roughton

In association with sub-consultants:

East African Engineering Consultants

Malindi - Garsen - Hola - Madogo Road

Feasibility Study, Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Resettlement Action Plan (RAP), Preliminary and Detailed Design and Preparation of Tender Documents for Rehabilitation of Malindi - Garsen - Hola - Madogo Section of Mombasa Garrisa B8 Road

For:

KeNHA

Kenya National Highways Authority

Republic of Kenya

World Bank

Draft Environmental Report

Vol. I: Environmental Impact Assessment

March 2018

KENYA TRANSPORT SECTOR SUPPORT PROJECT (KTSSP) P124109

CONSULTANCY SERVICES FOR A FEASIBILITY STUDY, ENVIRONMENTAL IMPACT ASSESSMENT, SOCIAL IMPACT ASSESSMENT & PREPARATION OF A RESETTLEMENT ACTION PLAN, PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTATION FOR THE REHABILITATION OF THE MALINDI-GARSEN-HOLA-MADOGO SECTION OF THE MOMBASA-GARISSA ROAD (B8)

DRAFT ENVIRONMENTAL REPORT: VOLUME I - ENVIRONMENTAL IMPACT ASSESSMENT

MARCH 2018

Notice

This report was produced by Roughton International Limited for Kenya National Highways Authority for the specific purpose of Feasibility Study, Environmental Impact Assessment, Social Impact Assessment & Preparation of a Resettlement Action Plan, Preliminary and Detailed Design and Preparation of Tender Documentation for the Rehabilitation of the Malindi-Garsen-Hola-Madogo Section of the Mombasa-Garissa Road (B8).

This report may not be used by any person other than with Kenya National Highways Authority's express permission. In any event Roughton International Limited accepts no liability for any costs, liabilities or losses arising as a result of the use of or reliance upon the contents of this report by any person other than Kenya National Highways Authority.

Document History

JOB NUMBER: KEN014			DOCUMENT REF: DRAFT ENVIRONMENTAL REPORT: VOLUME I - ENVIRONMENTAL IMPACT ASSESSMENT			
001	DER: Vol I - Environmental Impact Assessment	T. Omenda	J. Barron	R. Ayieko	M. Bukaka	30/03/2018
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date

KENYA TRANSPORT SECTOR SUPPORT PROJECT (KTSSP) P124109

CONSULTANCY SERVICES FOR A FEASIBILITY STUDY, ENVIRONMENTAL IMPACT ASSESSMENT, SOCIAL IMPACT ASSESSMENT & PREPARATION OF A RESETTLEMENT ACTION PLAN, PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTATION FOR THE REHABILITATION OF THE MALINDI-GARSEN-HOLA-MADOGO SECTION OF THE MOMBASA-GARISSA ROAD (B8)

Contents

LIST OF APPENDICES

TABLE OF FIGURES

TABLE OF TABLES

TABLE OF PICTURES

CERTIFICATION

I, **Mr, Tom Omenda** of E-CUE Associates, submit the following Environmental Impact Assessment (EIA) Report for Malindi-Madogo (B8) Road Project.
The EIA study has been carried out according to the Environmental Management and Coordination Act, 1999 and the 2011 NEMA National Guidelines for Strategic Environmental Assessments in Kenya.
To my knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the Project.

SIGNATURE: …… DATE:

The Environmental Impact Assessment Team

Tom Omenda	-	Lead Expert and Team Leader
Nancy Marwa	-	Environmental Engineer
Julie Sewe	-	Environmentalist
Vera Adongo	-	Environmentalist

The Proponent's Declaration:
As the proponent of the proposed project, we confirm that the information given in this EIA study report is true to the best of our knowledge.

Name……..

Designation……Signature……

Date……..…

LIST OF ABBREVIATIONS

LIST OF ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
BEP	Best Engineering Practice
CBO	Community Based organization
CH	Chainage
CIDP	County Integrated Development Plans
CO	Carbon monoxide
CPP	Consultative Public Participation
CSR	Cooperate Social Responsibility
DOHS	Directorate of Occupational Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESA	Environmentally Sensitive Area
EIA	Environmental and Social Impact Assessment
ESMP	Environmental/Social Management Plan
FGD	Focus Group Discussions
FIDIC	International Federation of Consulting Engineers
GII	Gender Inequality Index
GoK	Government of Kenya
GoK	Government of Kenya
HH	Household Head
HIV	Human Immuno-Deficiency Virus
ITCZ	Inter-Tropical Convergence Zone
IUCN	International Union for Conservation of Nature
KeNHA	Kenya National Highway Authority
KFS	Kenya Forest Services
KIHBS	Kenya Integrated Household Budget Survey
Km	Kilometre
KNASP	Kenya National Aids Strategic Plan
KNBS	Kenya National Bureau of Statistic
KWS	Kenya Wildlife Service
m	Metre
masl	meters above sea level
MDG	Millennium Development Goals
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organisations
NIB	National Irrigation Board
NMK	National Museums of Kenya
NOx	Oxides of Nitrogen
OSHA	Occupational Health and Safety Act
PAP	Project Affected Persons
PCR	Physical Cultural Resources
PM	Particulate Matter
PPE	Personal Protective Equipment
PSV	Public Service Vehicles

RE	Resident Engineer
RHS	Right Hand Side
RoW	Right of way
SO2	Sulphur dioxide
STI	Sexually Transmitted Infections
ToR	Terms of Reference
WRMA	Water Resources Management Authority

EXECUTIVE SUMMARY

E1. EXECUTIVE SUMMARY

The Malindi – Madogo road is currently in a poor state in some sections especially the section between Garsen and Madogo. The road is both class A and B. Malindi to Garsen is class A (7) i.e. international trunk road and Garsen to Madogo isclass B (8) i.e. national trunk road. From Malindi to Garsen the road is paved all-weather but the road condition is poor towards Garsen. The 91 km section from Garsen to Hola is an earth road which sometimes gets impassable during wet weather. KeNHA funded by World Bank has proposed to upgrade the road to all weather standards to include a bypass around Malindi.

This Environmental Impact Assessment (EIA) report is for the Malindi-Madogo (A7-B89) Road Project and has been prepared in fulfilment of the Environmental Management and Coordination Act (EMCA, CAP 387), Amendment 2015 and the World Bank Safeguards policies.

E1.1 Project description

The length of the project road is about 340km. The project road has been subjected to regular pavement washouts caused by seasonal waterways along its alignment which will require a permanent solution. The project road is intended to link the Lamu Port to the rest of Kenya. The Government of Kenya therefore intends to rehabilitate and strengthen sections of the road from Malindi Town to Madogo at the junction with the A3 road that are paved but in poor condition and upgrade the road to bitumen standard.

The project will mostly extract materials from existing borrow sites that are 14 and will open up 5 new sites. The hard core material will be sourced from Jaribuni quarry that is currently active.

E1.2 Enivronmental Impact Assessment (EIA)

This Environmental Impact Assessment (EIA) report has been prepared to identify significant linkages of the road project to the environmental and social settings of the project. The EIA report provides management plans and intervention actions that are based on physical environmental and social features, defined timelines and implementation cost elements. The management actions are also based on design concepts and principles

E1.3 EIA Study Objectives

The EIA study objectives are listed below and are in line with both EIA/EA regulations and EMCA CAP 387

- To collect and document environmental and socio – economic baseline data for the project
- To identify potential environmental impacts of the proposed Malindi - Madogo road project
- To assess the significance of these impacts
- To assess the relative importance of the impacts of alternative plans, designs and sites
- To propose mitigation measures for the significant negative impacts of the project on the environment and to provide cost estimates of the mitigation measures
- To generate baseline data for monitoring and evaluation of the efficiency of those measures being implemented during the projects' cycle
- To present information on the impact of alternatives

E1.4 Methodology

A detailed study for the EIA was undertaken in light of the legislative requirements of the EMCA, 1999 revised 2015 and the Environmental Impact Assessment and Environmental Audit Regulations, 2003. During the EIA study, the key focus was to identify potential environmental, social and cultural impacts of the proposed project and highlight possible mitigation measures for these impacts.

The study procedure involved desk review, observation, interviews, photography, geo-referencing and design of an environmental management plan.

E1.5 Legal, Administrative and Institutional Framework

The EIA report is guided by a number of environmental legislations, the primary one being the Environmental Management Coordination Act (EMCA, Amendment 2015). This act makes EIA a legal requirement. Other acts include; Water Act 2016, Occupational safety and Health Act, 2007, Work Injury Compensation Benefits Act, 2007, Sexual offenses Act, CAP 62, 2006 , Public Health Act CAP 242, 2012, Physical planning Act, CAP 286, 2010; Traffic Act CAP 403, 2014; Public Roads and roads of Access Act, CAP 399, 2010; Lands Act, CAP 280, 2015; Kenya Roads Act, CAP 408, 2012; National Land Commissions Act, CAP 5D, 2012; Registration of Titles Act Cap 281, 2010; The Wildlife Conservation and Management Act, CAP 376, 2013; Agriculture Act Cap 318 of 1980 (revised 1986); Intergovernmental Relations Act, 2012; County Government Act, No. 17 Revised 2014 (2012)

The Policies reviewed include; KENYA Vision 2030, National Environmental Action Plan 2009-2013, National Environmental Action Plan Framework 2009-2013, Environment and Development Sessional Paper No.10 of 2014, The Draft National Wetlands Conservation and Management Policy, National Land Use Policy, Sustainable Development Goals and the World Bank Safeguard Policies.

The relevant international policies are The Ramsar Convention on Wetlands and Convention on Biological Diversity

The main institutions are; National Environment Management Authority (NEMA); National Environment Council; Kenya Roads Board; Kenya National Highways Authority; Kenya Wildlife Service; and the National Museums of Kenya

E1.6 Environmental Baseline Conditions

Malindi falls within a tropical maritime climatic zone with tropical wet and dry or savanna climate. The average rainfall is about 1094mm per year with two rainy seasons. The dry seasons are also two; July to September and December to March. From Malindi towards the North, the region experiences a semi-arid type of climate; rainfall is low, bimodal, erratic and conventional in nature. Heading to Madogo the climate changes to arid conditions with average rainfall of about 275 mm per year. Rainfall is normally in short torrential downpour making it unreliable for vegetation growth.

The geology of Kilifi-Tana River mainly consists of Cenozoic sediments with some places overlain by Pliocene sands, sand stones, clay and conglomerates. Along A7, the soils are brown fine grained sandy soils. Tana River soils are lowland soils with high sodicity and salinity on sedimentary deposits. From Garsen towards Hola and Bura, the soils consist mainly of sandy clays to clays and range from imperfectly to poorly drained. Northwards towards Madogo, the soils range from the sandstones, dark clays to alluvial soils are along the Laggas.

The larger part of the project road (B8) lies in the lower Tana Basin that is within Tana river County. Groundwater is one of the sources of water supply and for irrigation in the project. Boreholes are a major source of water in Garsen while Sabaki River is a major source of water in Sabaki area. Proceeding towards Hola, a number of water pans were observed. Along the bypass residents largely depend on water kiosks set up by Malindi Water & Sewerage Services Company and others from private boreholes.

The area through which the proposed Malindi bypass crosses consists of farmlands laid to subsistence farming fruit trees and crops.

From Malindi towards Garsen, the vegetation ranges from sparse to medium density with *acacia spp* and *Prosopis juliflora* alternately dominating vegetation cover. Baobab and Cashew nuts occurred all through this section. Others include blue gum, mature Neem *(Azadirachta indica)*, *Deloxia regia*, *Casuarina equisetifolia,* Coconut *(Cocos nucifera)*, *Euphorbia candelabrum*, Terminalia spp, *Thevetia peruviana*, *Leucaena leucocephala* and sisal. Sodom's apple was a common weedy species throughout this section. Broadly, across Tana River County, vegetation range from scrubland to thorny thickets in riverine areas. An invasive tree species, *Prosopis juliflora*, commonly known in the area as 'Mathenge' is threatening to replace most of the indigenous vegetation. The Garsen-Hola-Bura areas have similar vegetation whereby *Prosopis juliflora* and acacia spp especially *Acacia farnEIAna, Acacia tortilis, Acacia ehrenbergiana, Acacia etbaica* and *Acacia reficiens* dominate.

Crossing to Bura, the overall natural vegetation is sparse except near the river where tall evergreen forest is sustained. Specific habitats in the dry bush land are those along the main ephemeral streams: the Hirimani, Walesa, Bilbil, Gelmadho and Tula.

The project area is a wildlife dispersal area and during field work, several wild animals were cited along the corridor. The animals cited include dikdik, baboons, warthogs, stripped hyena, spotted hyena, squirrel and stripped antelopes. Other wildlife include; red Colobus monkey, tana river crested Mangabey monkeys, elephants, hartebeast (Hirola), Gravy's and Burchell's zebra, gazelles, lions, giraffes, sykes monkey (*Cercopithecus mitis albotorquatus*) vervet monkey (*Cercopithecus aethiops pygerythrus*), yellow baboons (*Papio cynocephalus*), *Galogo zanzibaricus*, buffalo, blue monkey, east african oryx, lesser kudu, cheetah, leopard, grants gazelle, gerenuk, jackal.

There are quite a number of wildlife corridors along the proposed Malindi-Madogo road as it separates wildlife habitats like Tsavo East from Tana River. The corridors enable migration, colonization, interbreeding of animals and accessibility to water and food.

Climate change has affected rainfall patterns that have become irregular and unpredicaTable more so in the arid and semi-arid regions that have been experiencing increased precipitation of 50mm predicated till 2025. Most regions have slight increase in temperature including North eastern Kenya that has experienced an estimated increase of 1.2^0C over the last 50 years but the coastal zone has been experiencing low temperature at night with a descrease of 0.7^0C over the last 50 years.

A total of 21 material sites and water sources were assessed; one quarry site, 16 borrow sites, one sand pit and 3 water sources. The material sites are along the project road, the furthest is 12km from the road and the closest is 20m from the project road. Of all the sites assessed 6 material sites are located on site previously exploited while 8 are active, 5 are new sites and the rest are water sources.

E1.7 Social Baseline Conditions

The project road traverses 2 counties (Kilifi and Tana River). The project area counties cover an area of 51,233.6km^2. This comprises of built up environment, cultivated land, wetlands, floodplains and uncultivated land. The estimated population of Malindi Sub County is 162,712 and population density of 259 persons per square Kilometre in the 2009 Population Census while Magarini Sub County had a population size of 177,241 at 25 persons per square kilometre.

There are 15 cultural sites in Tana River County that include; Mwana, Shaka and Ungwana which are the early Swahili settlement villages. There is also a lot of archaeological tourism potential which could be harnessed.

The main gender issues that were indentified for this road corridor include; ownership of production resources (land, capital); participation in decision making and early/child marriages.

Kilifi County is covered by all the major mobile telephone service providers which include; Safaricom, Yu, Orange and Airtel with 7 post offices and 5 sub post offices. These services are however concentrated along the Garissa- Malindi road. There are three post offices in Tana River county that are located at Bura, Hola and Garsen and five courier service providers. Investments in DSTV, Zuku and other free to air satellite television has nevertheless made access to local and international broadcasts possible in the county .

Access to financial services in Kilifi County is generally on the increase with the advent of mobile phone money transfer services and agency banking. In additon, the county has only 10 commercial banks namely KCB, Equity, Cooperative, National Bank, Barclays, Standard Chartered Bank among others while Tana County has two banks (KCB and Equity bank), three bank agencies (KCB, Equity bank and Coop bank), one SACCO, one Micro-Finance Institution (MFI) and 10 village banks in the county.

The main sources of energy in Kilifi County include; wood fuel, electricity, paraffin and solar energy which are mainly used for cooking and lighting. Tana River County uses wood fuel for cooking and 78.2 per cent use kerosene for lighting. Only 0.9 per cent of the households are connected with electricity.

The main common problem in the entire Project area from Malindi to Madogo is lack of land tenure rights; this has resulted to common violence and communities' conflicts in the area, field survey identified that land in the entire Project area is yet to be adjudicated by the government.

Utilities available in Malindi and Magarini sub-counties include; social halls, electicity in some homes, a few sanitation facilities, police stations, health centres and public schools while Tana River County is accessible to technical training collage, banks, electricity, roads, water points, police stations, government offices, health facilities and public schools.

The main road is on B8 road hence only triggered at sections identified for construction of Interchanges will acquire land. However, land acquisition will be significant along the proposed, Option 1, Malindi Bypass corridor which is proposed to be constructed within human settlements to the west of Malindi alternatively Bypass, Option 2, alignment, which traverses virgin land with virtually no existing roads, to the immediate west of Malindi Airport could also require land acquisition.

E1.8 Potential Impacts

Potential impacts were analysed and the following are the potential positive impacts identified: creation of employment opportunities, promotion of tourism, improved living standards, providing a link to the proposed Lamu Port, improved security, support for Bura irrigation scheme, alternative routes to access towns, improved economic growth, improved management of wildlife, improved ambient air quality and road side drainages.

The potential negative impacts identified include; loss of wildlife, loss of vegetation resources, impacts on water resources, effect on soil and air, noise pollution, effects of sourcing of construction materials, health and safety concerns, HIV and AIDS, road safety concerns and wildlife poaching.

The potential negative impacts identified are listed in the Table below

Construction Phase

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
Wildlife	Poaching by construction workers and road kills by construction traffic	• Educate workers regarding the occurrence of important wildlife resources in the area and the importance of their protection • Avoid the spread of invasive non-	Medium	Easily reversible

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
		native *Prosopis juliflora* • Reseed disturbed areas with native plants mainly acacia species • Schedule activities to avoid disturbance of resources during critical periods of the day • Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife • Locating the construction camp at least 1 km away from Tana River Primate National Reserve and the Elephant Corridor in Mnazini • Develop a code of conduct for the workers to ensure none of them get engaged in hunting or harming game in any way • Fence off the campsites to keep wildlife out		
Vegetation resources	Clearance of vegetation thus reducing ground cover and exposing soil to agents of erosion	• Compensatory planting of trees • Vegetation should only be cleared along the road reserve • The use of existing cleared or disturbed areas for the Contractor's Camp	Medium	Long term partially reversible
Invasive species	Involves potential colonisation of newly cleared or excavated sites within the project area by *Prosopis juliflora*	• Clearing and removal of vegetation along the corridor and at borrow sites should be carried out in such a way that damage to adjacent areas is prevented or minimised • Prosopis juliflora cut down during construction should be given to the local communities for them to burn charcoal • Phase vegetation clearance to minimize colonization • Steep slopes and coarse textured soils are unfavourable for the growth of Prosopis juliflora therefore during construction the road should be raised to form slopes on the shoulders and stone pitching done on the road shoulders to the toe of the embankments to prevent colonization	Medium	Long term and reversible
Water resources	Pollution of the water resources along the project road by various pollutants associated with road construction and sedimentation due to increased surface runoff and soil erosion. Increased pressure on these resources which are already	• No grey water runoff or uncontrolled discharges from the site/working areas • Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank • The Contractor shall also prevent runoff loaded with sediment discharging to River Sabaki; • Works that are likely to generate silt-laden runoff will be undertaken preferentially during the drier months of the year; November to April;	Low	Short term

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
	insufficient to meet current water demand.	• Site compounds and stockpiles will be located away from water pans, River Sabaki and the laggas; • Where possible an 8m buffer strip of existing vegetation should be maintained alongside River Sabaki. • Any work along River Sabaki and laggas should be isolated to prevent silt propagating downstream • Earth stockpiles should be seeded as soon as possible • Tools and plant to be washed out and cleaned in designated areas within the site compound then a Suparator, an oil separator used to prevent surface and ground water pollution • Discharges to watercourses and water bodies that meet water quality standards should only be carried out under consent of WRMA		
Pressure on water resources	Possibility of overexploitation of the water resources along the project road during construction if they are used as the major source to meet construction water demand	• Consultations with the communities shall be required before commencement of water abstraction in river Sabaki • Water permits for the abstraction of water shall be obtained from WRMA • Consultations with the WRUAs should be done prior to abstraction to gain their support • Water pans and laggas should not be used to meet road construction water needs	Low	Short term
Siltation and sedimentation	Increased run off and erosion from various work sites could potentially result to siltation of water resources Increased sedimentation in the water pans may lead to a reduction in their storage capacity by making them shallower	• Any work along River Sabaki should be isolated to prevent silt propagating downstream; • Sediment wash from work sites into River Sabaki could be minimized by constructing settlement lagoons or other temporary attenuation measures such as sand/silt traps if necessary • Stockpiles should be located away from water sources	High	Short term
Alteration of aquatic and fish ecology	Bridge construction at Sabaki river will disturb the aquatic conditions at the bridge crossing	• The contractor should restrict bridge construction activities to non-breeding seasons i.e. during the dry seasons that is from June to September and January to March • The contractor should report any incidences of accidental fuel or oil spills on the river bed immediately they occur. • Prior to returning flows to the river channel the contractor should replace and	low	Short term

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
		restore the river bottom with suiTable rock material • Best management practices should be enforced to avoid accidental spill of bitumen, concrete leachate and sediments and spill of petrochemicals through proper storage, use and clean-up of construction related materials • Workers should be prohibited from fishing in River Sabaki •		
Waste management	Pollution of the environment caused by construction generated solid and liquid waste which include waste water, fuels, oils, hazardous substances and other liquid pollutants	• The contractor shall develop a comprehensive waste management plan prior to commencement of works • Litter bins should have secured lids to prevent animals and birds from scavenging • All personnel shall be instructed to dispose of all waste in a proper manner • Recycling of construction material shall be practiced • Earth spoils shall be disposed of in pre identified sites • The construction camps should be situated away from the primate reserve and wildlife corridors • Water containing pollutants should be directed to a conservancy tank for removal from the site where applicable • In case of any form of pollution of Sabaki River, the contractor should notify the RE • Wash areas shall be placed and constructed and oil/ grease interceptor used so as to ensure that the surrounding areas including groundwater are not polluted • No grey water runoff or uncontrolled discharges from the site or working areas to any adjacent water body • Fence off the main contractor's camp to keep away wildlife	Medium	Short term
Soil resources	Alteration of soil physical properties as well as exposure to erosion agents may result from the civil and general works within the road corridor Effects of soil pollution may also result from accidental oil spills	• The contractor should develop emergency response plans that includes spill response strategy • Proper maintenance of machinery and equipment • Spill prevention practices and response actions should be applied • Spills should be immediately addressed per the appropriate spill management plan • Proper handling of material through use of dip trays, directing spills to an oil sump	low	Long term

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
		which should be emptied into a designated disposal site • Refuel in designated refuelling areas that include a temporary berm to limit the spread of any spill		
Air quality	Anticipated impact may originate from vehicle and machinery fumes and dust	• The removal of vegetation shall be avoided until such time as clearance is required • Do not carry out dust generating activities during times of strong winds. • Water sprays shall be used on all earthworks areas. • Vehicles delivering soil materials shall be covered • Vehicle speeds shall be limited to minimize the generation of dust on site and on diversion and access • Use of personal protective equipment like dust musks by construction workers in areas experiencing high dust levels	Low	Short term
Noise and vibration pollution	Noise generated by equipment and workers could impact on sensitive receptors e.g. learning centers and health facilities within the project corridor	• The Contractor shall keep noise level within accepTable limits from NEMA in Noise regulation second schedule • Schools, hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction. Any excessively noisy activity shall be conducted outside of school hours • Construction workers should be required to wear ear muffs in areas exposed to excessive noise levels • Equipment should be maintained regularly • No unnecessary hooting by project vehicles	Low	Short term
Construction material sourcing	Impacts will relate to the borrow pits and hard stone quarries. When not properly rehabilitated these sites remain of poor quality and unproductive besides being visually intrusive. Furthermore, they may be safety risks	• Ensure that appropriate authorization to use the proposed borrows pits and quarries has been obtained before commencing • Carry out inspection of each of the site's soil stability before excavation; • Borrow pits and quarries shall be located more than 20 meters from watercourses in a position that will facilitate the prevention of storm water runoff from the site from entering the watercourse; • All roads to and from borrow pits and quarries should be made safe and accessible and transportation of material should follow a designated route • Safety distances should be maintained in material sourcing operation; 100m to any shopping centre, school and hospital and	Medium	Long term

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
		50m to any house irrespective of consent from the owner • The Contractor shall give a 14 day notice to nearby communities of his intention to begin excavation in the borrow pits or quarries; • If quarrying is to be necessitated, the contractor should prepare health and safety plan before any work • Where possible cordon off the quarry and borrow areas to keep livestock and children off • Topsoil shall be stripped prior to removal of borrow and stockpiled on site • Decommission the borrow pits and quarries upon completion of the Contract		
Safety and health	Impacts relate to accidents, occupational diseases, ill health and damage to property which can occur if precautionary measures are not taken	• The contractor should provide the workers with appropriate personal protective equipment • The contractor should ensure there are warning signs on the construction site and on the road • The contractor shall provide standard first aid kits at the site • A safety officer who has safety training and knowledge of safety procedures should be present to give guidance on the safety procedures • The contractor should have an insurance cover for all workers • The contractor should comply with all the Occupational Safety and Health Act 2007 regulations and ILO on safety and public health in construction activities	Low	Long term
Community health and safety	Increased traffic speeds due to the improved road may only make this situation worse and result in more accident cases	• Speed humps should be provided in the various centres along the road • Speed limits appropriate to the vehicles driven should be observed at all times • Adequate road signage of ongoing works should be provided • In areas where the road intersects the communal watering points, bumps and proper warning signage should be erected • Any chemical or fuel spills shall be cleaned up immediately • A safety and emergency response plan should be developed	Low	Long term
HIV / AIDS	Spread of HIV/AIDS due to influx of construction workforce into the project environment	• Initiate awareness creation, prevention and training programmes • Establish wellness centres • Incorporate HIV/AIDS control program	Low	Medium

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
Cultural sites	Interference of cultural set up of communities	• The proponent shall ensure preservation of the cultural resources of the communities	Low	Long term
Vulnerable and marginalized groups	Restriction of livestock crossing during Project civil works Pollution of Water pans Pasture destruction	• Sensitize community members about the Project and consult VMGs • Provide employment quarters for VMGs especially in unskilled or semi-skilled cadres • Provide support infrastructures for VMGs such as establishment of extra water pans along the road alignment • Support and facilitate the use of customary institutions for grievance and complaints	Low	Short term
Labour influx effects	Strain on various water resources for road works Job opportunities. Sexual Offences Teenage Pregnancies	• Effective community engagement and strong grievance mechanisms on matters related to labour • Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx, the contractor should engage a local community liaison person • Proper records of labour force on site while avoiding child and forced labour • Fair treatment, non-discrimination, and equal opportunity of workers including the VMGS (Along the road corridor) and women • Comply to provisions of WIBA 2007 • Develop and implement children Protection Strategy	Low	Short term
Human Right and Gender Inclusivity	Gender Inclusivity in hiring of workers Failure to protect Human Risk areas Interfering with Participation Rights and Labour Rights	• Mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule • The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability • Protecting Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights and Labour Rights	Low	Short term
Child protection	Children abused through hiring of child labour Sexual advance that could lead to early pregnancies School dropout Exposure to	• Develop and implement a Children Protection Strategy • All staff of the contractor must sign, committing themselves towards protecting children • Children under the age of 18years should not be hired on site as provided by Child Rights Act (Amendment Bill) 2014	Low	Short term

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
	communicable diseases such as HIV and AIDS			

Operation Phase

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
Vegetation resources	Good roads may improve charcoal business in the area which implies increased tree harvesting	• It is strongly suggested that KeNHA dedicates labour based maintenance strategy for the most vulnerable sections of the road with clear mandate to continually clear prosopis within the RoW. • KFS should closely monitor the cutting down of trees • Charcoal SACCOS should be encouraged to have tree planting programmes	Medium	Long term
Wildlife mortality	The road project could expose wildlife in Tana River Primate National Reserve and the wider environment to poaching and road kills	• Putting up road signs indicating start and end of wildlife corridors and images of wildlife to expect • Post speed limit sign preferably 50km/hr on either side at the point the road approaches the Tana Primate Reserve	Medium	Long term
Soil resources	Concentrated runoff alongside drains can cause accelerated erosion and gully formation	• Line the side drains with concrete or by stone pitching in erosion prone soils • Design run off control features like continuous distillation systems especially on the roadside drainages	Low	Long term
Noise pollution	Noise generated by increased traffic on the road	• Vehicles using the road should adhere to the Traffic Act where they are supposed to keep the vehicles in roadworthy conditions; • Road users to adhere to NEMA rules on noise pollution i.e. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. • Where possible the bus stops should be sited at a reasonable distance (200m) from the sensitive receptors	Low	Long term
Air quality	Vehicular emissions such as CO_2 during the operation phase of the project that will be widespread, but will be of concern to the sensitive receptors	• This impact is considered permanent within the context of the current fuel sources for the internal combustion engines that are still the dominant types of motor vehicles on Kenyan roads. This state of affairs is likely to persist in the medium term	Low	Long term
Read Safety	Impacts relate to accidents and	• Initiate road safety awareness within the project area targeting schools,	Medium	Long term

Parameter	Potential negative impact	Mitigation measures	Magnitude	Duration
	incidences involving humans, wildlife and livestock	places of worship and chief's meetings • Install appropriate reflectorized road safety signs along the entire stretch of the road • After careful assessment, introduce speed calming humps at sections that are deemed of critical safety concern like schools and markets		
Population	Strain on available resources Impacts related to potential spread of communicable diseases	• KFS to control cutting down of trees • KWS should be more vigilant in ensuring increased human population does not encroach into Wildlife reserve • Create awareness about communicable diseases especially HIV	Medium	Long term

E1.9 Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) is prepared to show how site specific concerns and mitigation measures are addressed through the construction and operation phases of the project.

The objectives of the ESMP are:

- To bring the project into compliance with applicable national environmental and social legal requirements;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts

In order to ensure the sound development and effective implementation of the ESMP, it was necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project.

The following entities will be involved on the implementation of this ESMP:

- National Environmental Management Authority (NEMA)
- The contractor
- Kenya National Highways Authorities (KeNHA)
- Resident Engineer
- Environmental and social officer
- Kenya Forest Service (KFS)
- Kenya Wildlife Service (KWS)

E1.10 Conclusion and Recommendations

The findings of the Environmental Impact Assessment show that the proposed Malindi-Madogo road has positive impacts that outweigh the potential negatives. Some of the main positives impacts identified include; improved standards of living, security, access to schools and health facilities, aesthetics, promotion of tourism in the Coastal region, growth of towns along the project road among others.

Among the potential negative impacts identified, encroachment of protected/conservation areas such as the Tana River primate reserve, increased sedimentation in water resources and increased wildlife mortality associated with traffic are the high impacts. With proper implementation of the provided mitigation measures, these impacts can be minimized.

The other potential impacts identified are of low and medium intensity. These are also mitigable and most are short term only lasting through the construction phase. The overall conclusion therefore is that the project should proceed and the mitigation measures proposed for the various negative impacts should be implemented at all stages of the project.

SECTION 1

1. INTRODUCTION

1.1 BACKGROUND

Malindi-Madogo Road Project is an international truck road A (7) that is from Malindi to Garsen and a class B road from Garsen to Madogo. It is a major road in the Coastal region of Kenya that is being upgraded to butimen standards by KeNHA that is funded by World Bank The project road meets A3 leading to Nairobi and the Somalian border at 0o29'29.64"S 39o31'45.32E. Currently Malindi to Garsen the road is paved all weather but the condition changes towards Garsen where the road is characterized by potholes. The 91 km section from Garsen to Hola is an earth road which sometimes gets impassable during wet weather.

From Hola to Madogo the road is paved but is generally in poor condition. The section between Hola and Bura is currently not in use and traffic has been diverted away from the original alignment. The normal route is used only during the dry season and the average transit time is 3 – 4 days.

This road is narrow and is well known for trucks plying the Mombasa-Dadaab route to ferry famine relief food.

Picture 1-1: Unpaved road between Garsen and Hola

Picture 1-2: Paved road currently closed between Hola and Bura

1.2 PROJECT OBJECTIVES

The objectives of the Malindi- Madogo road is to:

- Provide a link to the proposed Lamu port
- Provide better connectivity between Garsen, Hola and Bura
- Upgrade Bura link road to bitumen standards
- Boosttourism in coastal areas
- Reduce insecurity

1.3 JUSTIFICATION OF THE PROJECT

The project road has deteriorated considerably. Currently, only a portion of the road of about 230 km is motorable throughout the year. Approximately 100 km the road has been virtually impassable for motor vehicles. The extremely poor access conditions to this part of the country, and the high development potentials have warranted the construction and upgrading of the road.

1.4 EIA OBJECTIVES

1.4.1 Broad Objective

The Malindi - Madogo road project falls in the category of projects listed in the second schedule of the EMCA CAP 387 that require an EIA to be done before their implementation.

This Environmental Impact Assessment (EIA) report has been prepared to identify significant linkages of the road project to the environmental and social settings of the project. The EIA report provides management plans and intervention actions that are based on physical environmental and social features, defined timelines and implementation cost elements. The management actions are also based on design concepts and principles. This EIA report will also be used as a tool to enumerate the anticipated environmental impacts and to evaluate their magnitudes. The report will also suggest the mitigation measures for the identified negative impacts as well as generate an Environmental management and monitoring plan which will inform the process of decision making on the project.

