of assets and rights as a result of compulsory acquisition of land with attendant consequences of involuntary displacement in favour of public purposes. These will be harmonized with the guidelines of the lenders that takes precedence over national policies to ensure that project affected persons are left better off after the effects of the project improvement, ownership of assets notwithstanding.

### **8.3 Resettlement Planning and the Legal Provisions in Kenya.**

The deprivation of individual rights on land and property in Kenya is espoused in the Constitution of Kenya (2010) and the various laws dealing with interests on land. Matters of compulsory acquisition are vested in the National Land Commission and the procedures are detailed in the Land Act. There are laws that deal with specific provisions on protecting the individual rights including the law dealing with forced evictions and Internally Displaced Persons. Articles of the Constitution and the provisions of the Land Act require that fair compensation must be paid promptly before a project takes possession of the land intended to be compulsorily acquired. Where-as the Banks social safeguards stipulate that compensation should be based on replacement value, the general practice calculates the compensation on the basis of the market prices. However, the law provides for further of a percentage to the affected person for a disturbance allowance calculated as a percentage of the total claim/award. The preferred mode of compensating land-for-land proves difficult and is not a preferred method by PAPs as they envisage utilizing the compensation money to diversify their income generating activities.



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Recent efforts in the land sector reforms, some of the gaps hitherto identified between the Banks' guidelines and the law on compensation have been addressed with the enactment of the Land Act and other provisions in the Constitution of Kenya. PAPs including adult children and wives who hitherto could not be included in the compensation can now be accommodated with much ease. However, it is incumbent on the local leadership to provide guidelines as regards application of compensation resources. The Land Registration Act reinforces the provisions of the Land Act in closing some of the gaps between the Bank guidelines and the national laws.

In keeping with the objective to avoid or minimize involuntary displacement along the project road, the Framework will ensure that the road design and land acquisition activities will opt for vacant or sparsely developed land to minimize displacements. Efforts will be made to spare places of worship that are along the road corridor as much as possible and where not possible to avoid, the communities will be consulted. Their advice on how to relocate or reconstitute the facility including graves and shrines (if any) will be sought and agreements arrived at. In the event of such challenge arising among the properties to be acquired, the umbrella organizations will be consulted for guidance.

#### 8.4 AfDB Statements on Involuntary Resettlement

The African Development Banks' statement on Involuntary Resettlement is stipulated in the Banks' document entitled "Guidelines on Involuntary Displacement and Resettlement in Development Projects". The guidelines stipulate that when people must be displaced; it is to be ensured that they are treated equitably and they share in the benefits of the project that involves their displacement. Effort should be made to minimize disruptions to their livelihoods, ensure that the displaced persons receive resettlement assistance to improve their living standards. Close attention should be paid on the displacement of disadvantaged groups such as female headed households, elderly people, the poor and the marginalized communities. The borrower should set up mechanism to monitor the performance of the Resettlement Plan. The guidelines further recognizes that the borrowing country has laws and regulations dealing with various issues pertaining to displacement and compensation for loss of assets and rights that need not be violated even if they may not be adequate. The borrower should be encouraged to take a long-term view of the in-adequate provisions to improve on the inherent gaps to achieve equity.

#### 8.5 Entitlement Matrix

All assets affected in the involuntary displacement have been documented and their types segregated for compensation purposes. These will include:

- (i) Land – each parcel and the assets there-in will be identified. Details of ownership will be verified and any secondary interests also determined.
- (ii) Developments in terms of houses and other structures, perennial crops and other trees of value including trees and shrubs with medicinal value.
- (iii) Loss of incomes and livelihoods for people depending on the land irrespective of their ownership rights
- (iv) Community facilities and public institutions



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- (v) Other unforeseen impacts that may become evident on the embarking of the project implementation.

Speculators take advantage of capitalizing on areas attracting new infrastructure developments so as to benefit from the enhanced compensation or new investment opportunities that arise. In view of this, the community will be encouraged to retain their affected parcels of land lest they become landless. A cut-off date will be agreed upon with the affected persons and create an eligibility criteria to forestall spurious claims.

All people deriving their livelihoods from the affected land parcels, their ownership rights notwithstanding, will be paid some sort of compensation/assistance to ameliorate their suffering. The community and all stakeholders will be involved at all stages of the RAP development to ensure participation and transparency. This will also ensure their integration in the future ownership of the project. When the various committees are formed they will be incorporated as members and ambassadors for the project.

#### 8.6 Grievance Redress

Grievances are bound to occur in regard to details on the lost assets and the compensation process either by being excluded from prompt payment or some administrative mix-up of the award or the PAP him/herself. A committee of the local community and the project proponent will be formed to deal with such matters and avoid the longer legal process through the courts of law. The latter can be lengthy and has the potential to delay the project. The different categories of PAPs will be identified as each category will be entitled to different type of compensation or assistance on displacement.

An arrangement has to be designed to put in place an Institution within the project that will ensure that the objectives of the Resettlement Plan are efficiently realized. This will involve the project proponent and other interested parties including the PAPs representative and local leadership. The head of the project unit will ensure that the timelines are adhered to and compensation paid to the PAPs in time. Community Based Organizations and the Civil Society will be identified and involved in the process of preparation of RAP and its subsequent implementation.

RAP preparation will entail the carrying out of a census of the PAPs and an assets inventory of the PAPs to be able to quantify the impacts. The RAP report will be publicized to the PAPs and any other interested person for information and accountability. The RAP will disclose the mitigation measures and the process that will be followed in ameliorating the negative impacts. It will also lay down the indicators for monitoring and evaluation for implementation of the plan.

The main function of the Grievance redress Committee is to provide a forum for the PAPs to air their dissatisfaction arising from the compensation or implementation process of the project. This is an informal forum within the Resettlement Committee and/or the Project management Unit. The Committee is to receive complaints from the PAPs through the project office either verbally or in writing and they endeavour to address the issue to the satisfaction of the complainant. If the matter cannot be addressed to the satisfaction of the complainant within the prescribed period, the complainant then may have recourse to the Resettlement Committee. Failure to be satisfied, the



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complainant reserves the right to seek redress from the Court of law that is lengthy and costly in most cases.

The redress committee will compile well documented registers of all complaints received from the PAPs at the project office, the actions taken and the decisions arrived at. Initially, the Resident Engineer and his staff with secretariat of the GRC will handle the complaint. Failure to arrive at a satisfactory answer, then the RE will refer the matter to the GRC that meets periodically.

## 8.7 Monitoring and Evaluation

A monitoring and evaluation component will be incorporated in the project to oversee to the land acquisition and implementation process and ensure adherence to the objectives and strategies of the project. A different level of external experts will also be incorporated in the project to verify adherence of the project implementation to meeting its commitments in realization of the mitigation measures and more particularly that the PAPs are not left worse-off due to their being displaced from their land and assets. One of the indicators for monitoring is to ascertain that all compensation claims have been paid to the beneficiaries and in a timely manner. Further, the monitoring team will ensure that the beneficiaries of award money spend it as intended and are not left worse-off by squandering the resources.

## 8.8 PAPs Compensation Process

### 8.8.1 Asset Valuation

The detailed valuation of assets along the project roads has not been undertaken but an estimate has been made for the purpose. For a final valuation to be undertaken, it will be necessary for the land acquisition formalities to be completed in accordance with the provisions of the law governing compulsory acquisitions. This will entail the Gazetting of the affected properties, holding public inquiries to receive claims from the owners and any other interest holder. During the intervening period, an inspection will be carried out to ascertain the condition of the premises affected for assessment purposes. Official searches would also be conducted to verify ownership and any encumbrances attached to the title.

After the inquiries are held, an award is made to the registered owner after comparison of his claim and the official assessment by the government valuer. Option is provided to accept or reject the offer and recourse is provided to appeal on the quantum of the award for enhancement by the tribunal or the Environment and Land Court established by provisions of the Constitution of Kenya (2010).

### 8.8.2 Land Acquisition

The function of acquiring land compulsorily for public purposes is vested in the National Land Commission by the Constitution of Kenya (2010) and the Land Act. The Commission is responsible for arranging the Gazetting of the private land to give notice to the affected persons. It arranges for valuation inspections of the affected properties and issues the award after determining the claims



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submitted at the public inquiries. The act on behalf of the project proponent in arranging for taking possession of the affected land after making the compensation payment to the land-owners.

The valuation process will provide compensation for loss of land and developments, loss of incomes to both lease-holder and the tenants. Payments will be made for restoration of loss of livelihoods and restitution of affected public institutions facilities that do not receive monetary payments. Other costs that will be considered for payment will include payment of transport costs to the displaced persons to the relocation sites. They will also be considered for assistance to be allocated on priority basis any facilities developed to support their continued livelihoods. A flat rate disturbance allowance will be payable to the property owners over and above the award for any inconvenience suffered as a result of the acquisition.

#### 8.8.3 Cost of Affected Property and Resettlement

The estimates for the resettlement action plan (RAP) will cover land acquisition, restoration of livelihoods and other negative impacts arising within the community as a result of the road project. The details are shown below but the actual figures for compensation are to await valuation of the properties once the National Land Commission completes the process for compulsory acquisition. It is estimated that the land to be acquired for the proposed bypass will be a corridor measuring 40m wide where the corridor is narrower and the total length of the proposed road is approximately 42 Kilometers from Mombasa-Mariakani. This will entail acquisition of an additional 4.0m on either side of existing road reserve.

**Table 26: Cost of Land Acquisition**

Item for Compensation	Amount (KShs.)
Value of land	500m
Value of Structures	43m
Value of trees	10m
Public facilities	15m
Total	563m
15% (disturbance, injurious affection and severance)	84.5m
<b>Total Compensation Cost (Kshs)</b>	<b>647.5m</b>

Source: RAP Report

It is important to note that for purposes of the Resettlement Plan, individual land demarcation was not established and such will be done when carrying out final valuations for the bypass after the land acquisition has been compiled. The estimate of the value given is based on calculation of compensation figures referenced to the diminution in the market value of the land. The effects of severance and injurious affection plus any disturbance element has also been included by the additional 15% of the market value of the properties affected.

It is also important to point out that the value of crops is quite minimal as most of the affected land is under commercial and indigenous trees and subsistence farming of maize, potatoes and beans which for the sake of this estimation is not valued. The values of these subsistence crops have



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been ignored as they are expected to be harvested within a short time. Perennial crops were also found within the parcels of affected parcels of land which had palm and coconut trees.

#### 8.8.4 RAP implementation Budget

To ensure that the objectives of the RAP are adhered to and the process complies with the guidelines for social safeguards as stipulated by the AfDB it will be necessary to provide resources to facilitate the component for monitoring will also be provided for to follow-up on the targets set in the plan.

**Table 27: RAP Implementation Budget**

Expense	Description	Total Cost (KShs)
Professional service	Verification of assets and training of PAPs	6.5m
Resettlement and Grievance Redress Committee Cost	Allowances for committee meetings and agents	2.5m
Stakeholder Participation	Consultations and continuous sensitization	3.2m
Livelihood Support	Assistances and allowances for vulnerable groups	9.0m
RAP Implementation And Administration	Office operations and documentation	4.2m
Monitoring and Evaluation	Cost of monitoring and evaluation of the process	4.8m
<b>Total (KShs)</b>		<b>30.2m</b>

Source: RAP Report





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## Chapter 9: Impacts and Mitigation Measures

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### 9.1 General Trend

Road projects enhance social and economic benefits through improved transportation and connectivity. While noting the limited and temporary negative impacts during the construction phase, it should be appreciated that the overall benefits from the road upon completion and commissioning outweighs the negative implications of the road during its use. Negative impacts from road are mitigated through social engineering, enforcement of road use regulations, signage, maintenance and continuous planning among other measures.

The project road traverses a diverse range of environment and social setting influenced by among others social and economic activities and developments. The zones within the urbanized areas are characterized by traffic congestion, aerial emissions, noise, wastes generation, high traffic (human and vehicular) and potential safety risks. The semi-urban and rural areas are mainly be characterized with limited vegetation cover and disruption, soil erosion and safety risks and social disruptions. The following sections outline key areas of importance during the project implementation and post construction use of the road.

### 9.2 Positive Impacts

Improvement of the project road will have overall positive impacts to the environment and social aspects. Specific positive impacts of the proposed road improvement project will need to be enhanced. These benefits will not only be to the local communities, but will also be felt in the wider zone of the Mombasa Metropolitan regions and the semi-urban sections in Kilifi County. The following positive impacts are anticipated during and after completion of the improvement works for the Mariakani – Mombasa road (A109).

#### 9.2.1 Poverty Reduction and Improvement of Livelihoods

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 2,000 – 3,000 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) and
- (iii) Accommodation services,

Upon completion of the dualling project, the following benefits are envisaged

- (i) Travel time between Mombasa and Mariakani and vice versa (especially the section between Changamwe and Miritini – commonly famous for long traffic congestions) will be greatly reduced through improved traffic flow. This will arise from enhance value of time from efficient movement (this aspect has not been studied



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- (ii) Vehicle maintenance costs will be lower. This may effectively translate into direct and indirect costs.
- (iii) Security management

#### 9.2.2 Economic and Social Development

Overall, the road will be an economic pillar for realization of the Kenya Vision 2030 by enhancing efficient transportation and movement of people and goods. Speedy movement and spurring economic development between Mombasa Port locally, the hinterland of Kenya as well as the neighbouring countries. The construction activities may, however, slow down local traffic movement especially on deviation sections, through the construction period.

The improved road also has a potential to enhance appreciation of land and property values in the road section and the immediate neighbourhoods. Among the appreciation will include value addition to commercial and economic investments, potential for institutional development and attraction for residential housing development. This may not only reduce the congestion in the city centre but will also create manageable economic and social centers outside the Mombasa City Central Business District.

The project has proposed to integrate parking areas for trucks and other vehicles. The parking areas will provide rest facilities for the truck operators and platforms for servicing their vehicles. Other motorists including public service vehicles and personal vehicles will also utilize the facilities. It is important to note that the parking areas will present opportunities for small scale traders and other income generation activities as well as source of revenue for the Counties of Mombasa and Kilifi and indeed Kwale. During this ESIA, the Counties were in the process of identifying appropriate land for the provision of these facilities.

#### 9.2.3 Non-Motorized Traffic (NMT)

The proposed project has a Non-Motorized Transport (NMT) Component variously along the corridor. The component is integrated to enhance safety of the pedestrians and other road users. Walkways are considered along the entire new alignment with clear separation from the main carriageway. There will also be a lane dedicated for cyclists and cart pushers. This will go into reducing the amount of money spent on transport by the workers, small business operators, school children, the disabled and other people willing to walk to work places.

Pedestrian crossings including foot bridges and underpasses will ease safe movement and usage of the road by a majority of the residents, especially school children, the elderly, women and the disabled people. Locations proposed to benefit with footbridges will include among others;

- (i) Start of the road KM 0+000 suggested
- (ii) Mwembe Tayari (KM 0+500) suggested
- (iii) Sabasaba Junction (1+900) suggested
- (iv) Makande Road Junction (KM3+000) proposed in design,
- (v) Changamwe (KM6+200) proposed in design
- (vi) Changamwe (KM 7+600) suggested



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- (vii) Mikindani Junction (KM 8+500) suggested
- (viii) Jomvu (KM11+600) suggested
- (ix) Miritini (KM 14+000) suggested
- (x) Mazeras proposed in design
- (xi) Kokotoni suggested
- (xii) Mariakani proposed in design.

It has been observed that a large section of the beneficiaries do not favour foot bridges due to challenges of climbing stair or rumps, sometimes carrying luggage or restrictions to the disabled and aged. For this reason and to ensure a large beneficiary numbers, it is proposed that low underpasses be designed such that the pedestrians move at grade.

The total beneficiaries are estimated at 65,000 local residents (equivalent to the estimated local population who are expected to use the road every day) that include largely the communities living along the corridor as well as transit travelers, business people, social and economic centres and activities in the overall Northern Corridor Improvement Corridor.

#### 9.2.4 Streamlined Drainage Outfalls

Sections of the road corridor are faced with drainage challenges following encroachments by developments and residents into surface natural drainage channels. Partial flooding and damages to property as well as disruption of traffic movement and access to residential and commercial premises. Inadequate drainage provisions are also potentially a risk to the un-cohesive soils in parts of the road corridor. The provision and streamlining of roadside drains and their associated outfalls will go into tackling this challenge. Among the areas to benefit include the Jomvu – Miritini section (where almost of all drainage outfalls have been blocked), Changamwe areas with loose soils with risks of erosion. The drainage within the city (Km0+000 – KM 32+500) the covered drainage systems seems to be been clogged by excessive silt leading to partial flooding of the road and the abutting links during the rains.

Interventions through the road project will provide cleared and well designed drainage outfall at appropriate locations to not only clear the road reserve, but also ensure nil or minimal interference with downstream social, economic and even ecological features. Through appropriate cooperation of the landowners and operators, this intervention will have direct and indirect benefits in the area. To the extent possible, landowners and operators on both sides of the road will be encouraged to ensure no pollutants enters the open drainage system. Among the potential pollutants to focus on will include fuel service stations, workshops and motor garage yards. With the stoppage of roadside parking of trucks and other vehicles, a significant pollution loading into the open drainage will also be reduced.

#### 9.2.5 Waste Management

One challenge that faces waste movement in urban areas is appropriate access into the waste sources and the disposal destinations. It is hoped that upon the desired improvement of the access road along the project corridor, waste handling will be improved as well. It is notable that there is significant solid waste dumping on the road reserve and part of the adjacent areas. Among these



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include dumping at the transportation centers (e.g. Mwembe Tayari), the long-time Kibarani public dumping site and the random sites between Changamwe and Miritini areas. Development of the road may consider a collaborative effort to consider organized and appropriately situated waste holding locations easily accessible by the communities and waste handling agencies. Backed with regulations and community participation, the indiscriminate dumping of wastes along the road reserve will be controlled.

Deliberate provision of waste bins at bus bays, foot bridge landings and underpass exists as well as at the parking areas will be of significant benefit to the road users as well as the environment. Again collaborations will be required between all the players including KeNHA and the County Governments. Removal and disposal of the wastes will be integrated in the local waste management mechanisms.

#### 9.2.6 Other Benefits

- (i) Cattle crossings will be provided on the Mazeras – Mariakani section where at least 2No. Slaughter houses are situated namely Mwangoni Mombasa Slaughter House and Kasemeni Slaughter House (the latter on the Kwale County side. The livestock crossings will be located at between KM 29+400 and KM 29+800 and also between KM 31+500 and KM 32+000. The crossings will be a designed box culvert creating a hump such that the animals and owners cross the road at grade and will serve both the animals and residents.
- (ii) Through social responsibility arrangements, the project will be expected to intervene on social facilities including schools, health centres and water supplies. This will be in addition to the provision of wellness centres at pre-determined locations. 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 centres at Mariakani, Mazeras and Changamwe that may also be adopted for wellness centres during the construction period,
  - ✓ Provide access roads to schools, markets and health centres within 500m from the road among these listed under chapter 5.
  - ✓ Proposed wellness centres 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,
- (iii) Public parking areas will be integrated into the existing market centers. These should include appropriate access road from the main highway, lighting and drainage. Beneficiaries will include local residents and the local traders,
- (iv) Efficient transportation locally and regional. It is currently estimated that the base case vehicle speed is an average 10 – 30km/hr across the road corridor. On a worse situation, it takes an average of 3 – 6hrs to traverse a distance of 16km from Miritini into the city centre. With improved road, the vehicle speeds will change to an average of 50 – 80km/hr with significant improvement on travel time (10 – 20min) for the same distance.



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- (v) Improved road safety associated with less interaction of traffic with pedestrians. Appropriate mechanisms, however, would be required to streamline pedestrian movements including awareness creation and sensitization of the road users.
- (vi) Improving access roads abutting into the residential estates and commercial centers along the corridor. Among the beneficiary residential areas will include Port Reitz, Chaani, Bangladesh, Huruma, Mikindani, Jomvu, Miritini Estates as well as semi-urban settlements in Mazeras and Mariakani neighbourhoods
- (vii) Street lighting will enhance security in the urban sections of the road corridor. This is designed to cover all the urbanized road sections (KM 0+000 – KM 16+000) apart from the landing corridor for Moi International Airport.

### 9.3 Climate Change Mitigation

It is commonly known that as traffic congestion increases, CO<sub>2</sub> emissions (and in parallel, fuel consumption) also increase. In general, CO<sub>2</sub> emissions and fuel consumption are very sensitive to the type of driving that occurs. Traveling at a steady-state velocity results in much lower emissions and fuel consumption compared to a stop-and-go driving pattern. By decreasing stop-and-go driving that is associated with congested traffic, CO<sub>2</sub> emissions can be reduced.

When average speeds are very low, vehicles experience frequent acceleration/deceleration events. They also do not travel very far. 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<sub>2</sub> emission rates. As a result, this type of speed based CO<sub>2</sub> emission-factor curve has a distinctive parabolic shape, with high emission rates on both ends and a minimum rate at moderate speeds of around 60 to 75kph.

Mombasa – Mariakani (A109) could be viewed in four sections in line with the social and economic activities associated with emissions. The main island (mainly commercial activities), Sabasaba Junction – Makupa Causeway section (predominantly traffic influences), Changamwe – Jomvu – Miritini section comprising of mixed transportation, residential and commercial related emissions) and Miritini – Mazeras – Mariakani section (predominantly transportation emissions). From observations, the level of transportation related emissions is associated with efficient traffic movement. Congestion arising from high traffic in the urbanized and commercial areas between the island and Miritini is associated with high fuel consumption following reduced travel time and presence of vehicle engines with varying fuel consumption efficiencies. The section is also characterized with slow moving heavy trucks moving into and out of the town as well as local transfer of containers.

For purposes of capturing transport related emissions to some degree of certainty, the Average Daily Traffic (ADT) and the Average Daily Truck Traffic (ADTT) along Makupa Causeway stretch to Changamwe and that between Mazeras and Mariakani has been adopted for a calculated estimation of emissions. Carbon Dioxide (CO<sub>2</sub>) has been adopted as the indicator gas and also as the relevance element in Climate Change. It is estimated an average of 37,000 mixed traffic traverses through the Sabasaba Junction – Makupa Causeway – Changamwe (~3.2km) and this is likely to increase to an average of 37,740 mixed traffic by the year 2030. Of the mixed daily traffic,



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about 12,000 are heavy trucks (leaving 25,000 as small cars, tuktuks, public transport vehicles including urban matatus, minibuses and buses). There is also a significant number of motorcycles.

Sections of the road outside the commercial zone, i.e. Miritini – Mazeras – Mariakani (~26km) shows an average of 9,500 vehicles per day with an average number of heavy trucks estimated at 4,300 per day (average daily number of small cars, tuktuks, public transport vehicles including urban matatus, minibuses and buses is 5,200). At an average growth rate 2% on traffic, these volumes will rise to an average of 9,690 vehicles with an average of 4,365 heavy trucks by the year 2030 (with an average 5,325 per day of small cars, tuktuks, public transport vehicles including urban matatus, minibuses and buses).

Studies shows that on ideal conditions small vehicles running on petrol emits between 130g – 265g of CO<sub>2</sub> per km while heavy vehicles (commercial trucks) running on diesel could emit upto between 242g – 295g CO<sub>2</sub> per km. Based on the above traffic volumes estimates the CO<sub>2</sub> daily emissions have been calculated for the selected sections on 2014 and 2030 in the table below.

**Table 28: Calculated CO<sub>2</sub> Emissions**

Sections	Non-Trucks (Vehicles/day)		Heavy Trucks (Vehicles/day)		Associated Daily Emissions (Kg CO <sub>2</sub> /day)			
	2014	2030	2014	2030	2014		2030	
					Non-Trucks	Trucks	Non-Trucks	Trucks
Sections 2 and 3 (3.2km)	25,000	25,930	12,000	12,180	10,400 – 21,200	9,293 – 11,398	10,787 – 21,990	9,432 – 11,500
Sections 6 and 7 (26km)	5,200	5,356	4,300	4,365	17,576 – 35,828	27,056 – 32,981	18,103 – 36,903	27,465 – 33,480

The HDM emissions model was also used to calculate the expected impact of the proposed upgrading alternatives on the total vehicle emissions across the corridor. The model is based upon relationships between fuel consumption and exhaust emissions. The main advantage of this approach is that where fuel consumption is calculated in a detailed way, for example modeling the effect of road condition, gradient, engine function and so on, changes in fuel consumption are related directly to changes in road condition. The detailed results are summarised below:

**Table 29: HDM4 Emissions Analysis Summary**

	Hydrocarbons (HC)	Carbon Monoxide (CO)	Oxides Of Nitrogen (NO <sub>x</sub> )	Sulphur Dioxide (SO <sub>2</sub> )	Carbon Dioxide (CO <sub>2</sub> )	Particulates (PM)	Lead (Pb)
<b>Emission Quantities in Tones</b>							
<b>Base Case</b>	15,795	16,464	57,952	3,123	4,592,161	13,295	72
<b>Alt 1 - Concrete</b>	8,762	9,494	32,564	1,726	2,622,715	7,359	51
<b>Alt 2 – Asphalt</b>	9,531	10,265	35,341	1,878	2,833,098	8,006	53
<b>Alt 3 - Combination</b>	8,932	9,655	33,169	1,759	2,666,295	7,502	51



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	Hydrocarbons (HC)	Carbon Monoxide (CO)	Oxides Of Nitrogen (NO <sub>x</sub> )	Sulphur Dioxide (SO <sub>2</sub> )	Carbon Dioxide (CO <sub>2</sub> )	Particulates (PM)	Lead (Pb)
<b>Expected Reduction in Tones</b>							
<b>Alt 1 - Concrete</b>	-7,033	-6,967	-25,388	-1,398	-1,969,447	-5,936	-21
<b>Alt 2 – Asphalt</b>	-6,264	-6,199	-22,611	-1,245	-1,759,063	-5,289	-19
<b>Alt 3 - Combination</b>	-6,864	-6,809	-24,783	-1,364	-1,925,866	-5,793	-21
<b>Expected Percentage Reduction</b>							
<b>Alt 1 - Concrete</b>	45%	42%	44%	45%	43%	45%	29%
<b>Alt 2 – Asphalt</b>	40%	38%	39%	40%	38%	40%	26%
<b>Alt 3 - Combination</b>	43%	41%	43%	44%	42%	44%	29%

While showing the effects on all gaseous emissions, attention is on Carbon Dioxide (CO<sub>2</sub>) due to its implications on the climate change scenarios. It is clear that all three alternatives are expected to cause a significant decrease in the vehicle emissions ranging between 26% to 45% and will, therefore, be extremely beneficial from an environmental point of view. Emissions of CO<sub>2</sub> will have a reduction of between 1.8M tones and 1.97M tones (between 38% – 43% reduction). This is a direct indication of the benefits associated with Climate Change mitigation.