1.4.2 Specific Objectives

- To collect and document environmental and socio – economic baseline data for the project
- To identify potential environmental impacts of the proposed Malindi - Madogo road project
- To assess the significance of these impacts
- To assess the relative importance of the impacts of alternative plans, designs and sites
- To propose mitigation measures for the significant negative impacts of the project on the environment
- To establish appropriate mitigation cost for environmental and social interventions
- To generate baseline data for monitoring and evaluation of the efficiency of those measures being implemented during the projects' cycle
- To present information on the impact of alternatives; and
- Establish environmental and social management and monitoring protocol for implementation.

1.5 JUSTIFICATION OF THE EIA

1.6 PROJECT LOCATION

The project is located in Eastern Kenya and the Coastal region. It crosses two counties i.e. Kilifi and Tana River.

Figure 1-1 : Location of proposed project road

1.7 METHODOLOGY

1.7.1 Desktop study

Literature on the two counties was reviewed in order to get an understanding of the biophysical and social settings within the counties and to get an in depth understanding of the project area. These included published and unpublished literature on bio-physical conditions, socio-economic setting of the project area and legislative and policy framework applicable to the project.

1.7.2 Scoping

Scoping field work was conducted between 23rd and 28th November 2016 to determine the spatial and temporal extent of the boundaries for the EIA as well as the key issues to be addressed in the environmental and social assessment.

1.7.3 Fieldwork and study

1.7.3.1 Field survey

A detailed fieldwork was carried out between 6th to 10th March 2017,11th to 14th June 2017 and 5th to 21st Feburary 2018. This was conducted to have an appraisal of the existing environmental and social conditions in the project area as well as gather data on the key environmental aspects that were identified through the scoping process. The survey was conducted for the entire project area.

1.7.3.2 Field survey techniques

The field survey adopted various techniques of baseline data collection on the existing environmental and social conditions, namely;

- Direct observations and recordings
- Use of checklists for determining potential environmental impacts of the proposed project
- Survey questionnaires
- Discussions with key informants along the road and its vicinity
- Photography and geo-referencing

SECTION 2

2. PROJECT DESCRIPTION

2.1 PROJECT ROAD CURRENT CONDITION

The length of the project road is about 340km of which 80km is unpaved (between Garsen & Hola) while the rest of the road (250km) is paved but in poor conditions. The project road has been subjected to regular pavement washouts caused by seasonal waterways along its alignment which will require a permanent solution.

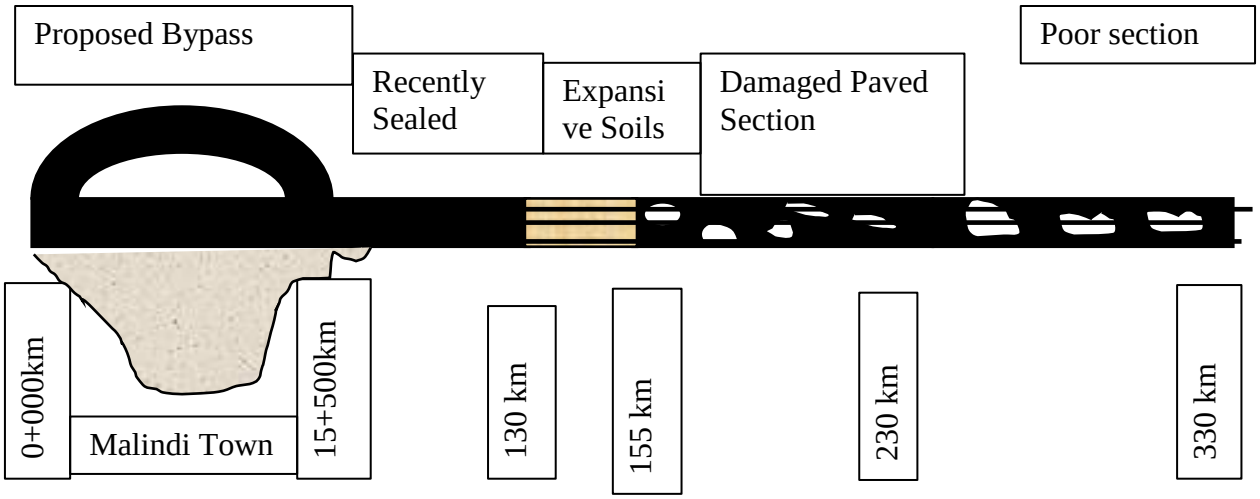
The Government of Kenya is planning to develop Lamu Port as Kenya's second main seaport and the project road is intended to link the Lamu Port to the rest of Kenya. The Government of Kenya therefore intends to rehabilitate and strengthen sections of the road from Malindi Town to Madogo at the junction with the A3 road that are paved but in poor condition and upgrade unpaved sections to bitumen standard. The inventory of estimated sections of the road which will form part of the project are summarised in the following Table:

Ref.	Section	Indicative Road Length (km)		Remarks
		Unpaved	Paved	
1	Malindi Bypass	10	0	Paved – Periodic maintenance
2	Malindi - Garsen Junction	0	103	Unpaved – Upgrade to bitumen standards
3	Garsen - Madogo	80	147	Paved – Periodic maintenance or rehabilitation
	Total	90	250	

Junctions identified in the TOR to be considered for grade separation are listed in the following Table:

Ref.	Location
1	Junction Malindi Bypass with existing A7 South of Malindi
2	Junction Malindi Bypass with existing A7 North of Malindi
3	Garsen junction of B8/A7 and Garsen - Lamu road
4	Madogo junction of B8 and A3

In addition, locations to be considered for heavy truck parking are Garsen and Madogo. Also, grade separated junctions, heavy truck parking, and markets for agricultural produce will be designed at seven locations along the project road.



2.2 PROJECT SCOPE

The Malindi – Madogo road project aims to achieve a rehabilitated pavement able to cater for expected future traffic volumes emanating from Lamu Port and other sources. The assignment will enable the Government of Kenya to obtain cost estimates and bidding documents with which to source funding, and to carry out procurement of the works by international competitive bidding. The assignment will also enable the Government of Kenya to develop the necessary environmental and social safeguards in addition to providing economic viability data.

The Consultant is to perform all work necessary as described in the TOR, including all technical studies, field investigations and related services. The Consultant is to cooperate fully with Government of Kenya agencies and particularly the Ministry of Roads and its subordinate state corporations, the Provincial Administration, the Ministry of Lands, the County Governments (once they are established), and other relevant entities. The Consultant is to provide support services necessary for the completion of the assignment.

The Consultant is to perform all engineering, economic, financial, social and environmental analyses and related work as described in the TOR and necessary to attain the objectives of the assignment.

The Consultant is to maintain close liaison with the Client as the assignment progresses, and is to submit deliverables for approval in accordance with the work programme.

The Table below outlines various road elements both existing and proposed.

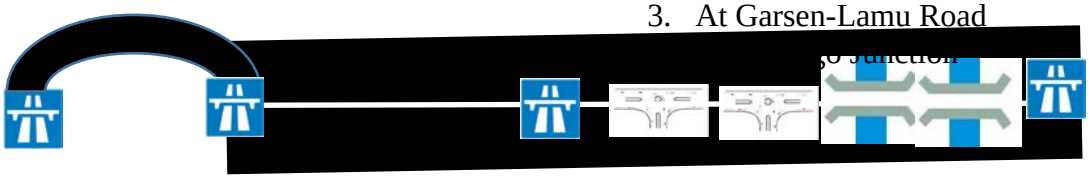
Parameter	Existing	Proposed
Project Road Class	National Link Road B8	
Carriageway	7m	7m
Pavement type	Single Sealed	Bitumen
Shoulders	1.5m Earthen	2.5 Paved
Interchanges		4
Bridges	3	3
Culverts	639	639+291
Towns	13	13
Major junctions	3	3 Chanelization
Bus bays	Some	26 +Bus shelter
Truck layby		3

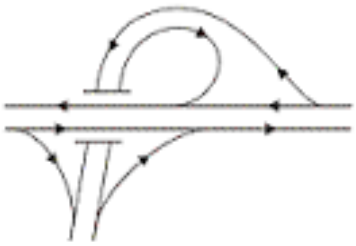
2.3 DESIGN GUIDELINES

- 2m-4m-Edge Marker Posts
- More 4m Guardrail-Metal crash Beam
- Raising of Road in Flat Areas – Flooding Areas
- Urban Drains and Service Roads in towns

2.4 BRIDGES AND INTERCHANGES

1. At starting of Malindi bypass –Sabaki
2. Ending of Bypass
3. At Garsen-Lamu Road





Truck layby's
1.Garsen

2.Madogo

Junctions
1.Garsen

2.Hola

Figure 2-1 : Proposed Interchange Layout

2.5 STRUCTURES

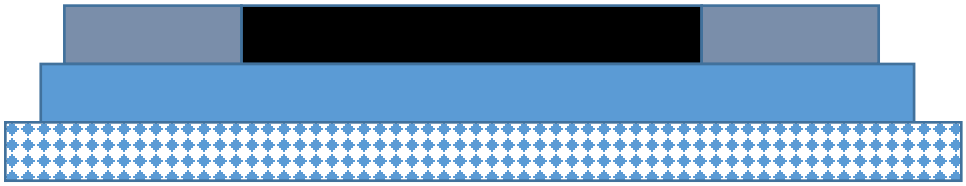
S.No	Type of Structures	Existing	Replace	New
1	Major Bridges	3	2	
2	Box culverts	33	33	10
3	Pipe Culverts	606	100	148
	Total	642	535	158

2.6 PAVEMENT DESIGN

Double Sealing

Bitumen Concrete

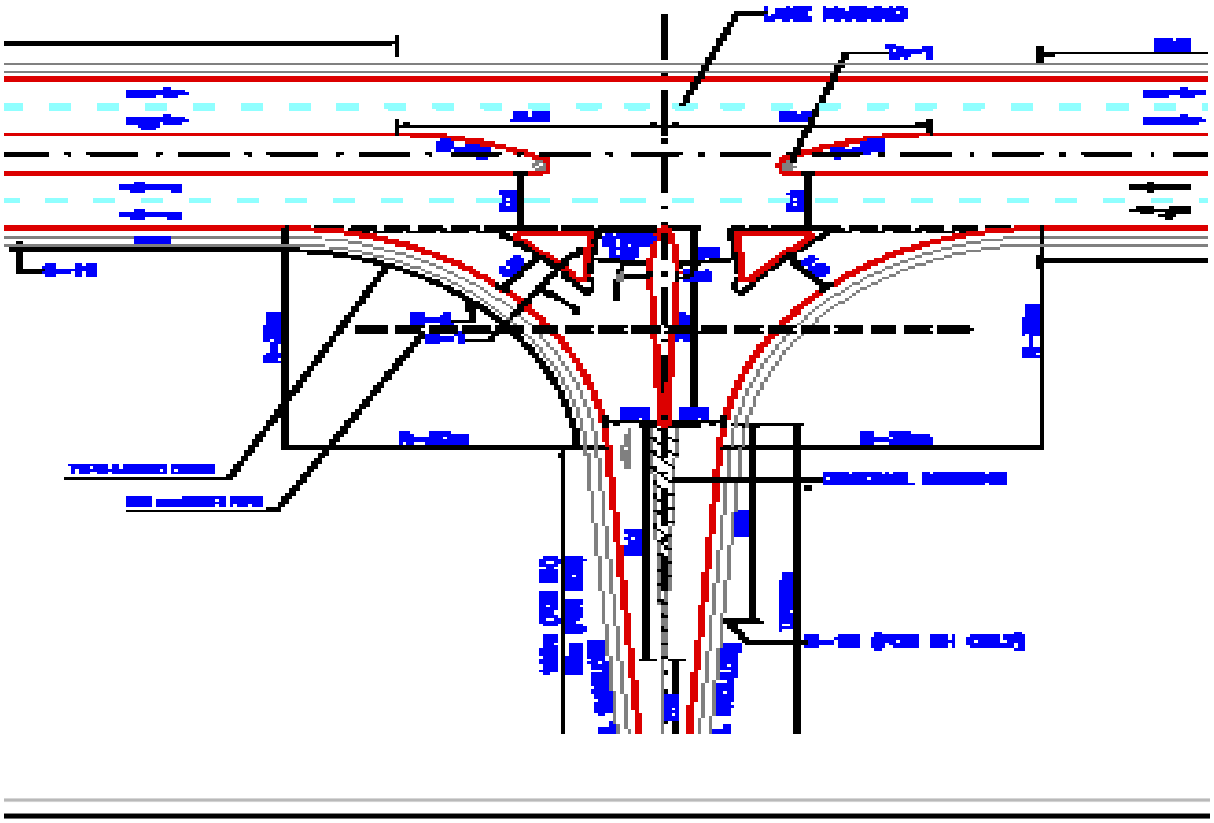
Double Sealing

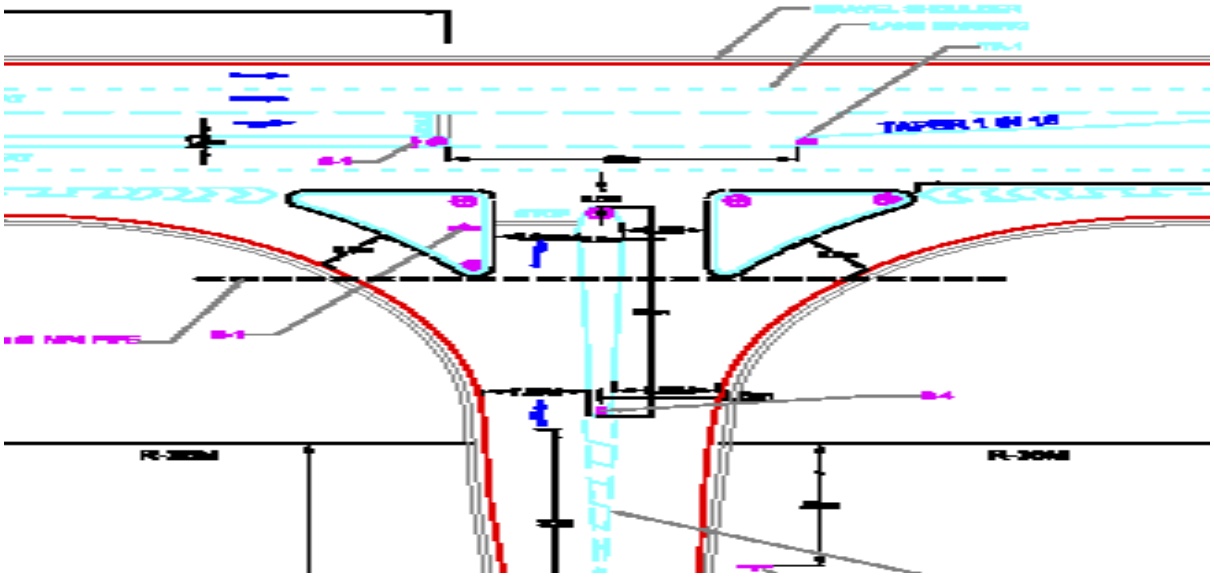


GSB

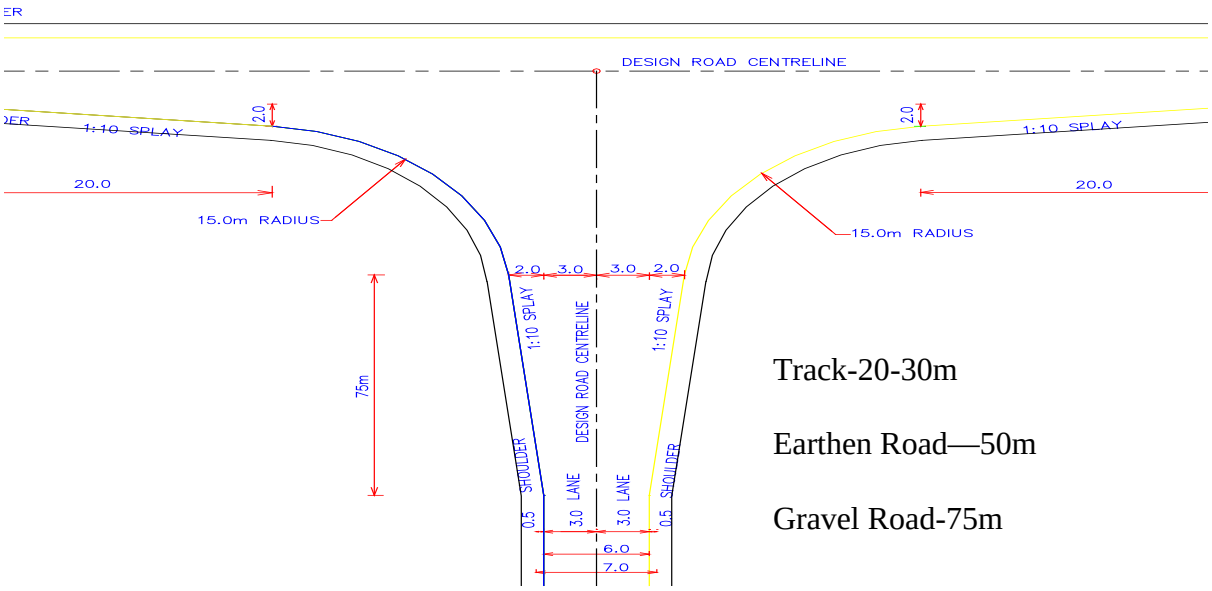
Crushed Base

2.7 JUNCTIONS AND INTERSECTIONS

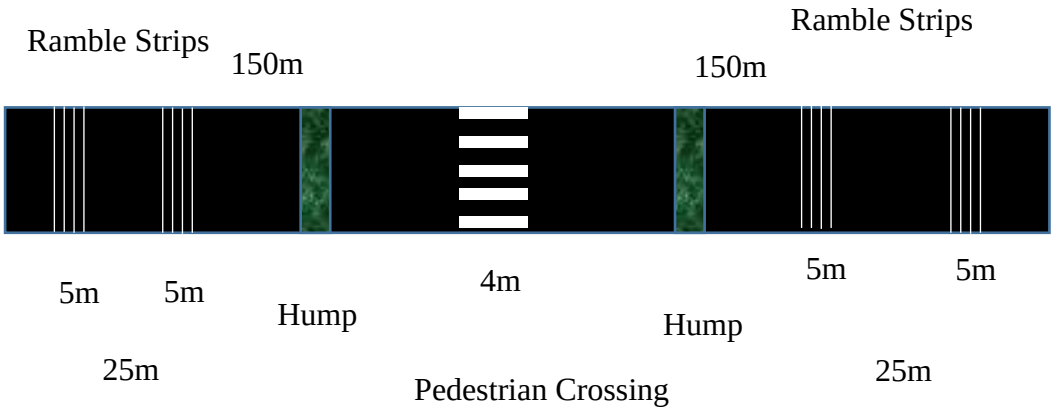




2.8 ACCESS ROADS



2.9 TOWN ROAD HUMPS AND RUMBLE DESIGN



2.10 BUS BAYS AND BUS SHELTERS

S.No	Town Name	Bus bays
1	Membrui	2
2	Maanaheri	2
3	Gongini	2
4	Fundisa Kibaoi	2
5	Marereni	2
6	Kanagoni	2
7	Hurara	2

S.No	Town Name	Bus bays
8	Majira	2
9	Garsen	2
10	Hola jn	2
11	Bura jn	2
12	BilBil	2
13	Cardende	2

2.11 TRAFFIC

The Malindi-Garsen-Madogo Road is currently single carriageway (2x1) road that was constructed to bitumen standards but has deteriorated over time. The road is currently under scheduled routine maintenance, where pot hole patching, crack repairs, bush clearing and drainage of culverts are undertaken to ensure the road is passable. The section stretching from Malindi to Garsen Town Junction through Mininjila (Lamu Junction) is in fair condition and can accommodate speeds of up to 100 km/hr. on is flat and mostly straight alignment.

The section from Garsen to Hola has alternating fair and poor sections and can accommodate normal speeds in the range of 60-80km on a flat and mostly straight alignment. The section from Hola Junction to Jeridende Trading Centre is dilapidated (totally worn-out), with near knee deep potholes and is currently avoided by most motorists, who opt to use earth roads engineered in a parallel formation to the main alignment.

The section from Jeridende Trading Centre to Madogo junction is in poor condition and is characterised by large potholes and worn-out shoulders. This section accommodates average normal driving speeds in the range of 30-60km/hr.

The A7/B8 road functions as a major rural trunk road, linking the port of Mombasa and Lamu to key coastal towns and other towns in the Northern Eastern, Eastern parts of Kenya and Kenya at large. The section at the Airport gate has a dual carriageway. The Airport road is experiencing major traffic delays due to the congestion caused by poor road condition.

2.12 ALIGNMENT

The terrain traversed by the project road changes from fairly fertile land for the first half of the road to arid desert for the second half towards Madogo and Garissa.

Fertile Section near Malindi

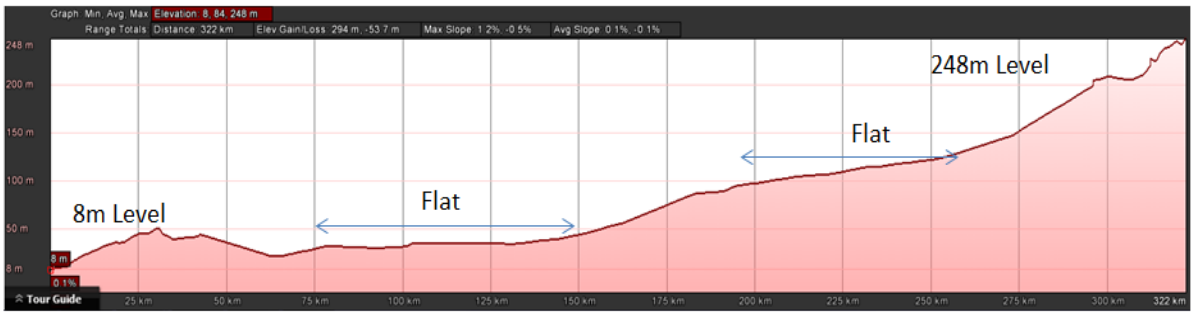
Middle section of Project Road

Arid Dry area near Madogo

The existing road is in fairly poor condition which could be due to a few reasons such as, weak subgrade, use of marginal material, insufficient drainage facilities, overloaded vehicles and lack of maintenance. This consultancy will consider all aspects of failure to understand the issues and ensure the proposed road has the capacity to achieve its design life.

The longitudinal elevation starting at Malindi at around 8m above sea level gently rises to around 248m above sea level at Madogo. There are a few flat areas which will need careful attention from a drainage design aspect.

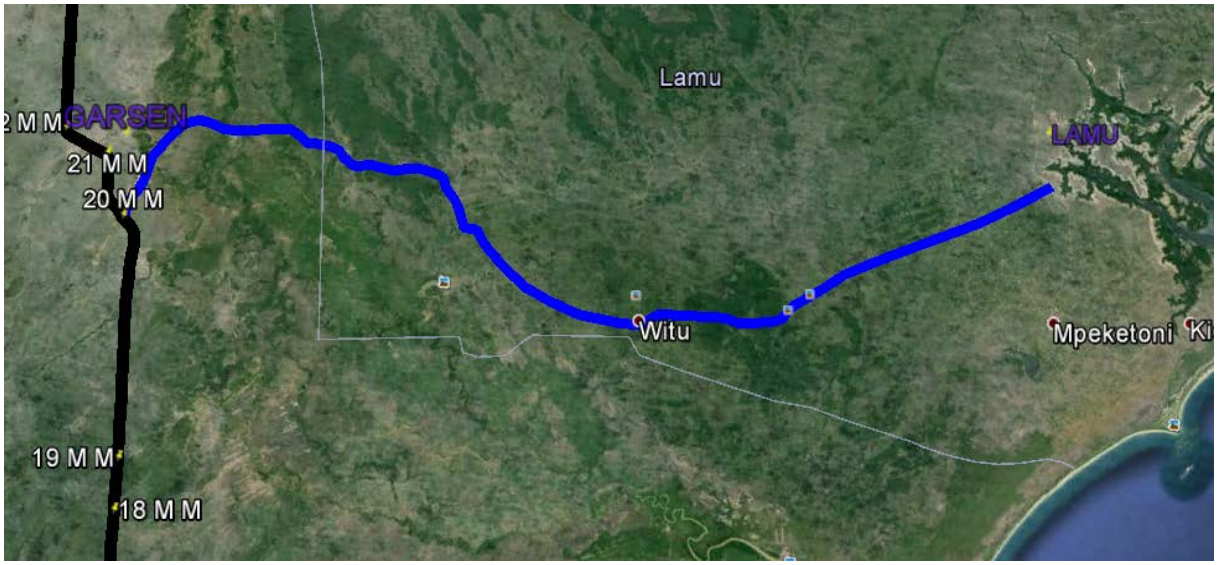
Figure 2-2 : Longitudinal elevation is represented in the diagram below:



2.13 DESIGNING FOR THE FUTURE

The main development expected in the near future is the port at Lamu. This will incorporate a highway from Lamu to Garsen and will have a significant impact on the traffic forecasts for the Project Road.

Understanding the development and discussions with the relevant stakeholders will ensure that the project road is adequately designed for this impact.



2.14 STRUCTURES AND BRIDGES

The project road forms part of the road corridor linking the port of Mombasa to the north eastern region of the country and further afield to Ethiopia and South Sudan.

At various points along the existing road, crossing structures including pipe and box culverts, and bridges are found. In accordance with the Terms of Reference, the Consultant has carried out an assessment, of the existing structures, to determine their functional adequacy for passage of the traffic expected on the road as a result of the proposed improvements.

A complimentary assessment of the hydraulic adequacy of the existing drainage crossing structures has been undertaken and is presented as a separate part of this preliminary design report. On the basis of this assessment, a decision to retain or replace some or all of the structures has been made.

2.15 QUANTITIES AND COST ESTIMATES

As far as possible, the cost estimation methodology for Malindi-Garsen-Hola-Madogo Road followed the conventional approach for estimating road project costs earmarked for rehabilitation and upgrading works. Malindi-Garsen-Hola-Madogo Road project is about 339.2km in length and includes Malindi bypass component measuring about 9.1Km.

For purpose of implementation of Construction works, the road has been packaged in three contracts each contract priced separately. i. Contract 1 starts from Km 0+000 to km 95+000 and includes overpasses within Malindi town and Malindi Bypass road which is 8.9km. The total length of Contract 1 is about 103.9km. ii. Contract 2 starts from Km 95+000 to km 215+000. The total length of Contract 2 is about 120Km. Contract 2 includes Minjila Interchange and Minjila Roadside Amenity Area iii. Contract 3 starts from km 215+000 to km 334+613. The total length of Contract 3 is about 119.613km. Contract 2 includes Madogo Interchange and Madogo Roadside Amenity Area.

The estimated contract period for each of the three contracts is 36 months (running concurrently).

Cost estimates have been produced from first principles, based on analysis of December 2008 to March 2010 quoted material, equipment and labour rates. These rates have been adjusted using price escalation factor determined from price indices obtained from the National Bureau of Standards, Ministry of Planning from January 2010 to March 2017.

From the foregoing cost estimates, the estimated construction cost, including financial and physical contingencies, per kilometre of the Contract 1 section of proposed road, is shown in Table 2-1.

Table 2-1: Cost per kilometres for the 3 contract packages

Contract 1	Construction Cost plus Contingencies (KSHS)	Length (km)	Cost per km. (KSHS)
Contract 1	10,600,805,898.0044	95.000	111,587,430.51
Contract1: Malindi Bypass	1,248,372,993.52	8.900	140,266,628.48
Contract 2	12,320,799,458.03	120.000	102,673,328.82
Contract 3	12,483,238,785.64	119.613	104,363,562.37

From analysis of the Bills making up the Total Construction Cost Estimate, it can be seen that the pavement costs obtained by totalling of the costs of Bills Nos. 12, 13, 14, 15 and 16 represent 45.60%, 43.76%, 45.35%, 44.61% of the Total Contract Cost (TCC) for Contract 1, Malindi bypass, Contract 2 and 3 respectively. Earthwork is second most expensive Bill Item, constituting approximately 22.13%, 32.42%, 23.62%, 23.24% of the total contract cost for contracts 1, Malindi bypass, contract 2 and 3 in the same order.

SECTION 3

3. PROJECT ALTERNATIVES

The proposed road project A7 and B8 will follow the existing alignment. However, as for the bypass, two different sections were surveyed. One is on an existing road and the other is an entirely new road. They have been discussed below;

3.1.1 Alternative 1

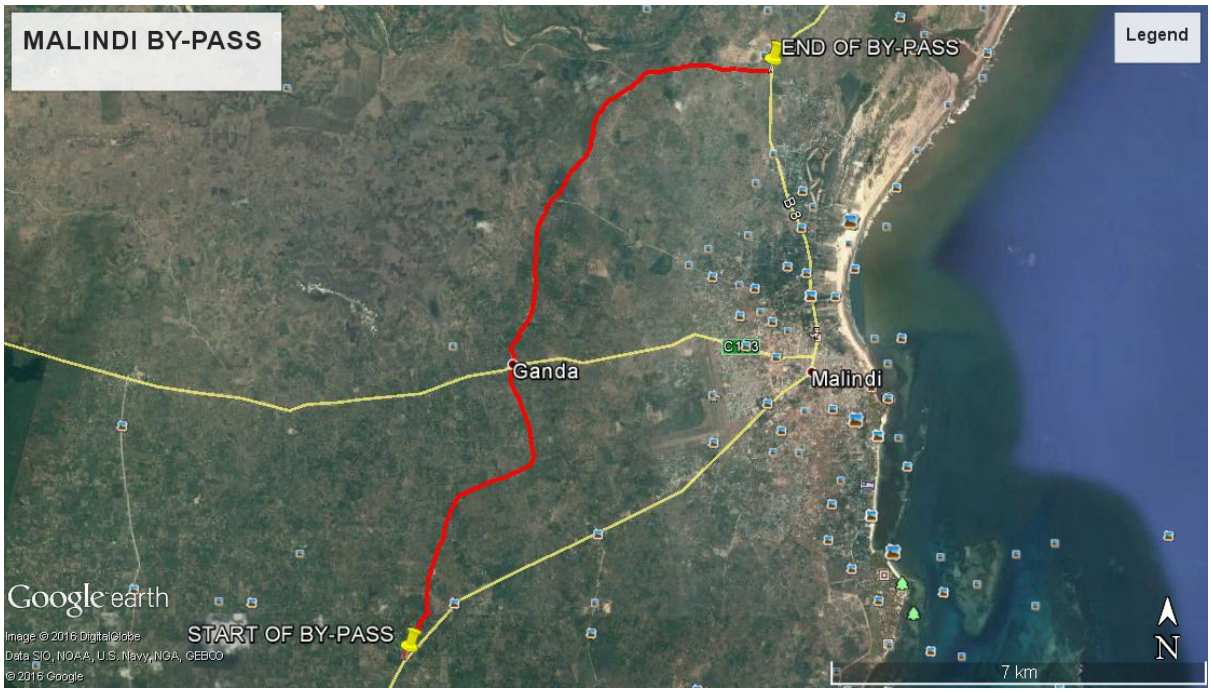
The first bypass alternative is on an existing road and its 15.6km long. It passes through four established small/medium sized settlements (Msabaha, Ganda, Majivuni and Sabaki). Of these settlements, Ganda would be most affected by the imposition of a road reserve width of 60m along the existing road.

There is also a length of 2.3 kms of this existing gravel road which is confined between 2-2.5m high stone walls on both sides of the road (passing through mango plantations) which would need to be demolished, and probably re-constructed as accommodation works, together with the payment of compensation for the land and income lost by the construction of the road and purchase of the 60m wide road reserve width required. Existing intermittent ribbon developments would also be affected.

Picture 3-1: Ganda

Picture 3-2: Section of the bypass with stone walls

Figure 3-1: Bypass alternative 1



3.1.2 Alternative 2

The second alternative is an entirely new road, 9.15km long and whose alignment crosses farmlands and grazing fields. This will therefore warrant for land acquisition and compensation especially for the mango and cashew nut plantations identified. Using a 40m corridor, a total of 39ha. of land will be cleared of vegetation. Out of this approximately 450 trees will be lost.