Reduced congestion on the road section, especially the Changamwe – Miritini, has unique benefits that include low total consumption of fuel that directly reduces emissions of carbon and the associated gases and so to greenhouse effects (in addition to carbon, other emissions reduced will include Nitrogen oxides, sulphur oxides, hydrocarbons and particulate matter as illustrated above).

#### 9.4 Specific Negative Impacts

Due to the need for focused mitigation initiatives to the negative impacts, this report has identified the issues in details then back-up with the environmental management plan. Most of 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) Disruption of drainage along the built-up areas. This is specifically noted along some areas including Changamwe – Jomvu – Miritini where natural drainage outfalls have already been compromised by residential and commercial development activities. Increased road surface and surface runoff may pose a challenge to the existing drainage capacity and hence to the adjacent premises as well as to the road itself,
- (v) Noise and vibrations to the neighbouring premises arising from construction equipment, deviated traffic and other sources,



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- (vi) Social related infections associated with interactions including HIV/AIDS and other communicable diseases,
- (vii) Social and economic disruptions during the construction phase involving business facilities, informal livelihoods activities, dwellings and social amenities,
- (viii) Potential displacement of businesses dependent on demand for expansion or realignment space of the road,
- (ix) 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,
- (x) Safety aspects associated with the road usage upon completion, especially in the high populated areas.

## 9.5 Negative Impacts (Construction Phase)

### 9.5.1 Aerial Emissions

Emissions from earth moving machines, slow traffic and construction equipment will be significant in the urban zones. Due to the poor dispersion rates created by the building structures, the effective construction of particulate matter CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> and HC could be high during construction. However, the concentrations would be expected to be low in the rural area (Mazeras – Mariakani) due to low level emissions and high dispersal rate. Construction activities are potentially high sources of dust (PM) and other emissions calling for appropriate watering programs throughout the construction period.

#### Mitigation Measures

- ✓ *Intensive watering programme would be necessary during the construction phase to be developed by the Contract and approved by the Supervision),*
- ✓ *Ensure constant watering of construction surfaces and dry materials to keep dust low throughout the project areas and the deviation routes.*
- ✓ *Ensuring construction equipment and vehicles are regularly maintained at high working conditions to reduce associated emissions into the atmosphere*
- ✓ *Control the speed of movement of construction vehicles,*
- ✓ *Dust control mechanisms at the gravel borrow sites through extraction in wet conditions and transport in covered trucks*
- ✓ *Dust control measures at the quarry sites and aggregate crushing sites*
- ✓ *Dust control at spoil dumping locations*
- ✓ *Similar measures will be necessary at the material sites as well as the access road for the delivery trucks.*
- ✓ *Construction workers should be provided with appropriate personal protective gear (dust masks) and application enforced at all times.*

**It is recommended that a programme for air quality sampling and measurements is initiated upon commencement of works such to provide the status every quarter to provide a progressive trend through the construction period.**





## 9.5.2 Noise and Vibrations

Traffic movements, commercial activities and social premises will be associated with noise during the works. It is expected to be noisier within the active section of the corridor (within the CBD and the commercial sections upto Miritini) with additional sources of noise while the level may reduce gradually towards Mariakani. Material sites are also potentially noise sources from the extraction activities including blasting, crushing and transportation. Other impacts include;

- (i) Potential disturbance to residential, commercial and institutional premises along the proposed construction roads.
- (ii) Noise and vibrations caused by heavy machinery could potentially cause damage to buildings along the construction areas and materials sites.
- (iii) Non-compliance with the elevated noise and vibrations regulations is a likely health problem to the immediate residents or business communities.
- (iv) Non-observance with the occupational health and safety to the construction workers.

### Mitigation Measures

- ✓ *Inform the neighboring communities of any un-usual construction activities with extraordinary noise levels such as to include time, expected duration and any safety precautions.*
- ✓ *Undertake structural integrity assessment of existing buildings and other structures along the road as control for damages from vibrations*
- ✓ *Utilize low noise machinery for the construction to the extent possible (Noise levels be below 35dBA to the nearest receptors by days).*
- ✓ *Undertake assessment of building structures within the work areas with respect to their capacity to withstand compaction vibrations.*
- ✓ *Limited blasting for hard stone quarries shall only be done after approval by the relevant authorities and also effective public information.*
- ✓ *Provide all construction workers with relevant safety gear including 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),*
- ✓ *In the event of commercial sources of materials, the Contractor should encourage influence due diligence.*

**Initiate a programme of noise measurements upon commencement of the works to provide a trend and a tool for improvement. Measurements should be monthly within the urbanized areas and quarterly outside in the rural urban settings.**

## 9.5.3 Ecological Issues

The most significant ecological feature in the corridor is Makupa Causeway that traverses the section of the ocean linking the island and the western mainland. The causeway constructed between 1899 – 1902, was initially an open bridge channel. However, later it was locked during the construction of the town bound carriageway. It blocks flows on both sides from mixing Tudor effectively containing chemical pollutants on the harbor side and organize pollutants on the other



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green side with mangrove vegetation constituting the main feature. The causeway has since stabilized into a unique ecosystem despite interference by human activities including settlements, waste disposal and commercial premises.

Other features are limited vegetation cover (grass and coconut) especially in the semi urban areas. Social and economic activities have significantly interfered with vegetation. The corridor has minimal vegetation cover in form of trees and so construction will have minimal effects presenting an opportunity for landscaping and planting more upon completion. The potential land development along the corridor (residential, commercial and institutional) structures further compromising vegetation cover in future land use changes.

The level of impacts could be associated on the nature of improvement project including;

- (i) Opening the causeway into a bridge effectively allowing a free flow of water from both sides. The mix of chemical pollutants towards the harbour and predominant organic pollutants from Tudor creek may initiate another long period of ecological stabilization. While this option is not being implemented under this design phase, the implication will need a detailed study and modeling to establish the potential ecological trends over a period of 20 – 30 years,
- (ii) There will, however, be limited effects to the water and associated habitats on both sides of the causeway though not any worse than the situation is already.
- (iii) Water quality through pollution discharge directly or via infiltration.
- (iv) Limited interference with adjacent mudflats habitats.
- (v) Potential loss of flora and fauna if limited removal of the mangrove becomes necessary,
- (vi) Shoreline changes from construction activities may include dredging, installation of pylons and beams. This may lead to temporary and limited disruption of the immediate shoreline to the Causeway that include aqueous, sediment and benthic life-forms in addition to the possible removal of vegetation adjoining the causeway edges,
- (vii) Unpredictable environment variability through loss of ecosystem services and habitats.

The five main areas of concern within the Makupa Cause-Way area, therefore, would be;

- (i) Water quality degradation by construction works or operations (storm water and run-off inputs from the construction platforms, constructed roads and bridges, spillages, etc;
- (ii) Habitat modification by conversion of some areas of the mudflats, benthic habitat areas and mangrove forests into roads, or being on the receiving end of the solid matter load from construction works;
- (iii) Flora and fauna community modification by conversion of some areas of the mudflats, benthic habitat areas and mangrove forests supporting key species of ecological conservation, or commercial interests into roads, or being on the receiving end of the solid matter load from construction works. This may result in species displacements or shifts in population and community structure;
- (iv) Shore-line changes and derelictions on seascape/ landscape with consequences to site stability (shoreline stability) and other aesthetic values;
- (v) Unpredictable environmental variability and extreme events by way of loss of ecosystem services associated with critical habitats if these are irredeemably lost. Such habitats are



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more vulnerable to extremes of climatic variability as was witnessed during the 2007/2008 El Nino event in Kenya.

#### Mitigation Measures

- ✓ *Removal of vegetation should only be on need basis*
- ✓ *Maintain a count of all trees removed for compensation purposes at end of project and this should cover the material sites*
- ✓ *Landscaping and beautification to constitute part of the restoration programmes that also covers the material sites*
- ✓ *Prepare a tree planting programme as part of the project completion activities*
- ✓ *Retaining a closed-up Makupa Causeway Channel is the objective of the design stage where the existing pavements will be designed as they are. This option may not impart significant impacts to the current ecological setting of the causeway,*
- ✓ *Confine the rehabilitation works to the existing causeway pavements (a comprehensive study would be required for future physical interference or removal of the causeway structure,*
- ✓ *It is recommended that construction along Makupa Causeway be undertaken preferably during the dry season to prevent excessive construction related pollution getting washed into the sea.*
- ✓ *No interference with vegetation or other natural features outside the pavement will happen (the works will be confined within the existing causeway pavement to the extent possible.*

#### **9.5.4 Waste Management**

As expected waste generation is associated with high intensity of social (settlements and institutional premises) and commercial activities (trading centers) a situation experienced in the CBD and the immediate neighbourhoods. The aspects will also be important for the construction (spoil disposal). Dumped wastes at Kibarani and road reserve sections in Changamwe, Jomvu and Miritini will also require to be relocated accordingly. The solid wastes could be a potential environmental contaminant during the earth works and at points of disposal.

Waste generated from campsites together with associated spoil generation and disposal impacts would include;

- (i) Potential degradation of land and physical environment at spoil disposal sites.
- (ii) Aesthetic degradation at spoil disposal sites.
- (iii) Risks to safety of the workers and immediate residents as well as the road users.
- (iv) Risks to health on the removal and transportation of roadside solid wastes.
- (v) Dumping of the solid wastes should be on approved public disposal sites.
- (vi) Land degradation from pollution and debris (asphalt, concrete)
- (vii) Blockage of natural drains.

#### Mitigation Measures

- ✓ *Wastes recovered from dump sites (Kibarani) and road reserve shall be dumped in approved public waste disposal sites*



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- ✓ *All construction camp sites shall have waste management plans and provided with appropriate waste handling equipments*
- ✓ *Spoil generated be disposed off on pre-identified and approved locations (impact assessment should be completed for the locations),*
- ✓ *Milled concrete asphalt be re-used on diversions and other public access roads in the area,*
- ✓ *Involve Mombasa City Authorities on the removal and disposal of the roadside solid wastes to approved dumping areas.*
- ✓ *Construction 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.*

#### 9.5.5 Soil Contamination and Loss

There is significant pollution to surface soils along the urbanized sections. Pollutants include oil residuals from fuel service stations, motor garage yards, solid waste dumping and roadside truck parking. Development of the second carriageway may not necessarily lead to soil loss especially considering minimal requirement of diversions. However, earth moving in the few sloppy sections and at the drainage outfalls will need to be cautiously undertaken.

##### Mitigation measures

- ✓ *Spoil arising from the urban sections is contaminated and should be handled as hazardous materials and disposed off under supervision and into controlled dumping areas,*
- ✓ *Spoil should not be dumped or accumulated on sections near the surface drains or water ways.*
- ✓ *Steep slopes and embarked sides (Makupa Causeway) should be well protected to avoid erosion, siltation and damages to the causeway,*
- ✓ *The drainage outfalls should be properly constructed to reduce the erosion from surface runoff and storm water.*

#### 9.5.6 Surface Drainage

The road corridor is naturally not prone to serious flooding, though generally low lying with a few mild slopes. However, surface drain between Miritini and Mariakani are well preserved in most locations though progressively getting compromised by new development, truck parking, truck washing and land use changes. The additional carriageway may temporary compromise the surface drainage, especially on the Mazeras – Mariakani where it is to be done afresh

Generation of surface runoff from the new pavements will require additional surface drains capacity. This increased runoff poses extra risks to areas with weak soil cohesiveness including Changamwe, Miritini and parts of Mazeras where cases of landslides are evident. This risk is particularly notable on land downstream drainage outfalls and discharge channels where private property is also affected. Roadside trends in the city centre and section upto Miritini area have been compromised by economic activities and leads to more flooding during rains



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#### Mitigation Measures

- ✓ *Appropriate hydrological studies and recommendations would be necessary to quantify the runoff and size of drains*
- ✓ *Ensure appropriate structural designs, positioning and sizing of drainage structures,*
- ✓ *Drainage outfalls should be lined and protected. The outfalls channels should be directed into private land or premises,*
- ✓ *To minimize soil loss and siltation of the drains, they should be lined,*
- ✓ *Provide a policy for acquisition and delineation of discharge drainage channels to the nearest surface water body,*
- ✓ *Appropriate drainage provisions, outfalls and discharge channels will be provided for the truck parking yards,*

#### **9.5.7 Safety**

Nairobi – Mombasa high way has number of black spots and among them are within the project section where serious road accidents have been experienced before. While the improvement of the road is expected to reduce road accidents, it could also lead to increased numbers of incidents arising from potential high speeds and inappropriate conflicts with the land use features including residential and institutional premises development. Other Impacts include;

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

#### Mitigation Measures

- ✓ *To ensure minimal interruption of traffic flow during construction (The Contractor(s) will adopt and review traffic management plan developed under the design process),*
- ✓ *Facilitate flow of surface runoff along the project roads to avoid unnecessary flooding.*
- ✓ *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 at construction camp sites and work areas.*
- ✓ *Provide acceptable alternative public bus stands during the construction on deviations and parts of the traffic management plan.*
- ✓ *Identify appropriate locations for installation of pedestrian crossings as part of the road project (footbridges, underpasses, crossing rumps, etc.),*



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- ✓ *Install appropriate information and signage for the road users along the construction sections and deviations at all times of the construction works*
- ✓ *Ensure drivers safety and enhanced safe driving by all construction drivers*
- ✓ *Sensitize the adjacent communities on safety issues related to the road construction works*
- ✓ *Secure all construction sites (camp sites, material sites and construction areas) from the public access to ensure safety*
- ✓ *All completed road sections should be fitted with appropriate road safety provisions (road furniture, speed controls, foot bridges crossing ramps, etc.) before commissioning.*

#### 9.5.8 Conflicts with Services and Amenities

The existing amenities along the road corridor are potentially at risk. Among points of conflicts will include;

- (i) Water pipelines (in the median for the sections between Digo Road to Makupa and to Changamwe). Other sections the water pipelines are on the sides. The main water pipelines to be disrupted runs from Mzima Springs and Marere sources via Mazeras Water reservoirs as well as Baricho wells sources via Guu Tatu and Changamwe Reservoirs. There are also distribution pipelines, some crossing the road corridor and potentially to be disrupted.
- (ii) Sewer lines, especially within the city centre and upto Miritini areas. The Miritini to Mariakani section is not provided with sewerage services. The sewer line in the City section (KM 0+000 – KM 2+600) is positioned along the median with connecting sewers crossing from the main buildings. No sewers cross the Makupa Causeway.
- (iii) Railway lines specifically across Makupa causeway (main line from railway station running parallel, crossing over the road and ROB (tunnel) to the port. Also at Changamwe station and Mazeras – Mariakani section.
- (iv) Power lines (overhead and underground) all along route. This is a feature on all sections of the road with the responsibility going into Kenya Power and Lighting Company (KPLC) and Kenya Electricity Transmission Company (KETRACO).
- (v) Others are potential conflicts;
  - ✓ Communication cables variously
  - ✓ Access roads and junction disruptions. This will include public walkways, pedestrian crossings, bus stops, etc.
  - ✓ Main surface drains entering the road reserve and discharging from the road.

#### Mitigation Measures

- ✓ *All Services Providers shall be asked to provide clear maps showing their services with respect to the road corridor.*
- ✓ *The existing water service pipelines will not be removed or disrupted until alternative lines have been provided. Coast Water Services Board will be facilitated through the Contractor(s) to evaluate the service line relocation and provide a budget and plan. Only after the new line is in place shall the existing be removed to give way for the project,*



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- ✓ *Alongside the water pipelines, Coast Water Services Board will also be facilitated to relocate sewer lines without disrupting the users before the commencement of the project,*
- ✓ *KPLC and KETRACO will be facilitated through the Contractor(s) for the relocation of power transmission lines without disruption to the services before the disruption,*
- ✓ *All other services providers will be provided with adequate information on the corridor design and extent to enable them plan relocation in consultation with KeNHA.*
- ✓ *The Contractor(s) will provide alternative temporary NMT facilities and accesses during the construction period.*
- ✓ *Identified drainage channel way-leave to the nearest receiving water bodies should be acquired as a matter of policy.*

#### 9.5.9 Increase in Accidents

There is likelihood of increased frequency of human and livestock accidents along sections of the dualled road especially on Tee and Cross junctions as well as near institutions and the market centers of Mariakani, Mazaras and Mombasa city. Potential accidents during construction on the work area and deviation

##### Mitigation Measures

- ✓ *There is need to avoid Tee and Cross-junctions and provide for underpasses and overpass or road exchanges on junctions to the extent possible to reduce conflicts*
- ✓ *The road design should consider to provide for underpasses and overpasses for pedestrian crossings near institutions, market centers and high population area*
- ✓ *It will be important to undertake awareness campaigns on road use and post proper road signage on sensitive designated areas during construction.*

#### 9.5.10 Constraints in Social Relations and Facilities

Increased immigration into the project area will lead to increase in population especially in towns and high potential area during construction phase. This will result to strained relationships which sometimes degenerate into open conflicts between the residents and the construction workforce. With immigration into areas adjacent to the road, there will be additional demand on the existing social facilities.

##### Mitigation Measures

- ✓ *KeNHA's CSR Policy to be reviewed with a view to social interventions for enhanced acceptability,*
- ✓ *There will be need to expand and increase the number of social facilities in areas where immigration is expected.*
- ✓ *Establish a Public Liaison Desk to address social concerns on continuous basis.*

#### 9.5.11 Material Sites and Material Haulage

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



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- (i) Potential elevated noise emanating from materials extraction activities and delivery trucks to the immediate residents.
- (ii) Vibrations from the material extraction machinery have a potential to cause cracking of buildings.
- (iii) Over-abstraction of water for construction from public sources of water could compromise on availability of the same for basic social needs.
- (iv) Emission of dust and gaseous discharges from material abstraction machinery will create potential aesthetic pollution, air pollution and risks to health.
- (v) Removal of vegetation cover and top soils affects the land soil quality.
- (vi) Borrow pits left open have potential health and safety risks to the local communities, children and their animals.
- (vii) Sources of sand (mainly outside the project area) have potential risks to damage the river beds.
- (viii) Oil storage areas could discharge hydrocarbons to water sources through storm water drains or infiltration into the ground.
- (ix) Potential conflicts through damages to public roads used for materials haulage.

#### Mitigation Measures

- ✓ *Environmental impact assessments (EIA) to be undertaken prior to extraction of materials from identified materials sites and approved by NEMA.*
- ✓ *Operations of the materials sites to be guided by respective management plans established and approved under the respective ESIA reports,*
- ✓ *Material extractions and delivery should only be done during the day.*
- ✓ *If borrow pits and quarries are operated, they be fenced off.*
- ✓ *Rehabilitation of materials sites to take place immediately upon exhaustion (Contractors will provide appropriate rehabilitation plans for each material site).*
- ✓ ***If commercial material sources are adopted, the Contractor(s) should ensure that due diligence process is followed by the suppliers at all times,***
- ✓ *Material extraction and haulage should be done in dump conditions to keep dust low, especially if it is located within settled areas.*
- ✓ *Consider establishment of boreholes to provide construction water as opposed to abstraction from the constraint public 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 points for the construction water.*
- ✓ *The Contractor(s) will be required to identify specified materials haulage road for maintenance throughout the project implementation.*

#### 9.5.12 Land Acquisition and Relocations

While it is appreciated that the road reserve has adequate corridor, some areas notably urban centers are highly encroached with commercial structures and activities including go-downs, small scale shops, kiosks and open air yards. There are also truck parking areas, tree and flowers seedling gardens and services such will need to be relocated, however through an agreed and formal process (RAP). There will also be land acquisition at specific points of the road requiring appropriate composition.





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#### Mitigation Measures

- ✓ *A full Resettlement Action Plan should be done prior to commencement of the road*
- ✓ *There is need to keep to the current road alignment and corridor*
- ✓ *All those who have illegally encroached the road reserves should be given advance notice to vacate and this should be done with a humane face*
- ✓ *Where land is acquired, those affected should be appropriately compensated in advance, assisted to relocate and their means of livelihoods restored.*
- ✓ *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.*

#### **9.5.13 Traffic Management**

The following traffic management challenges will be experienced during the construction phase

- (i) Potential congestion and disruption of roads abutting into the project Road.
- (ii) Potential conflicts with people movements along the deviation roads.
- (iii) Degradation of access roads abutting from the project road serving the adjacent estates.
- (iv) Risks to safety of the road users on the abutting access roads into the commercial centres and residential estates.
- (v) Any of the abutting roads affected by the project implementation should have the condition left as original if not better.
- (vi) A section of the project road also serves access into Moi International Airport and hence flow of traffic should be as smooth as possible during construction period.

#### Mitigation Measures

- ✓ *The Contractor(s) shall adopt and review traffic management plan for the construction works,*
- ✓ *To the extent possible avoid deviating traffic into the estate roads to minimize conflicts.*
- ✓ *Where necessary, the affected roads should be maintained well for the period of construction.*
- ✓ *Appropriate signage and information will be provided at all the deviations (beginning and end points).*
- ✓ *Ensure all deviations are maintained for smooth flow of traffic.*
- ✓ *Information on the intention of use of any sections of the abutting roads early to prepare the residents.*
- ✓ *Road users accessing the airport from any direction should be encouraged to use alternative available routes for minimum inconveniences.*

#### **9.5.14 Public Disruptions**

There will be potential disruptions during road construction to public facilities, businesses and residential accesses leading to temporary lower business loses and long walking distances. Other



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disturbances will occur in form of interference with infrastructure including electricity lines, communication lines and water pipes affecting services.

#### Mitigation Measures

- ✓ *Access routes as well as foot bridges, especially to social facilities and residential areas should be provided, based on recommendations from the local population*
- ✓ *Restoration of services and access roads be done within the shortest period possible.*

#### **9.5.15 Health and HIV/AIDS**

Construction of the road will be accompanied with influx of population from many areas including prostitution increasing. Cases of HIV/AIDS specially and other social diseases may also increase in addition to potential health from sanitation and hygiene challenges. There is also potential increase on cases of other communicable diseases (STIs, TB, etc.).

#### Mitigation Measures

- ✓ *Initiate an awareness creation, prevention and training programmes on HIV/AIDS upon commencement of works. KeNHA is responsible of this activity,*
- ✓ *Establish wellness centers including VCT and ARV centers at strategic location of the project corridor,*
- ✓ *Incorporate HIV/AIDS control program as part of the construction deliverables.*

#### **9.5.16 Economic Aspects**

The following disruptions are expected to be experienced

- (i) Temporary disruption of access to residential, industrial and commercial centers along the road during the construction phase.
- (ii) Temporary disruption and displacement of small-scale informal traders along the road corridor during construction.
- (iii) Permanent displacement of small-scale informal traders along the road corridor.

#### Mitigation Measures

- ✓ *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.*
- ✓ *Make provisions for small-scale traders along the road corridor as part of the long terms physical planning of the area*
- ✓ *The riparian landowners and traders have an opportunity to suggest components with value to their economic activities.*



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## 9.6 Negative Impacts (Post-Construction Phase)

### 9.6.1 Land Use Changes

The road commissioning will have far reaching effects on land use practices that needs to be controlled. Most new urban roads in the country are faced with challenges in physical planning, hence loosing the main objectives of easing traffic flow. Among the effects include;

- (i) Potential unplanned developments along the corridors attracted by easy transportation.
- (ii) Increased demand for residential, schools, recreation facilities and health facilities effects on public resources.
- (iii) Potential increase in traffic flow and categories into the areas.

#### Mitigation Measures

- ✓ *Involve other authorities (including County Governments of Mombasa and Kilifi) in applying existing land use planning regulations along the corridors. Review and enforce land use zoning along the corridor in both Mombasa and Kilifi Counties,*
- ✓ *Influence appropriate land use planning in view of traffic management aspects in the city*
- ✓ *Ensure strict enforcement of access provisions to premises along the road,*
- ✓ *Roadside parking to be avoided to the extent possible.*

### 9.6.2 Health, Safety and Security

Improvement of the project road will allow higher traffic speed and frequency with among other impacts;

- (i) Elevated noise levels to the riparian residential, commercial and institutional facilities
- (ii) Potential increased road accidents as the road users adapt to new road use trends
- (iii) Potential immigration of business, institutions and residential Improved road corridor with risks of increased social interactions and security challenges
- (iv) Potential increased demand on available sanitation and hygiene facilities along the corridors
- (v) Increased chances of higher infections and spread of HIV/AIDS and other communicable diseases

#### Mitigation Measures

- ✓ *Road safety awareness campaigns should be organized to sensitize the people on the road safety and protection of the road signage and information,*
- ✓ *Ensure improvement and protection of signage, guard rails and other features that contribute to road safety,*
- ✓ *Provision and enhanced use of foot over bridges and underpasses in sections with high pedestrian movement,*
- ✓ *Sensitize landowners on appropriate land use practices and compatible development structures.*
- ✓ *Provide speed control measures(speed bumps, road signage) at high population areas(institutions and social amenities),*



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- ✓ *All un-road worthy vehicles should not be allowed on the road for safety purposes*
- ✓ *Strict monitoring compliance with traffic use and speed limits,*
- ✓ *Retain and maintain selected wellness centers for public use, especially at truck parking yards.*
- ✓ *Liaise with HIV/AIDS Control Agencies for enhanced information and awareness at all times along the road corridor.*

#### 9.6.3 Drainage Management

Additional new pavements sections along the road corridor will consequently lead to increased surface run-off hence challenges on the drainage system including outfalls. Changing land use practices is also a challenge to surface drainage systems in the face of the increased surface runoff generated. It is, therefore, noted that;

- (i) There are potential conflict of drainage outfalls and the immediate land owners arising from destruction of private property by the surface run-off.
- (ii) Road shoulders may experience erosion due to the road side truck parking and washing as well as the increased surface runoff.
- (iii) There is potential obstruction of drainage system from solid waste dumping and overgrowing vegetation, silt accumulation arising from roadside activities
- (iv) Continued cutting of the road surface and reserve has a potential for interfering with the roadside drainage systems.

#### Mitigation measures

- ✓ *Ensure periodic maintenance of the storm water drainage channels for efficient use,*
- ✓ *Ensure adequate landscaping to reduce on siltation to the drainage channels,*
- ✓ *Strict penalties on road side truck washing and parking along the project road*
- ✓ *Ensure no drainage outfall leads to individual's property, appropriate drainage way leave will need to be acquired and secured*
- ✓ *Ensure proper solid waste disposal and management across the project road.*
- ✓ *Provide appropriate service ducts to avoid future cutting of the road pavements and reserve for service lines.*
- ✓ *Develop a policy for the roads regard drainage outfall management, e.g. acquisition of the outfalls.*
- ✓ *KeNHA to develop a policy guidance for this particular road on securing natural drainage outfalls without significant land use conflicts.*
- ✓ *The road surface shall discharge surface runoff such as to avoid roadside flooding or discharges into adjacent residential plots*

#### 9.6.4 Waste Management

Development of the project road will encourage increased migration of people and business developments to areas adjacent to the road. Increased traffic volume and the elevated economic activities could lead to increased volumes of solid waste generation and hence corresponding problems of waste management. Roadside litter is bound to increase with rising social and



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economic activities along the road, and especially beyond Miritini areas. This is also likely to worsen at truck parking yards, bus bays and foot bridge landings.