Picture 3-3: Mango plantation

Picture 3-4: Farm

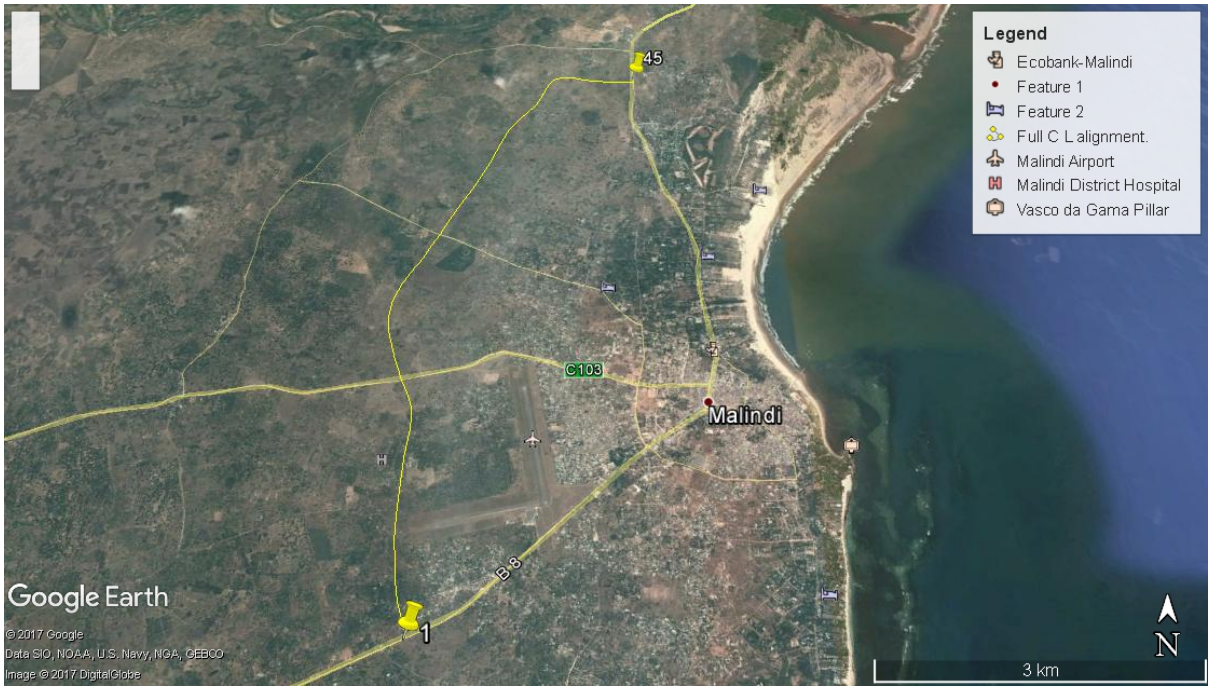


Figure 3-2: Bypass alternative 2

Assessing Environmental Impact Implications of the Bypass alternatives

Criteria	Score	Description
Nature of impact	-	If impact is perceived to be negative
	+	If impact is perceived to be positive
Magnitude of impact	0	No impact or uncertain impact
	-1	Low negative impact
	-2	Medium impact
	-3	High impact
Possibility of mitigation	0	Uncertain
	+1	Minimal Mitigation is possible
	+2	Mitigation can reduce the magnitude of impacts to about half
	+3	Full mitigation is possible

A rapid Environmental Impact Assessment was done on the two alternatives in order to rank them according to the magnitude of the impacts as shown in the Table below,.
The scores are integrated to guide in recommending the best bypass option from an environmental perspective.

	Alternative 1 (Msabaha-Ganda –Sabaki bypass)				Alternative 2 (Malindi Airport bypass)			
ENVIRONMENTAL ISSUE	Description	Nature of impact	Magnitude of impact	Possibility for mitigation	Description	Nature of impact	Magnitude of impact	Possibility for mitigation
Loss of vegetation	• Considering that there are 4 settlements along the bypass, vegetation clearance would be comparatively lower to the second bypass • Approximately 400 trees are to be cut along the 15km stretch	-	-2	+2	• More vegetation will be cleared since the road will be replacing farmlands • Approximately 450 trees are to be cut along the 9km stretch	-	-3	+2
Land degradation /Soil erosion	• Compared to the *Alternative 2*, overall earthworks will be less since alternative 1 has an existing road • The expected soil erosion during construction will be proportional to the expected earthworks • The area has a fairly flat terrain therefore soil erosion will be low as runoff from paved surface would easily soak into the adjacent soil an existing gravel road	-	-2	+2	• Massive earthworks will be required on the virgin lands to clear the project footprint • Subject to the expected major earthworks, soil erosion will be higher than Alternative 1 • However, just like Alternative 1, comparatively gentler terrain in most places imply soil erosion will be low as runoff from paved surface would easily soak into the adjacent soil.	-	-3	+1
Noise and vibration	• This road is along a built up area with 4 major towns, 3 mosques, 9 schools and a hospital within 100m from the road hence noise from construction will affect	-	-3	+1	• The alignment mostly has farms with very few settlements within 500m from the alignment with only one temporary nursery school following within 100m of the road	-	-1	+3

	these sensitive receptors • The number of sensitive receptors are higher in this alternative				• The number of sensitive receptors are lower in this alternative			
Particulate matter	• Dust arising due to construction activities may affect the sensitive receptors along the road	-	-3	+1	• The dust caused by construction will affect the temporary nursery school that is within 100m of the road	-	-1	+3
Drainage and impacts	• Since this alternative largely follows the current alignment, the 10 new drainage channels will have lower impacts	-	-2	+2	• New alignments and 12 new drainage channels could affect agricultural fields below the drainage discharge points	-	-3	+2
Aggregate			-12	8			-11	11

3.2 ENVIRONMENTAL COST

3.2.1 Vegetation

The first alternative follows an existing road. The 60m road reserve will require removal of an estimated 400 mature indigenous, exotic and fruit trees. This include; baobab (*Adansonia digitata*), *Senna siamea, Azadirachta indica, Croton megalocarpus, Polyalthia longifolia* and *Bombax rhodognaphalon.* In addition there are tree crops that will be affected mainly mangoes, coconut trees, cashewnut (*Anacardium occidentale).* Out of the 400 mature trees that will be cut down approximately 80 are located on private land majority of which are adjacent to the 2.3km boundary wall.

The second alternative will be an entirely new road. The road crosses farmlands and grazing fields. Crops in these farms consist of fruit trees such as cashew nuts-*Anacardium occidentale,* mangoes-*Mangifera indica*. Coconut-*Cocos nucifera,* lemon-*Citrus limon,* pawpaw-*Asimina triloba* and sugar apple-*Annona squamosa* and other trees such as *Casuarina equisetifolia*, Neem (*Azadirachta indica)* and *Croton* spp, *Delonix regia, Leucaena leucocephala,* Baobab *(Adansonia digitata).* The bypass is 9.145 km long and a corridor of 60m thus a total of 55 ha. of land will be cleared of vegetation. Out of this approximately 450 trees will be lost.

Below is the tabulation of costs relating to loss of trees and their compensation costs.

Total cost per tree;

Item /service	Cost
Seedling	150
Digging the seedling a hole	50
Protection(stakes, Chain-link, nails, labour)	420
Manure	50
Transportation	50
Purchase of water and watering of the seedling	600
Contractor's margin (30%)	400
Total	1,720

Alternative 1

Compensatory tree planting

Compensatory tree planting along the 15 km stretch at 8m spacing on both sides totalling 3750 seedlings. Total cost per tree 1,720. **Total cost; 3750*1720 = 6,450,000**

Alternative 2

Compensatory tree planting

Compensatory tree planting along the 9.145 km stretch at 8m spacing on both sides totalling to 2500 trees. Total cost per tree 1,720. **Total cost; 2500*1720= 4,375,000**

Summary

Item	Alternative 1 (Msabaha – Ganda-Sabaki bypass)	Alternative 2 (Malindi Airport bypass)
Compensatory tree planting	6,450,000	4,300,000
Support for boundary tree buffer for sensitive receptors	1,261,000	97,000
Total	7,711,000	4,397,000

3.2.2 Noise and vibration

Construction noise

The first alternative: Sensitive receptors to noise and vibration along the Msabaha –Ganda-Sabaki road were 13 i.e. 9 learning institutions, 3 mosques and 1 dispensary while;

The second alternative did not have any sensitive receptors near the proposed alignment expect for a temporary nursery school.
During construction, noise generating activities such as equipment operations and the workers themselves could be a public nuisance to nearby settlements and commercial centres, health centres and schools especially those within 200m of the road reserve. Considering the number of sensitive receptors adjacent to these two options, this impact will be comparatively higher in alternative 1 than alternative 2.

Operation noise

During operation phase traffic noise is dependent on the traffic volumes. Upon completion, traffic noise will increase from the current level in alternative 1 while alternative 2, which currently has no traffic will have new traffic noise. However, alternative 2 has only one sensitive noise receptor so impact will be considerably low.

Road Maintenance; requires the use of heavy machinery, and although these activities may be intermittent and localized, they nevertheless contribute tremendous amounts of sustained noise during equipment operation. As in traffic noise the impacts relate to presence of sensitive receptors like schools and hospitals.

Mitigation measures

One way of mitigating noise impact is by establishing a screen along the ROW boundary adjacent to the sensitive receptor. Trees planted at close spacing have been demonstrated to substantially buffer traffic noise. It is proposed that traffic noise and dust that could impact on learning institutions, religious centres and health centres be buffered by boundary trees. The types of tree species recommended are;

Polyalthia longifolia : hedge planting: should be planted at 1 m within row spacing in three rows in a staggered pattern to form complete buffer. Ashoka is a suiTable noise barrier since the foliage covers the whole stem from foot to tip. It grows locally in Malindi hence suiTable for this purpose. The only disadvantage is that it is slow growing tree that takes about 4 years to mature.

Azadirachta indica : should be planted at least 3 m spacing. Neem tree is a hardy plant that grows in the project area. It is also a passive absorber of noise.

Below is a tabulation of boundary tree buffer costs for sensitive receptors based on Ashoka hedge and neem tree.

Item	Alternative 1 (Msabaha –Ganda-Sabaki bypass)		Alternative 2 (Malindi Airport bypass)	
	Sensitive receptor	Cost	Sensitive receptor	Cost
Support for boundary tree buffer estimated average support of Sh. 97,000 per institution.	Mosque (3)	291,000	Mosque (0)	-
	School (9)	873,000	School (1)	97,000
	Hospital (1)	97,000	Hospital (0)	-
Total		1,261,000		97,000

3.2.3 Particulate Matter (PM)

The first alternative is an existing dirt road and therefore particulate matter or fugitive dust levels are already high. A total of 13 sensitive receptors to air pollution were identified i.e. 9 learning institutions, 3 mosques and 1 dispensary are along alternative 1. Construction related dust could affect these institutions. The alternative bypass will therefore require more dust suppression than alternative 2.

The second alternative does not have any sensitive receptors except for a temporary nursery school within 100 m of the new road.

The net traffic emissions projections for both alternatives are similar so this is not discussed further.

Estimated cost of suppressing dust is provided in the Table below:

Item	Alternative 1 (Msabaha – Ganda-Sabaki bypass)	Alternative 2 (Malindi Airport bypass)
No. of water tankers needed	5	3
Hire water tanker per day	18,000	18,000
Estimated days for construction	205	125
Total	18,450,000	6,750,000

3.2.4 Soil protection and drainage

Due to potential land degradation at the cross-drainage outfalls, it is suggested that the velocity of water be dissipated and the adjacent land stabilized using deep-rooted plants such as bamboo. In some cases these measures may require easement of land to allow planting of protective vegetation as suggested. The estimated costs of protecting the outfalls are presented in the Table below and are based on planting bamboo.

Item	Alternative 1: Msabaha – Ganda - Sabaki bypass	Alternative 2: Airport bypass
Number of drainages	10	12
Number of bamboo seedlings	500	600
Cost for bamboo seedlings	535,000	642,000

3.2.5 Summary

Below is the summary of environmental cost comparison of the two alternatives.

Environmental issue	Alternative 1: Msabaha – Ganda - Sabaki bypass	Alternative 2: Airport bypass
Vegetation	6,450,000	4,300,000
Noise and vibration	1,261,000	97,000
Particulate matter	18,450,000	6,750,000
Drainage	535,000	642,000
Total cost	26,696,000	11,789,000

From the analysis above Alternative 2 is more environmentally favourable. Decision on the best option should therefore consider all other factors including socio-economic benefits, engineering and transport economic considerations hence project will be implemented with strict adherence to the mitigation measures for either of the alternatives.

Environmental issue	Short Bypass	Long bypass	Malindi-Minjila	Minjila junction-Km 215	Km 215-Madogo
Vegetation	4,300,000	6,450,000	10,750,000	8,600,000	5,160,000
Noise and vibration	97,000	1,261,000	2,198,666	2,198,666	2,198,666
Particulate matter	6,750,000	18,450,000	72,912,000	72,912,000	72,912,000
Drainage	642,000	535,000	825,600	825,600	825,600
Total cost	11,789,000	26,696,000	86,686,266	84,536,266	81,096,266

The environmental and social costs of the two alternatives have been compared in the Table below

Cost	Alternative 1	Alternative 2
Compensatory tree planting	6,450,000	4,300,000
Support for boundary tree buffer for sensitive receptors	1,261,000	97,000
Compensation and land acquisition	516,800,000	499,400,000
Total	524,511,000	503,797,000

SECTION 4

4. POLICY, LEGAL AND REGULATORY FRAMEWORK

4.1 CONSTITUTION OF KENYA

Environmental rights and freedoms which are presented in Chapter 5 Article 42 of the Kenyan constitution, states: Every person 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, particularly those contemplated in Article 69; and to have obligations relating to the environment fulfilled under Article 70.11.
The construction of the road should aim at protecting the environment from degradation that could be attributed to the road works and during its operation.

4.2 LEGAL FRAMEWORK

4.2.1 Environmental Management and Coordination Act, 1999 (Revised 2015)

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

4.2.1.1 Environmental (Impact Assessment and Audit) Regulations, 2003

These regulations are made under section 147 of the Environmental Management and Co-ordination Act, and contain rules relative to content and procedures of an environmental impact assessment in the sense of section 58 of the Act. They also contain rules relative to environmental impact audit and monitoring and strategic environmental assessment and regulate some other matters such as appeal and registration of information regarding environmental impact assessment.
It states in Regulation 3 that "These Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act.
Road construction is listed in the second schedule of the EMCA, 1999 as one of the projects that must undergo an EIA prior to its commencement.

4.2.1.2 Environmental Management and coordination Act (Waste Management) regulations 2006

The regulations are found under sections 92 and 147 of the Environmental Management and Coordination Act 1999. These regulations outline requirements for handling, storing, transporting and treatment/disposal of all waste categories including industrial waste, hazardous and toxic waste, pesticides and toxic substances, biomedical wastes and radioactive substances.
Construction of the road is likely to generate waste from the construction process as well as waste generated by construction workers. The proponent shall ensure that waste disposal sites are properly designated for all the waste generated from the construction site.

4.2.1.3 Environmental Management and coordination Act (Water Quality) Regulations, 2006

The regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The objective of the regulations is to protect human health and the environment. The regulations also provide guidelines and standards for discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment.
This will be relevant anytime there is a discharge of effluent into the environment to ensure that the effluent meets the specified standards before discharge to the water bodies in the project area. The

proponent in liaison with the contractor will ensure that the effluent is treated as per the specified guidelines before it is discharged into any of the water bodies around the project area.

4.2.1.4 Environmental Management and coordination Act (Air Quality) Regulations, 200

Under the general prohibitions (Part II), section 5 states that no person shall act in a way that directly or indirectly causes immediate or subsequent air pollution. Among the prohibitions are priority air pollutants (as listed under schedule 2 of the regulations) that include general pollutants, mobile sources and greenhouse gases. Odours are also prohibited under section 9 of the regulations (offensive emissions). Emissions into controlled areas such as schools, hospitals, residential areas and populated urban centres are also prohibited. Other sources recognized at sections 32 and 33 are those arising from construction equipment and materials as well as particulate matter from demolitions of structures and buildings as well as stockpiled dry materials.
The requirements of this regulation will be relevant during the construction phase when the generation of particulate matter (PM) and emission of noxious and greenhouse gases such as CO_2, CO are anticipated.

4.2.1.5 Environmental Management and coordination Act (Noise and Excessive Vibration) Regulations, 2009

This law has given general prohibitions on excessive vibrations, and permissible noise levels. It gives provision related to noise from certain sources such as from motor vehicle, construction at night and noise, excessive vibrations from construction, demolition, mining or quarrying sites.
The project will require reference to this section because of the machines and vehicles used in the construction phase as well as vehicles using the road in the operational phase.

4.2.1.6 Environmental Management and coordination Act (Fossil Fuel Emission Control) Regulations, 2006

These regulations are contained in the Legal Notice No. 131 of the Kenya Gazette Supplement no. 74, October 2006. Apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnership to control fossil fuel emissions used by the contractor.
The fossil fuels in this context are petrol, diesel and kerosene that will be used during the construction of the road. These will be combusted and emitted from the machines and construction vehicles used during the construction of the road. Other emission sources include the vehicles that will be using the road as a result of diverted traffic.

4.2.1.7 Environmental Management and coordination Act (Conservation of Biological Diversity) Regulations, 2006

Part II of the Regulations provides for the conservation of biological diversity through the requirement of an environmental impact assessment for persons who engage in activities that may potentially have an adverse impact on the environment, propose to introduce exotic species in Kenya or unsustainable use of natural resources. These regulations apply to conservation of biodiversity which includes conservation of threatened species, inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

4.2.1.8 Environmental Management and coordination Act (Wetlands, riverbanks, lakeshores and sea shore management) Regulations, 2009

These regulations include management of wetlands, wetland resources, river banks, lake shores and sea shores.
Part II on management of wetlands and wetland resources states that the objectives of the regulations is to provide for the conservation and sustainable use of wetlands and their resources in Kenya to ensure the protection of wetlands as habitats for species of fauna and flora and also to prevent and control pollution and siltation of wetlands.

Part II 5(1) on principles of management of wetlands part 1(b) states that an EIA and EA as required under the Act shall be mandatory for all activities likely to have an adverse impact on the wetland.
Part IV 21(1) states that a developer intending to a undertake a project which may have a significant impact on a wetland, river bank, lake shore or the sea shore shall carry out an environmental impact assessment in accordance with the provisions of the Act.
There are specific sections that apply to the wetlands and rivers banks and these are found within the project area.

4.2.2 The Water Act 2016

This is an Act of Parliament to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services. Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. The control and right to use water is exercised by the Minister administering the Act, and such use can only be acquired under the provisions of the Act. The Minister is also vested with the duty to promote investigations, conserve and properly use water throughout Kenya. Water permits may be acquired for a range of purposes, including abstraction for roads construction.
It will be relevant during abstraction and use of water from rivers within the project area during construction of the road.

4.2.3 Occupational Safety and Health Act, 2007

This Act applies to all workplaces and workers associated with it; whether temporary or permanent. The main aim of the Act is to safeguard the safety, health and welfare of workers and non-workers. It is thus recommended that all Sections of the Act related to this project, such as provision of protective clothing, clean water, and insurance cover are observed so as to protect all from work related injuries or other health hazards.
The Act will apply directly at all work areas and to all the construction workers as appropriate.

4.2.4 Public Health Act CAP 242, 2012

Part IX Section 115 of the Act states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a watercourse is deemed as a nuisance.
Section 118(c) state that any street, road or any part either street or road that is constructed if in the opinion of the medical officer of health is deemed to be offensive or to be injurious or dangerous to health then it is a nuisance liable to be dealt with in the manner provided for in the Act.
The act will be relevant since it will act as a guideline in ensuring that appropriate measures will be taken in accordance to the Act in order to safeguard the health of project workers and the general public within the project area.

4.2.5 Physical Planning Act CAP 286, 2010

Section 29 of the Act empowers the County Government to reserve and maintain all land planned for open spaces, parks, urban forests and green-belts. The same Section allows for prohibition or control of the use and development of such an area. Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development approval granted by the respective County Government.
Since the project will pass through different counties, this Act will be relevant in consultation with the Physical planning departments of the counties.

4.2.6 Traffic Act CAP 403, 2014

This Act emphasizes that motor vehicles use appropriate fuel. The Traffic Regulations in the Act specify that all the vehicles are required to be well constructed, maintained and used so as not to emit any smoke or visible vapor. This Act also consolidates the laws relating to traffic on all public

roads. It also prohibits the encroachment on and damage of roads including land reserved for roads. It also allows the Highway authority the jurisdiction to close the road while carrying out construction works.
The proposed project is essentially under the provision of this Act.

4.2.7 Public Roads and roads of Access Act CAP 399, 2010

This is an Act of Parliament which provides legal guidance on roads of public travel and access to public roads. Section 8 and 9 of the Act provides for the dedication, conservation or alignment of public travel lines including construction of access roads adjacent to lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on adjacent land owners seeking permission to construct the respective roads. Public meetings should be held for purposes of public consultations and notifications before implementing a road project.
Elaborate public consultations will be required during the planning and design stages and all stages of implementation.

4.2.8 Lands Act CAP 280, 2015

This is an act of Parliament that gives effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources.
In situations where private and public land will be required for the project then reference shall be made to the Act.

4.2.9 Work Injury Compensation Benefits Act, 2007

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

4.2.10 The HIV Prevention and Control Act 2006

The Act creates public awareness on causes, modes of transmission, consequences and means of prevention and control of HIV and AIDS. It protects the rights of the infected and affected and outlaws discrimination in all its forms against persons living with HIV and AIDS or those perceived or suspected to have HIV and AIDS.
Reference should be made in this act to prevent discrimination of people infected with HIV and also create awareness to prevent the spread of HIV

4.2.11 Sexual Offences Act CAP 62, 2006

An Act of Parliament to make provision about sexual offences, their definition, prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes.
This applies to the construction workers who may be tempted to engage in unwanted sexual acts.

4.2.12 Kenyan Roads Act CAP 408, 2012

This is an Act of Parliament which provides for the establishment of the Kenya National Highways Authority (KeNHA), the Kenya Urban Roads Authority (KURA) and the Kenya Rural Roads Authority (KeRRA). It also provides for the powers and functions of the authorities.
The Act legitimizes the proponent to undertake the project and to observe all provisions of relevant laws.

4.2.13 National Land Commissions Act CAP 5D, 2012

This is an act of Parliament which makes further provisions as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the Commission. It also gives effect to the objects and principles of devolved government in land management and administration.

4.2.14 Registration of Titles Act CAP 281, 2010

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

4.2.15 The Wildlife Conservation and Management Act CAP 376, 2013

This Act provides for the protection, conservation and management of wildlife in Kenya. The Act deals with areas declared as National Parks, under the Act. The Act controls activities within the park, which may lead to the disturbance of animals. Further the Act protects wildlife outside the parks. The Act prohibits killing of wildlife for any purpose whatsoever unless authorized by the KWS.
There are a wide variety of wildlife within the project area and a primate reserve for which implementation of this Act will be relevant.

4.2.16 Agriculture Act

This Act has the stated objectives to promote and sustain agricultural production, provide for the conservation of the soil and its fertility, and stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry. Authorized officers are empowered to prohibit the clearing of vegetation and the grazing of livestock and to require the planting of trees to protect the soil from erosion, as well as to impose penalties under the Act.
The Act is relevant for soil conservation relating to earthworks and material sites.

4.2.17 Intergovernmental Relations Act, 2012

An Act of Parliament to establish a framework for consultation and cooperation between the national and county governments and amongst county governments; to establish mechanisms for the resolution of intergovernmental disputes pursuant to Articles 6 and 189 of the Constitution.
Since the project passes through two different counties there will be need for wide consultations between the national and county governments on the project.

4.2.18 County Government Act No. 17 Revised 2014 (2012)

An Act of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services.
Consultations with the respective county governments will be needed and maintained throughout the implementation of the project.

4.3 NATIONAL POLICIES

4.3.1 Kenya Vision 2030

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

4.3.2 National Environmental Policy, 2013

This policy aims to protect the environment. Section 5.6 on Infrastructural Development and Environment 5.6.1 states that Infrastructural development includes among others buildings, roads, ports, railways, ICT, pipelines, irrigation systems, airports and electricity transmission. This section also emphasizes that the environment aspects of such infrastructural developments are distinct and

unique such as effects on flora and fauna, social and psychological disruption, vegetation clearance, excavation works and spillages during construction. This policy states that the government will:

- Ensure Strategic Environmental Assessment (SEA), Environmental Impact Assessment, Social Impact Assessment and Public participation in the planning and approval of infrastructural projects.
- Develop and implement environmentally-friendly national infrastructural development strategy and action plan.
- Ensure that periodic Environmental Audits are carried out for all infrastructural projects
- Integrated National Transport Policy

This is a national policy which aims to develop, operate and maintain an efficient, cost effective, safe, secure and integrated transport system that links the transport policy with other sectoral policies, in order to achieve national and international development objectives in a socially, economically and environmentally sustainable manner.

4.3.3 Land Policy

Environmental management principles: To restore the environmental integrity the government shall introduce incentives and encourage use of technology and scientific methods for soil conservation. Fragile ecosystems shall be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. 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.

4.3.4 Draft National Wetlands Conservation and Management Policy

Kenya has no comprehensive wetland policy in place currently. However a Draft National Wetlands Conservation and management policy exists.

4.4 WORLD BANK SAFEGUARD POLICIES

The Malindi-Madogo project is financed by the World Bank. Besides the national legislations, there are guidelines that govern infrastructure developments like roads particularly those tied to conditions on funding road projects. The World Bank has developed guidelines for pollution prevention and abatement measures as well as emission measures that are accepTable to the bank (World Bank Group, 1998).

4.4.1 Environmental Assessment (Operation Policy 4.01)

The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision making is improved through appropriate analysis of actions and of their likely environmental impacts (World Bank, 1989). It is also used to ensure that potentially affected persons have been properly consulted.

This policy will be relevant since the project is likely to have potential (adverse) environmental risks and impacts on its area of influence. It will also cover impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans boundary and global environment concerns. It will also be relevant in assessing the project as a Category A and adhering to all the outlined principles.

4.4.2 Natural Habitats (Operation Policy 4.04)

This policy aims to promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development.

This policy is relevant since the project has the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).

4.4.3 Physical Cultural Resources (Operation Policy 4.11)

This policy aims for the protection of physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. This policy aims to ensure that the impacts associated with these resources are addressed.

There is a cultural centre along the project road and Tana River County has 15 cultural sites identified by the National Museums. This policy is relevant in order to ensure conservation of all these cultural sites.

4.4.4 Indigenous peoples (Operation Policy 4.10)

The objective of this policy is to ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples. The policy ensures that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated.

This policy will be relevant for the protection of Ndera community conservancy which is classified as home for indigenous people.

4.4.5 Involuntary Resettlement (Operation Policy 4.12)

This policy aims to avoid or minimize involuntary resettlement and, where this is not feasible, 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.

This policy will be relevant since some people may be relocated along some sections. The aim will be to ensure that the disruption to their lives is kept to a minimum.

4.4.6 Gender Development

This policy deals with ensuring that before a development is financed by the bank, the gender disparities and inequalities that are a barrier to the development are addressed in order to ensure the effectiveness of the project.

This policy will be relevant in addressing the gender issues within the project environment.

4.5 RELEVANT INTERNATIONAL POLICIES

4.5.1 Ramsar Convention on Wetlands

This is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands as a contribution towards achieving sustainable development throughout the world. Under Article 3.1 of the Convention, Contracting Parties agree to “formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory”. Tana River Delta Ramsar site is one of the wetlands listed in the Ramsar wetlands. The road project should avoid or minimize adverse impacts on Tana River wetlands. This in turn will ensure that wetlands continues to deliver their vital role in supporting maintenance of biological diversity.

Tana Delta Ramsar site is in the project road area and therefore it will require that the guidelines for protection of the wetlands be adhered to.

4.5.2 Convention on Biological Diversity

The convention requires that implementation of development projects to avoid significant adverse impacts on biodiversity. The Convention requires parties to implement EIA recommendations

effectively to avoid or minimize significant adverse impacts on biodiversity. It also introduces the Strategic Environmental Assessment (SEA) to assess environmental implications of policies and programmes particularly for those with major implications on natural resource use.
Tana Delta Ramsar site and Tana River Primate National Reserve is home to endangered species hence this convention will have to be adhered to.

4.6 INSTITUTIONAL FRAMEWORK

4.6.1 National Environment Management Authority

This is the government agency that is responsible for the implementation of all the policies relating to the environment. It was established under the Environmental Management and Co-ordination Act No. 8 of 1999 (EMCA). This agency is responsible for reviewing the EIA report and verifying the information in the report. They are also responsible for overseeing and ensuring compliance to the environmental guidelines therein.

4.6.2 Kenya Roads Board

Strengthening the institutional framework is one of the strategies the government of Kenya (GoK) has adopted to improve the road network in Kenya. The Roads Maintenance Levy Fund manages the roads in repair and rehabilitation.

4.6.3 Kenya National Highways Authority

This is an autonomous road agency, responsible for the management, development, rehabilitation and maintenance of international trunk roads linking centres of international importance and crossing international boundaries or terminating at international ports (Class A road), national trunk roads linking internationally important centres (Class B roads), and primarily roads linking provincially important centres to each other or two higher-class roads (Class C roads).
The agency will be responsible for the implementation of the project once the design and funds procurement for the project have been completed.

4.6.4 Kenya Wildlife Service

This is a state corporation that was established by an Act of Parliament (Cap 376), with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. The corporation undertakes conservation and management of wildlife resources across all protected areas in collaboration with stakeholders. Its mandate is to work with others to conserve, protect and sustainably manage wildlife resources.
There are wildlife protected areas in the project area and some rare and threatened species of both flora and fauna.

4.6.5 National Resource Management Authority

This is a state corporation and the lead agency in water resources management. Its responsibilities include; to develop principles, guidelines and procedures for the allocation of water resources; to monitor, and from time to time reassess, the national water resources management strategy; to receive and determine applications for permits for water use; to monitor and enforce conditions attached to permits for water use; to regulate and protect water resources quality from adverse impacts; to manage and protect water catchments in accordance with guidelines in the national water resources management strategy, to determine charges to be imposed for the use of water from any water resource; to gather and maintain information on water resources and from time to time publish forecasts, projections and information on water resources; to liaise with other bodies for the better regulation and management of water resources; to advise the Minister concerning any matter in connection with water resources.

4.6.6 National Museums of Kenya

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

purposes of enhancing knowledge, appreciation, respect and sustainable utilization of these resources for the benefit of Kenya and the world for now and the future. World Bank OP11 Physical Cultural Resources (PCR) deals with protection of PCR and avoiding their damage or destruction. The corporation will therefore help in fulfilling this obligation if any of the PCRs are discovered within the project area.

The project area has a number of cultural sites that will need to be conserved.

SECTION 5

5. BASELINE CONDITIONS

5.1 PHYSICAL ENVIRONMENT

5.1.1 Climate

Malindi falls within a tropical maritime climatic zone. According to Köppen and Geiger, this climate is classified as tropical wet and dry or savannah climate (Aw). The average rainfall is about 1094mm per year with two rainy seasons: Long rains between April and June; and short rains in October and November. The dry seasons are also two: July to September; and December to March.

Malindi is hot all year round, with a cooler season from June to September, when the daytime temperatures are around 27/28 °C, and a hotter and humid season from November to April, when the daytime temperatures are just above 30 °C, with May and October as intermediate months.

From Malindi towards the North, the region experiences a semi-arid type of climate. According to Köppen and Geiger, this climate is classified as semi-arid. Average annual temperatures are about 30^{o}C with the highest being 41^{0}C around January-March and the lowest being 20.6^{0}C around June-July. Rainfall is low, bimodal, erratic and conventional in nature. The total annual rainfall ranges between 280 mm and 900 mm with long rains occurring in April and May, short rains in October and November with November being the wettest month. The Inter Tropical Conventional Zone (ITCZ), which influences the wind and non-seasonal air pattern for the river Tana, determines the amount of rainfall along the river line. The dry climate in the hinterland can only support nomadic pastoralism.

Heading to Madogo the climate changes to desert conditions and are classified by Köppen and Geiger as hot desert climate (BWh). The average rainfall is about 275 mm per year. There are two rain seasons, the short rains from October to December and the long rains from March to May. Rainfall is normally in short torrential downpour making it unreliable for vegetation growth. The southern parts of the County such as Hulugho, Masalani and Bura receive more rainfall than the northern parts.

5.1.2 Potential evapo-transpiration and temperature

The temperatures are generally high throughout the year and range from 20^{o}C to 41^{o}C. The average temperature is however 36^{o}C. The hottest months are September and January to March, while the months of April to August are relatively cooler. The areas of Sabaki to Gongoni are close to the coastal belt hence experiences an annual temperature range of between 30^{0}C and 34^{0}C with relatively low wind speeds ranging between 4.8 km/hr. and 12 Km/hr.

The humidity of the area between Malindi and Madogo averages 60g/m3 in the morning and 55 g/m3 in the afternoon. An average of 9.5 hours of sunshine is received per day. Strong winds are also experienced between April and August with the rest of the months getting calm winds.

5.1.3 Geology and Soils

5.1.3.1 Geology

The geology of Kilifi-Tana River mainly consists of Cenozoic sediments with some places overlain by Pliocene sands, sand stones, clay and conglomerates.

Lower Tana Basin form part of the sedimentary basins of the East Kenya. This sedimentary basin is underlain by pre-Cambrian basement system rocks at an approximate depth of 10,000 metres. These are overlain by recent (quaternary) colluvial and alluvial sediments, with alluvium often of marine origin, with more recent river alluvium overlaid in the Tana flood plain and tributaries.