#### Mitigation Measures

- ✓ Provide waste management receptacles at strategic locations (truck parking zones, bus bays, pedestrian crossing zones, foot bridge landings). Collaboration with the County Governments will be necessary for removal of the waste materials,
- ✓ The county government should have well established systems of solid waste management to avoid dumping on road side, open land and storm water drains,
- ✓ Roadside drains to be provided with silt and litter traps for removal and disposal and protection of receiving water bodies,
- ✓ The County Governments will be required to enforce effluent management from sources discharging into the road drainage including oil interceptors at service stations,

#### **9.6.5 Social and Economic Aspects**

Increased accessibility has a contributory effect of changes in land use along the project road that entails road side business developments and residential areas which leads to increased population and strained social facilities; schools, health centers, transport facilities. The increased economic activities may attract investors to the community along the road and construction of new buildings and business premises. It is also noted that the proposed truck parking yards will be a source of income for a large number of people and also generate revenue for the County Governments.

#### Mitigation Measures

- ✓ Collaboration with the county planning department to restrict on the road side developments and promote compatible physical planning,
- ✓ Increase the number of social facilities along the project road,
- ✓ Ensure collaborations with the relevant stakeholders for sustainable social and economic development,
- ✓ The County Governments to collaborate with KeNHA in the planning and operations of the parking areas,
- ✓ Ensure amenities provided for the parking yards including drainage, water supply, sanitation facilities, waste holding receptacles, lighting and access passages are well maintained.

On the Gender front the following mitigation measures have been proposed;

- ✓ Deliberate efforts should be made to inform/consult with women including other vulnerable groups in order to enable them participate effectively and benefit from the project.
- ✓ Resettlement Action Plan (RAP), should take into consideration gender dynamics and inequalities both within the family and in the business sector with regards to decision making, ownership of assets, employment and income. The implementation of RAP should adhere to the principles of the Involuntary Resettlement Policies of GOK and AfDB.



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- ✓ *In order to address fears entailed in relocation and issues of compensation, women, men, and the youth should be meaningfully consulted in separate groups to address their different priorities, before replacement or costs for loss of livelihood is assessed – with a view to improve their incomes and productive levels. Special attention should be paid to the needs of women, the elderly, children and PWDs.*
- ✓ *Prior to project implementation, recruitment team should remove barriers to women's participation in the construction of the road by having transparent recruitment procedures; ensuring that women are also part of the recruitment process. PWD should be given special attention.*
- ✓ *For a user friendly road for all members of the community – men, women, children, the elderly and PWDs, the design should ensure proper foot paths and cycle tracks, public spaces, junctions, road signs, bus stops and designated places for hawkers and vendors.*
- ✓ *During implementation it is suggested that linkages be established by civil society organizations (CSOs) – especially local women's organization such as Kenya Association of Women Contractors (KAWOC), Youth and PWD organizations to in order to ensure that the recommendations in this Gender Analysis Study are adequately implemented.*

#### 9.6.6 Road Maintenance

Sections with ease in transportation activities normally attract business development. There is a high likelihood of potential encroachment into the road reserve challenging the traffic movement through truck parking and road side business developments during road use. Other impacts will include;

- (i) Potential encroachment into the roads' reserves challenging the traffic flow and other public service amenities.
- (ii) Road safety risks from excessive information (advertisements) that compromises visibility of road safety signage and information
- (iii) Challenges on the maintenance of the road furniture risks road safety.

#### Mitigation Measures

- ✓ *Regular maintenance of the landscaping vegetation to avoid interference with vehicle movement and road maintenance*
- ✓ *Define and secure the road reserve along the project road to avoid future encroachments*
- ✓ *Collaborate on the development of road side bill boards that are a threat to safety,*
- ✓ *Ensure periodic maintenance of the pavements as well as the other road furniture (signage) for safety purpose,*
- ✓ *Involvement of the community in the maintenance of the road,*
- ✓ *Keep vigil for any encroaching social and economic activities.*
- ✓ *Ensure no adverts compromise the road safety signage and information.*
- ✓ *Liaise with the relevant authorities on the control of advertising billboards that may affect visibility of the road signage and information.*



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#### 9.6.7 Aesthetic Conditions

The following impacts are anticipated on the visual attraction for the road users and residents

- (i) Challenges in visual beauty of the road corridors.
- (ii) Local weather moderation including heat and wind drought.
- (iii) Lack of dust and emission control.

#### Mitigation Measures

- ✓ *Design and implement appropriate landscaping plan for all sections of the project road.*
- ✓ *Influence developments along the corridor to uphold acceptable beauty and cleanliness*
- ✓ *Participation of the riparian landowners would be essential for enhanced ownership.*

#### 9.7 Cumulative Impacts

Improvement of the project road has been identified to have overall positive impacts to social and economic aspects and notable improvement on the environment. Other transport related interventions in the same region including the Southern Bypass (Dongo Kundu), the Airport, the proposed Standard Gauge Railway and other link roads will effectively enhancing both the positive and negative impacts. Among the cumulative impacts could be described as follows;

- (i) Travel time reduction in the area will be more efficient. Having appreciated a travel improvement from a general vehicular speed from 10 – 30km/hr to 50 – 80km/hr, the situation can only get better. This will especially be beneficial to goods removal and transportation from the port, efficiency in accessing the airport by travelers and access to health facilities, especially by women and the elderly,
- (ii) Efficient vehicular movement arising from a multiplicity of improvement initiatives will effectively lead to a reduction in emissions, especially CO<sub>2</sub>. Cumulatively, the initiatives will contribute to Climate Change mitigation,
- (iii) Safety of the road users also stands to be improvement. With distribution of traffic to additional routes, enhanced signage and information, provision of NMT facilities and informed road users and communities, cases of road accidents will be significantly reduced,

There are also potential cumulative negative impacts that will arise from the ongoing projects. Among them will include;

- (i) There is an increasing demand for road construction materials including hard stone aggregate, gravel and water. Yet, there is a serious scarcity of the same in the region and where available, long distances are covered. This situation will lead to serious degradation of land and general environment at material sources arising from over-extraction and haulage. This may take many years to restore,
- (ii) There is also potential competition and increase in demand for construction materials at the available sources leading to higher prices and hence negative influence in committing more land for materials extraction at the expense of other sustainable land use practices,



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- (iii) Considering each project requires at least two construction camp sites, there is a potential for numerous sites getting established all over the area. Environmental and social linkages of construction camp sites including waste disposal, sanitation challenges, negative social interactions, demand for amenities and resources as well as influx of construction workers into camps might overwhelm the holding and management capacity,
- (iv) Running projects may pose increased social risks with respect to among others HIV/AIDS, Gender involvement, drug trafficking security and other social challenges unless strategic social engineering strategies are formulated such as to guide all the projects.
- (v) The enhanced transport improvement targeted on the Mombasa – Nairobi Highway is soon going to attract more settlements and commercial activities. The situation may not get an immediate back up of necessary amenities including water supplies, sanitation, access roads, drainage systems and power.

The above are indicators of cumulative impacts associated with the ongoing transportation related projects in the area. Quantitative assessment of cumulative impacts, however, is beyond the scope of this assignment.





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## Chapter 10: Environment and Social Management Plan

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### 10.1 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.

In view of the above, 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.

### 10.2 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.



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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.

### 10.3 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).

### 10.4 Responsibilities

#### 10.4.1 General View

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



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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.

Specific responsibilities will be as follows

#### 10.4.2 KeNHA Responsibility

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.

The Environmental and Social division at KeNHA will facilitate compliance of road projects with environmental regulations. The office will advise on the projects on compliance and is also a direct liaison with NEMA. Projects concerns will reach this office directly or through the supervisor while on the other, NEMA (or any other environmental stakeholder) is expected to address the project related issues through the same office. The office, therefore, is expected to be well informed of all project related issues at all times. KeNHA and the Environment Division specifically will be represented on the ground by the Supervision for the day to day operations and engagements. However, the office will be expected to have a direct representation during monthly progress/site meetings and other consultative forums.

#### 10.4.3 NEMA Functions

The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory bodies on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programmes, plans and projects.

#### 10.4.4 Project Implementation Responsibilities

KeNHA has a project implementation structure that has clear provisions for environmental and social integration. An ideal structural works has the following components;



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#### Contractor(s)

The contractor is required to establish an environmental office to continuously advise on environmental components of the project implementation. Elements in the environmental and social management plan are expected to be integrated in the project with appropriate consultations with KeNHA through the supervising environmental expert. The environmental officer of the contractor is also expected to fully understand the engineering and management aspects of the project for effective coordination of relevant issues. In addition, the Contractor is also expected to bring on board a Sociologist (full time or part-time) to provide a communication link with the communities and other stakeholders. However, Project Manager and the Operations Manager will require to be informed on the environmental and social status for ease of facilitation.

#### Supervisor

The supervisor is engaged by the KeNHA (as the project client) to ensure effective implementation of the environmental management plan. It is expected that supervisor engages the services of an environmental expert who should in return understand the details and more of the environmental recommendations and especially the proposed action plans, timeframes and expected targets of the management plan. The supervisor environmental expert should be the liaison person between the contractor and KeNHA on the implementation of environmental concerns as well as issues of social nature associated with the project. The Supervision (through the Resident Engineer) will also ensure social expert inputs and support in addressing emerging concerns from the communities and the stakeholders including;

- (i) Complaints on environmental pollution, safety, noise, etc,
- (ii) Land acquisition issues,
- (iii) Employment and recruitment process
- (iv) Cultural interactions
- (v) Security aspects

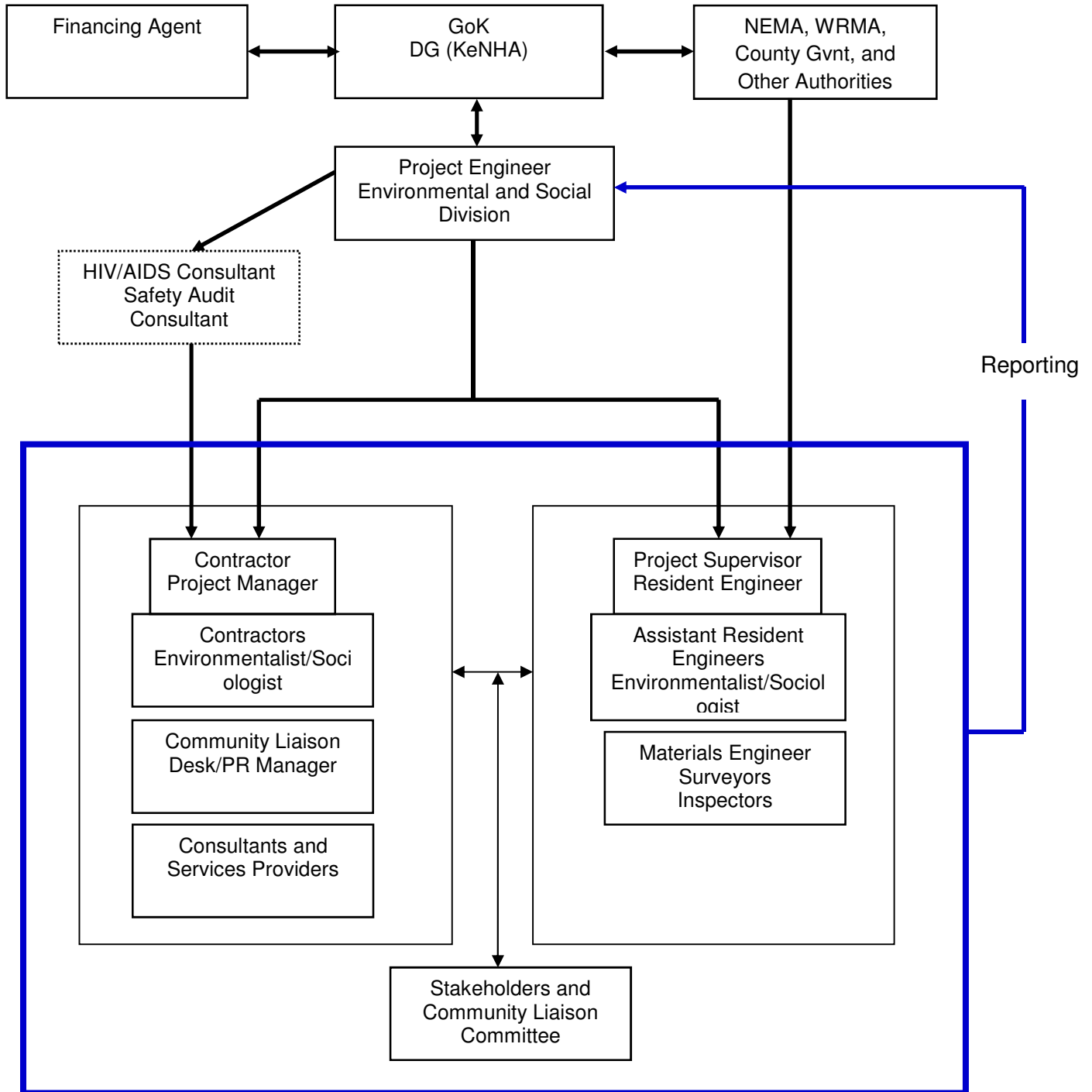
#### Community Liaison Committees

Affected communities living along the road corridor will be asked to form Project Liaison Committees to collaborate with the Project Management on issues of concern to the people. The Committees to be established under the County Commissioners' office in both Counties (Assistant County Commissioners and the Areas Chiefs) will provide the administrative support for the Committees. Members of the Committees will be drawn from a cross section of the community such as to include local leaders (village elders), landowners, institutions, business people, vulnerable groups, youth, etc. The Committee will comprise of a Chair and a Secretary and will be open a file with the Resident Engineer and the Contractor. Main focus of the Committee will be on;

- (i) Land acquisition issues,
- (ii) Health and safety
- (iii) Pressure on resources and amenities
- (iv) Environmental quality including noise and air quality,
- (v) Access passages and drainage channels blockages.

The linkages between the above players will be planned as illustrated in the figure below.

**Figure 34: Proposed Project Environment and Social Management Structure**





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#### 10.4.5 Post-Construction Activities

Upon completion of the construction, the project road will be handed over to the Client (KeNHA) but the Contractor to remain on site for the prescribed liability period (12 – 24 months). During the period, the following activities will take place;

- (i) A Completion Report will be prepared to present the status at which the project was handed over. This report will cover among other issues the environmental conditions, emerging social and economic trends, emerging land use patterns as well as the traffic and road use as well as key challenges faced. The report will form the basis for monitoring of the road thereafter,
- (ii) KeNHA will pursue with the County Governments issues of land use zoning along the road corridor
- (iii) Landscaping and beautification of the project corridor as well as restoration programmes for the material sites and spoil dumping areas. Deliberate tree planting will be undertaken on pre-selected areas in the regions with participation from the Contractor, Consultant, KeNHA and the local residents.
- (iv) Initiate the initial audit process as required by NEMA.

#### 10.5 Management Action Plans

The management of the road is categorized into the construction and road use phases with unique impacts and calling for unique mitigation measures. Among the key parameters for consideration in the management activities would include the following;

- (i) Environmental aspects (water resources, drainage, hydrology, topography, marine effects, soil loss, vegetation cover, air quality, noise and vibration),
- (ii) Social linkages (health and safety, settlements, displacements, transport efficiency, security, etc.)
- (iii) Economic issues (land use features, temporary and permanent disruptions, land appreciation, transport efficiencies, etc.)
- (iv) Cultural features

The management plan, an important component of environment and social impact study comprises of the key components listed below;

- ✓ The environmental aspects (illustrated above)
- ✓ Management actions
- ✓ Responsibilities
- ✓ Implementation timelines
- ✓ Main target areas of the corridor
- ✓ Monitoring parameters
- ✓ Cost estimates per action



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The above management activities and plan components are presented in a matrix for ease of appreciation and implementation. To ensure that the plan is well implemented, a monitoring plan is also developed such as to comprise the following items specifically for use by the Supervision.

- ✓ Environment or social issue
- ✓ Monitoring parameter
- ✓ Expected output
- ✓ Monitoring frequency
- ✓ Responsibilities



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**Table 30: ESMP Construction Phase**

Item No.	Anticipated Linkages and Sources	Management Actions and Target Areas	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
1	<p><b>Degradation of water sources</b> Construction water abstraction practices;</p> <ul style="list-style-type: none"> <li>There are no surface water sources along the corridor</li> <li>Abstraction of construction water risks other dependants of the same sources</li> </ul>	<ul style="list-style-type: none"> <li>Ensure valid permits on construction water abstraction (sources established in Kokotoni and Mwache areas);</li> <li>Groundwater abstraction be on permits conditions (locations to be identified).</li> <li>Ensure the public at target water sources gets priority on surface water sources</li> </ul>	<p>Contractor(s) Resident Engineer</p> <p><b>During Construction period</b></p>	<ul style="list-style-type: none"> <li>Compliance with Water Rules</li> <li>Minimal social conflicts on water sources</li> </ul>	<p>Approx. KShs. 1.5M for the whole project period.</p>	<ul style="list-style-type: none"> <li>Water quality</li> <li>Social conflicts</li> </ul>
2.	<p><b>Air quality:</b></p> <ul style="list-style-type: none"> <li>Dust and particulate matter;</li> <li>Visual disruption;</li> <li>Surface depositions (buildings and commodities);</li> <li>Public health problems</li> <li>Material sites</li> </ul> <p><b>Sources:</b> Construction activities (excavations, machinery operations, construction vehicles and trucks, materials extraction, road use).</p>	<ul style="list-style-type: none"> <li>Ensure deviations and dry materials are kept damp at all times;</li> <li>Materials extraction under damp conditions</li> <li>Establish information flow process to the communities on dusty conditions.</li> <li>Material delivery trucks to comply with established emission standards</li> <li>Undertake sampling for air quality in 4No. pre-identified locations every 6 months for monitoring purposes</li> </ul>	<p>Contractor(s) Resident Engineer</p> <p><b>During Construction Period</b></p>	<p>Low visible particulate matter in the air through the road corridor and material sites.</p>	<p>Approx. KShs. 5M for road watering.</p>	<ul style="list-style-type: none"> <li>Construction related dust level within the project;</li> <li>Exhaust fumes from construction machineries.</li> </ul> <p><b>This is a Project wide situation.</b></p>
3	<p><b>Vegetation Cover Degradation:</b> Loss of vegetation cover on new sections and material sites,</p>	<ul style="list-style-type: none"> <li>Plan for landscaping and beatification for the project corridor upon project completion (all sections of the road),</li> </ul>	<p>Contractor(s) Resident Engineer Adjacent Land Owners</p>	<ul style="list-style-type: none"> <li>Vegetation cover along the road reserve that is also safe to the</li> </ul>	<p>~KShs. 50M for landscaping, grassing</p>	<p>Greenery along the road corridors should be a</p>





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Item No.	Anticipated Linkages and Sources	Management Actions and Target Areas	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
	<p><b>Sources</b></p> <ul style="list-style-type: none"> <li>Trees/Coconut trees removal for road construction</li> <li>Top stripping removing grass and shrubs coverage on new sections</li> <li>No agricultural crop cover</li> </ul>	<ul style="list-style-type: none"> <li>Only the immediate required section of the new road sections shall be cleared of vegetation (Miritini – Mazeras sections has the highest potential for vegetation cover loss)</li> <li>Undertake a tree (&gt;12inch girth) count throughout the corridor for compensation purposes through planting (limited large trees noted but coconut trees are significant)</li> <li>Plan to compensate for lost mangrove sections and other vegetation lost along the Makupa Causeway sections (lost through section expansion and removed for efficient construction works)</li> </ul>	<ul style="list-style-type: none"> <li>Remove vegetation where construction is taking place</li> <li>Tree Count preparatory stages</li> </ul>	<p>road users.</p> <ul style="list-style-type: none"> <li>Landscaping and grassing on road reserves</li> </ul>	and tree planting	priority. Landscape outlook
4	<p><b>Waste Management:</b></p> <ul style="list-style-type: none"> <li>Construction waste disposal (spoil, dry vegetation, concrete residues, asphalt concrete residues, etc.)</li> <li>General Wastes (garbage, papers and cartons, plastics and polythene, wood and scrap metals);</li> <li>Special Wastes (oil, grease and associated materials)</li> <li>Liquid effluents</li> <li>Aerial emissions,</li> <li>Waste asphalt concrete</li> </ul> <p><b>Sources:</b></p> <ul style="list-style-type: none"> <li>Excavation areas</li> <li>Camp sites</li> <li>Batching plant yards and</li> </ul>	<ul style="list-style-type: none"> <li>Develop Standard Operating Procedures (SOPs) and schedules for the project works,</li> <li>The Contractor(s) to develop waste management plans and provide appropriate facilities for their operations</li> <li>Prepare signed agreements with landowners where spoil earth is to be disposed indicating conditions and responsibilities for restoration and management,</li> <li>The spoil disposal sites should be approved by NEMA before dumping commence</li> </ul>	<p>Contractor(s)</p> <p>Waste handling Contractor(s) where available</p> <p>Resident Engineer</p> <p><b>During milling of the existing paved road sections</b></p>	<p>Minimal disruption to physical and biological environmental quality throughout the route.</p> <p>Focus on entire road corridor. Construction waste holding areas.</p>	Estimated cost SOPs development KShs. 5M	<p>Pathways for materials from camp sites, service yards and material preparation yards.</p> <p>Destinations for spoil disposal</p> <p>Utilization of asphalt concrete materials and other recyclable wastes</p>



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Item No.	Anticipated Linkages and Sources	Management Actions and Target Areas	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
	workshops <ul style="list-style-type: none"> <li>Construction equipment</li> <li>Paved roads</li> </ul>	<ul style="list-style-type: none"> <li>Consider re-use of used/waste asphalt concrete for public access roads in the neighbouring area</li> </ul>				
5	<p><b>Land Use:</b></p> <ul style="list-style-type: none"> <li>Land use changes along road corridor is inevitable</li> <li>Material sites land use may change.</li> <li>Land values appreciation</li> </ul> <p><b>Source:</b></p> <ul style="list-style-type: none"> <li>Disruption by construction activities;</li> <li>Social and economic benefits associated with the road,</li> <li>Relocation of commercial and institutional premises to the road corridor</li> </ul>	<ul style="list-style-type: none"> <li>Monitor emerging land use trends along the road during construction in liaison with planning department,</li> <li>Land use planning and zoning to commence during the construction phase and enforced immediately</li> <li>KeNHA would encourage the local authorities on the provisions of social amenities along the corridor in light of changing social and economic development.</li> </ul>	<p>KeNHA County Governments (Mombasa and Kilifi) Planning Department</p> <p><b>Throughout the Construction Period</b></p>	<p>Planned social and economic activities along the road corridor</p> <p>Clear land use zones</p> <p>All road sections.</p>	<p>No direct costs are anticipated on this item, it is an administrative aspect.</p>	<p>Land use trends. Along the project corridors,</p> <p>Acceptability of land use zoning</p>
6	<p><b>Health and Safety</b></p> <ul style="list-style-type: none"> <li>Personal injuries (construction employees and residents);</li> <li>Social ailments including communicable diseases (including HIV/AIDS);</li> <li>Potential accidents at material borrow areas and quarries;</li> <li>Environmental diseases (bronchial and eye problems).</li> <li>Accidents involving construction trucks.</li> </ul> <p><b>Sources:</b></p> <ul style="list-style-type: none"> <li>Construction dust and emissions;</li> <li>Interaction of construction workers with communities;</li> <li>Pollution of water from construction activities;</li> </ul>	<ul style="list-style-type: none"> <li>Provide safety programmes for material sites and working areas including emergency response mechanisms;</li> <li>Safety provisions (signage and lighting) for the work areas along the road corridor;</li> <li>Appropriate information and warning signs shall be provided along all the deviation roads for enhanced safety;</li> <li>Awareness, prevention and training on HIV/AIDS and other social diseases (KeNHA);</li> <li>Provide <u>wellness centers</u> at ✓ The construction camp sites</li> </ul>	<p>Contractor(s)</p> <p>Resident Engineer</p> <p>KeNHA to provide guidelines and engage HIV/AIDS Consultants</p> <p>HIV/AIDS Contractors engaged by KeNHA</p>	<ul style="list-style-type: none"> <li>Information flow and dissemination on health and safety.</li> <li>Specific response to HIV/AIDS issues.</li> <li>Safety provisions and enforcement mechanisms</li> </ul>	<p>Approx. KShs.10M on HIV/AIDS awareness, prevention and training</p> <p>KShs. 20M for the provisions of medical care as per Contractors Insurance Cover.</p> <p>Allow KShs. 20M for wellness centers</p>	<p>Complaints on health safety aspects related to the road construction activities.</p> <p>Trends in HIV/AIDS cases along the corridor,</p> <p>Special focus on material sites, road diversions routes.</p>



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Item No.	Anticipated Linkages and Sources	Management Actions and Target Areas	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
	<ul style="list-style-type: none"> <li>Material sites;</li> <li>Traffic deviations;</li> <li>Construction camp sites.</li> </ul>	<ul style="list-style-type: none"> <li>Adoption of pre-identified health centers within the road corridor</li> <li>Selected sites for parking yards;</li> <li>Provide group medical insurance and personal Protective Equipments (PPEs) for the construction workers and ensure application.</li> </ul>	Throughout the Construction period	.		
7	<p><b>Impacts of Deviation Routes</b></p> <ul style="list-style-type: none"> <li>Conflicts with residents and local motorists on the movement disruptions.</li> <li>Potential physical damages to the local access roads.</li> <li>Risks of safety to the residents (especially children) and local motorists.</li> <li>Dust emissions (Particulate Matter)</li> </ul> <p><b>Deviation routes to be identified by the Contractor in conjunction with the Resident Engineer</b></p>	<ul style="list-style-type: none"> <li>Confine construction traffic to the construction road reserve to the extent possible (there will be 40M corridor available).</li> <li>If deviations are unavoidable, inform the road users and residents in advance seeking for cooperation.</li> <li>Install appropriate signage and information (including reflective barriers and signs) on the construction road and deviations for reduced conflicts and accidents.</li> <li>Maintain the deviation roads in good motorable conditions at all times for efficient traffic flow.</li> <li>Deviation roads should be maintained damp for dust control at all times (the roads are within proximity of social and economic activities).</li> </ul>	<p>Contractor(s)</p> <p>Resident Engineer</p> <p><b>Throughout the Construction Period</b></p>	<p>Minimal conflicts with the deviation road users and local residents.</p> <p>Minimal disruptions and accidents.</p> <p>Minimal additional land take or encroachments into private land</p>	<p>No direct costs (integrated into the construction budgets).</p>	<ul style="list-style-type: none"> <li>Public complaints</li> <li>Dust levels,</li> <li>Noise and vibration levels</li> <li>Conflicts (accidents, congestion levels, conditions of the deviation roads).</li> </ul>
8	<p><b>Social and Economic:</b></p> <ul style="list-style-type: none"> <li>Temporary disruption of</li> </ul>	<ul style="list-style-type: none"> <li>Enhance collaboration with communities on construction</li> </ul>		Full implementation of		