5.1.3.2 Soil types

Along A7, the soils are brown fine grained sandy soils. Those between Malindi and Garsen are fertile and support agriculture which was evidenced by farmlands along the road. Tana River soils are lowland soils with high sodicity and salinity on sedimentary deposits. Being in the sedimentary plain, further classifications of the soils are;

Table 5-1: Soil classification in Tana River County

DESCRIPTION	CLASSIFICATION
Well drained, deep to very deep, dark red to dusky red, friable, sandy loam to sandy clay loam, acidic	Ferralo-chromic Acrisols with ferralic Arenosols and ferric Luvisols
Well drained to imperfectly drained, very deep, brown to dark brown, friable, micaceous, slightly calcareous, sandy loam to clay loam, in places with saline-sodic deeper sub soils	Eutric Fluvisols
Imperfectly drained, very deep, red to reddish brown, firm, slightly calcareous, moderately saline and moderately sodic sandy clay, abruptly underlying a topsoil of loamy sand	Sodic Planosols and luvo-orthicSolonetz saline phase

Soils of the Tana Delta are highly variable, depending on the depositional history and hydraulic regime.

Moving from Garsen towards Hola and Bura, the soils consist mainly of sandy clays to clays and range from imperfectly to poorly drained. This explains the number of water collection points observed between these areas. Gulley erosion was noticeable along the unpaved sections of the road and areas neighbouring the water collection points.

Moving Northwards towards Madogo, the soils range from the sandstones, dark clays to alluvial soils along the Laggas,

Picture 5-1: Sandy loam soils along Malindi bypass

Picture 5-2: Clay soil along Malindi bypass

Picture 5-3: Sandy soil in Sabaki

Picture 5-4: Sandy-Clay soils between Hola and Bura

Picture 5-5: Farmland before Gongoni

Picture 5-6: Clay soils after Garsen

Along Malindi Bypass, the most dominant soil type are deep, dark brown sandy loam soils. Other types of soils along the bypass include light brown sand soils and black sticky clay soils. The sandy soils are mainly along the foot paths crossing the bypass while clay soils are in Majivuni village between chainage 3+780 to 4+080 km. There is no evidence of soil pollution along the bypass.

5.1.3.3 Soil erosion

The types of erosion along Malindi-Madogo road are splash erosion, rills and gullies. Along the bypass rill erosion was evident especially on the medium slopes at chainages 2+200 to 2+280, 3+640 to 3+780 and along footpaths crossing the bypass. Sediment deposition and landslides may also result due to characteristics of the soil that tend to be loose and recurrent incidents of flash floods. A gentle slope on the sides of the road, erosive soil, high intensity flash floods, rainfall of erratic and conventional nature and soil characteristics are factors leading to or increasing erosion. The high intensity flash floods carry away the road culverts as it moves towards Tana River. Erosion occurrence is more common in areas where sandy soils are the dominant soil type more evident as rills or gullies and the most affected areas are between Garsen and Mnazini.

Picture 5-7: Severe soil erosion on the road heading to Hola

Picture 5-8: Culverts carried away by flash floods along Hola-Bura road

Picture 5-9: Gulley erosion as surface runoff finds its way into a water pan

Picture 5-10: Gulley erosion on an unpaved section of the project road

Table 5-2 : Sections with severe erosion

Sections with severe erosion	Coordinates
Galma location	S 02.10629,E040.05398
Mnazini	S 02.06760,E040.06064
Wenje to Hola	S 01.71494,E040.03814 to S 01.51790,E039.99852
Hola to Komorkila centre	S 01.51529,E040.00294 to S 01.24921,E039.87016
Bura to Madogo	S 01.18918,E039.82821 to S 00.49106,E039.52969

5.1.4 Agro-ecological Zonation

The project area is divided into four agro-ecological zones that define the area on the basis of combinations of soil, landform, and vegetation etc. The separate zones have similar sets of potentials and constraints for development.

Coconut-Cashew nuts Zones- This area from Malindi to Sabaki Bridge is mostly non ASAL where the main economic activity is mixed farming. This zone has a mean temperature of 27^0 C and annual

precipitation of 900mm per annum. The area has potential for those crops grown in the coconut-cassava zones.

Livestock-Maize/Millet Zone- The zone is of lower agriculture potential with precipitation of 700 – 900mm. The area is suiTable for dry land farming especially drought tolerant crops and livestock ranching.

Livestock Zone- The locals are involved in pastoral activities. The soils range from sandy, dark grey clay and sandy loam to alluvial deposits. The soils have undergone seasons of trampling by livestock thus easily eroded by wind and during rainy seasons.

Lowland Ranching- It varies in altitude of 90-300m with mean annual temperature of 27^0 C and annual precipitation of 350-700mm. Major activities within this zone include ranching and wildlife.

5.1.5 Vegetation cover

The area through which the proposed Malindi bypass crosses consists of farmlands laid to subsistence crops especially maize, beans, potatoes and peanuts. Intercropping is a practice that was observed in the area i.e. between fruit trees and crops. Fruit farming is practiced both at a medium and small scale with cashew nuts (*Anacardium occidentale)* and mangoes *(Mangifera indica)* being the most common. Coconut (*Cocos nucifera),* lemon *(Citrus limon),* paw (*Asimina triloba)* and Sugar apple (*Annona squamosal)* are the other fruit trees common in the area.

Picture 5-11: *Mangifera indica* plantation

Picture 5-12:Intercropping – Maize, *Anacardium occidentale* and *Mangifera indica*

Picture 5-13:Maize farm

Other than farmed crops, other trees identified along the proposed bypass include; small plantations of *Casuarina equisetifolia, Azadirachta indica* and *Croton* spp, others are *Delonix regia, Leucaena leucocephala, Adansonia digitata (*Baobab*)* and *Prosopis juliflora.*

Picture 5-14: *Casuarina equisetifolia* Plantation

Picture 5-15: Young *Azadirachta indica*

Thevetia peruviana and *bougainvillea* spp are commonly used as live fence. Shrubs such as *Lantana camara* among others were also observed often in dense bush formation within cashew nut and mango plantations. There are also patches of open fields which also serve as grazing fields.

Picture 5-16: *Thevetia peruviana* used for fencing

Picture 5-17: Open fields with *Adansonia digitata*

Picture 5-18: Plantation with dense ground cover of shrubs and grass

Moving from Malindi towards Garsen, the vegetation ranges from sparse to medium density with acacia spp and *Prosopis juliflora* alternately dominating vegetation cover. Baobab and Cashew nuts

occurred all through this section. Others include blue gum, mature Neem *(Azadirachta indica)*, *Deloxia regia*, *Casuarina equisetifolia,* Coconut *(Cocos nucifera)*, *Euphorbia candelabrum*, Terminalia spp, *Thevetia peruviana*, *Leucaena leucocephala* and sisal. Sodom's apple was a common weedy species throughout this section.

Picture 5-19: Farmland between Malindi and Garsen

Picture 5-20: Baobab along Malindi

Picture 5-21: *Azadirachta indica*

Picture 5-22: *Casuarina equisetifolia* plantations

Subsistence farmlands and small- scale *Casuarina equisetifolia* woodlots and plantations are found sporadically adjacent to the road.

Broadly, across Tana River County, vegetation range from scrubland to thorny thickets in riverine areas. However shrubs and annual grasses dominate most parts of the project area; however, there are enclaves of trees and perennial grasses in wetter parts. An invasive tree species, *Prosopis juliflora*, commonly known in the area as 'Mathenge' (after the person who introduced it) has spread rapidly in the area and is threatening to replace most of the indigenous vegetation. It was introduced for fuel-wood production in the Bura Pilot Irrigation Scheme. It grows fast and chokes other vegetation, watering points and the canals, and is colonizing most of the areas that are not cropped, including the riparian environments.

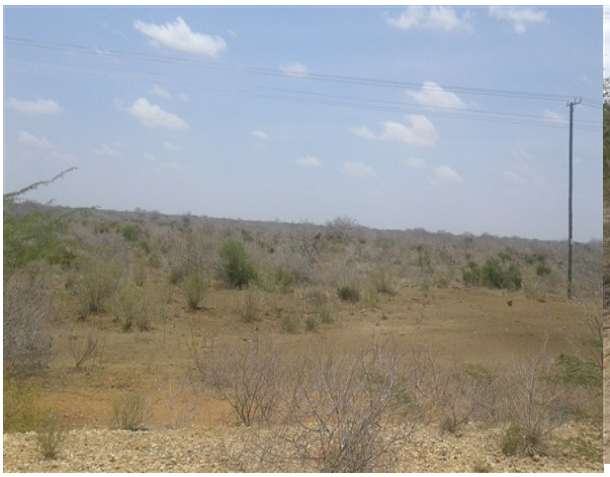
The Garsen-Hola- Bura areas have similar vegetation whereby *Prosopis juliflora* and acacia spp especially *Acacia farnEIAna, Acacia tortilis, Acacia ehrenbergiana, Acacia etbaica* and *Acacia reficiens* dominate. Other trees in between the thickets of *Prosopis juliflora* and acacia spp are; *Euphorbia candelabrum*, Candelabra cactus (*Euphorbia lactia*), *Opuntia vulgaris, Combretum illairii, Grewia tembenesis* and *Grewia tenax.*

Crossing to Bura, the overall natural vegetation is sparse except near the river where tall evergreen forest is sustained. The vegetation in this region has been classified into three types, riverine forest, transitional zone (between riverine forest and dry bush land) and dry bush land which includes the ephemeral streams. The project road crosses the dry bush land zone.

The bush land is dominated mainly by thorny shrubs with scattered tufted grasses and a few trees which remain in drought-dormant condition for much of the year, but leaves sprout immediately after or just before the onset of the rains. Characteristic shrubs are *Acacia reficiens ssp misera, Acacia bussei, Acacia mellifera, Cadaba glandulosa, Commiphora candidula, Commiphora campestris* and *Salsola dendroides*. The few scattered trees include *Acacia tortilis ssp raddiana, Acacia zanzibarica, Euphorbia robecchii, Salvadora persica, Dobera glabra* and *Platycelyphium voense.* Most of the larger trees have a restricted distribution along the few ephemeral streams, where they form patches of small forests.

Specific habitats in the dry bush land are those along the main ephemeral streams: the Hirimani, Walesa, Bilbil, Gelmadho and Tula. The dominant trees occurring along the streams are *Acacia tortilis ssp raddiana, Acacia tortilis ssp spirocarpa, Acacia senegal var leiorhachis, Berchemia discolor (Phyllogeiton discolor), Hyphaene compressa (Hyphaene coriacea), Tamarindus indica* and *Terminalia prunioides. Salvadora persica* and *Dobera glabra* are evergreen species and hence conspicuous during the dry season.

Moving towards Madogo, *Prosopis juliflora* continues to dominate up to a certain point where acacia then dominates. Other acacia spp such as *Acacia tortilis* among others were also identified in this section.



Picture 5-23: Scrubland along Garsen-Hola

Picture 5-24: Acacia and *Prosopis juliflora*

5.1.5.1 Prosopis juliflora

Prosopis juliflora was introduced in Kenya a quarter a decade ago by the government to mitigate desertification in arid and semi-arid areas. Although the tree has transformed the areas into evergreen zones, it has very deep roots which search water leading to drying up of wells and boreholes. In 1960 they were discovered at a depth of 53 metres. This ability enables the plant to survive in the arid and semi-arid areas. Furthermore, the plant has high seeding capacity and can produce up to 40kg of pods per year, from which 60,000 seeds can be obtained hence spreading and colonization comes easy especially in disturbed areas.

The plant also became an enemy to pastoralists as many of their livestock have lost their teeth due to high sugar content, they have wounded their hooves due to the thorny thicket that characterises the plant and some have died after eating the tree's pods and thorny leaves.

Both livestock and wildlife play a critical role in dispersal e.g. yellow baboons (*Papio cynocephalus*), bush pigs (*Potamochoerus larvatus*), donkeys and goats apart from wildlife and livestock other

agents of dispersal include self-dispersal and water. Habitat preference of wildlife dispersers and livestock herding patterns influence the spatial pattern of invader seed influx.

Prosopis pre-dominantly prefer disturbed sites hence their preference to colonize the road shoulders. They also prefer oasis of wetter conditions such as laggas and water pans. Indeed rain water from the road tends to settle on the shoulders availing water to the plant aiding its colonization. Colonizing the shoulders of the road has not only led to road pavement damage and wildlife mortality (animals seek shelter within the bushes and are often killed when they suddenly move infront of on-coming traffic) but has also raised road safety concerns as the bushes on the road shoulders compromise sight.

Despite the negative attributes, *Prosopis juliflora* has some economic benefits which include;

- The seeds can be processed into animal feeds.
- *Prosopis juliflora* is also used to make charcoal.
- The tree stem and branches make high quality hardwood carvings.

Picture 5-25: *Prosopis juliflora* along Malindi-Garsen

Picture 5-26: *Prosopis juliflora* after Garsen

Picture 5-27: Severe invasion of *Prosopis juliflora* in lagga

Picture 5-28: *Prosopis juliflora* along the road

Areas that are severely affected by *Prosopis juliflora* along the project road have been listed in the Table below.

Table 5-3 : Sections severely affected by *Prosopis juliflora*

Sections severely affected by *Prosopis juliflora*	Coordinates
Matendo Centre	S 03.08262,E040.14187
Gongoni area	S 03.05019,E040.13918
Soyosoyo village	S 02.96017,E040.13921
Kibaoni Centre	S 02.92045,E040.13941
Wanzai area	S 02.77828,E040.14611
Kurawa centre	S 02.73922,E040.14396

Kemu Salt works area	S 02.71801,E040.14278
Mwendapole area	S 02.70793,E040.14204
Hurara to Garsen	S 02.64304,E040.13823 to S 02.28382,E040.09829
Galma to Hola	S 02.13466,E040.06528 to S 01.57772,E039.97450
Hola to Komorkila Centre	S 01.51529,E040.00294 to S 01.35734,E039.91639
Lakore to Bura	S 01.23320,E039.84782 to S 01.17282,E039.81818
Bura to Bilbil	S 01.17282,E039.81818 to S 01.04525,E039.79189
Bilbil to Dukanotu	S 01.01735,E039.79204 to S 00.85270,E039.70728
Charitende Centre to Madogo Junction	S 00.83907,E039.69917 to S 00.49106,E039.52969

5.1.6 Water Resources

The larger part of the project road (B8) lies in the lower Tana Basin. Mt Kenya and the Aberdare Ranges, which are both gazetted and protected areas, are the main water towers of the region, providing 49% and 44% of the region's waters, respectively. The remaining 7% is provided by Nyambene Hills and other minor catchments. Tana Catchment region holds 33.5% of the national safe yield for surface water and 23.8% of the national safe yield for groundwater. The Region provides more than 70% of Kenya's hydropower and 80 % of the water consumed in Nairobi City, the Kenyan capital. The Lower Tana Basin lies at an altitude of less than 500 m. It is an extensive zone characterised by water scarcity in time and space. Evapotranspiration rates are high due to the high temperatures.

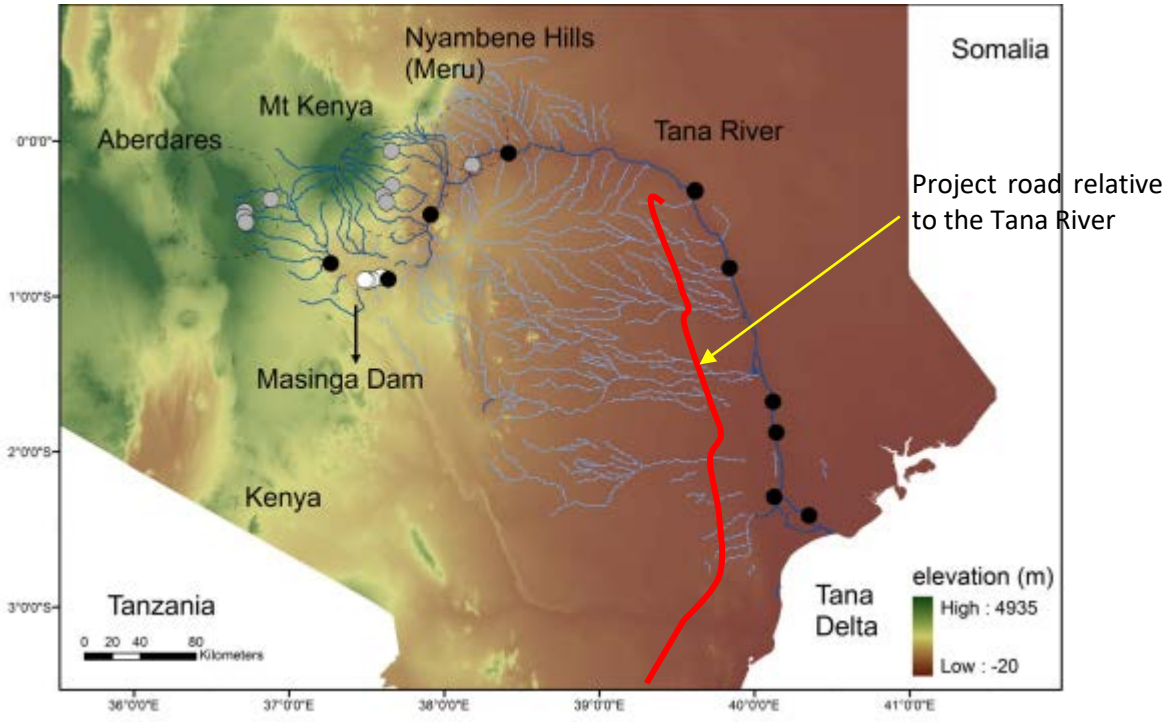


Figure 5-1: Tana River County drainage system

Discharge in the Tana River fluctuates. At present, it sustains flood based farming (using tidal effects) and riverine forests with high and unique biodiversity.

Groundwater is important for water supply and for irrigation in the project area; however there are challenges of salinity and high fluoride and iron content due to the nature of the rock formation. Other challenges include seawater intrusion. Shallow boreholes have dried up in some places e.g. Hola. The salinity of groundwater increases with increasing distance from Dry River streams (laggas).

The floodplain wetlands and in particular the oxbow lakes are considered to be of high value for recession agriculture of sorghum and millet, fishing, reeds for roof thatch, fresh water, grazing. The

same applies to the Tana River itself. The floodplains also have a very important function in the attenuation of flood peaks thus protecting downstream areas from their destructive power.

Boreholes are a major source of water in Garsen while Sabaki River is a major source of water in Sabaki area. Proceeding towards Hola, a number of water pans were observed. These provide water for the communities including for watering livestock among other uses.

Picture 5-29: Swampy area at 4+500

Picture 5-30: Water pan at 3+580

Along the bypass residents largely depend on water kiosks set up by Malindi Water & Sewerage Services Company and others from private boreholes. Between 0+000 and about 1+500, residents have an option of fetching water from a borehole at the Mosque at no charge. However, for areas without boreholes such as Majivuni village, water kiosks serve as the main source of water. Water from these sources is used for drinking, cooking and cleaning.

Water pans are the other source of water during and after the rainy season. One was cited approximately 500m from 2+900, another about 300m from 3+580 and the other at 6+700. This water is used for general purposes other than cooking.

5.1.6.1 Sabaki River

This is the main water source along the project area and is the second longest river in Kenya after Tana River with a length of 390km. Sabaki River flows across the Kapote and Athi plains, through the Athi River town and is met by the Nairobi River on the north east. It forms the Fourteen Falls and turns south-south-east under the wooded slopes of the Yatta ridge near Thika. Apart from the numerous small feeders of the upper river, almost the only tributary is the Tsavo River, from the east side of Kilimanjaro, which enters in about 3° S. Onwards it flows east and enters the Indian Ocean in 30 12' S., just 10km north of Malindi town as Galana or Sabaki river. The project road crosses the river at Sabaki centre (03.14817^0 S, 040.12604^{0}E).

Picture 5-31: Sabaki River

5.1.6.2 Laggas

There are several laggas along the project road and some of them are used as sand sources during the dry periods. Most of these laggas dry up during the dry season except Soyosoyo lagga that has ocean water from a salt mine flowing into it and Lagbuna Shirikisho lagga that has a depression under the bridge holding water for a longer period. In Bura West and Hola, drainage consist of ephemeral streams (laggas) flowing from the Kitui uplands in the West and draining in the Tana floodplain. These laggas form flat broad valleys. Some of these Laggas are;

- Lagga Walesa (North of Bura West area) ,
- Lagga Hiraman,
- Lagga Dakaji (main drainage between Bura West and Hola),
- lagga Thua/Galole (Passes south of the Hola Irrigation Scheme) among others

The Table below shows some of the laggas along the proposed project road and their location.

Table 5-4 : Laggas along the project road

Location	Coordinates
Kambi ya waya	S 02.91046, E 040.14092
Marereni	S 02.86760, E 040.14656
Msumarini	-
Soyosoyo laggas in Kadzuhoni	S 02.97204, E 040.14268
Kurawa	S 02.72553, E 040.14312
Hurara	S 02.59605, E 040.13382
Lagbuna shirikisho in Minjila	S 02.731, E 040.11654
Shikamoo estate	S 02.46827, E 040.71817
Tarasa (Hurawa)	S 02.38276, E 040.11645
Bura	S 01.14332, E 039.79906
Bura	S 01.11568, E 039.79453
Bilbil	S 01.08297, E 039.78944
Dukanotu	S 00.88762, E 039.72880
Dukanotu	S 00.84094, E 039.70036
Charitende	S 00.83920, E 039.69922
Madogo	S 00.64294, E 039.60472

Picture 5-32: Dry lagga in Msumarini

Picture 5-33: Soyosoyo lagga in Kadzuhoni

Picture 5-34:Lagbuna Shirikisho in Minjila area

Picture 5-35: Sand harvesting in a dry lagga in Charitende

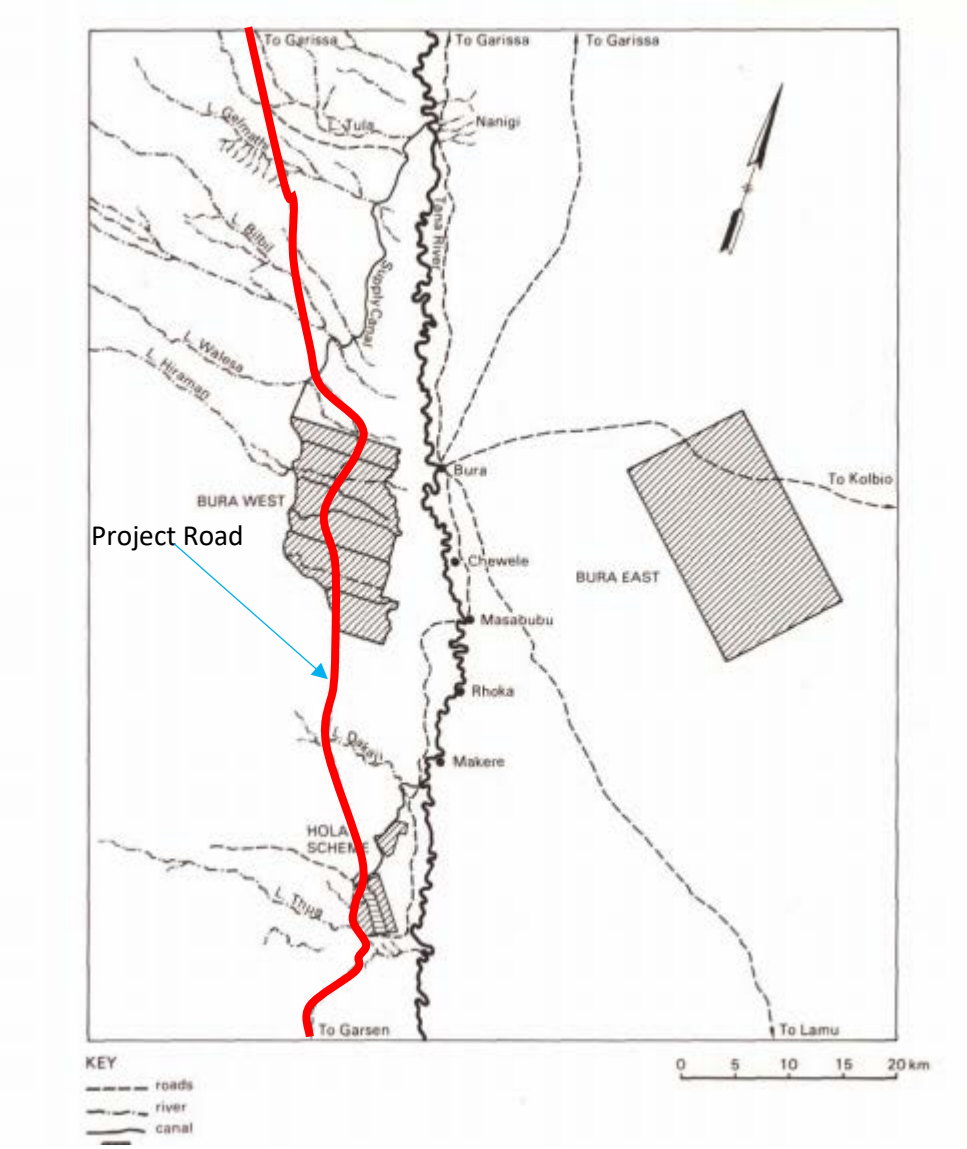


Figure 5-2: Laggas along the project road

(Source: Soils & Irrigation of three areas in the Lower Tana Region, Kenya)

5.1.6.3 Water pans

Detailed field work was carried out during the dry period, between March 7th and March 10th 2017. During this time all the water pans between Garsen and Mnazini had dried, however a total of 8 water pans were recorded within 200m of the Malindi-Madogo road. Two are located before Garsen that is Kukwathani water pan in Marereni and Mballa water pan in Gongoni. The water pans before Garsen are located more than 2km away from the project road while the rest are mainly concentrated between Garsen and Mnazini within 200m of the road. The water pans are used for watering livestock and also support wildlife. These water pans are managed by the pastoralist communities.

Picture 5-36: A dry water pan

Picture 5-37: Water pan with water

Table 5-5: Water pans along the project road

Water pan	Coordinate	Distance and Location
Water pan 1	02.10387^{0}S,040.05408^{0}E	150m from the road on the right hand side
Water pan 2	02.09333^{0}S,040.05486^{0}E	100m from the road on the left hand side from.
Water pan 3	02.08574^{0}S,040.05682^{0}E	100m from the road
Water pan 4	01.98573^{0}S,040.07495^{0}E	120m from the road on the right hand side.
Water pan 5	01.96487^{0}S,040.08764^{0}E	100m from the road on the right hand side.
Water pan 6	01.94557^{0}S,040.08694^{0}S	120m from the road on the right hand side.

5.1.6.4 Dams

There are two dams within the project area i.e. Nyangora which is located before Bura on the left hand side and Nanigui on the right hand side.

5.1.7 Fauna

The project area is a wildlife dispersal area and during field work, several wild animals were cited along the corridor. The animals cited include dikdik, baboons, warthogs, stripped hyena, spotted hyena, squirrel and stripped antelopes. Other wildlife include; red Colobus monkey, tana river crested Mangabey monkeys, elephants, hartebeast (Hirola), Gravy's and Burchell's zebra, gazelles, lions, giraffes, sykes monkey (*Cercopithecus mitis albotorquatus*) vervet monkey (*Cercopithecus aethiops pygerythrus*), yellow baboons (*Papio cynocephalus*), *Galogo zanzibaricus*, buffalo, blue monkey, east african oryx, lesser kudu, cheetah, leopard, grants gazelle, gerenuk, jackal.

The primate reserve (S 01°51'34.2" E 040°03'57.6") which is home to two endangered primates Tana river mangabey and Tana river red colobus is located along the project road. The wildlife species are not confined to the reserve, but move freely in the area.

Picture 5-38: Stripped antelope

Picture 5-39: Stripped hyena knocked down by a vehicle

Picture 5-40: Baboon

The proposed bypass is largely characterized by farms and tree plantations hence macro-fauna such as millipedes and ants are in abundance during rainy seasons. Other animals along Malindi bypass include bats that feed on mango fruits, chameleons, lizards and snakes.

5.1.7.1 Threatened/Endangered species

African Elephant (Loxodonta africana)

The African Elephant is very catholic in its range, and tends to move between a variety of habitats. It is found in dense forest, open and closed savanna and grassland.

Threat

Poaching for ivory and meat has traditionally been the major cause of the species' decline. Although illegal hunting remains a significant factor in some areas, like the adjacent Tsavo National Park, currently the most important perceived threat is the loss and fragmentation of habitat caused by ongoing human population expansion and rapid land conversion. A specific manifestation of this trend is the reported increase in human-elephant conflict, which further aggravates the threat to elephant populations.

Red colobus (Procolobus rufomitratus)

The Tana River red colobus is a highly endangered species of primate in the family Cercopithecidae. It is endemic to a narrow zone of gallery forest near the Tana River.
The Tana River red colobus had been considered one of The World's 25 Most Endangered Primates. It was, together with the equally endangered Tana River mangabey, the main reason for the creation of the Tana River Primate Reserve in 1978, but human encroachment within this reserve continues.

Threat

The Tana River red colobus is located only on a very small section of the world. Its current endangerment is caused by the deforestation and the hunting done by humans. Tropical forests are constantly being cut down, causing the destruction of habitat for the red colobus. Cultivation of the land and the creation of levees and dykes have had the most devastating impact.

Tana River Crested Mangabay (Cercocebus galeritus)

The Tana River mangabey is found along the Tana River. It is found within 27 forest fragments along a 60 km stretch of floodplain forests, from Nkanjonja to Hewani. It has been listed as Endangered given the small population size (ca. 1,200 individuals) and the fact that all the animals occur in a single subpopulation.

Threat

This species is threatened by deforestation for agricultural land and timber, burning of adjacent grasslands preventing forest regeneration, overgrazing of forest understory by livestock, and changes to the flow of the Tana River and water Table by damming and irrigation projects. Felling of canopy trees for canoe construction, wild honey collection, and palm fronds are being used for thatching and mats. Sub canopy trees are being used for housing poles and the topping of *Phoenix reclinata* for palm wine collection severely impacts the resources used by the species.

Tana River cisticola (Cisticola restrictus)

It is found in the lower Tana River basin at Karawa, Garsen, Ijole, Mnazini and Sangole. It may also be found in Somalia.

Tana River poplar (Populus ilicifolia)

Populus ilicifolia is an evergreen tree growing to 30 m tall with a trunk up to 1.5 m diameter. This species is one of the dominant components of riparian forest. It is restricted to the Tana, Athi and Uaso-Nyiro river systems in Kenya and the Ruvu river system of Tanzania. IUCN has classified it as a vulnerable species.

Threats

The habitat is greatly reduced and the species is notably scarcer. Seed crops are frequently washed away in annual floods after vegetation clearance. In Kenya the habitat has also been widely irrigated and cleared for settlement programmes.