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	<p>business activities along the road corridor;</p> <ul style="list-style-type: none"> <li>Social relationships and contacts during construction;</li> <li>Temporary disruption to the access into and out of adjacent premises;</li> </ul>	<p>activities affecting them through established Community Liaison Committees based on Administrative line,</p> <ul style="list-style-type: none"> <li>Provide deviations and slip accesses to the affected premises during construction throughout the corridor</li> <li>The Contractor to prepare and consult on an employment plan and implement in accordance to law.</li> <li>At least 60% of employment (casual) to involve the local population, especially the youth.</li> </ul>	<p>Contractor(s)</p> <p>Resident Engineer</p> <p>KeNHA – CSR</p> <p>Contractor – CSR</p> <p>Property Owners, Traders and residents</p> <p><b>Throughout the Construction Period</b></p>	<p>RAP</p> <p>An acceptable, sustainable and economically viable road with long term benefits to all.</p> <p>Special attention along the high population sections of the project corridors.</p> <p>Effective utilization of CSR budget to the benefit of the communities</p> <p>Acceptable employment plan</p>	<p>Approx. KShs.50M on communication, information dissemination, CSR and monitoring activities</p>	<p>Trends in socio-economic dynamics along the project road and its catchments.</p> <p>Safety data and reports</p> <p>Intervention projects and relevance to community needs</p> <p>Implementation levels</p>
	<ul style="list-style-type: none"> <li>Displacement of settlements</li> <li>Displacement of small-scale traders</li> </ul>	<p>Follow-up on the implementation of RAP (see 9 below)</p>				
	<ul style="list-style-type: none"> <li>Noise to residents living along the route.</li> <li>Safety issues</li> <li>Community requirements (health, education, sanitation, water, access roads, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>The contractor to establish and manage environmental and social initiatives to oversee mitigation measures developed under this report.</li> <li>Ensure effective signage and information to road users, especially on deviations and construction sections with obstacles</li> <li>Provide safe crossings and walkways during the construction works backed up with appropriate signage.</li> </ul>				



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9	<p><b>Provision of Road Reserve:</b></p> <ul style="list-style-type: none"> <li>Encroachments;</li> <li>Acquisitions</li> <li>Relocation of small scale traders.</li> <li>Displacement of settlements</li> </ul> <p><b>A Resettlement Action Plan Framework has been developed for the project</b></p>	<ul style="list-style-type: none"> <li>Provision for community improvement services under social responsibility including health, education, water supply, sanitation, access roads, etc.</li> <li>All the PAPs should be identified and compensated before the project commences (RAP process undertaken),</li> <li>Consider monetary options for livelihood restoration of the PAPs on the face of shortage of free land space in the project Counties.</li> <li>Avoid disruption of public institutions to the extent possible (schools, religious premises and health centers) – None was observed within the existing alignment.</li> <li>Ensure the design of the road is confined within the reserve corridor that is already available.</li> </ul>	<p>KeNHA</p> <p>National Land Commission</p> <p><b>Throughout the Construction Period</b></p>	<p>Compensation of all PAPs before commencement of the works</p>	<p>Actual costs as per the RAP report.</p>	<p>Settling PAPs entitlements appropriately</p> <p>Effective relocation of small scale traders and restoration of their livelihoods,</p> <p>Grievances and efficiency of redress.</p>
10	<p><b>Camps and Material Sites:</b></p> <ul style="list-style-type: none"> <li>Land degradation;</li> <li>Loss of land vegetation cover;</li> <li>Surface hydrology changes;</li> <li>Access roads' damages;</li> <li>Degradation of water sources.</li> </ul>	<ul style="list-style-type: none"> <li>Undertake environmental and social assessments on all material sites with comprehensive management plans (including restoration strategies).</li> <li>Obtain relevant approvals and licenses from the National Environment Management Authority (NEMA) for all material and construction camp sites.</li> <li>Undertake environment and social</li> </ul>	<p>The Contractor(s)</p>	<p>Quarry sites</p> <p>Borrow areas</p> <p>Water abstraction points</p>	<p>~KShs. 10M for the assessments and rehabilitation.</p>	<p>Sustainability</p> <p>Implementation of parameters in the rehabilitation plans.</p>



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		<p>impact assessments for all construction camp sites with comprehensive restoration plan and obtain relevant License from NEMA.</p> <ul style="list-style-type: none"> <li>Obtain appropriate abstraction permits for construction water from WRMA.</li> <li>Landowners entering into lease agreements on materials extraction should to reflect the responsibility for rehabilitation of the material sites;</li> <li>Prepare comprehensive material abstraction and/or procurement agreements for the materials sites with landowners to maintain land usability thereafter;</li> <li>Identify materials haulage routes and ensure maintenance of the roads, dust control and safety precautions.</li> </ul>	<b>Throughout Construction Period</b>	<p>Camp sites and operations.</p> <p>Materials holding and batching yards sustainability</p>		<p>Valid NEMA Licences on camps and materials sites</p> <p>Implementation of material abstraction and/or procurement agreements</p>
11	<p><b>Decommissioning of Construction Installations:</b></p> <ul style="list-style-type: none"> <li>Removal of construction camps.</li> <li>Rehabilitation of material sites</li> <li>Materials batching yards.</li> <li>Construction equipment removals,</li> <li>Cleanup-up at fueling yards</li> </ul>	<ul style="list-style-type: none"> <li>Carry out decommissioning audits for the camp sites and seek approval of the decommissioning plan from NEMA.</li> <li>Prepare and submit for approval by NEMA the rehabilitation and restoration plans for all materials sites used for the project (quarry sites, borrow pits and spoil dumping areas).</li> <li>Rehabilitate all material sites and</li> </ul>	<p>Contractor(s)</p> <p>Resident Engineer</p> <p>KeNHA</p> <p><b>Closure of the</b></p>	<p>Rehabilitated material sites, cleared material preparation yards and camps.</p>	<p>~KShs. 2M on Decommissioning Audits studies and development of decommissioning plans.</p>	<p>Usability of the affected camps' and material sites.</p>



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Item No.	Anticipated Linkages and Sources	Management Actions and Target Areas	Responsibility and Timeframe	Targets to Achieve	Cost Estimates (KShs.)	Monitoring Parameters
	<ul style="list-style-type: none"><li>Removal of the road pavement</li></ul>	materials preparation yards in accordance with the approved rehabilitation plans.	project			



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**Table 31: ESMP Post-Construction Phase**

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
1	<p><b>Environmental Pollution:</b></p> <ul style="list-style-type: none"> <li>▪ Water quality degradation;</li> <li>▪ Air pollution from vehicular emissions;</li> <li>▪ Solid waste dumping (road litter);</li> <li>▪ Vehicular related scraps;</li> <li>▪ Residuals from road construction waste.</li> </ul> <p><b>Sources:</b></p> <ul style="list-style-type: none"> <li>▪ Surface runoff drains from the road;</li> <li>▪ Oils spills on road surface especially at accidents scenes;</li> <li>▪ Road litter (from road users and roadside clearing);</li> <li>▪ Poorly maintained vehicles – higher related emissions.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Introduce clean-up responsibilities and charges for the road users (e.g. spills from accident vehicle owners) to reduce road related environmental pollutants and visual nuisance;</li> <li>▪ Provide public waste receptacles at strategic locations along the route (bus stops, foot bridge landings and crossing areas);</li> <li>▪ Drainage channels be kept clear at all times to prevent overloading with polluting materials. Drainage outfalls are to be acquired and kept free of encroachments</li> <li>▪ KeNHA to consider developing and enforce vehicular emission regulations in consultations with NEMA</li> </ul>	<p>KeNHA</p> <p>County Governments of Mombasa and Kilifi (Roads and Infrastructure)</p> <p>Traffic Police</p> <p>Throughout the road use</p>	<p>No direct costs are anticipated (Initiative part of the road administration).</p>	<p>Compliance with established environmental standards including waste management regulations.</p>	<p>Complaints on the utilization of the roads.</p> <p>Environmental quality trends.</p> <p>Compliance with road transport regulations.</p>
2	<p><b>Safety and Security:</b></p> <ul style="list-style-type: none"> <li>▪ Increased road accidents;</li> <li>▪ General security aspects;</li> <li>▪ Road safety issues.</li> <li>▪ Vandalism of safety installations</li> </ul> <p><b>Sources:</b></p> <ul style="list-style-type: none"> <li>▪ Increased traffic and driving style along the routes;</li> <li>▪ Social interactions;</li> <li>▪ Inadequate road safety signage and facilities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Establish road safety strategies fo this road section complete with sensitization programmes for the road users including motorists, pedestrians and riparian residents;</li> <li>▪ Liaise with the Traffic Police Department on ways to ensure compliance with road regulations;</li> <li>▪ Ensure maintenance of signage, crossings, speed breaks and other facilities at all times (there is a</li> </ul>	<p>KeNHA</p> <p>Traffic Police Department</p> <p>County Government Security Departments</p> <p>An all time</p>	<p>No direct costs are anticipated</p>	<p>effective information and signage to enhance safe movement and use of the road</p>	<p>Complaints from the residents and business operators.</p> <p>Recorded cases and categories of road accidents.</p> <p>Replacement of signage continuously.</p>





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Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
		<p>challenge of vandalism of road safety installations in the country);</p> <ul style="list-style-type: none"> <li>▪ Maintain NMT facilities (footbridges, underpasses and crossing rumps at all times);</li> <li>▪ Involve community leaders and administration in ensuring usage and sustainable utilization of NMT provisions for public safety</li> </ul>	compliance			
	<p><b>Health</b></p> <ul style="list-style-type: none"> <li>▪ Cases of HIV/AIDS and other social diseases,</li> <li>▪ Dust associated infections</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhance initiative for information and awareness as part of the road displays</li> <li>▪ Organize and implement HIV/AIDS Awareness programmes along the road corridor in liaison with relevant authorities (make it a long term initiative)</li> <li>▪ Maintain on CSR basis the <u>wellness centers</u> (including the VCT Services and ARVs) located within the truck parking yards and improved public health centers for long term benefits to the communities.</li> </ul>	<p>KeNHA</p> <p>National HIV/AIDS Control Agencies</p> <p>Ministry in-charge of Health Services</p> <p>County Government</p> <p>An all time initiative</p>	Allow KShs. 5M annually	Impact on the local communities and road users	Level of Use of the facilities
	<p>Noise and vibrations;</p> <p><b>There are no notable land use features sensitive to noise and vibrations at the moment</b></p>	<ul style="list-style-type: none"> <li>▪ Introduce vegetation cover (limited tree and shrubs) along the road reserve as noise buffer to the immediate riparian premises</li> <li>▪ Influence land use practices and building characteristics along the road for low noise conflicts (orientation, design considerations, distance from the road)</li> </ul>	<p>KeNHA</p> <p>Land Use Planning within The County Governments of Mombasa and Kilifi</p>	Allow KShs. 3M per month for each county on noise monitoring and awareness creation	Co-existence of the road with the riparian residents	Noise trends and progressive impacts



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Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
		<ul style="list-style-type: none"> <li>Influence County Governments policy on land use planning along the corridor with among others annuals noise monitoring to influence land use practices</li> </ul>	An all time activity			
3	<p><b>Social Aspects:</b></p> <ul style="list-style-type: none"> <li>Increased population;</li> <li>Higher traffic volumes;</li> <li>Road safety issues.</li> </ul>	<ul style="list-style-type: none"> <li>Collaboration with Land Use Planning departments of the County Governments of Mombasa and Kilifi to influence collaborated land use zoning,</li> <li>Maintain in collaboration with the County Governments social facilities within the corridor including bus bays, sanitation, waste bins, roadside drains, etc.</li> <li>Consider collaborated emergency response facilities within proximity of the road. The wellness centers proposed earlier are appropriate for this purpose</li> <li>Encourage riparian landowners to maintain road reserve sections in front of their premises, including beautification, drainage maintenance and vegetation clearance. This will enhance ownership and responsible use of the road.</li> </ul>	<p>KeNHA</p> <p>County Governments of Mombasa and Kilifi</p> <p>Local community small scale traders</p> <p>All time</p>	No direct costs are anticipated	Compatibility of the road with social and economic interests of the local business community, residents and other road users.	<p>Land use trends in time and along the route.</p> <p>Population trends.</p> <p>Complaints received from the local communities and the road users in general.</p>