Scientific Name	Habitat	Class	Threats	Movement patterns
Hirola-hartebeest *(Beatragus hunter)*	Semi-arid thorn bush, open bush grassland, to light woodland, and lush savanna grassland. Their preferred habitat is seasonally flooded, open grassland with scattered small shrubs and trees on well-drained soils with short leafy swards of grass formed by fire, or by the combined grazing pressure of wildlife and domestic livestock	Critically endangered	Hunting, disease(rinderpest), drought, habitat loss, and competition with livestock	Full Migrant
Tana River red colobus	This species occurs in riverine and where forests are	Endangered	Drastic changes in vegetation, diversion	Not a migrant

Scientific Name	Habitat	Class	Threats	Movement patterns
(Piliocolobus rufomitratus)	dominated by *Pachystela* and *Barrington ia*		which changes the water Table; forest clearance for agriculture, fires eroding forests, degradation due to livestock and firewood collection, selective felling of Ficus trees for canoes and hunting of the animals for meat and skins	
Tana River mangabey (Cercocebus galeritus)	Riverine gallery forests and adjacent patches of bush	Endangered	deforestation for agricultural land and timber, burning of adjacent grasslands preventing forest regeneration, overgrazing of forest understory by livestock, and changes to the flow of the Tana River and water Table by damming and irrigation projects and persecution for crop-raiding	Not a migrant
Elephant (Loxodonta Africana)	Tends to move between a variety of habitats that include dense forest, open and closed savanna, grassland and, at considerably lower densities in the arid deserts	Vulnerable	Poaching for ivory and meat, loss and fragmentation of habitat caused by ongoing human population expansion and rapid land conversion, human-elephant conflict	Full Migrant
Lion (Panthera leo)	The Lion has a broad habitat tolerance; can survive in very arid environments, dry deciduous forests, savanna woodland and grassland	Vulnerable	Indiscriminate killing due to conflict, prey base depletion, habitat loss, trophy hunting, use of Lion bones and body parts and derivatives for traditional medicine and diseases	Not migrant
Giraffe Giraffa Camelopardalis	Savanna/woodland habitats	Vulnerable	Habitat loss (through deforestation, land use conversion,	Full migrants

Scientific Name	Habitat	Class	Threats	Movement patterns
			expansion of agricultural activities and human population growth), civil unrest (ethnic conflicts), poaching and ecological changes due to mining activity, habitat conversion to agriculture, climate-induced processes	
Tana river sykes monkey (Cercopithecus mitis ssp. Albot orquatus)	Riverine, bamboo forest, secondary forests and thickets	Vulnerable	Deforestation, habitat fragmentation, hunting (for food and animal parts are also used in places for traditional medicine) and expanding human settlement	Not a migrant
Zebra (Equus quagga)	They have spatial awareness that allows them to orient movements towards preferred forage patches or the nearest water source, and thus move efficiently across large distances. Mostly in mid-productive grasslands, open savanna with an abundance of grass and the presence of some trees or open woodland	Near threatened	Hunting for their skins and meat, competition with livestock, fencing areas can block migration corridors	Full Migrant
Lesser Kudu (Tragelaphus imberbis)	Semi-arid areas, open spaces and long grass and lowland areas	Near threatened	Hunting, high susceptibility to rinderpest	Migrant
Stripped hyena (Hyaena hyaena)	Open habitat or light thorn bush country in arid to semi-arid environments	Near threatened	Declines in the populations of other large carnivores, human conflict, traffic mortality, poisoning, illegal trade in skins, and body parts for use in traditional medicine	Not a migrant
Oryx (Oryx beisa)	Semi-arid and arid bushland and grasslands of North-East Africa. The condition of	Near threatened	Poaching (for meat and hides), encroachment by	Migrant

Scientific Name	Habitat	Class	Threats	Movement patterns
	grazing and state of the soil influence seasonal movements		settlement and livestock since the majority of the population remains outside protected areas	
Warthog (Phacochoerus africanus)	Confined to savanna grasslands, open bushlands, and woodlands	Least concern	climatic extremes (including droughts), disease (including rinderpest), competition with livestock for water and food, predation and they are also hunted for entertainment, bush meat, skins, tusks (only the upper tusks are considered for trophy) and as bait for hunting large carnivores	Not a Migrant
Kirk's dik dik (Madoqua kirkii)	It occurs in a wide variety of mainly arid habitats, from dense thorn scrub to thickets and open woodland; also found on rocky hills in savanna habitats, riverine woodland and wet areas	Least concern	Affected by the expansion of agricultural settlement and excessive hunting	Migrants
Sykes monkey (Chlorocebus pygerythrus)	This species is present in savanna, open woodland, and forest-grassland mosaic, especially close to rivers. It is an extremely adapTable and versatile species able to persist in secondary and/or highly fragmented vegetation, including cultivated areas, and sometimes found living in both rural and urban environments	Least concern	Actively persecuted (shot and hunted) by landowners in areas where it raids crops or interacts with humans. Vervets are found to be a source of bush meat	Not a Migrant
Yellow baboon (Papio cynocephalus)	Bushland, thickets, steppes, the coastal littoral, secondary and/or highly fragmented vegetation, including cultivated area	Least concern	Agriculture and tree clearance in some parts of the range, in addition, it is commonly exported from East Africa	Not a Migrant
Buffalo	Semi-arid bushland, Acacia	Least	Rinderpest and other	Full migrant

Scientific Name	Habitat	Class	Threats	Movement patterns
(Syncerus caffer)	woodland, grasslands, forests, coastal savannas, and moist lowland rainforests	concern	diseases such as anthrax have spread from cattle to wildlife, habitat loss and poaching	
Blue monkey (Cercopithecus mitis)	Riverine, bamboo forest, secondary forests and thickets	Least concern	Deforestation and habitat fragmentation	Not a Migrant

5.1.7.2 Fish

The proposed project road crosses Sabaki River which is home to a number of endemic fish some of which have been classified as vulnerable by IUCN. The Table below shows a list of some of the species in the lower reaches of this river and their conservation status.

Table 5-6 : Fish in the lower reaches of Sabaki River

Scientific name	Habitat	Conservation status	Food	Breeding season
Monodactylus argenteus	Inhabits hundreds of kilometres upstream in rivers	Least concern	Feeds on plankton and detritus	Spawn in shallow bay areas and estuaries
Mormyrus bernhardi	-Fresh water rivers	Endemic to the Athi-river system	It primarily feeds on weeds and insects, but also on other small invertebrates, such as small fish and fish eggs.	It breeds during the rainy seasons moving upstream in rivers.
Mormyrus tenuirostris	Rivers tana and Athi	Least concern	Feeds on weeds and insects, but also on small vertebrates, such as small fish and fish eggs	Spends periods out of water in the mangrove forests to breed
Mugil cephalus	Near shores, it sometimes forages in lagoons, estuaries and lower courses of rivers and can tolerate freshwater	Least concern	They are mainly diurnal, feeding on detritus, micro-algae and benthic organisms	Breeds in June, July August September, October and November in deep waters offshore
Neobola fluviatilis	No information available	Least concern	It feeds on insects.	The juvenile distribution suggests that breeding perhaps occurs in shallow areas, especially flooded pools at river edges, some of which are seasonal
Nothobranchius elongatus	Occurs in swamps and temporary pools	Vulnerable	Plankton and other small	It is a bottom spawner with a 2–4

Scientific name	Habitat	Conservation status	Food	Breeding season
(Elongate Nothobranch)	in the floodplains		larvae	months incubation period
Nothobranchius interruptus	Occurs in swamps and temporary pools in the floodplains. It is a bottom spawner with a 2–4 months incubation period	Vulnerable	Planktons-	It is a bottom spawner with a 2–4 months incubation period
Nothobranchius janpapi	Small pools and swamps in the floodplains, living near the water surface	Least concern	Worms, larvae	It is a bottom spawner with a 2–4 months incubation period
Nothobranchius jubbi	Species occurs in pools, swamps and very small streams	Least concern	Worms , larvae-	It is a bottom spawner with a 2–4 months incubation period -
Nothobranchius f oerschi	Water-filled depressions, pools and swamps mostly located in lowland floodplains.	Vulnerable	Microworms-	Breed during wet seasons
Nothobranchius lourensi	Temporary pools in the River floodplain	Vulnerable	Feeds on daphania, microworms, rotifers and grindal minis-	Breed in peat moss during wet seasons-
Nothobranchius microlepis	Its natural habitat is intermittent freshwater marshes	Least concern	Small planktonic crustaceans	Breed on temporary natural biotopes-
Nothobranchius steinforti	Freshwater marshes	Vulnerable	Plankton and small larvae	Empheral bodies of water within the onset of rainy seasons-
Poecilia latipinna	Fresh water rivers and marshes	Least concern	Feed primarily upon algae and other plant materials, although they will consume a number of aquatic invertebr ates, including the larvae of mos quitoes	A single female may give birth on multiple occasions throughout the year
Poecilia reticulata	Found in various habitats, ranging from highly turbid water in ponds,	Least concern	Feeds on zooplankton, small insects and detritus	No obvious seasonal peak and breeds anywhere in their locality.

Scientific name	Habitat	Conservation status	Food	Breeding season
	canals and ditches at low elevations to pristine mountain streams at high elevations			
Pristis microdon	Freshwater reaches of rivers and floodplain waterholes	Critically endangered	Feeds on benthic animals and small schooling species	Spawning generally occurs at the beginning of the wet season in November or December in shallow water with instinct of newborns travelling in groups, which would increase an individual's chance of avoiding predation on their journey up river.
Protopterus amphibious	This species is found in swamps and floodplains. Lungfishes survive under the dried mud of floodplains	Least concern	Canivorous eats invertabrates, fish and amphibians	The breeding season starts at the beginning of rain
Protopterus annectens	Backwaters of rivers and flood plains	Least concern	Carnivorous, feeding on molluscs	Breeds at the beginning of rainy season in the root of aquatic vegetation
Pseudocrenilabrus multicolor ssp. Victoriae	Occurs beneath overhanging grass along the shore. Avoids open water, and remains close to the bottom	Least concern	Worms, crustaceans, insects, algae, vegeTable.	Breeds during rainly seasons and on wet lands during dry seasons-
Rhabdalestes tangensisl	Forms shoals in the shallow margins of streams and rivers	Least concern	Mussels	Breed in marshy areas of rivers-
Salmo trutta	Lower reaches of rivers	Least concern	Juveniles feed mainly on aquatic and terrestrial insects; adults on mollusks, crustaceans and small fish	Spawns in couples between late October and March, usually in November-December laying eggs in gravel layer of rocks

Scientific name	Habitat	Conservation status	Food	Breeding season
Scatophagus tetracanthus	Inhabit lower reaches of a river	Not evaluated	Omnivores	-They spawn in marine waters and then the small fish move upstream where it is less saline
Schilbe intermedius	Lower parts of a river	Least concern	Catfish pellets	It spawns throughout the year peaking once and migrates into rivers in fairly compact schools during the rainy season that is from March to May and October to December to spawn in floodwater pools It is potamodromous (migratory) and generally does not penetrate high up into river systems
Stenogobius kenyae	Occupies lowland rivers and bay	Least concern	mollusks	Breeds in brackish water and oster beds
Synodontis rukwaensis	It lives in shallow waters in the marginal vegetation	Least concern	Synodontis species are omnivorous generalists, feeding on a wide spectrum of different foods and are largely unspecialized examples of their food are Insects, crustaceans, mollusks, annelids, seeds, and algae	Spawn in the rainy season when they migrate into smaller steams
Synodontis serpentis	Occupies lower parts of a river	Not evaluated	Synodontis species are omnivorous generalists, feeding on a wide spectrum of different foods and are largely unspecialized examples of their food are	Has an irregular pattern of spawning peaks, it starts breeding during the rainy season that is July to October and continues breeding after it. During this time ,they usually swim in pairs

Scientific name	Habitat	Conservation status	Food	Breeding season
			Insects, crustaceans, mollusks, annelids, seeds, and algae	
Tilapia rendalli	Prefers quiet, well-vegetated water along river littorals or backwaters, floodplains and swamps	Least concern	It is generally an omnivorous, opportunisitc feeder throughout its life, with adult tilapia shifting towards herbivory as the primary feeding mode	Prefers a sloping spawning shallow ground near the marginal fringe of vegetation

Source: (http://fish.mongabay.com/data/ecosystems/Sabaki%20River.htm)

5.1.7.3 Birds

The project road area hosts quite a number of bird species between Malindi and Madogo. Some of those identified include; Vulturine guinea fowl (*Acryllium vulturinum*), steppe eagle (*Aquila nipalensis orientalis*), martial eagle, spur-winged plover (*Vanellus spinosus*), Von der Deckens hornbill (*Tockus deckeni*) and white-bellied bustard (*Eupodotis senegalensis*), white winged apalis, African open-bill stork,bat hawk, African pygmy falcon, African barred owlet, scaly babbler, black-bellied glossy startling and golden pipit.

Some of the birds in the Sabaki River basin and estuary are; flamingos, whistling ducks, pink backed pelicans and drongo.

Tana River delta host; pelicans, egrets, storks, spoonbill, sandpipers and terns. The Tana River forests also host several near threatened bird species including Malindi pipit (*Anthus melindae*) and the Basra reed warbler (*Acrocephalus griseldis*).

Picture 5-41: *Acryllium vulturinum*

Picture 5-42: *Aquila nipalensis orientalis*

5.1.8 Wildlife corridors

A wildlife corridor is a link of wildlife habitat, generally native vegetation, which joins two or more larger areas of similar wildlife habitat. Corridors are critical for the maintenance of ecological processes including allowing for the movement of animals and the continuation of viable populations. There are quite a number of wildlife corridors along the proposed Malindi-Madogo road as it separates wildlife habitats like Tsavo East from Tana River. For example Elephants from Migasogana conservancy in Tsavo East move to Baridi then cross Malindi-Madogo road at Mnazini

on their way to Tana River. The corridors enable migration, colonization, interbreeding of animals and accessibility to water and food. The Table below shows wildlife areas along the project road.

Table 5-7: :Wildlife corridors

Wildlife	Location	Coordinates
Antelope and dikdik	Hurara area	S 02.65890,E040.13914
Hyenas and baboons	Garsen-Hola	S 02.28382,E040.09829 to S 01.51529,E040.00294
Elephant corridor	Mnazini	S 01.96222,E040.08905
Dikdik	Bilbil-Madogo	S 01.00965,E039.78912 to S 00.64709,E039.60546

Figure 5-3 : Wildlife corridors along the project road

5.2 ENVIRONMENTALLY SENSITIVE AREAS (ESA)

The proposed road crosses some areas that can be classified as environmentally sensitive areas (ESA). These include; Tana Delta Ramsar site and the adjacent Tana River Primate National Reserve. These areas are considered as ESA due to their ecological functions and because they act as local biodiversity hotspots with regard to indigenous plant and animal species of the area.

5.2.1 Tana Delta Ramsar Site

This is a wetland on the Tana River protected by the Ramsar convention. It is the second most important estuarine and river delta ecosystem in Eastern Africa comprising a variety of freshwater, floodplain, estuarine and coastal habitats with extensive and diverse mangrove systems, marine brackish and freshwater intertidal areas, pristine beaches and shallow marine areas, forming productive and functionally interconnected ecosystems.

This diversity in habitats permits diverse hydrological functions and a rich biodiversity including coastal and marine prawns, shrimps, bivalves and fish, five species of threatened marine turtles and IUCN red-listed African elephant (*Loxodonta africana*), Tana Mangabey (*Cercocebus galeritus*), Tana River Red Colobus (*Procolobus rufomitratus*) and White-collared Monkey (*Cercopithecus mitis* ssp. *albotorquatus*) are found within the delta. Over 600 plant species have been identified, including the endangered *Cynometra lukei* and *Gonatopus marattioides*. As one of the only estuarine staging posts

on the West Asia - Eastern Africa coastal flyway, it is a critical feeding and wintering ground for several migratory water birds such as waders, gulls and terns.

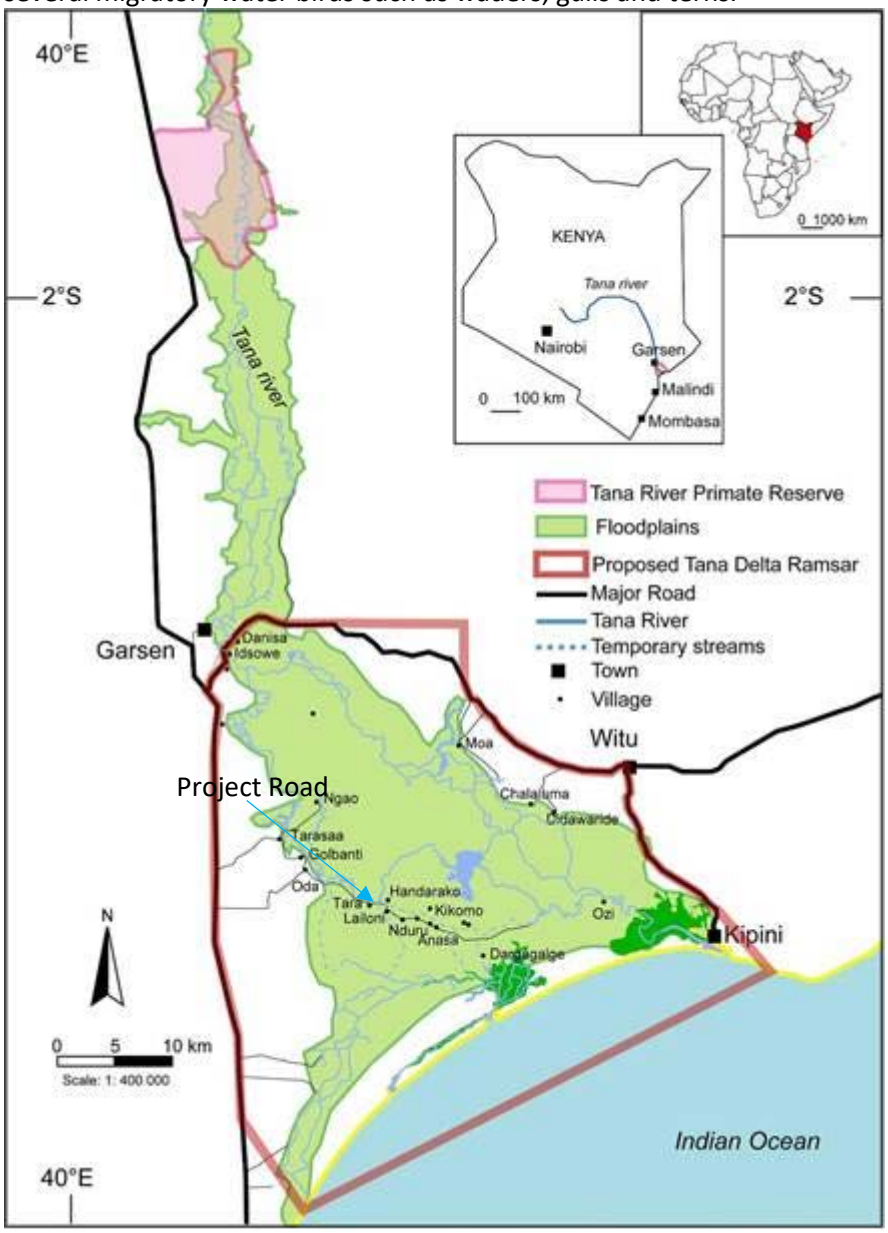


Figure 5-4 : Tana Delta Ramsar Site

Source: wetlands international website

5.2.2 Tana River Primate National Reserve

The Tana River National Primate Reserve was gazetted in 1976 to protect the lower Tana riverine forests and two highly endangered primates, the Mangabey and the Tana River Red Colobus. The reserve consists mainly of patches of riparian forests extending for 16km along the meandering course of the lower Tana River.

5.2.3 Ndera Community Conservancy

Ndera community conservancy is among the partners in conservation supported by World Wide Fund for nature (WWF) Coastal Kenya Programme (CKP) in the North Coast. The conservancy registered in 2010 with acreage of 6500 Hectares is inhabited by Pokomo and Didi Waride communities and is based in Tana River County. The Pokomos majorly practice agriculture and fisheries while the Dide Waride are pastoralists. The conservancy has a wide range of wildlife and from the reports from the community rangers, only the rhinoceros is lacking among the big five with

elephants and buffaloes being in abundance. Among other species in the conservancy include the red colobus monkey.

5.2.4 Air quality

As in most of Kenya air quality within the corridor is good since there is low traffic hence cumulative emission from exhaust pipes is low and insignificant. However, generation of particulate matter in form of dust is sporadically high along unpaved section between Garsen and Hola and the diversion between Tula and Madogo. Another minor source of air pollution is the burning of charcoal from *Prosopis juliflora* which is dominant in the area but again this is significant.

The most important air quality receptors are sensitive institutions along the project road. For this project, these receptors have been either identified as secondary (found along the tarmacked sections of A7/B8 that need re-carpeting). These institutions include learning centres, health facilities and urban centres. These institutions are concentrated in the section between Malindi and Garsen due to relatively dense settlements. The Table below shows the sensitive receptors that were 200m of the project road.

Table 5-8: Type and number of major receptors

Major receptor	Number
Schools	33
Health Centres	5
Places of worship	30
Urban centres/offices	18
Total	86

The proposed bypass crosses a rural area with homesteads, farms, mango and cashew nut plantations interspersed with thick secondary bushes hence the area does not experience significant air pollution.

5.2.5 Noise and vibration

Other than sections crossing Malindi and Garsen towns, the rest of the road crosses areas that are serene with low ambient noise levels. The latter is because they are rural settings with sparse settlement. Currently the project road has minimal traffic and the number reduces further between Garsen and Madogo. Receptors for noise and vibration have been listed below.

Picture 5-43: Kadzuhoni primary school in Kadzuhoni

Picture 5-44: Islamic madrasa in Kurawa

Picture 5-45: Nuru Academy at 1+460 along the proposed bypass

The Table below shows the names of the institutions and their location along the road.

Table 5-9: Institutions

Learning Institutions

Name of institution	Coordinates	Location along the project road
St Clement education center	S 03.09444, E 040.06463	Left hand side 10m from the road in Malindi
Moi university research station	S 03.15755,E 040.11913	Right hand side 20m from the road in Moi centre
Kangombani primary school	S03.06374, E 040.09038	Left hand side 24m from the road in Mambrui
Mjanaheri secondary school	S 03.04435, E 040.08286	Left hand side 9m from the road in Mjanaheri
Crecent high school	S 03.02764, E 040.13707	Left hand side in Gongoni
Kadzuhoni primary school	S 02.58489, E 040.08279	Right hand side 10m from the road in kadzuhoni
Kibaoni primary school	S 03.618490, E 39.850548	Right hand side of the roa.
Upendo junior Academy	S 02.54537, E 040.08268	80m from the road in Kambi ya Waya
Kambi ya waya academy and	S 02.54462, E 040.08274	13m from the road in Kambi ya

Name of institution	Coordinates	Location along the project road
Ndume Royal Secondary		Waya
Kaloleni primary school	S 02.51421, E 040.09082-	99m RHS of project road
Marereni secondary school	S 02.51218, E 040.009021	Right hand side 10m from the road in Marereni
Marereni primary school	S 02.051263, E 040.09014	Right hand side 13m from the road in Marereni
Marereni nursery school and Marereni Teachers College	S 02.051178, E 040.009022	Right hand side 9m from the road in Marereni
Kanagoni primary school	S 02.048581, E 040.8537	Right hand side 9m from the road in Kanagoni
Mkono wa Njogoo primary school	S 02.44552, E 040.08405	Left hand side 6m from the road in Msumarini
Kurawa secondary school	S 02.4404236, E 040.08368	Riht hand side 7m from the road in Kurawa
Islamic madrasa	S 02.4404236, E 040.08368	Right hand side 10m from the road in Kurawa
Hurara primary school	S 02.38354, E 040.008177	Right hand side 15m from the road in Hurara.
Africa Hope Academy	S 02.55492, E 040.12360	Right hand side in Migingo/Vumilia
Imani primary school	S 02.54504, E 040.12132	Right hand side in Migingo/Vumilia
Galole farmers training college	S01.61496, E 039.98280	Right hand side 40m from the road in Galole
Galole school of excellence	S 01.57768 ,E 039.97449	Right hand side 50m from the road in Galole
Hola Youth Polytechnic	S 01.53113, E 039.99791	Right hand side at Hola junction
Kalkacha primary school	S 01.50443, E 039.99827	Right hand side 74m from the road at Makutano center
Proposed Bura Technical Training College	S 01.14886, E 039.82821	Right hand side at Bura junction
Bilbil primary school	S 01.04487,E 039.79192	Right hand side 15m from the roads
Taqwa school	S 00.784273,E 039.66722	Right hand side 15m from the road in Charitende

The areas along the proposed bypass have a rural setting with sparse population. This gives the area a serene environment.

Health Centers

There are several health centers in the project area but only two are located within 200m from the project road that is Kambi ya waya health centre 17m from the road reserve in Kambi ya waya S $02^0$55’20.4’’, E $040^0$08’19.2) Mtoroni dispensary $02^0$42’23.6’’, E $040^0$0830.7’’10m from the road in Hurara and Tana Clinic which is 10m from the road reserve in Charitende market center. The rest only have the signpost by the road and are located beyond 200m from the project road for example Mnazini/ Maziwa dispensary health center and Wenje dispensary (S 01.8558, E -040.06512) located in Hara.

Picture 5-46: Tana Clinic in Charitende

Residential Areas

Various residential centers are located along the road with the majority concentrated between Malindi and Garsen. The number decreases from Garsen to Bura with very few homesteads between Bura and Madogo.

Picture 5-47: Homesteads along the just after Mambrui Centre

Picture 5-48: Homesteads along the road

The Table below shows the location of significant settlements.

Table 5-10: Residential areas

Coordinates	Location along the road
S 03.16787, E 040.11001	At the starting point
S 03.16236, E 040.11296	Left hand side 10m from the road
S 03.16025, E 040.11517	Right hand side 25m from the road in Kiharo
S 03.15739, E 040.11899	Both on the right and left hand side 23m from the road in Moi centre
S 03.15102, E 040.12322	Right hand side 10m from the road in Vitinari
S03.06374, E 040.09038	Left hand side 24m from the road in Mambrui
S 03.06317, E 040.14000	Left hand side 10m from the road in Mjanaheri
S 02.79793, E 040.14715	Right hand side 15m from the road in Msumarini
S 02.76532, E 040.14579	Left hand side 3m from the road in Wanzai
S 02.66961, E 040.13990	Left hand side 5m from the road after Vuga.

S 02.49365, E 040.11760	Right hand side 30m from the road in Kurawa
S 02.96224, E 040.08905	Right hand side 3m from the road in Mnazini/ Bahati
S 01.85558, E 040.06512	Right hand side 6m from the road in Hara
S 00.78427, E 039.66722	Left hand side 15m from the road in Charitende

Market Centers

There are several market centers along the road majority of which are found between Malindi and Garsen and very few between Bura and Madogo.

Picture 5-49: Mambrui market centre

Picture 5-50: Charitende market

The Table below shows the market centers along the road

Table 5-11: Market centres

Name of market	Coordinates
Kiraho centre	S 03.18115, E 040.11010
Moi centre	S 03.15755, E 040.11913
Marafa	S 03.14412, E 040.12725
Sabaki centre	S 03.14817, E 040.12604
Mambrui centre	S 03.11192, E 040.15238
Mjanaheri centre	S 03.07547, E 040.14172
Gongoni	S 03.02189, E 040.08184
Kibaoni	S 02.92045,E040.13941
Marereni centre	S 02.86761, E 040.14656
Msumarini centre	S 02.79794, E 040.14716
Kurawa centre	S 02.44042, E 040.08368
Mwenda pole	S 02.70794, E 040.14204
Hurara centre	S 02. 63822, E 040.13804
Kaza roho centre	S 02.52209, E 040.11709
Minjila junction	S 02.28383, E 040.09830
Madogo junction	S 00.49106, E 039.52966

Places of worship

The places of worship along the proposed road are mosques and churches. The number of these places of worship decreases as one moves from Garsen to Madogo with no places of worship observed between Garsen and Madogo.

Picture 5-51: New apostolic church in Gongoni

Picture 5-52: Mosque in Kurawa

The Table below shows the names of places of worship and there location along the project road.

Table 5-12: Places of worship

Name of the worship center	Coordinates	Location along the project road
ACK Diocese of Malindi (St. Clement)	S 03.09444, E 040.06463	Left hand side 10m from the road in Malindi
Islamic centre (Hudheifa Sabaki)	S 03.08292, E 040.0742.	Left hand side 15m from the road in Sabaki
Mosque	S 03.05014, E 040.08314	Left hand side 9m from the road in Mambrui
Full gospel church	S 03.01384, E 040.008135	Left hand side 19m from the road in Gongoni
Gongoni new apostolic church	S 03.01384, E 040.08135	Right hand side 10m from the road in Gongoni.
Mosque	S 02.56164, E040.08192	Right hand side 16m from the road in Kadzuhoni
Mosque	S 02.54592, E 040.08260	Left hand side 13m from the road in Kambi ya Waya
Mosque	S 02.51557, E 040.08505	Left hand side 10m from the road in Marereni
Mosque	S 02.5128, E 040.090	Left hand side 10m from the road in Marereni
St Mary's Catholic church	S 02.44236, E 040.08382	Left hand side 6m from the road in Kurawa
Masjid Raudhwa Kurawa	S 02.44043, E 040.08368	Left hand side 7m from the road in Kurawa
Mosque	S 02.040115, E 040.008237	Left hand side 9m from the road in Hurara
Madrasa mosque	S 02.42107, E 040.08298	Left hand side 8m from the road in Hurara
Migingo Mwangaza church	S 02.32062, E 040.07075	Right hand side 17m from the road in Migingo
St Magdaline prayer house	S 02.031506, E 040.007044	Left hand side 14m from the road in Migingo
Al-ahdal Islamic center	S 02.20005, E 040.07089	Left hand side 14m from the road in Migingo

Name of the worship center	Coordinates	Location along the project road
Anglican church	S 02.16142, E 040.006231	Left hand side 17m from the road in Garsen junction
Al Ahdal Islamic center	S 02.33587, E 040.11966	Left hand side 17m from the road in Minjila

The above institutions are the most important potential receptors for noise and air quality.

5.2.6 Climate change

Climate change is already being experienced in Kenya evidenced through change in rainfall, temperature, pressure and wind patterns. In many areas including the coastal region rainfall patterns have become irregular and unpredicaTable more so in the arid and semi-arid regions that have been experiencing increased precipitation of 50mm predicated till 2025.

Most regions in the country are experiencing slight increase in temperature including north eastern Kenya that has experienced an estimated increase of 1.2^{0}C over the last 50 years but unlike other regions in Kenya the coastal zone has been showing cooling treads in temperature especially at night with a descrease of 0.7^{0}C over the last 50 years.Socio-Economic Environment

5.2.7 General Characteristics

The Kenya National Bureau of Statistics (KNBS) estimated the population of Malindi Sub County to be 162,712 and population density of 259 persons per square Kilometre in the 2009 Population Census while Magarini Sub County had a population size of 177,241 at 25 persons per square kilometre.

Table 5-13:Population Density

Constituency	2009(Census)		2012(Projection)		2015(Projection)		2017(Projection)	
	Population	Density (Persons/ Km^2)	Population	Density (Persons/ Km^2)	Population	Density (Persons/ Km^2)	Population	Density (Persons/ Km^2)
Magarini	177,241	25	194515	27	213473	30	234278	33
Malindi	162,712	259	178570	284	195974	312	215073	342
Total	339,953							

Source: Kenya National Bureau of Statistics, Kilifi office201

5.2.8 Project Location

The project road traverses 2 counties (Kilifi and Tana River). The project area counties cover an area of 51,233.6km^2. This comprises of built up environment, cultivated land, wetlands, floodplains and uncultivated land. The various sub-counties and political constituencies traversed by the project road are presented in the following Table.

Table 5-14: Sub-county and area

County	Sub-county traversed by the project	Area (km^2)
Kilifi	Malindi	627.20
	Magarini	6979.70
Tana River	Bura	13,191.5
	Galole	9,657.3
	Tana Delta	16,013.4
Total		36,811.8

Source: County Integrated Development Plans 2013

Picture 5-53: Town in Magarini sub-county

Picture 5-54: Bilbil centre Tana River County

5.2.8.1 Kilifi County

Kilifi County is one of the six counties in the coast region. The county lies between latitude 2° 20‟ and 4° 0‟South, and between longitude 39° 05‟ and 400 14‟ East. It borders Kwale County to the south west, Taita Taveta County to the west and Tana River County to the north, Mombasa County to the south and Indian Ocean to the east. The county covers an area of 12,609.7 km2[1].

Administrative Units

The county has seven sub counties namely, Kilifi North, Kilifi South, Ganze, Malindi, Magarini, Rabai and Kaloleni. It has 17 divisions, 54 locations, 165 sub-locations. Magarini Sub-county is the largest while Rabai is the smallest in terms of area in Km2. Administrative units (Sub-County, Divisions, Location and sub locations) for Kilifi County are illustrated in Table 5-15: Area of the County by Sub-County **below**

Table 5-15: Area of the County by Sub-County

Sub-county	Area (Km2)	No. of divisions	No. of Locations	No. of Sub Locations
Kilifi North	530.30	1	6	22
Kilifi South	400.60	2	6	16
Ganze	2941.60	4	16	48
Malindi	627.20	2	8	18
Magarini	6979.40	2	8	28

[1] Source of Data: Kilifi County Integrated Development Plan (CIDP) 2013-2017

Sub-county	Area (Km2)	No. of divisions	No. of Locations	No. of Sub Locations
Kaloleni	686.40	5	11	21
Rabai	205.90	3	7	12
	12,371.4	19	62	165

Source: KNBS Kilifi office, 2012

Malindi and Magarini Sub Counties

Malindi is the largest urban centre of Kilifi County with an approximate population of 118,265. The town is located about 120km north of Mombasa on the coast. It is a major tourist destination, providing employment opportunities within the tourist establishments as well as within other formal and informal sectors. The field surveys were conducted in and around Malindi along B8 road and Proposed Malindi Bypass, specific areas which formed the sampling frame are presented in Malindi and Magarini Sub Counties Sampling Area below.

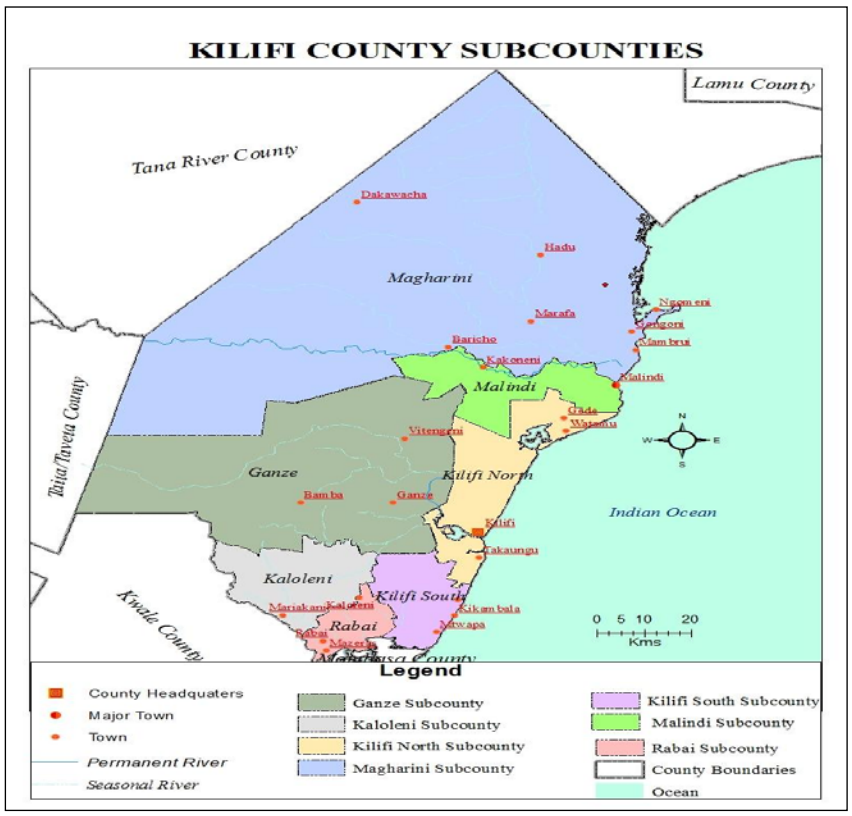


Figure 5-5: Map of Kilifi County Sub Counties. Source: CIDP – Kilifi County 2013-2017

Table 5-16: Malindi and Magarini Sub Counties Sampling Area

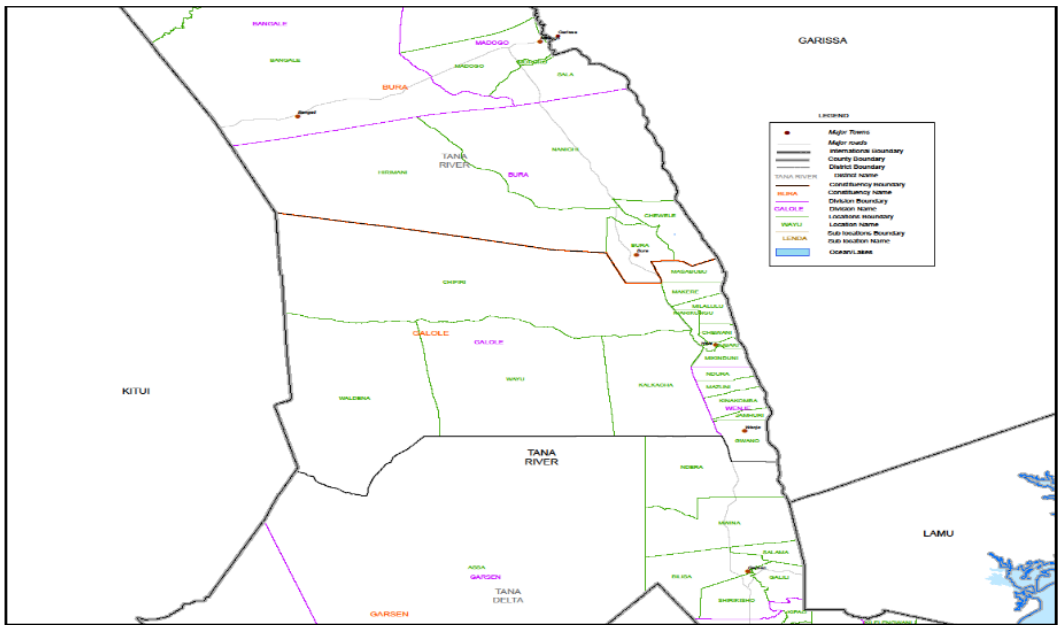
Project Corridor	Sub County	Area
B8	Malindi	Barani
	Malindi	Shela
	Malindi	Kanu Offices
	Magarini	Shopping Complex
	Magarini	Mambrui
	Magarini	Gogoni
	Magarini	Marereni
Malindi By Pass road section	Malindi	Msabaha

Project Corridor	Sub County	Area
	Malindi	Mukao Moto
	Magarini	Kasimbiji
	Magarini	Ganda

Source: field Data Novermber 2016

5.2.8.2 Tana River County

Tana River County is located in the coastal region of Kenya. The county borders Kitui County to the West, Garissa County to the North East, Isiolo County to the North, Lamu County to the South East and Kilifi County and Indian Ocean to the South. The county straddles between latitudes 000'53" and 200'41'' South and longitudes 380 30' and 40015' East and has a total area of 38,862.20 Km2. The



county has a coastal strip of only 76 Km.

Administrative Units

The county is divided into three (3) administrative units namely; Bura, Galole and Tana Delta, nine (9) divisions, 15 wards, forty five (45) locations and ninety six (96) sub-Locations. Table 5-17 shows the area of the county by administrative units.

Table 5-17: Tana River Sub Counties

Sub-county	Area (Km2)	No. of Locations	No. of SubLocations
Bura	13,191.5	14	29
Galole	9,657.3	16	33
Tana Delta	16,013.4	15	34
	38,862.2	45	96

5.2.9 Cultural sites

The National Museums of Kenya has embarked on a project to conserve about 15 cultural sites in Tana River County. The region has cultural sites like Mwana, Shaka and Ungwana which are the early Swahili settlement villages. A pillar of independence is set to be established at one of the oldest Mau Mau detention camps in Hola, established in 1952. The Hola massacre where 12 Mau Mau activists were killed in 1959, determined the British decision to grant Kenya's independence. In the pipeline is the establishment of a park-garden in Hola, where tourists and locals alike can rest and read

about the country's history. There is also a lot of archaeological tourism potential which could be harnessed.

Figure 5-6: Tana River Sub Counties

Figure 5-7: Cultural sites along the project road:

Source:http://www.artmap.tv/news_detail.aspx?id=633

Picture 5-55: Magarini cultural centre

5.2.10 Human Rights and Gender Inclusivity

The national average rating on the Gender Inequality Index (GII) for Kenya is 0.55 and is averagely 0.71(5) for Kilifi and Tana River project corridor. The GII reflects gender-based disadvantages in 3 dimensions that include reproductive health, empowerment and labour market.

Madogo to Minjila Road Corridor

The main gender concerns in this section was related to access to economic assets and cultural practices that marginalizes women from mainstreaming development. For example in most cultures, women do not participate fully in major decision making processes. This is because cultural beliefs do not give women chances to take up leadership positions and own property. On the political scene, Enrolment rates in schools is much lower for girls as compared to boys while dropout rates are higher for girls due to various factors such as early marriages, early pregnancies and preference of boys over girls in education. The challenge for the county is therefore to address socio-economic and cultural factors affecting women participation in development.

Minjila to Malindi Town and Bypass Road Corridor

The main gender issues that were indentified for these road corridors include; ownership of production resources (land, capital); participation in decision making and early/child marriages.

5.2.11 Infrastructure

5.2.11.1 Roads and airports

Kilifi County's entire road network covers about 3000Kms. Of this 1,320 km is rural classified network, about 450kms is national classified network and the rest are unclassified. Approximate 30km of rural county roads are to bitumen standards, 220Km of rural county roads are gravelled and the rest are earth roads. The County has one airport in Malindi and seven airstrips with the major ones located at Hola, Bura, Garsen, Kilifi and Kijipwa.

Tana River has a total road network of 3,377km with about 55 per cent in motorable condition. The total road network is composed of 1,108km (class A – E) of classified roads and 2,269km (class U) of unclassified roads. Out of this only 449km is bitumen surfaced. The major roads in the county include the Madogo – Hola – Malindi road which is dilapidated.

5.2.11.2 Communication

Kilifi county is covered by all the major mobile telephone service providers which include; Safaricom, Yu, Orange and Airtel. It has mobile telephone coverage of 75 percent and 7,037 landline connections. The county has 7 post offices and 5 sub post offices. The proportion of the population that has to travel 5km or more to the nearest post office is 78 percent. There are 70 cyber cafes mostly in the urban areas.

These services are however concentrated along the Garissa- Malindi road. There are three post offices in the whole county located at Bura, Hola and Garsen. There are five courier service providers in the county. Internet connectivity is still low with most people using modems from mobile phone service providers. Investments in DSTV, Zuku and other free to air satellite television has nevertheless made access to local and international broadcasts possible in the county . The Kenya Broadcasting Corporation (KBC) Radio is the only media house which has a signal in the county.

5.2.11.3 Financial Institutions

Access to financial services in Kilifi County is generally on the increase with the advent of mobile phone money transfer services and agency banking. However, the county has only 10 commercial banks namely KCB, Equity, Cooperative, National Bank, Barclays, Standard Chartered Bank among others. There are 17 micro finance institutions namely Kenya Women Finance Trust, Faulu, Platinum Credit among others. The total number of SACCOs is 160 of which 77 are active and 83 are dormant. The active ones include Imarika Sacco, Lengo, Kilifi and Malindi farmers Sacco amongst others. The financial institutions in the county target 1.2 million people.

Tana County has two banks (KCB and Equity bank), three bank agencies (KCB, Equity bank and Coop bank), one SACCO, one Micro-Finance Institution (MFI) and 10 village banks in the county. The banks, SACCO and the microfinance institutions are located in Hola and Garsen as these areas have electricity connection with many commercial activities.

5.2.11.4 Energy access

The main sources of energy in Kilifi County include; wood fuel, electricity, paraffin and solar energy which are mainly used for cooking and lighting. The number of trading Centres connected with electricity stands at 50 while over 80 percent of the households use wood fuel. The number of trading Centres connected with electricity is expected to increase as the county continues to implement the Rural Electrification Programme which is aimed at connecting rural Centres with electricity so as to promote wealth and employment creation. The county is currently promoting the use of renewable energy and use of energy saving jikos by households and institutions such as schools and hospitals. The county is also promoting the establishment of woodlots to ensure there is constant and sustainable supply of wood fuel.

Majority of the population (87.5%) in Tana River County use wood fuel for cooking and 78.2 per cent use kerosene for lighting. Only 0.9 per cent of the households are connected with electricity.

5.2.11.5 Social Problems

The main common problem in the entire Project area from Malindi to Madogo is lack of land tenure rights; this has resulted to common violence and communities conflicts in the area. In Malindi for instance, the local community are consistently in dispute with the Arab community while in Tana River the Pastoralists and engaged in constant disputes with the farmer, field survey identified that land in the entire Project area is yet to be adjudicated by the government. Figure 5-8 presents the details

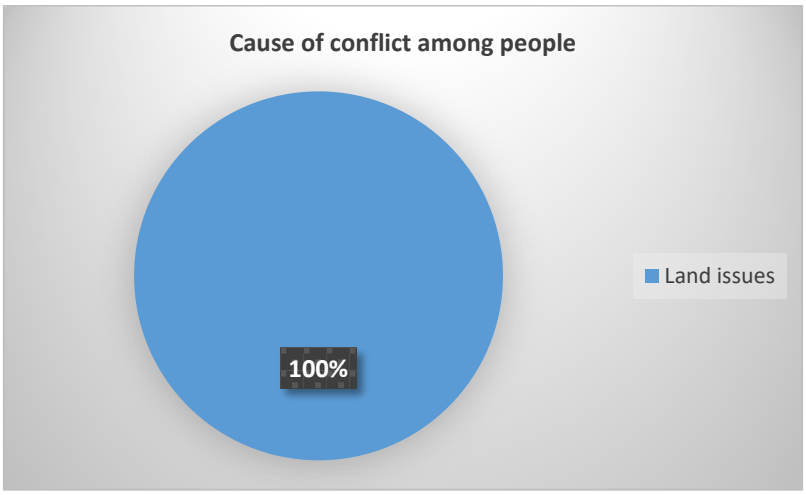


Figure 5-8: Causes of conflicts

5.2.11.6 Charcoal areas

Charcoal trading is the main economic activity of the people living around the project road. There are four charcoal hotspots along Malindi-Madogo road; Vibao viwili, Mwenda pole, Kanagoni and Kaza roho. Species of trees used for charcoal burning include Mngolola, Mtoro and *Acacia dropanolobium* but the most preferred tree is *Prosopis julifora* which grows up to 12metres tall with a diameter of 1.2 metres only grows after two months of cutting. A mature plant can produce hundreds of thousands of seeds that remain viable up to 10 years. Apart from *Prosopis juliflora* that is readily available other trees are from Kanyumbuni forest near Tana river while others such as Acacia spp are sourced locally from the bushes in Wanzai, Mwenda pole, Kaza roho, Vibao Viwili and Kanagoni .Charcoal meant for small scale consumption are burnt and sold along the road while the one meant for large scale consumptions are burnt, packed in bags and transported using lorries to various towns in Kenya especially in Nairobi.

People involved in charcoal trading must register with Kenya Forest Service and get a licence permit after which they register with various charcoal associations of individual's preference. The associations include:

- Kanyumbuni Charcoal Burners
- Magarini Processors Association
- Tana River Charcoal Burners

Picture 5-56: Wanzai charcoal point

Picture 5-57: Charcoal burning and selling point in Vumilia/ Migingo

The Table below shows the charcoal selling points

Charcoal selling point	Coordinates
Kurawa	S 02.70794, E 040.14204
Mwenda pole	S 02.66961, E 040.13990
Vumilia/Migingo	S 02.55298, E 040.12321
Vumilia/ Migingo	S 02.54088, E 040.12022
Wanzai/ Kanagoni	S 02.76534, E 04014519
Kaza roho	S 02.48890, E 040.11766
Lukore	S 01.22246, E 039.82959
Bura(Hirimani)	S 01.10837, E 039.89268
Bilbil	S 01.03628, E 039.79247
Bilbil	S 00.97942, E 039.77138
Dukanotu	S 00.85268, E 039.70728
Charitende	S 00.64665, E 039.60539
Madogo junction	S 00.49106, E 039.52966

5.2.11.7 Housing

Majority of the houses in Kilifi County have walls made of mud/wood 59 percent as the main walling material, followed by brick/block at 22.05 percent and mud/cement at 5.95 percent. On the floor earth 73.5 percent as the main floor materials, cement 25.05 percent, tiles 1.15 percent on roofing Makuti leads with 41.4 percent, Corrugated iron sheets 32.9 percent and grass 20.2 percent as the main roofing materials. There are informal settlements coming up in the major urban Centres in the county especially Malindi and Kilifi towns.

Picture 5-58: Houses with makuti as roofing material

Picture 5-59: Houses with iron sheets and makuti as roofing material

Majority of the people (41.1 per cent) of Tana River live in mud/wood walled houses, with about 29.5 per cent living in grass straw houses. Twenty six per cent of the roofing material used is corrugated iron sheets and 13.9 per cent makuti.

Picture 5-60: Grass straw houses around Bura area

5.2.11.8 Household Roster

Age of Respondents:

The age profile of the respondents was determined by calculating the mean age of the respondents**,** from the analysis the mean age of respondents was 28years old. The minimum was 18years and the maximum age was 60years.

Household age	
Mean	28.40
Minimum	18.00
Maximum	60.00

Gender of Respondents:

Gender Profile of respondents interviewed within Tana River was 86% male and 14% female as illustrated by Figure 5-9 below. The survey further noted that most female respondents were not willing to be interviewed; they indicated that their culture gives male the authority to address household issues, this situation was also noted in Malindi.

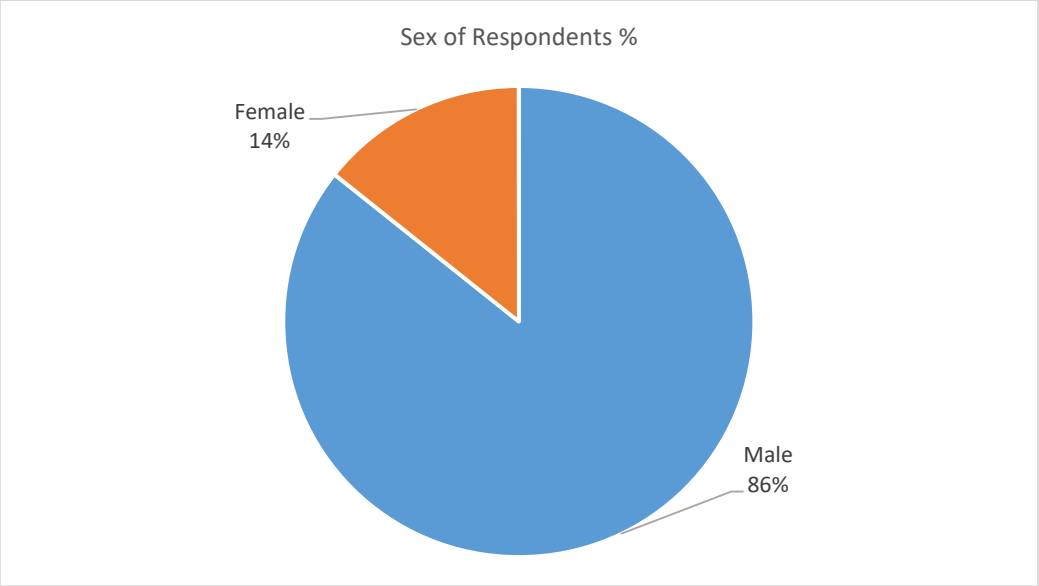


Figure 5-9: Gender of Respondents

Household Main occupation

From the assessment, 50% of the respondents' household were self-employed. This was the highest percentage while the least was 29% who were unemployed. The survey identified that the communities were mostly pastoralist (native Ormos) while the other category was for farmers (native Pokomos). The two communities traditionally engage in conflict during dry months over land.


Picture 5-61: Camel Heard and crop field in Bura irrigation scheme

5.2.11.9 Housing and Amenities

This module recorded information on the type of housing, main construction materials, and available amenities (water, electricity, sanitation) as discussed below.

Housing Material – Walls

From the assessment natural stones are the leading building material for walls with a percentage of 76% mud is the second natural with 24%. The main building material for the **floor** is earth at 62% and cement at 38%. The main type of **roofing** material used is 81% corrugated iron sheet. 19% represent other materials like 'makuti, this is presented in Figure 5-10 below.

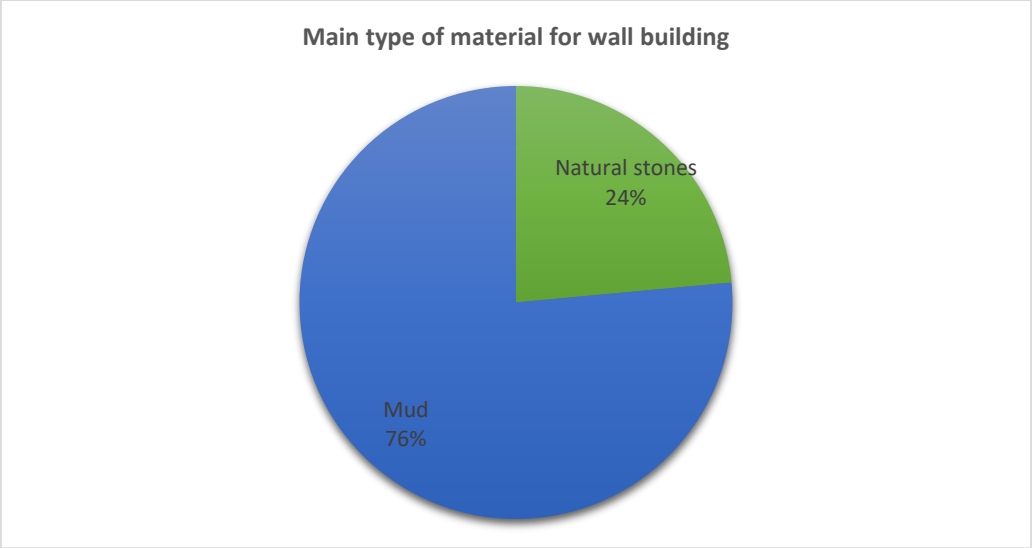


Figure 5-10: Housing Materials

5.2.12 Social infrastructure

This module assessed available social infrastructure in Malindi and Magarini Sub Counties, the social amenities were listed and their accessibility, utilization and condition determined as presented in Figure 5-11.

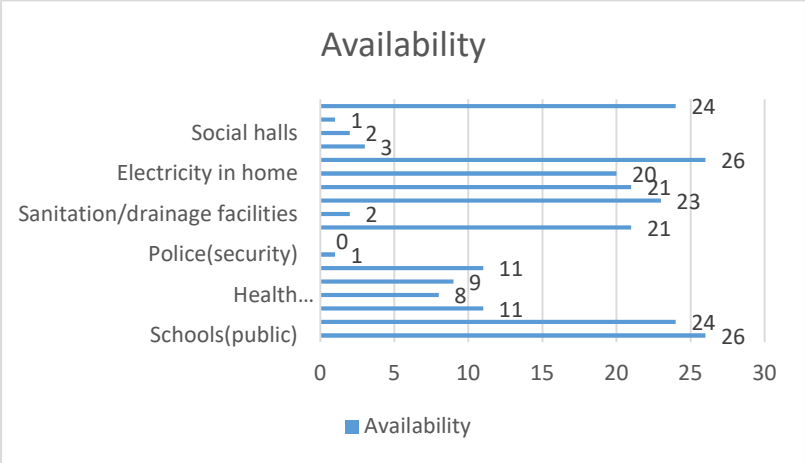


Figure 5-11: Social Infrastructure available in Kilifi County

Available social infrastructure in Bura, Galole and Tana Delta, the social amenities were listed and their accessibility, utilization and condition determined as presented in Figure 5-12 below.

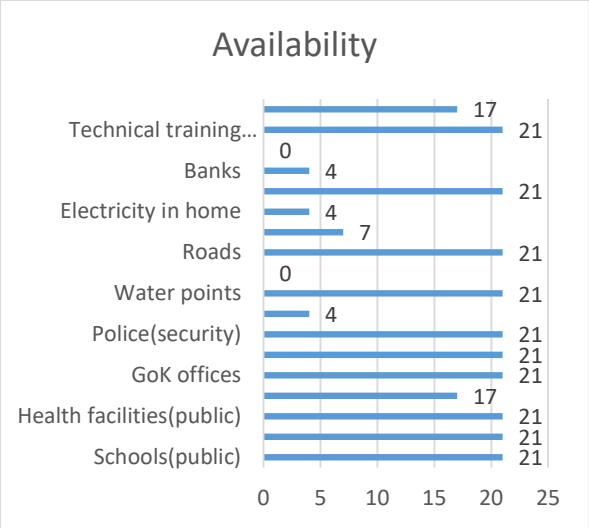


Figure 5-12: Social Infrastructure available in Tana River County

Schools:

In Kilifi County i.e. Malindi and Magharini, the presence of public schools was at a frequency of 26, this indicates a high percentage of literacy level among the community member, the survey also identified that most of the schools were accessible because they are located along main roads.

The enrolment rate for class (1) was at an average of 90% annually with a gender enrolment bias towards boys at 67% compared to girl's enrolment at 33%, this could be an indication that some families are still not keen on educating girls. On average the school population was at 300 to 400 pupils varying from school to school.

The schools that were identified include Airport, Takaye, Ganda, Chocha, Mambrui, Gongoni, Marereni, Tawakal, Tawheed, Burhani Primary schools.

Picture 5-62: School infrastructure in Kilifi County

In Tana River County, the presence of public schools was at a frequency of 21 indicating a moderate percentage of literacy level; the survey identified that most of the schools not accessible during the rainy season due to poor road infrastructure.

The enrolment rate for class (1) was at an average of 85% annually with a gender enrolment bias towards boys at 63% compared to girl's enrolment at 37%; this could be an indication that some

families are still not keen on educating girls. On average the school population was at 150 to 250 pupils varying from school to school.

The schools that were identified schools include **Galole**: Kalkacha Primary, Tana High School, Laza Primary, Ama Primary, Rafiki Primary; **Tana Delta**: Garsen Primary, Maua Primary and Garsen Secondary. **Bura:** Huruma Primary and Secondary and Magora Primary.

Picture 5-63: School infrastructure in Tana River county

Health:

From field assessment in Kilifi County, public Health centres recorded a frequency of 11, the main health facility in the Malindi General Hospital located in Malindi town. The area also has private health facilities example Danrose, Ganda, Catholic Mission, and Meridian which are all privately owned. Malindi General Hospital located within Malindi Town records on average 50 to 100 patients on a daily basis, common ailment include water borne related diseases, snake bites, respiratory complications and maternity. It is projected that once the road is rehabilitated the hospital will record increased number of people looking for medical services.

Picture 5-64: Health infrastructure in Kilifi County

Public Health centres recorded a lower frequency of 17 in Tana River County. The main health facility is the Hola District Hospital, Bura Health Centre and Garsen Health Centres.

The hospital records on average 30 to 40 patients on a daily basis, these patients are diagnosed with common ailment which include; water borne related diseases, snake bites, respiratory complications and maternity.

It is projected that once the road is rehabilitated the hospital will record increased number of people looking for medical services. Accessibility was the main problem to health centres in the area owing to the poor state of the roads.

Health incidences

From the assessment, malaria is the leading health problem as shown in Figure 5-13 with a percentage of 48%. Existing health facilities within Malindi and Magarini Sub Counties include, Malindi General Hospital, St Marys Catholic other Include Ganda Health centre, Mshangoleni dispensary.

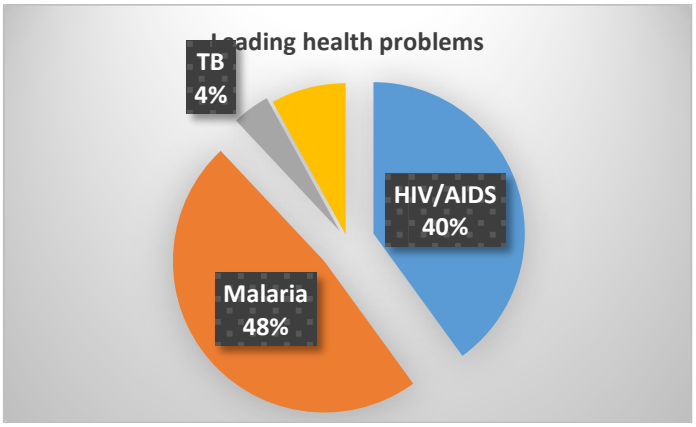


Figure 5-13: Health Status of the Household

Age Group vulnerable to disease

From the above chart, 36% of the people getting sick in the HH are children(6-12 years), 23% are infants(less than years), 185 are youths(13-18 years), another 18% are adults(18-65 years and the least affected are the elderly with a percentage of 5% as illustrated in Figure 5-14 below

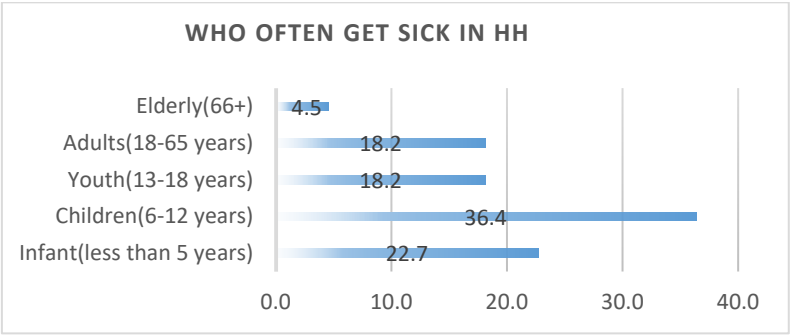


Figure 5-14: Age Group Vulnerable to disease

Household Members access to Health services: According to the chart below, when a member of HH fall sick: 27% use private hospital, another 27% use public dispensary, 23% use private clinics, 18% purchase medicine(from pharmacy or shop) while the other 5% use private hospitals as presented in Figure 5-20 below.

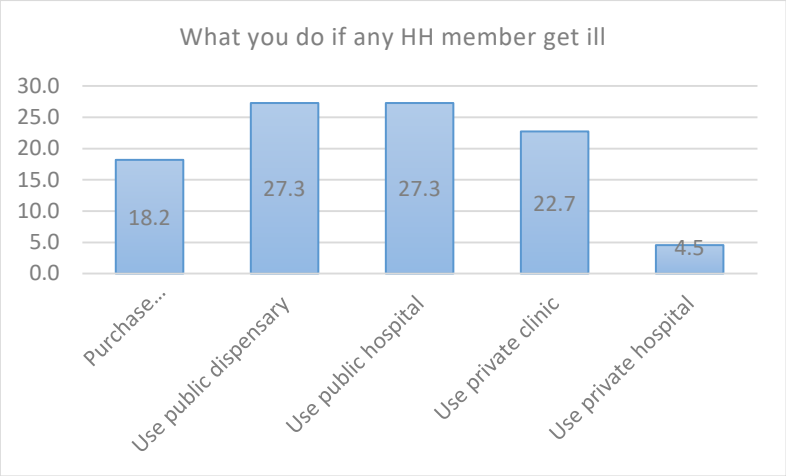


Figure 5-15: Accessibility of Health Services

Perception of community on HIV prevalence; From the assessment 28% of the respondent cited that know few people who have died of HIV/AIDS in their village within the last 6 months. 24% said that they knew of many people, 16% knew of a few people, 8% knew of very many people, 12% said they don't know of any people while the other 12% said that there was no person who have died of HIV/AIDS that they know of as illustrated in Figure 5-16 below

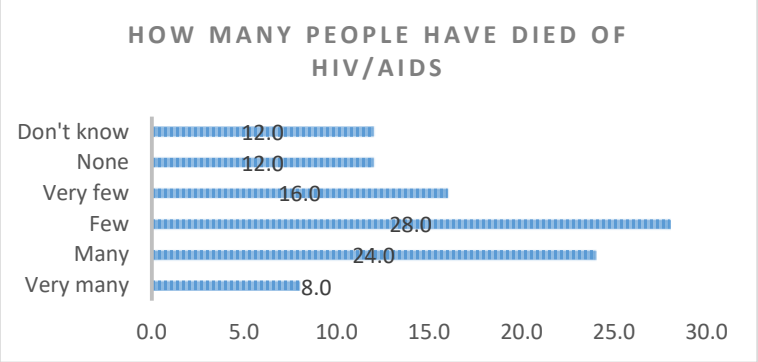


Figure 5-16: Household Perception of HIV AIDs

Historical sites and Religion:

The Project area is along the Kenya coastline which has a high dominance of Muslim religion; this is traced back to colonial era and the ancient Arab migration to East Africa. However in village dominated by local African communities, the dominant religion is Christianity.

The popular historical monument in the Project area is the Gede Ruins located in Watamu town and the Vasco Da Gamma Pillar located in Malindi town.

Picture 5-65: Religious facilities (Mosque in Ganda and Vasco Da Gamma Pillar)

Water:

The main water source for Bura, Galole and Tana Delta sub counties is the River Tana. The towns are supplied by Tana Water and Sanitation Company, however villages away from the town depend on shallow wells and river lagers as the source of water, field assessment identified that water availability is an acute problem in the county, this could be attributed to the fact that the County is and Arid and Semi-Arid region (ASAL).

The assessment identified that a 10,000m^3 water tank retails at Ksh 5,000 in Bura, Garsen and Hola, the water boozers get water from river Tana which is the main source of water in the area, interviewed water boozer drivers cited poor road as the major challenge they encounter.

Picture 5-66: River Tana and Tana Water Company in Hola town

Sources of Water;

From the assessment, 66.7% of the respondents have obtain water from water vendors, 19% obtain water from water tank as presented in Figure 5-17 below. The main problem faced by households in Tana River is lack of adequate water sources, distance travelled to get water and water quality considering that the county is 100% Arid and Semi-Arid (ASAL) region.

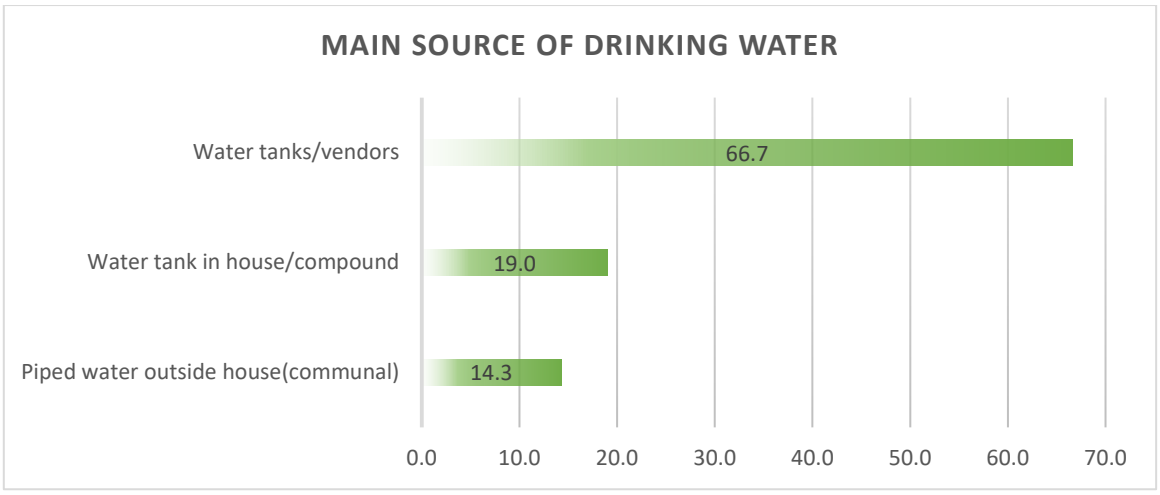


Figure 5-17: Sources of Drinking Water

The assessment identified that the main problems faced by household in regards to water was the water reliability, water quality and distance of water source considering Tana River County is an Arid and Semi-Arid (ASAL) re region. This is illustrated in Figure 5-18 below

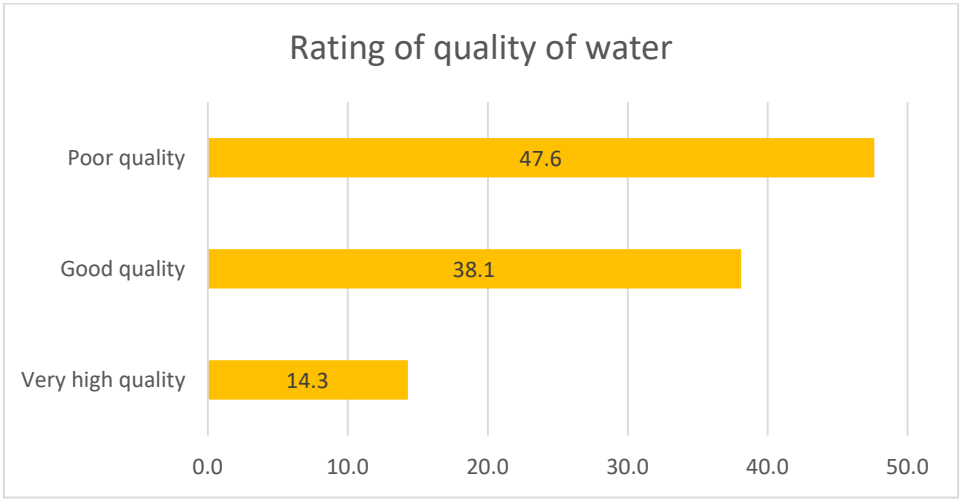


Figure 5-18: Rating of Water Quality

Picture 5-67: Sources of water

Transport:

Field assessment on available transport infrustructure recorded a frequency of 21 towards availabilty of motorable road infrustructure within the Project area. The main access road in the area is the B8 road from Malindi – to Garissa, however the B8 road from Hola to Bura has been closed by KeNHA for repair owing to its poor state. Vehicales from Hola to Bura are currently using the lower road which runs along river Tana to Bura.