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Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Cost Estimate (KShs.)	Targets to Achieve	Monitorable Indicators
4	<p><b>Economic Aspects</b></p> <ul style="list-style-type: none"> <li>▪ Land use changes due to efficient transport;</li> <li>▪ Mixed economic activities (general trading, industrial, institutional, etc.)</li> <li>▪ Involve local youth on road maintenance to enhance income and ownership</li> </ul>	<ul style="list-style-type: none"> <li>▪ Collaborations for sustainable social and economic development;</li> <li>▪ Maintain truck parking yards on drainage, water supply, waste collection and lighting/security</li> <li>▪ Enhance income generation opportunities for the County Governments and the local communities</li> </ul>	<p>KeNHA</p> <p>County Governments of Mombasa and Kilifi</p> <p>Local community small scale traders</p>			
5	<p><b>Road Maintenance:</b></p> <ul style="list-style-type: none"> <li>▪ Blockage of drainage and hindrance to free storm water flow;</li> <li>▪ Accumulating roadside litter collection;</li> <li>▪ Effects on road safety from inadequate facilities and signage maintenance;</li> <li>▪ Encroachment into the road reserve;</li> <li>▪ Illegal roadside land development practices.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Establish modalities for the involvement of the residents in the maintenance of the road;</li> <li>▪ Install and maintain appropriate road signs;</li> <li>▪ Collaborate on the control of roadside billboards that are a safety risks;</li> <li>▪ Maintain trash bins at strategic locations along the roads including bus stops, foot bridge landings, under pass exits.</li> </ul>	<p>KeNHA</p> <p>County Governments of Mombasa and Kilifi</p> <p>All time</p>	<p>KShs. 3m for the initial maintenance period.</p> <p>Other costs within the road maintenance budgetary allocations.</p>	<p>Maintained high level quality of road surface, installations and components.</p> <p>Focus on the entire road corridor.</p>	
6	<p><b>Decommissioning Phase:</b></p> <p>Any decommissioning of the road section or its components should be preceded by preparation of removal plan</p>	<p>Undertake a decommissioning audit of part, sections or entire road and establish appropriate measures for prevention of environmental pollution and public safety risks.</p> <p>Apply established decommissioning plan for the removal of part of all sections of the road</p>	<p>KeNHA</p> <p>Contractor</p> <p>NEMA for surveillance</p>	<p>No direct cost estimates at this stage.</p>	<p>None or minimum impacts to the environment and social well being.</p>	<p>—</p>



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**Table 32: ESMP Monitoring Parameters (Construction)**

Issue	Monitoring Parameters	Expected Output	Responsibility
Physical Environment	✓ Drainage management	Drainage systems that are compatible with the land use features along the corridor	Contractor
	✓ Drainage outfalls orientation		Resident Engineer
	✓ Spoil management and disposal	✓ Approval of spoil disposal sites by NEMA (appropriate environmental assessments submitted),  ✓ Disposal of spoil in accordance with regulations and conditions on signed agreements,  ✓ Waste management in accordance with NEMA Waste Management Regulations regulations	Contractor
	✓ Construction debris and scrap materials		Resident Engineer
	✓ Wastes from construction camp sites		
	✓ Other waste management and disposal		
	✓ Materials sites management (restoration plans)	✓ Materials rehabilitation plans and implementation strategy	Contractor
✓ Road corridor finishing (rehabilitation/restorations)	✓ Road reserve landscaping and beautification plans	Resident Engineer	
Biological Environment	✓ Air quality	✓ Air sampling and measurements schedules  ✓ Water sampling and analysis schedules  ✓ Noise measurements schedules	Contractor
	✓ Water quality		Resident Engineer
	✓ Noise and vibrations		
Social Aspects	✓ Vegetation cover	Rehabilitation and restoration plans	Contractor
	✓ Ecological features	Conservation strategies	Resident Engineer
	✓ Aquatic features (wetlands)		
Social Aspects	✓ OHS and Public Safety	✓ Compliance with established regulations ✓ Provision and operations of wellness centers	Contractor
	✓ Emergency and Security		Resident Engineer
	✓ HIV/AIDS	✓ Operations of VCT Centers ✓ Training, Awareness and prevention programmes	HIV/AIDS Consultants
	✓ Health and Sanitation		KeNHA
	✓ Waste Management	✓ Implementation of RAP recommendations ✓ Consultations with residents	County Government of Kilifi
	✓ Displacements of people		
	✓ Employment and income generation opportunities		
✓ Accessibility to homes, services and institutions			



## **10.6 RAP Monitoring Aspects**

A monitoring and evaluation (M&E) program is required to be developed to provide feedback to project management which will help keep the programs on schedule and successful. Monitoring provides both a working system for effective implementation of the RAP by the project managers, and an information channel for the PAPs to assess how their needs are being met. RAP monitoring shall be conducted in two ways namely Advisory Committee and internally by Redress Committee.

### **10.6.1 Advisory committee**

An advisory committee will carry out monitoring and evaluation of RAP implementation. The committee shall begin the work right from the implementation of RAP and will meaningfully and realistically monitor and evaluate the resettlement programs on a periodic basis so that all the vital activities are successfully implemented. Monitoring and evaluation will be useful in information of corrective measures by identifying the problems and difficulties faced by the PAPs and bringing them to the notice of the RC. The Committee shall carry out the following;

- (i) Verify results of internal monitoring by RC;
- (ii) Assess whether resettlement objectives have been met; specifically, whether livelihoods and living standards have been restored or enhanced;
- (iii) Assess the resettlement efficiency, effectiveness, impact and sustainability, drawing lessons for future resettlement activities and recommending corrections in implementation process; and
- (iv) Ascertain whether the resettlement entitlement were appropriate to meet the objectives and whether the objectives will suit the PAPs conditions
- (v) A monitoring and Evaluation mechanism need to be factored into the project implementation to ensure that the objectives of mitigating the negative impacts in the project are addressed in a timely and effective manner. The process will ensure that the resettlement program delivers on the entitlement benefits. Monitoring and Evaluation will provide a link between the project affected persons/community and the implementers and facilitate the field operatives to take remedial measures with a view to achieve the targets within schedule. The Monitoring and Evaluation process will enhance the delivery capacity of KeNHA and maximize the benefits of the RAP package to the affected persons/communities.

The objectives of the Monitoring and Evaluation programme are to:-

- (i) Ensure that the existing system of livelihood is not disturbed.
- (ii) Assess if compensation and rehabilitation measures are adequate.
- (iii) Monitor if the timelines are adhered to.
- (iv) Identify emerging or potential problems.
- (v) Identify methods of responding efficiently to mitigate the problems.

The process will be monitored both internally and externally with the project field staff dealing with the day-to-day operational issues. This will include payment of compensation, physical



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identification of project affected persons and arrangement for their payments, relocation and resettlement. The scope of the Monitoring and Evaluation will involve:-

#### 10.6.2 Responsibility

This is a purely administrative stage with the project field office dealing with the establishment of resettlement unit, consultation with the project affected persons in the preparation of the resettlement plan, information dissemination on payment of entitlements, grievance redress, etc. The project field office team will be involved in handling of payment of compensation to the affected persons, delivery of entitlements, disbursing of income and livelihood restoration assistance, consultations and relocation among other activities.

#### 10.6.3 Performance Monitoring

Once the PAPs have received their compensation or have been resettled, the focus of the field office team will focus on programmes that promote income generation for the re-settlers and ensuring that the programmes are acceptable to them, the new livelihood patterns are sustainable and assessing how the income generating interventions are impacting on the living standards of the re-settlers. To achieve compliance with the targets, it will be necessary to establish benchmarks upon which the success rate is measured.

#### 10.6.4 Monitoring and Evaluation Indicators

These will include primarily the activities and the entitlements due to the displaced people. These include among others:-

- (i) Frequency and number of consultations held with various stakeholders; parties engaged in grievance redress and participating in the project such as Civil Society groups;
- (ii) Grievances filed by the PAPs and nature of the grievances including the time it has taken to resolve them
- (iii) Procedures in the operations such as asset verification and valuation procedures including effectiveness of compensation delivery system;
- (iv) Number of land parcels to resettle the affected persons and amount of compensation proceeds released to the target group;
- (v) Number of assets compensated and the amounts paid out to the individuals and public facilities restored;
- (vi) Number and category of people paid their compensation and rehabilitated including vulnerable groups receiving assistance;
- (vii) The growth in number of settlements, market areas and the change in standard of living of the displaced persons.

#### 10.6.5 External Monitoring

It will be imperative to involve an external monitoring and evaluation specialist for the project to meet the accountability and transparency criteria. The external monitoring will purposely validate the work done by the field office monitoring to ascertain that the targets are met and the objectives



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of the RAP are adhered to. The specialist will particularly review the implementation of the land acquisition. It will be important for the exercise to be carried out during and after the life of the project. However, it may require more frequency (maybe quarterly) to ensure there is no lapse in the follow-up on implementation of the resettlement goals and that no grievances are over-looked. The project will provide a budget to facilitate the external specialist and his team to carry out their assignment effectively. The PAPs will be effectively involved and informed through participatory meetings in the evaluation exercise.

#### 10.6.6 Internal monitoring

This should be responsible of the Redress Committee, it will look into the conventional indicators verses the assistance provided to the affected families, number of affected families, families resettle, infrastructure facilities allocated etc. It will also monitor the financial aspect, that include payment of compensation, grants, income restoration, etc. Regular progress reports shall be prepared and summated to KeNHA and ministry of transport and infrastructure in a timely manner



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## Chapter 11: Conclusions and Recommendations

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### 11.1 Conclusions

The proposed rehabilitation and expansion of Mombasa – Mariakani Road is a national flagship under the Kenya Vision 2030 and has economic benefits to the country as well as the immediate neighbouring states (Uganda, Sudan, Rwanda and to some extent Burundi). At the local level, the road expansion will address the persistent traffic congestion between Miritini and the City Centre (where at time it runs into hours) through streamlining the flow of heavy traffic. It is noteworthy that the road is the only gateway into the City of Mombasa from the western mainland.

While appreciating the benefits and positive impact associated with the project, there are negative impacts that need to be addressed and mitigated during the construction and post-construction phases. For this reason, a comprehensive environmental and social impact assessment (ESIA) study will be necessary. Equally important will be a comprehensive resettlement action plan (RAP) considering the extent of potential displacements and disruptions along the corridor during the construction.

The ultimate goal of this ESIA study was to identify impacts resulting from the proposed project that were determined on the basis of the baseline conditions to be established during the field work and information obtained from the documents reviewed. The environmental and social impact assessment study process was designed to provide a view of the environmental and social status and establishment of the diversity on physical environment, social and ecological status in the area.

Following on the above observations, the conclusions below were arrived at;

- (i) There is a general appreciation of the road improvement by a majority of the residents and stakeholders. This arises from the frequent traffic congestion along leading to high travel times and loss of man-hours and associated social and economic implications. Benefits established under this study ranges from regional and national (goods transit to other parts of the country and the neighbouring states) and local (travel time reduction, road safety enhancement, environmental pollution control, security response improvement, etc.)
- (ii) Following previous experiences in road construction where encroachments have been the key focus, there is concern among the communities including landowners and business people adjacent to the road reserve who are anxious to know the extent of the road and level of land acquisition early in advance to enable appropriate agreements and compensations to avoid potential conflicts.
- (iii) Encroachments into the road reserve is limited to commercial and small scale traders, mostly with temporary structures and limited permanent structures (there are no notable residential features within the road reserve). The affected persons are to be identified through a RAP process for appropriate relocation mechanisms,





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- (iv) The road expansion from 36.5m to 40m will need appropriate land acquisition ranging between 3 – 4m to meet the space requirements. Land acquisition on areas with interchanges and major junctions may have a higher demand for land space. Again, the RAP process is to provide guidance on the land acquisition and mechanisms of acquiring the same.
- (v) The road section harbours public amenities including water pipelines, power lines (underground and above ground), sewer systems, communication lines, drainage systems, etc. it is expected that some of the service lines are likely to be affected during the construction phase. However, a Service Providers forum will be established under KeNHA with a view to identifying collaborative mechanisms of dealing with the services relocation.
- (vi) Environmental issues are mainly on environmental health and environmental pollution as opposed to physical environmental destruction due to the urban nature of a larger part of the road. Aerial emissions, noise and vibrations, waste management and safety are the key environmental concerns during the project implementation. Appropriate mitigation measures have been provided under the EMP for integration during the construction period,
- (vii) Due to the location of the project road, construction materials will be sourced outside the project areas. while potential sources have been identified through the design process, the Contractor(s) still have an obligation to identify specific sources. In this regard, it is noted that comprehensive ESIA studies will still be required for approval of the material sites,
- (viii) In view of the above observations, the level of environmental assessment has been placed under Category 1 in accordance with AfBD Integrated Safeguards System (ISS) considerations. For a Category 1 project, a Full ESIA Study and Full RAP would be required. This has applied to this project road.
- (ix) This Resettlement and Action Plan will be implemented by compensating the individuals affected by the proposed road activities. The compensation and assistance allowances will enable the PAPs to relocate and pave way for the road construction.

## 11.2 Recommendations

- (i) A comprehensive Resettlement Action Plan will be necessary for the road to address the potential social and economic displacements during the project implementation. The RAP should be implemented such that all eligible PAPs are compensated by the project activities gets underway (this was ongoing during this ESIA process).
- (ii) Involvement of the stakeholders and public during the project implementation, and particularly during the construction and early stages of the road use would be necessary to ensure minimized social impacts.



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- (iii) The Contractor(s) will be expected to develop construction environment and social management plan in line with the one developed under this report for purposes of supervision and continuous monitoring.
- (iv) All material sites will have comprehensive ESIA undertaken and management plans developed such as to include extraction practices, haulage and materials management rehabilitation plans.
- (v) As part of the beautification of the road, a comprehensive landscaping component should be integrated into the project implementation.
- (vi) Appropriate safety audit should be undertaken for the road to guide on the implementation and usage of the road thereafter.
- (vii) Continuous engagement of the road users and community members on safety will be necessary on the long term management of the road section.
- (viii) It is recommended that any planned of the project affected persons precede the construction activities and where cash compensation payments are payable, be done in accordance with the prevailing law.
- (ix) KeNHA should ensure that the contractor comply with the applicable gender principles; labour laws encouraging the contractor to employ 30% women, PWDs and the youth in road construction and maintenance; providing safe working conditions for both women and men workers; and ensuring that all civil work contractors engaged under the project, participate in HIV prevention and road safety programmes and; that information reaches the local communities (women, men, the youth and vulnerable groups) living and working along the road corridor.



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## **Annexes**

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