Picture 5-68: Malindi Airport Malindi- Ganda- Tsavo Road

Sanitation infrastructure;

The common mode of wastewater disposal in households according to the respondent interviewed were pit latrines at 48% an indication of poor sanitation status especially in urban towns of Garsen, Hola and Bura, Figure 5-19 presents the finding.

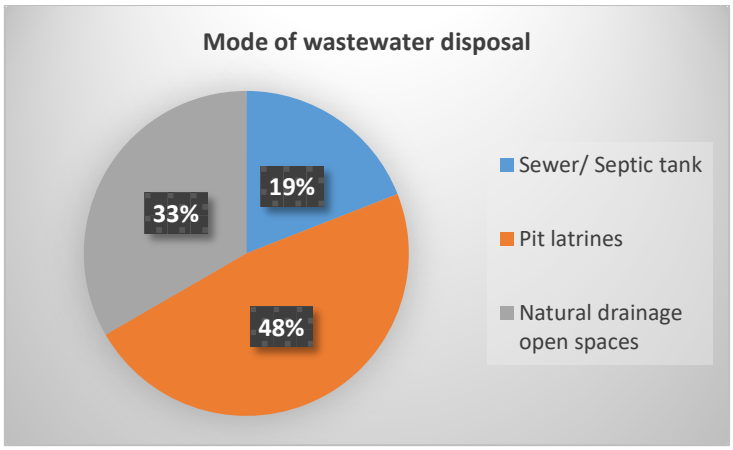


Figure 5-19: Sanitation Infrastructure

5.2.13 Traffic Survey

Traffic survey was undertaken in four approach in Malindi, Hola and Bura towns during social assessment field Survey. This first approach was to undertake traffic count which included traffic Density and Composition, Origin and Destination Survey, vehicle operating cost and transporters survey.

5.2.13.1 Density and Composition Survey

The traffic density survey consisted of visual traffic counts in Malindi and Madogo and Madogo to Malindi, the counts should be were conducted over 5 days. The days included week-day and weekend), different types of vehicles were be distinguished as illustrated below

Table 5-18: Malindi to Madogo Mean Traffic Count

Time of Passage	Bicycle	Ox/horse cart	Motorcycle	Motor trailer	Car	Pickup truck	light truck	medium truck	heavy truck	bus
800-900	22	0	86	72	61	12	14	8	3	24
900-1000	6	0	72	69	69	7	18	12	7	16
1000-1100	8	0	65	71	46	13	11	4	2	15
1100-1200	2	0	81	62	32	5	9	7	0	3
1200-1300	0	0	69	43	38	7	0	0	1	9
1300-1400	3	0	46	37	26	3	8	1	3	0
1400-1500	2	1	41	36	12	14	3	9	0	1
1500-1600	4	1	46	26	38	8	5	3	4	6
1600-1700	8	0	59	61	43	12	8	4	2	8
Average	6	0	63	53	41	9	8	5	2	9

Figure 5-20 below shows the mean traffic count done for 5 days of different vehicles as shown between 8am to 5pmmoving from Malindi to Madogo.

On average, 6 bicycles, 63 motorcycles, 53 motor trailers, 41 cars, 9 light pickups, 8 light, 5 medium and 2 heavy trucks plus 9 buses use this route. The pick hours for small cars as indicated below was noted to be 9.00hrs to 10.00hrs, 13.00hrs to 14.00hrs and 16.00hrs to 17.00hrs, however the maximum destination for small cars was Gogoni which is approximately 40km from Malindi Town.

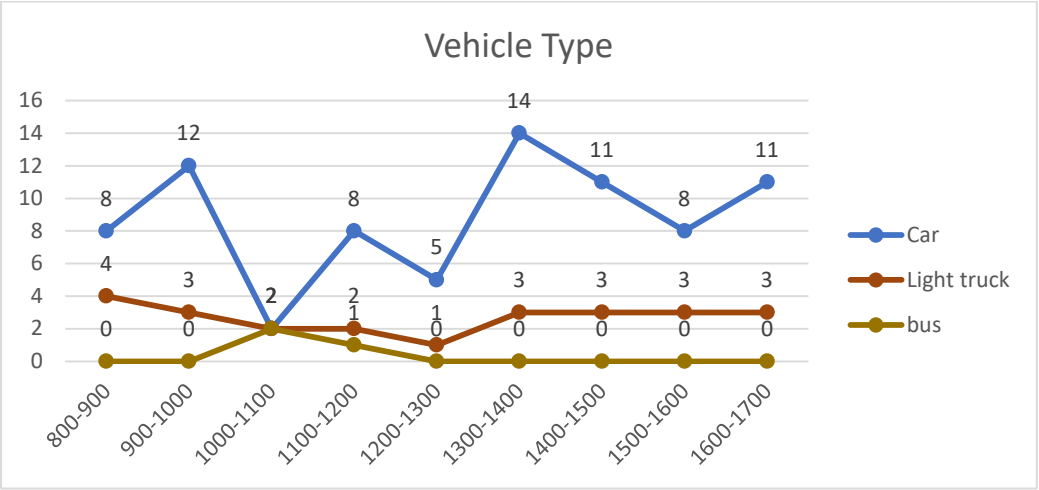


Figure 5-20: Traffic Composition and Density – Malindi to Madogo

Table 5-19: Traffic Composition and Density – Madogo to Malindi

Time of Passage	Bicycle	Ox/horse cart	Motocycle	Motor trailer	Car	Pickup truck	light truck	medium truck	heavy truck	bus
800-900	12	0	27	6	13	12	11	12	4	2
900-1000	2	0	11	6	4	2	4	8	3	1
1000-1100	5	0	16	2	8	3	3	3	1	1
1100-1200	1	0	21	6	13	3	3	1	1	0
1200-1300	1	0	22	3	5	1	4	1	2	0
1300-1400	13	0	32	12	13	3	5	4	2	0
1400-1500	12	0	18	11	11	3	1	1	1	0
1500-1600	1	0	24	2	1	3	5	2	3	0
1600-1700	7	0	42	4	17	4	7	7	8	0
Average	6	0	24	6	9	4	5	4	3	0

Traffic Composition and Density – Madogo to Malindi above shows the traffic count of the same type of vehicles from 8am to 5pm plying the same route but moving from Garissa to Malindi. On average, 6 bicycles, 24 motorcycles, 6 motor trailers, 9 cars, 4 light pickups, 5 light, 4 medium and 3 heavy trucks use this route.

Pick hours for buses and truck travelling to Malindi is given as 8.00hrs to 9.00hrs while pick hours for small cars is 8.00hrs to 9.00hrs and 16.00hrs to 17.00hrs, most of these small cars have their maximum destination as Bura and Madogo from Garrissa.

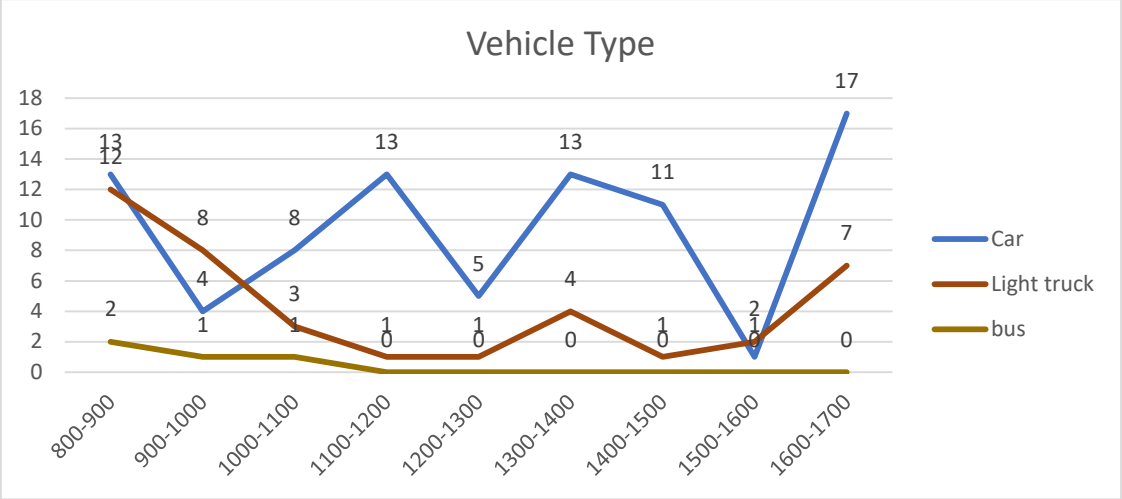


Figure 5-21: Traffic Composition and Density – Madogo - Malindi

5.2.13.2 Transporters Survey

The purpose of this module was calculate vehicle operating costs and to get further detailed information about the nature of the transport business, the targeted transport companies that were interviewed during the field assessment were; Sabaki Public Buy Service SACCO, Tahmeed Public Buy Service SACCO, Craysline Salt Company and Unga (Maize meal) Limited Factory. All the companies are located in Malindi.

Commodities/ Passengers: The main commodities being ferried include but are not limited to: cargo from Mombasa port, agricultural products like maize, salt from KenSalt and Kay Salt Malindi, charcoal and passengers who are mostly tourist and government / international agencies personnel. The Buses transport passengers from Malindi to Garrissa, Bura, Hola, Garsen and Lamu at average cost Ksh 600

Vehicle Operating Cost: The most common problem encountered by the transport companies include frequency tyre, suspension shocks, bushes and springs, on average Tameed Bus company spends Ksh 30,000 on repair and maintenance on one bus.

Distance Travelled and Time taken: The distance from Malindi to Garrisa is 350km while Malindi to Lamu is 250km, on average the buses spend 10-12hours to travel from Malindi to Garrissa and 8-10hrs to travel from Malindi to Lamu. The respondents cited poor road as the major challenges which make the busses travel at an average speed of 40km per hour rather the road design speed of 80km per hour. This also makes the number of trips made by the transporter to be fewer.

Road Condition and Passability: The road between Hola to Madogo become impassable during the rainy season of April to June and short rains of October to December, at this time buses do not travel or charge double fare. The cost of transporting 10tonne cargo from Malindi to Madogo is also exorbitant estimated at Ksh 20,000 to 25,000; this cost is higher compared to transporting similar cargo over the same distance (Malindi to Taveta) which costs Ksh 10,000 to 15,000.

Picture 5-69: Road Condition Hola after Rains

Picture 5-70: Transport Trucks in Marereni Centre and Bura Town

5.2.14 Resettlement

Land Acquisition

The main road is on B8 road hence only triggered at sections identified for construction of Interchanges will acquire land. However, land acquisition will be significant along the proposed, Option 1, Malindi Bypass corridor which is proposed to be constructed within human settlements to

the west of Malindi. Illustrated below is the Bypass, Option 2, alignment, which traverses virgin land with virtually no existing roads, to the immediate west of Malindi Airport. Areas proposed for establishment of interchanges are stated below.

- Bypass start junction on B8
- Bypass end junction on B8
- Lamu Junction (Minjila) intersection
- A3 road Nairobi to Garissa intersection with B8
- The existing B8 road traverses through an area where land is yet to be adjudicated by the Government; land ownership is majorly communal or trust land.

Land Acquisition at Proposed Interchanges

Proposed Interchanged	Land Acquisition
Lamu Junction (Minjila) intersection	Land Acquisition not anticipated as the road reserve is wide and free from encroachment
Bypass start intersection	Land Acquisition is anticipated where the intersection requires more land than is available within the existing road reserve.
Bypass end intersection	Land Acquisition is anticipated where the intersection requires more land than is available within the existing road reserve.
B8 road intersection on A3 road Nairobi to Garissa	Land Acquisition not anticipated as the road reserve is wide and free from encroachment.

The project Terms of Reference required the study of a Bypass for the town of Malindi. Two alignment options were examined for the proposed Bypass. Both these options, though located by the Consultant completely independently, were found to correspond very closely with the Kilifi County Physical Planning Department's long-term development plans.

5.3 KILIFI COUNTY LONG-TERM PLAN FOR MALINDI TOWN ROADS

The characteristics of the two Bypass alignment options examined were quite different. Option 1 was 15.6 kms in length and made use of existing gravel roads. Option 2 was 9.15 kms in length and for the most part traversed virgin terrain which was free of existing roads.

SECTION 6

6. CONSULTATIONS AND STAKEHOLDER ENGAGEMENT

6.1 INTRODUCTION

This Chapter presents a summary of the stakeholder engagement undertaken as part of the SIA for the proposed Project. The engagement process for the SIA has been undertaken in line with Kenyan requirements for public participation and international requirements for engagement as outlined in the World Safeguard Standards. An EIA is also being undertaken for the Project, through which an engagement process will be undertaken to meet Kenyan regulatory requirements for engagement as part of the EIA Process.

6.2 OBJECTIVE OF STAKEHOLDER ENGAGEMENT

The objectives of engaging stakeholders and the community during the SIA process include:

- Disseminate and inform the stakeholders about the project while ensuring understanding: open, inclusive and transparent processes of culturally appropriate engagement and communication is undertaken to ensure that stakeholders are well informed about the proposed Project, the SIA and any future studies.
- Gather comments, suggestions and concerns of stakeholders: involving stakeholders in the assessment including the identification of issues and concerns and the development of mitigation. Stakeholders also play an important role in providing local knowledge and information for the baseline to inform the impact assessment.
- Building Relationships: through supporting open dialogue, engagements help establish and/ or maintain a productive relationship between the proposed Project and stakeholders. This supports not only an effective SIA, but also strengthens the existing relationships and builds new relationships between Consultants and stakeholders.
- Engaging Vulnerable People: an open and inclusive approach to consultation increases the opportunity of all stakeholders to provide comment on the Project and to voice their concerns. Some stakeholders, however, need special attention in such a process due to their vulnerability. Special measures are to be considered to ensure that the perspectives of vulnerable stakeholders are heard and considered.
- Managing Expectations: it is important to ensure that the proposed Project does not create or allow unrealistic expectations to develop amongst stakeholders about Project benefits. The engagement process serves as one of the mechanisms for understanding and then managing stakeholder and community expectations, where the latter is achieved by disseminating accurate information in an accessible way.
- Ensuring Compliance: the process is designed to support compliance with Kenyan regulatory requirements and international best practice.

6.3 APPROACH TO STAKEHOLDER ENGAGEMENT

Stakeholder engagement has been undertaken through consultation and public participation. The CPP process has enabled to establish communication channel between the general public, the consultant and the project proponent. It has also enabled the concerns of the stakeholders to be known to the decision making bodies at an early phase.

Consultation and stakeholder engagement was done for the purposes of baseline data gathering and to provide up to date information. The consultations were held during the site visit in 5th Feb to 10th Feb 2018 also Institutional meetings were held on 10th and 11th October 2016. The following consultation activities were undertaken:

- Meetings with the Technical departments in Kilifi and Tana River County;

- Public consultation meeting with the community in;Madogo, Chardende, Garsen, Hola, Bura, Ganda and Malindi Locations
- Focus Group Discussions (FGDs) in Madogo, Chardende, Garsen, Hola, Bura, Ganda and Malindi Locations and
- Key Informant Interviews (KIIs) with key stakeholders in Kilifi and Tana River Counties.

This engagement allowed stakeholders and the Project affected people to contribute their local knowledge to the assessment of impacts and mitigation measures and to share insights on the Study Area to inform the impact assessment. The meetings held are presented in the Tables below.

6.4 SUMMARY OF CONSULTATION MEETINGS

Table 6-1: Institutional Meetings

Date	County	Venue	Attendees
10/10/2016	Kilifi	Tamani Jua Resort – Malindi	As per the attached attendance List in the appendices
11/10/2016	Tana River	Laza Leisure Lodging Resort-Hola	As per the attached attendance List in the appendices

Table 6-2: Public Consultations Meetings

Date	Location	Venue	Attendees
5/02/2018	Madogo	Chief's Camp	Assistant County Commissioner, Chief Madogo Location, EIA Expert, Sociologist, KeNHA Garissa Region and Members of the public
5/02/2018	Chardende	Chief's Camp	Assistant County Commissioner, Chief Chardende Location, EIA Expert, Sociologist, KeNHA Garissa Region and Members of the public
7/02/2018	Garsen	Chief's Camp	Assistant County Commissioner, Chief Garsen Location, EIA Expert, Sociologist, KeNHA Garissa Region and Members of the public
7/02/2018	Hola	Chief's Camp	Assistant County Commissioner, Chief Hola Location, EIA Expert, Sociologist, KeNHA Garissa Region and Members of the public
6/02/2018	Bura	Chief's Camp	Assistant County Commissioner, Chief Bura Location, EIA Expert, Sociologist, KeNHA Garissa Region and Members of the public
10/02/2018	Malindi	National Museums Grounds	Design Engineer, Chief Malindi Location, EIA Expert,NLC , Sociologist, KeNHA Garissa Region and Members of the public
3/7/2017	Ganda	Chief's Camp	Design Engineer, Chief Ganda Location, EIA Expert ,NLC , Sociologist, KeNHA Garissa Region and Members of the public

Meeting minutes including the meeting photos and attendance registers are presented in *Appendix 1*.

The key questions and concerns raised by stakeholders during engagement are outlined in the Tables below.

6.4.1 Outcomes of Engagement – Institutional Meetings

Table 6-3: Outcome of Institutional Consultations-Kilifi County

Theme	Issues
Road quality	The community involved in the consultation highlighted the following needs. • Previous contractors have been constructing low quality roads.ie Narrow roads • Road safety measures have not been adhered to in the past by the previous contractors. • The proposed road design by the engineer has incorporated the components of the proposed roads and the required standards. • KeNHA Coast region is currently undertaking maintenance of roads in the region that includes Road marking, repair of potholes.
Encroachment in the Right Of Way (ROW)	• Removal of PAPs from the road reserves should be guided by the Land Act 2012 • Being that the project is co-financed by the World Bank and the Government of Kenya a proper enumeration of PAPs will be conducted and will be compensated appropriately
Disability and Road design	• If disability factor was incorporated in the proposed Road design • This has been put into consideration of the road design for example extra pedestrian lanes in towns and markets. • Bus stage bays have been provided with shelter and access to the bays designed properly for such group
Road Linkage to satellite towns	• Stakeholders requested that the proposed roads should transverse through major towns.to reduce collapsing of towns by by Pass ieGarsen and Takaungu Towns • The projects aims at rehabilitating the existing roads and also the available roads within nearby towns • Road By Passes are constructed to minimize conflict between the road users and also ease traffic congestion
HIV/AIDS Awareness	• Stakeholders requested the National AIDS Control Council (NACC) to share data on HIV/AIDS prevention and control initiative with the project team • The NACC representative confirmed that Kilifi County had launched their AIDS Control master plan and promised to share with the project team
Floods	• Concerns on sections of Malindi Madogo Road that always flood during the rainy seasons • Residents complained of the clogging of water culverts along the Road • Enough measures have been put on the design with many culverts along the road that will reduce flooding o the road
Water abstraction during construction	• Residents complained of previous contractor's abstraction construction water and suggested since the area is a semi-arid proper water usage should be observed • The contractor will prepare a method statement on how he intends to get the construction water which shall be approve by the Resident Engineer

Table 6-4: Outcome of Public participation consultations –Tana River County

Theme	Issues
State of roads	The community involved in the consultation highlighted the following needs: • Stakeholders were concerned about the poor state of Garissa –Hola-Malindi road and rising theft incidences along the road • KeNHA Coast region had already contracted urgent road works to rehabilitate MalindiMadogo Road that will include clearing of bushes, filling of potholes and general repair • KeNHA had secured funds from World Bank under the Kenya Transport Sector Support Project(KTSSP) to undertake feasibility study on Environmental Impacts Assessment (EIA), Social Impact Assessment(SIA), Resettlement Action Plan (RAP) and Preliminary and Detailed design
HIV/AIDS Awareness	• NACC Representative questioned the project's HIV/AIDS awareness mechanisms adopted during the construction period. • The design has incorporated a HIV awareness and control program that includes establishment of wellness Centres in the truck lay bays
Linkage of the project to LAPPSET	• Residents asked whether the project was linked to the Lamu Port South Sudan Ethiopia Transport(LAPPSET Project) • The project is not linked to LAPPSET but once complete will provide link between the Lamu Port and other Coastal towns example Mombasa, Malindi , Garsen, Hola and Garissa
Water Usage	• Residents suggested that burrow pits at decommissioning can be converted to water pans. • The area being an Arid and Semi-Arid region the contractor will be required to line the burrow pits appropriately after burrowing for water pans
Location of truck lay bay centres	• Stakeholders suggested that truck lay bays centres be constructed away from towns to reduce congestion in towns • Stakeholders questioned the number of truck lay stations in the design • The design has proposed 6 lay bays to be constructed at market centres along the road and also far away from the main towns
Youth engagement in the project	• The Youth representative asked if the project will benefit the local youths • The project will benefit the youth either directly or indirectly by providing employment to them or through provision of business opportunities to them

6.4.2 Public Participations Outcome of Meetings

Table 6-5: Outcome of Public consultation-Madogo Location

Theme	Issues
Contractor sharing construction water with the residents	The Stakeholders involved in the consultation highlighted the following issues: • The area being an Arid and Semi-arid region, the residents requested if the contactor could share the construction water with them • The contractor will share the water with the locals on request by using the correct channels
Water pan construction	• Residents asked if the contractor after excavation could secure the areas to be used as water pans by the community • The contractor will be requested to secure areas after excavation for community water harvesting

Theme	Issues
Dust Pollution.	• The stakeholders inquired how the contractor was planning to curb dust and pollution during the construction period • The contractor will be requested to sprinkle water during construction time on the roads to minimize dust
Hazards of Mathenge plant	• The residents raised concerns over the Mathenge plant that always grows along construction areas and always thus blocking roads • Routine maintenance will be done along the road corridor to cut the plant using the locals to provide employment and also improve visibility of the feeder roads
Employment of the locals	• Residents suggested that the locals should be given first priority when recruiting persons during the project • Residents insisted that no person from North Eastern Region should be recruited during the project • The contractor will be requested to give first priority to qualified locals before considering others and also the construction tender shall be advertised to get a contractor best suited for the work
Construction of Feeder roads	• The residents inquired if feeder roads in the area will also be rehabilitated • KENHA officials from Garissa region explained that the feeder roads are under a different authority, i.e. KURRA and KERRA, hence those complains should be directed to their offices

Table 6-6: Outcome of Public consultation-Chardende Location

Theme	Issues
Benefits of the project	The Stakeholders involved in the consultation highlighted the following issues: • The residents inquired how the project was going to directly benefit them • The road will trigger significant social and economic growth to the area through improved transport, improved trade through more vehicles, improved economic opportunities, and employment
Road usage during construction	• Residents asked how they were going to access the road during construction period • Stakeholders inquired if standard diversions will be constructed by the contractor • The contractor will ensure that the road accessible at designated public crossing areas during construction. • The contractor will be required to provide diversion as this was a standard requirement in road works contracts
Noise and Dust Pollution.	• The stakeholders inquired how the contractor was planning to curb dust and pollution hazards during the construction period • The contractor will be requested to sprinkle water during construction time on the roads to minimize dust • The Environmental impact assessment study that is part of the consultancy assignment and Environment and Social Management Plan (ESMP) will be developed. This plan provides appropriate mitigation measures to Project Impacts related to dust and general air pollution as suggested
Road safety measures	• The stakeholders suggested that the community should be trained on Road and safety by the transport authority • The stakeholders inquired if the contractor will erect road signage along the road during construction to notify the road users

Theme	Issues
	• Officers from transport and safety shall be requested to sensitize the public on road safety • The road design has in cooperated safety measures associated with class B roads and that road users will be protected
Drainage system	• The residents complained of the poor drainage systems of the previously constructed roads and insisted the contractor should work on the road's drainage • The design team agreed to take care of that and include it in the design. The design has in cooperated an elaborate drainage infrastructure that suits the area
Truck lay bays	• The residents inquired if the projects had also put truck lay bays in the plan • The design team informed the meeting that the Project design allows for provision of truck lay bays and that Chardende will benefit from that

Picture 6-1: Chardende meeting

Table 6-7: Outcome of Public consultation-Garsen Location

Theme	Issues
Employment of locals	The Stakeholders involved in the consultation highlighted the following issues: • The residents suggested the contractor should give the locals priority while recruiting persons during the project • The contractor will follow labour laws in engaging staff and remuneration
The proposed road	• Residents asked what was the size of the proposed road • Stakeholders inquired about the design proposed drainage system due to the rampant flooding in the area • The Road size to be R.O.D. to be 11 meters • Drainage to be taken care of by the contractor • Local participation and sensitization to be done
Compensation of the affected persons	• The residents inquired what mechanisms were going to be used to compensate the PAPs • Under the consultancy, a Resettlement Action Plan (RAP) will be prepared. The plan will identify and enumerate any person whose assets or sources of livelihood are likely to be impacted upon by the project. However, in Garsen no one will be affected by the road projects because the works are limited within existing road corridor which is clear from encroachment
Road safety	• Residents inquired how animal crossing corridors in Wardei, Bula, Garsen,

Theme	Issues
measures and Pollution	Minjila, and KWS Airstrip will be managed during the project period • Residents inquired how the contractor will deal with noise and dust pollution during the construction period • Stakeholders concerns over erection of Road signs, and bumps in Boya, Bardhanesa, and Mtapani corridors • The EIA prepared for the Project has mapped out all the wildlife corridors along the road. Appropriate mitigation measures have been proposed for potential risks associated with road kills? • The contractor will place all the required signs and bumps where necessary

Picture 6-2: Garsen meeting

Table 6-8: Outcome of Public consultation-Hola Location

Theme	Issues
Road standard and Safety	The Stakeholders involved in the consultation highlighted the following issues: • The residents raised concerns over the previous contractors who constructed poor quality roads • Residents inquired on the safety of their animals while crossing the road during the construction period • Stakeholders inquired if bridges are going to be constructed on seasonal rivers and streams and culverts be put to direct storm waters? • Road signs and land mark indicating water points. • The residents were concerned if a weighbridge could also be constructed? • The gathering was informed that the road design includes elaborate speed control measures such as road bumps, signs that will control the speed of vehicles. . Also, community education by carried out to protect the locals and their animals, and wildlife • The contractor will construct the road to high standards, design take care of drainage, and locals be educated on effects and usage of the road • The meeting came into an agreement that those that fall within the jurisdiction of KENHA will be done but those without may be not
Conflict management	• Residents asked how various conflicts that might arise during the project will be handled • The meeting resolved that a committee be formed, contactors labour be managed through a contractual agreement, public awareness be created and be engaged. The EIA and RAP also provides an elaborate Grievance Redress Resolution Mechanism that will be applied during implementation of the Project

Theme	Issues
Hazards of mathenge plant	• How the contractor was planning to deal with the effects of mathenge tree? • Routine maintenance will be carried out along the road to reduce hazards, and crossing areas be designated to avoid over speeding

Picture 6-3: Hola public meeting

Table 6-9: Outcome of Public consultation-Bura Location

Theme	Issues
Benefits of the project	The Stakeholders involved in the consultation highlighted the following issues: • The residents inquired how the project was going to directly benefit them • The road would impact the road socially through labour influx, new cultures, improved transport, and improved trade through more vehicles, improved economic opportunities, and employment
Road standard and safety	• Stakeholders inquired about the Road will be accessible by the vulnerable groups and the physically challenged • Crossings and accessibility during construction • Locals requested for bumps and road signs be put protect road users thus insisted on a good standard road • The locals requested for the public to be sensitized and educated on road use and signs • The locals requested for the road to take care of drainage, and be large enough to avoid blockages • The locals requested for a trailer park be created to provide business opportunities • The design team agreed to put truck lay bays and standard drainage system into consideration of the design • Officers from transport and safety shall be requested to conduct the road safety education to the community. • The contractor will be requested to construct quality roads and erect signage and bumps along the road
Noise and Dust Pollution.	• The stakeholders inquired how the contractor was planning to curb dust and pollution hazards during the construction period • The contractor will be requested to sprinkle water during construction time on the roads to minimize dust • The Environmental impact assessment study that is part of the consultancy assignment. And Environment and Social Management Plan (ESMMP) will be developed. This plan provides appropriate mitigation measures to Project

Theme	Issues
	Impacts related to dust and general air pollution as suggested
Compensation of the affected persons	• The residents inquired how compensation of the affected persons was going to be conducted • The compensation would follow the laid down procedures that is Land for land owners, structure for structure for structure owners, trees and crops for their owners. Asset inventory will be done to determine their true owners and documentation, then disclosure, gazettement, signing agreements and then payment
Improvement of local facilities	• The residents requested if the contractor could improve on the local public utilities like schools and health centres • It was advised that there was no budget for that along the corridor, but those that were to be affected by the road shall be considered
Tendering of the contractor	• The locals demanded that contractor should not be from North Eastern • An agreement was reached that the contract will be advertised and bidders be invited including international companies

Picture 6-4: Bura public meeting

Table 6-10: Outcome of Public consultation-Ganda Location

Theme	Issues
Benefits of a By pass	The Stakeholders involved in the consultation highlighted the following issues: • The residents inquired how the By-pass was going to benefit them • In Malindi road reserve is small hence interferences with private property, hence ease congestion. Road shoulders and tarmac to be worked be improved
Mapping conflict	• Residents asked how the conflict between beacons and map going to be solved • The meeting resolved that the issue beacons and maps will be addressed. Communication and clarity be undertaken. RAP census will to be initiated immediately so that the PAPs affected by the Project can be identified
Noise, Vibration and Dust Pollution	• The stakeholders inquired how the contractor was planning to curb dust, noise and vibration and pollution hazards during the construction period • The contractor will be requested to sprinkle water during construction time on the roads to minimize dust • Vibration would be minimal as there would no blasting, the EIA prepared for the Project will require the contractor to use water sprays to reduce dust menace associated with such Projects

Theme	Issues
Project Affected Persons (PAPs)	• Residents inquired about Relocation of affected persons, program and time taken • Baseline survey cut-off date • Asset inventory • This will be done with due diligence and real owners be identified with the help of chiefs and village elders. NLC requested for understanding and all participatory engagement. NLC- land divided into private, public and community. Sensitization, engagement and dissemination • The meeting resolved that that the issue on cut off dates would be communicated later • Ample time will be given for relocation after compensation •

Picture 6-5: Ganda meeting

Table 6-11: Outcome of Public consultation-Malindi Location

Theme	Issues
Need of a By pass	The Stakeholders involved in the consultation highlighted the following issues: • The residents Requested for by-pass be aligned with LAPSSET project • Design team promised to look into it and see if possible
Project Affected Persons (PAPs)	• Identification of actual PAPS • Issue of squatters currently in the location if they will be compensated too? • Compensation mechanism of Total and partial displacement • The available Compensation options for PAPs • The locals requested for Notices to be given before demolition and work plan activities • The local community requested that the contractor should minimize the Effects on business disruption where possible • Contractor to be consulted to minimize damages to properties and businesses • in either agreed that notice be given before commencing any activity • PAPs will be compensated Land for Land, or Land for money • PAPs will be compensated according to their respective effects on their structures • Squatters will be compensated for their structures, trees and crops only, land owners to be for their land
Noise and Dust Pollution.	• The stakeholders inquired how the contractor was planning to curb dust and pollution hazards during the construction period • The contractor will be requested to sprinkle water during construction time on the roads to minimize dust
Drainage	• The residents complained of the current drainage system is too small thus

Theme	Issues
system	expansion will cause cracks on the nearby buildings • The matter is to be addressed though sea level is a challenge
Project Design	• The residents inquired if the projects had also put truck lay bays in the plan • The design team informed the meeting that the Project design allows for provision of truck lay bays and that Chardende will benefit from that

Picture 6-6: Malindi public meeting

SECTION 7

7. ANALYSIS OF ENVIRONMENTAL IMPACTS

The impact analysis were done using the Léopold matrix which is a grid that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis. For the identification of impacts a breakdown of the environment into elements or factors that may be affected and a breakdown of the various actions or activities of the project under study were done. The rating evaluation is as presented in the Table below:

EVALUATION PARAMETER	RATING	RATING
Nature of impact(NI)	-Positive -Negative -Uncertain	+ - -/+
Intensity(IT)	-Major -Medium -Minor	3 2 1
Extent(EXT)	-Disperse -Medium -Localized	3 2 1
Timing (TM)	-Immediate -Medium -Delayed, long term	3 2 1
Reversibility(R)	-Short term, easily reversible -Long term, partially reversible -Not reversible	1 2 3
Persistence(P)	-Temporary effect -Permanent effect	1 3
Type of impact (TI)	-Direct -Indirect -Cumulative	3 2 1

The following section describes the meaning of the terms used:

- **Sign /Nature of the impact:** Alludes to the beneficial nature (+), bad (-)
- **Intensity** It refers to the degree of impact on the factor, in the specific area in which it operates.
- Ranked from 1 to 3. The three expressed an almost total destruction of the factor in the area in which the effect occurs.
- **Type:** Refers to the nature of the impact, direct (3) indirect (2) or cumulative (1)
- **Extension/Location:** An area of influence covered by the impact in relation to the project environment. In this sense, if the action produces a much localized effect within the space, it is considered that the impact is low (1). If, however, the effect does not support a precise location

within the project environment, having a pervasive influence beyond the project footprint, the impact will be large (3). Intermediate situations are considered as partial (2).

- **Timing:** Refers to the moment of occurrence, the time lag between the onset of action and effect on the appearance of the corresponding factor. We consider three categories according to this time period is zero, up to 2 years, or more than two years, which are called respectively as immediately (3), medium term (2), and long term (1).
- **Reversibility:** It refers to the possibility of reconstructing the initial conditions once the effect. Can be characterized as short-term, easily reversible (1), medium term, partially reversible if mitigated (2) and impossible (3).
- **Duration/ Persistence:** Refers to the time that supposedly stays the effect, from the onset of the action in question. Two situations are considered, depending on whether the action produces a temporary effect (1) or permanent (3). It is therefore this generic characterization because spaces are not discrete time course associated with these categories and because in any case, it is very difficult, in the limit, to discern on temporary or permanent effects.

Impact indicators

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

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

Where:

Imp: Importance of the impact generated by the action on the project i j element of the medium

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

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

TMi: Timing, the moment of impact generated by the action on the project i j element of the medium.

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

Ri: Possibility of reversibility.

The above used technique is WB methodology (1995) and only two impact characterization parameters included in the matrix are not considered in the impact magnitude valuation formula, these are the “type” and “recoverability”

The Table below presents the scores of each environmental item as obtained from the formula.

Topic	Element	Action	Impacts	NI	TI	EX	IT	R	TM	PI	Phase	MG
Floral species	Vegetation & farmlands	Civil works	Clearance of vegetation for road construction	-	3	1	2	2	3	3	C	16
	Prosopis juliflora	Operation	Increased charcoal hotspots	+/-	2	1	2	2	2	3	O	15
Faunal species	Vegetation	Civil works	Loss of wildlife habitat	-	3	1	2	1	3	3	C	15
	Wildlife areas	Civil works	The effect of noise &vibrations on fauna	-	3	1	2	1	3	1	C	13
	Sabaki River		Alteration of aquatic and fish ecology	-	3	1	1	1	3	3	C	12
	Wildlife areas	Civil works & operation	Poaching	-	2	1	1	1	1	3	C/O	10
	Wildlife areas	Civil works & Operation	Road mortality of wildlife	-	3	1	2	3	3	3	C/O	17
Water resources	Sabaki river	Civil works	Increased sediments in water resources along the road project	-	3	3	2	1	3	1	C	17
	water pans & laggas	Civil works	Pollution of water pans	-	3	1	1	1	2	1	C	9
	water pans & laggas	Civil works	Over exploitation of the water resources	-	3	1	2	1	3	1	C	13

Topic	Element	Action	Impacts	NI	TI	EX	IT	R	TM	PI	Phase	MG
Soil	Soil physical properties	Civil works	Increased surface run off due to vegetation clearance and increased paved area	-	3	1	1	1	3	3	C/O	12
	Land condition	Civil works	Soil erosion	-	3	1	1	1	3	1	C/O	10
	Soil contamination	Civil works	Potential soil contamination from fuels, oils &other hazardous materials	-	3	1	1	2	3	3	C	13
Noise and vibrations	Excessive vibration above ambient	Civil works	Consider machine type and extent of vibration during construction	-	3	1	1	1	3	1	C	10
Air quality	Air pollution	Civil works	Dust and/or smoke generation during works	-	3	1	1	1	3	1	C	10
	Air pollution	Civil works	Increased CO2 emission from use of fossil fuel	-	3	1	1	1	3	1	C/O	10
Waste	Solid waste	Civil works	Environmental pollution	-	3	1	2	3	3	1	C	15
	Liquid waste	Civil works	Environmental pollution	-	3	1	2	3	3	1	C	15
Protected/conservation areas	Ecological integrity	Civil works	Encroachment	-	3	1	2	3	3	3	C	17

Topic	Element	Action	Impacts	NI	TI	EX	IT	R	TM	PI	Phase	MG
Public health	Outsiders	Construction of project road	Communicable diseases	-	3	2	2	2	2	3	C	15
Safety & Health	Locals and workers	Civil works	Risk of accidents and occupational diseases	-	3	1	1	2	3	1	C	11

Table 7-1: Hierarchy of Impacts

Rating	Impact	Mean Grade
High	Encroachment of protected/ conservation areas	17
	Increased sediments in water resources along the project road	17
	Wildlife mortality associated with traffic	17
Medium	Loss of vegetation	16
	Increased charcoal burning	15
	Loss of wildlife habitat	15
	Waste	15
	Communicable diseases	15
Low	Alteration of aquatic fish ecology in Sabaki River	12
	Effect of noise and vibration on Fauna	13
	Over exploitation of water resources	13
	Poaching	10
	Increased surface runoff	12
	Soil erosion	10
	Soil contamination	13
	Excessive noise and vibration	10
	Dust and smoke generation	10
	Increased CO_2 emission	10
	Safety & health	11
	Pollution of water resources	9

SECTION 8

8. POTENTIAL POSITIVE IMPACTS

8.1 CONSTRUCTION PHASE

8.1.1 Creation of employment opportunity

During the road construction phase, unskilled and semi-skilled labour will be required to work on the road sites to carry out unskilled duties. However, this will be a short term employment that will terminate after the completion of the project. As a measure of enhancement, the unskilled personnel should be sourced locally.

8.2 OPERATION PHASE

8.2.1 Promotion of tourism in the coast region

Coast region is one of the most toured places in Kenya and East Africa as a whole due to its vast variety of tourist attractions. Some of these sites are located some few kilometres off the project road for example Tana River Primate National Reserve (Mchelelo Game Reserve) located in Baomo 11km off the project road at Mnazini which is home to a wide variety of wildlife including the two endangered primates (Tana river mangabey and Tana river red colobus) zebras, gazelles, lions and elephants.

Tana River itself is also a tourist attraction site as it is rich in biodiversity including 22 species of birds, hippopotamuses, crocodiles, giraffes, lions migrating elephants and various tree species. There are also Tana Delta Dunes, boat racing etc. All these sites can be accessed via the project road especially by visitors from Nairobi, North and Eastern Kenya and Somalia.

Unfortunately the state of the road is very poor as it is seriously eroded in some sections, others are not tarmacked and some of the tarmacked portions have very large potholes .This prevents most tourists from using the Malindi –Madogo road thus denying them access to some of the tourists attraction sites like Tana River Primate National Reserve and Tana River itself. With the improved road, there will be easier access to the tourism sites thereby promoting tourism in the region thus improved government revenue from the tourism sector.

8.2.2 Improved living standard

The main economic activity along the project road is charcoal trading which is done via Sacco's. Other people earn their living through small scale businesses such as wood trade and fruits e.g. coconut selling along the road. Sometimes it can take up to three months without making any sales due to lack of customers especially for charcoal and wood traders. The lack of customers is attributed to poor transport facilities i.e. B8 road which is in a deplorable state. When the road is improved, it will open up the area hence traders will get customers to buy their goods thereby increasing their income.

8.2.3 Providing a link to the proposed Lamu Port

The proposed Lamu port is located in Magogoni near Manda-bay in Lamu and can be accessed via the Malindi- Madogo road .Currently the road is in a very bad condition nearly impassable during the rainy seasons in some sections .This prevents transport via the road thus people from Nairobi and Somalia may not use it. With the improved road, there will be increased links to the port as people and goods can be transported to the port via Malindi- Madogo road.

8.2.4 Improved security in the coast region

Kenya is currently facing a lot of terrorism attacks mostly concentrated in the coast region. The insecurity issues increases further as one move from Malindi to Garissa via Malindi- Madogo road with the area between Hola and Madogo being the most dangerous place. People are discouraged from evening and night travelling in the area due to fear of attack by terrorists and 'shifters'. The poor condition of the road facilitates these attacks further as the police force unit can't arrive in time

to save the victims as well as public service vehicles moving at a very low pace thereby increasing their chances of attack. With the improved road, there will be fewer attacks due to increased traffic, increased efficiency and rescue by relevant police force unit e.g. Red Cross group and Kenya Defence Force. Kenya Red Cross Society can also access the place easily in case of an attack to rescue the injured victims. Also, vehicles will increase their speed to the required standard, and victims can easily escape thereby reducing the chances of terrorists attack.

8.2.5 Support for Bura Irrigation Scheme

The development of Bura irrigation scheme will improve as the produce can be transported to markets easily and cheaply. Farm inputs can also reach the scheme at the right time without delay.

8.2.6 Creation of employment opportunities

During the road operation phase, the people living along the project road will benefit roadside traders. This benefit can be enhanced by building roadside markets with basic facilities. This will enhance income to the community.

8.2.7 Alternative route to access towns in coast region

Currently most of the towns in coast region are accessed via Mombasa- Nairobi highway which is expensive and time consuming as compared to Malindi- Madogo route. These towns include Lamu, Malindi, Garsen, Bura and Hola. Currently transporting perishable goods to these towns via Mombasa-Nairobi highway is costly.

8.2.8 Improved economic growth in the towns of Garsen, Hola, Bura and Bilbil

The project will enhance the regional economy and the national economy in general through increased flow of goods and services, especially agricultural produce to major markets in the region and beyond. Ultimately such gains would contribute to poverty alleviation which is a cornerstone of vision 2030.

Long distance travellers to Somalia will use the route to and from Mombasa and the proposed Lamu Port. Businesses such as hotels and food suppliers will greatly benefit from this diverted traffic.

8.2.9 Enhanced access to social amenities like schools and health facilities

Schools and hospitals are some of the sensitive receptors identified along the project road. Field work study identified the following information pertaining to location and number of these institutions.

- The type and numbers of institutions currently in operation along, or in the catchment area of the study roads.
- The distance away – the identified institutions are located vis-à-vis the study road.

Most health and educational facilities – both public and private, tended to be sited along the road – which indeed is the “main road” for the area. Only a few were located relatively farther away from the road.

For the health and educational facilities located along the road, the main problems experienced were during rainy seasons: when they were inaccessible by motor-vehicles – particularly for those sections which were in poor state of maintenance.

For those facilities located off the main road, the problems were total inaccessibility by vehicles

The quality of education in these areas is affected by poor road condition which is impassable during the rainy seasons. This is because students and teachers have difficulty getting to school in time leading to high absenteeism. School supplies can’t reach when required and inspectors can’t access the schools easily, thus adversely affecting the quality of education. The same is experienced by hospitals as patients and health staff sometimes cannot get to hospital in time. When patients and

health staff cannot get to the health facilities on time, the risk to patients increase as the quality of service delivery by the health institution is compromised.

The upgrading of the road to bitumen standards is therefore seen as a sure and a better way to address these perennial problems experienced by the residents living around the proposed project road.

8.2.10 Enhanced Participation in community and government affairs

The improvement of the road will enhance participation of local communities in various affairs for example politics and other social functions.

8.2.11 Improved Management of Wildlife Conservation Areas

The wildlife conservation areas along the project road are Tana River Primate National Reserve (Mchelelo Game Reserve) and Tana River. Improvement of the road will improve management of the reserve by improving mobility of game rangers against poaching.

8.2.12 Improved ambient air quality

Upgrading the road to bitumen standards will minimize dust especially along the un-paved sections of the road between Garsen and Hola, some sections between Hola and Bura and between Charitende and Madogo where traffic currently use a makeshift diversion through the bushes.

8.2.13 Improved road side drainage

Improvement of structures such as culverts and bridges, cross drainage structures as well as road side drainage, will improve drainage along the road corridor especially between Garsen and Mnazini, several culverts have been damaged or washed away by runoff.

SECTION 9

9. POTENTIAL ADVERSE IMPACTS

9.1 CONSTRUCTION PHASE

9.1.1 Wildlife

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	The road construction phase could expose wildlife in Tana River Primate National Reserve and the wider environment to poaching by construction workers and road kills by construction traffic. Further if contaminated waste is poorly managed then some types of waste could affect animals especially primates
Type of impact (TI)	Direct / Indirect	High speed construction traffic could lead to increased road kills, which is a direct impact, while possible poaching by workers is an indirect impact.
Intensity (I)	Low	This impact is considered low.
Extent	Mainly localized but partially dispersed	The direct impacts are likely to occur within the road corridor, however considering the spatial movements of animals, the ultimate impact may be slightly dispersed. The indirect impacts relating to possible poaching could be slightly widespread.
Reversibility	Long term and Delayed	Easily reversible.
Persistence	Temporary	Mainly affected during construction phase, but road maintenance implies routine clearance along the corridor that will lead to continued disturbance of the habitats.

There are two environmentally sensitive areas along the project road i.e. Tana Delta Ramsar Site and Tana River Primate National Reserve. Both have their boundaries adjacent to the project road but are not fenced hence wildlife move across the project area especially north of Garsen.

The primates in the national reserve include; *Piliocolobus rufomitratus* (Tana River red colobus), *Cercocebus galeritus* (Tana River mangabey), *Cercopithecus mitis ssp. Albotorquatus* (Tana River sykes monkey), *Chlorocebus pygerythrus* (Sykes monkey), *Papio cynocephalus* (Yellow baboon) and *Cercopithecus mitis* (Blue monkey). *Piliocolobus rufomitratus* (Tana River red colobus) and *Cercocebus galeritus*(Tana River mangabey) are endangered with population estimated 33-253 individuals/per km² for the red colobus monkey and Tana river mangabey's population has declined by roughly 10-30% since 1975 that had an estimate of 1,200 to 1,600 individuals.

Primates are social mammals and mostly move together in close familial relationships or in troops depending on the species. The primates and other wildlife have embraced the continuous habitat that allows faunal movement across the area including across the current road. Construction traffic could significantly increase traffic volumes along this road and this can occasionally lead to road kills of not only primates but other wildlife as well. .

Apart from primates, other wild animals that include dik dik, warthogs, stripped hyena, spotted hyena, squirrel and nyala (*Tragelaphus angasii),* elephants, hartebeest (Hirola), zebra, gazelles, lions, giraffes, buffalo, east African oryx, lesser kudu, cheetah, leopard, grants gazelle, gerenuk and jackal.

Figure 9-1: Zones that are critical for wildlife

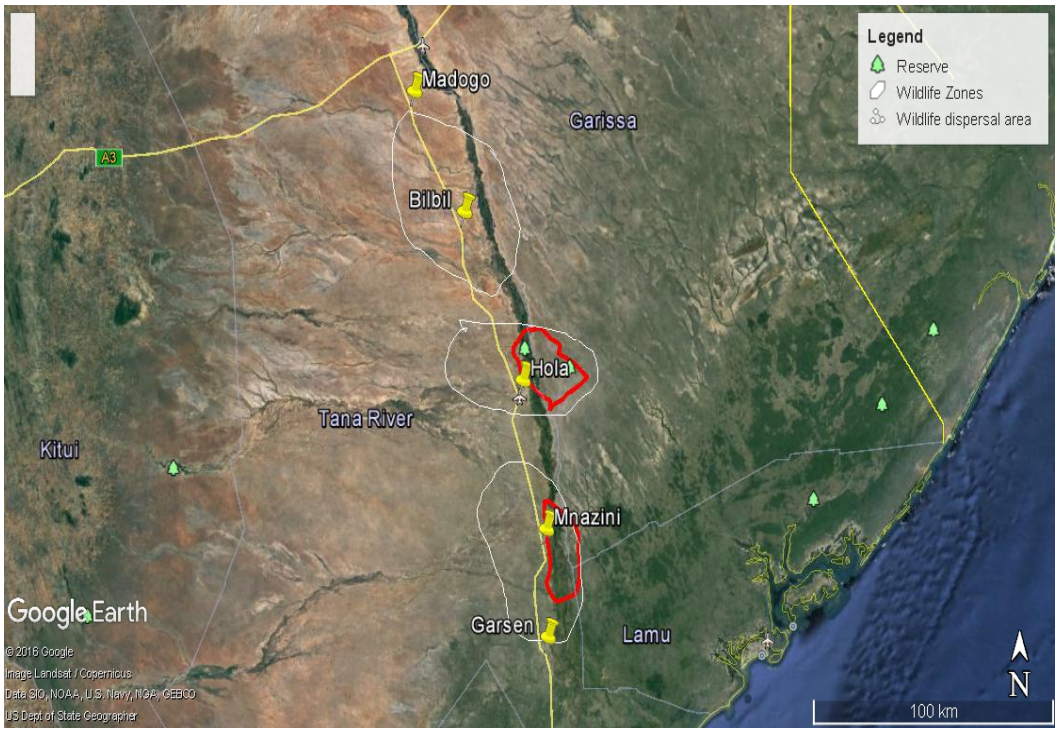


Figure 9-2: Zones that are critical for wildlife

Mitigation measures

- Educate workers regarding the occurrence of important wildlife resources in the area and the importance of their protection, including the appropriate regulatory requirements.
- Avoid the spread of invasive non-native *Prosopis juliflora* by ensuring the haulage trucks do not transport the seeds from the road side to material sites.
- Reseed disturbed areas with native plants mainly acacia species during interim and final reclamation. Undertake reclamation activities as early as possible on disturbed areas.

- Schedule activities to avoid disturbance of resources during critical periods of the day (e.g., night) or year (e.g., periods of courtship, breeding, nesting, lambing, or calving).
- Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife.
- Locating the construction camp at least 1 km away from Tana River Primate National Reserve and the Elephant Corridor in Mnazini.
- Develop a code of conduct for the workers to ensure none of them get engaged in hunting or harming game in any way.
- Appropriate waste management by covering all solid waste especially those from the camps and those considered hazardous waste.
- Fence off the campsites to keep wildlife out.

9.1.2 Vegetation Resources

Impact characteristics	Rating	Description
Nature of impact	Negative	Clearance of vegetation thus reducing ground cover and exposing soil to agents of erosion
Type of impact	Direct	Clearing the road corridor, access roads and diversions
Intensity	Medium	The project area is mostly semi-arid with sparse vegetation cover in most parts
Extent	Localized	Only on few sections of the road has vegetated road reserve. The other vegetation loses will be at material sites.
Reversibility	Long term partially reversible	Permanent vegetation clearance on the road footprint and replanting of vegetation that is not within the road reserve.
Persistence	Temporary effect	Vegetation can be replanted or re-grow naturally in the cleared area.

The main road (A7/B8) generally follows the existing alignment and therefore, during construction only vegetation which has encroached into the road reserves will be cleared to give way for the improvements of the project road. *Prosopis juliflora* is the dominant tree. On the other hand the proposed bypass will be an entirely new road. The alignment crosses farmlands and grazing fields. Vegetation in these farms consists of fruit trees such as cashew nuts-*Anacardium occidentale,* mangoes-*Mangifera indica*. Coconut-*Cocos nucifera,* lemon-*Citrus limon,* pawpaw-*Asimina triloba* and sugar apple-*Annona squamosa* and natural trees such as *Casuarina equisetifolia*, Neem (*Azadirachta indica)* and mature Croton spp, *Deloxia regia, Leucaena leucocephala,* Baobab *(Adansonia digitata).* The bypass is 9.145 km long and a corridor of 40m thus a total of 39 ha. of land will be cleared of vegetation. Out of this approximately 450 trees will be lost.

Mitigation measures

- Compensatory planting of trees i.e. plant at least twice the number of trees, about 900 in total either on farmers land or in public land within the project area.

- Vegetation should only be cleared along the road reserve and where it will interfere with road construction and/or present a hazard to traffic. The local community should be given a chance to harvest the targeted vegetation if they so wish.
- Areas to be cleared should be agreed and demarcated before the start of the clearing operations to minimize exposure. Also stage vegetation clearance is recommended so as not to clear the entire corridor all at once.
- The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc. shall be encouraged.

9.1.2.1 Spread of invasive species

Impact characteristics	Rating	Description
Nature of impact	Negative	Involves potential colonisation of newly cleared or excavated sites within the project area by *Prosopis juliflora*.
Type of impact	Direct	Ground disturbance promotes colonization by *Prosopis juliflora*.
Intensity	Minor	*Prosopis juliflora* has already invaded the areas along the project road. Incremental impact will therefore be minor
Extent	Localized	Prosopis mainly colonizes disturbed soil and thus only areas that will be disturbed are susceptible.
Reversibility	Long term and reversible	Spread can be controlled if detected in good time and the sites can be cleared of the weed.
Persistence	Temporary effect	Invasive weeds tend to persist once established in an area.

Prosopis juliflora dominates along the project road and the surrounding areas. During construction, vegetation within the road reserve will mostly be cleared. This may however facilitate further spread of the weed within the corridor and at borrow areas.

Prosopis juliflora is mainly spread by livestock and wildlife that consume the seed pods and spread the seeds in their droppings. Apart from animal dispersal, other agents of dispersal include; water and self-dispersal mechanism.

Colonization of the road reserve by the weed can cause road safety concerns as visibility at road curves is compromised. This may lead to accidents and wildlife mortality. In addition, encroachment of the invasive plant on the road shoulders can progressively damage the paved surface by establishing in tiny cracks on the pavement.

Prosopis juliflora being an invasive species may necessitate frequent maintenance to ensure that it does not grow by the road shoulders and cause visual intrusion. This is an added cost in the operation phase making it more expensive in terms of maintenance unlike other roads.

Mitigation measures

- Steep slopes and coarse textured soils are unfavourable for the growth of *Prosopis juliflora* therefore raising the road to form slopes on the shoulders and stone pitching the road shoulders to the toe of the embankments should prevent colonization

- Clearing and removal of vegetation along the corridor and at borrow sites should be carried out in such a way that damage to adjacent areas is prevented or minimised
- A monitoring program shall be put in place along the entire stretch that will do regular monitoring with the help of the local communities once the road is complete and during operation to ensure there is no encroachment by the plant and to uproot and clear those that have already encroached from they grow to maturity
- *Prosopis juliflora* cut down during construction should be given to the local communities for them to burn charcoal for their use or use as firewood
- Phase vegetation clearance to minimize colonization of *Prosopis juliflora* in neighbouring habitats.

9.1.3 Impacts on water resources

Impact characteristics	Rating	Description
Nature of impact	Negative	The impact involves pollution of the water resources along the project road by various pollutants associated with road construction and sedimentation due to increased surface runoff and soil erosion. Impact may also include increased pressure on these resources which are already insufficient to meet current water demand.
Type of impact (TI)	Direct	Water pollution, sedimentation and strain on the resources may occur during construction.
Intensity	Medium	Water is an important resource and scarce along the proposed project road.
Extent	Localised and disperse	Extent of impact will be localised for the water pans and disperse in case of sedimentation of River Sabaki.
Reversibility	Short term and easily reversible	Rivers have a self-cleansing mechanism. Polluted water can be treated to make it usable again
Persistence	Temporary	Are restricted to the construction phase of the project

9.1.3.1 Water pollution

The project road crosses some water bodies that include Sabaki River and laggas. During construction, these resources may be exposed to silt-laden run-off, chemical/fuel spillages and leaks from plant and machinery, and from chemicals and other pollutants (e.g. cement, paints, etc.) used/stored on site, localised erosion of banks and beds of watercourses when works are required in their proximity (e.g. reconstruction of crossings); and inappropriate disposal of foul water from the construction site giving the impact a high magnitude. Kilifi and Tana River Counties are water scarce and therefore conservation of these water resources is vital because the community depends on them.

Mitigation measures

- No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent laggas and River Sabaki shall be permitted;
- Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site where applicable

- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to River Sabaki;
- Works that are likely to generate silt-laden runoff (e.g. earthworks and excavations) should be undertaken preferentially during the drier months of the year; November to April;
- Site compounds and stockpiles should be located away from water pans, River Sabaki and the laggas; The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and water pans without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances;
- Where possible an 8m buffer strip of existing vegetation to be maintained alongside River Sabaki. Where this buffer zone is necessarily breached (i.e. at crossings) the design and construction of structures will be environmental sympathetic;
- Any work along River Sabaki and laggas should be isolated to prevent silt propagating downstream
- Earth stockpiles to be seeded as soon as possible, covered with geotextile mats or surrounded by a bund to minimise the risk of sediment-rich runoff;
- Tools and plant to be washed out and cleaned in designated areas within the site compound where runoff can be isolated for treatment before discharge to Sabaki river or sewer under appropriate consent;
- If required, vehicles should cross River Sabaki and laggas at designated crossing points only, which will include protection to minimise silt-laden runoff/mud from entering the watercourse;
- Debris and other material could be prevented from entering watercourses by Construction SUDS (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses tobe carefully managed to prevent suspension of silt (or contamination by other pollutants); and
- Discharges to watercourses and water bodies will only be carried out under consent of the relevant governing bodies such as WRMA.

9.1.3.2 Siltation and sedimentation

The road crosses Sabaki River, laggas and there are also a number of water pans next to it. Increased run off and erosion from various work sites could potentially result to siltation of these water resources. Increased sedimentation in the water pans may lead to a reduction in their storage capacity by making them shallower. The water pans are an important resource for the communities along the proposed project road as most of them are pastoralists and depend on these resources to meet their cattle water needs and also their domestic needs.Mitigation measures

- Any work along River Sabaki should be isolated to prevent silt propagating downstream;
- Sediment wash from work sites into River Sabaki could be minimized by constructing settlement lagoons or other temporary attenuation measures such as sand/silt traps if necessary
- Diversion of minor watercourses to be carefully managed to prevent suspension of silt (or contamination by other pollutants)
- Sand/silt traps should be used so as to prevent silt and any other sediments from getting into River sabaki;
- Site compounds and stockpiles to be located away from water pans, laggas and River Sabaki; The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and water pans without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances.

9.1.3.3 Pressure on water resources

There is a possibility of overexploitation of the water resources along the project road during construction if they are used as the major source to meet construction water demand. Water is a scarce resource in both Kilifi and Tana River counties. The communities highly depend on them for their cattle and domestic use therefore over exploitation leading to a temporary reduction in quantity may have a high impact.

Mitigation measures

- Consultations with the communities shall be required before commencement of water abstraction in river Sabaki
- Water permits for the abstraction of water shall be obtained from WRMA (especially for River Sabaki and Tana River) to ensure that existing water rights and uses will not be affected by the road project for its diverse water needs
- Consultations with the WRUAs should be done prior to abstraction to gain their support
- Water pans and laggas should not be used to meet road construction water needs.

9.1.4 Alteration of aquatic and fish ecology

Impact characteristics	Rating	Description
Nature of impact	Negative	Bridge construction at Sabaki river will disturb the aquatic conditions at the bridge crossing
Type of impact	Indirect	Disturbance is caused to fish habitat not on the fish themselves.
Intensity	Minor	The impact is restricted to the bridge crossing point on Sabaki river.
Extent	Dispersed	The effect could be felt beyond the bridge construction point
Reversibility	Temporary, easily reversible	Impact is only during the construction and can be reversed.
Persistence	Temporary effect	Restricted to construction period

During construction of the road, there may be disturbance of fish habitats especially by bridge construction across Sabaki River. Construction may temporarily alter aquatic conditions at the bridge crossing point resulting in disturbance which could locally impact on aquatic fauna including fish.

Bridge construction activities can result in sedimentation of the river, temporary physical barriers can affect fish movements and in some cases contaminants may also affect aquatic fauna. These construction activities may interfere with some fish species which are only found in Sabaki River such as *Mormyrus tenuirostris* and *Mormyrus benhardi,* though they are of least concern according to the IUCN list. Other species are *Northobranchius* spp which are vulnerable and the critically endangered *Pritis microdon.* The fish species mentioned above, among others, breed during the rainy seasons some near the shore in shallow places while others in quite places in the deepest part of the river.

Impacts on fish and other aquatic fauna found in river Sabaki are, however, expected to be low since works that can affect them are restricted to a single point that is Sabaki river bridge crossing.

Mitigation measures

- Best management practices should be enforced to avoid accidental spill of concrete leachate, oils, sediments and spill of petrochemicals at the bridge works
- Construction activities should preferably be undertaken during the non-breeding seasons i.e. during the dry seasons that is from June to September and January to March

9.1.5 Waste management

Impact Characteristics	Rating	Description
Nature of impact (NI)	Negative	Impact involves pollution of the environment caused by construction generated solid and liquid waste which include waste water, fuels, oils, hazardous substances and other liquid pollutants.
Type of impact (TI)	Direct	Pollution of the project environment.
Intensity (I)	Medium	Large volume of waste is normally generated from excavation of the material sites and carriageway including debris, spoil, general waste (wrapping materials and food waste).
Extent	Localized	To the project area.
Reversibility	Short term and easily reversible	Short term and will only occur during the construction phase and is easily reversible if the appropriate mitigation measures are implemented.
Persistence	Temporary effect	Certain type of waste will only be experienced during the construction phase.

9.1.5.1 Solid Waste

During construction, solid waste will be generated from a wide range of project activities. Some of the waste includes earth spoils, wrapping materials discarded by the workers on site, food waste from kitchens, waste from the workshops and offices consisting of waste papers, toners and cartridges, broken equipment and containers, steel, timber, etc. To minimize pollution and visual intrusion, the waste will have to be managed appropriately.

Wild animals from Tana River primate reserve may be affected by liquid and sometimes solid waste if not properly managed. Some categories of waste can be harmful to wildlife if ingested. Food waste may also attract primates and birds to the construction camps with the potential of being a nuisance to the construction workers.

Mitigation measures

- The contractor shall develop a comprehensive waste management plan prior to commencement of works
- Properly labelled and strategically placed waste disposal containers shall be provided at all places of work
- Litter bins should have secured lids to prevent animals and birds from scavenging
- All personnel shall be instructed to dispose of all waste in a proper manner
- Recycling of construction material shall be practiced where feasible e.g. containers and cartons

- Earth spoils shall be disposed of in pre identified sites
- The construction camps should be situated away from the primate reserve and wildlife corridors to prevent wildlife from scavenging polluted waste.

9.1.5.2 Liquid waste

a) Waste water

During construction various types of liquid waste will be produced such as concrete washings, runoff from workshops and grey water from contractor's camp. Just as with solid waste, liquid waste can attract wildlife especially for meeting their drinking water needs. This can affect wildlife especially primates.

Mitigation measures

- Water containing pollutants such as concrete or chemicals should be directed to a conservancy tank for removal from the site where applicable
- Potential pollutants of any kind and form shall be kept, stored and used in such a manner that any escape can be contained
- In case of any form of pollution of Sabaki River, the contractor should notify the RE
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas including groundwater are not polluted
- No grey water runoff or uncontrolled discharges from the site or working areas to any adjacent water body.
- Fence off the main contractor's camp to keep away wildlife. Consider innovative ways for keeping off primates as these can always climb over any fence.

b) Fuels, oils, hazardous substances and other liquid pollutants

The construction phase will involve use of stationary and mobile plant and equipment which will require fuelling and lubrication. There are chances of accidental spillage of used engine oils, grease and diesel which may lead to soil contamination. Should this spillage occur during the rainy season, the contaminants may be washed off by surface runoff and find their way into the water bodies especially Sabaki River and the many water pans.

Mitigation measures

- The contractor shall ensure that the machines and equipment are in good condition
- Ensure proper handling of lubricants, fuels and solvents while maintaining the equipment
- Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal.
- A safety and emergency response plan will need to be developed for all operations with emphasis on the protection of the environment prior to start up.
- Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal;
- Storm water shall be diverted away from the fuel handling and storage areas. An oil water interceptor shall be provided to treat any rainwater from fuel storage and handling areas;
- Measures should be taken to ensure proper storage of fuel, oil and bitumen. Oil-water interceptors or sumps should be constructed to capture discharge of oils, fats and other polluting liquids from maintenance workshops, vehicle and equipment washing bays and kitchen drains;

- At the work sites the contractor should be expected to maintain strict surveillance particularly when working within the vicinity of water supply points and the rivers within the project area;
- Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment or provided with own containment
- No construction materials shall be stockpiled within areas that are at risk of flooding

9.1.6 Soil Resources

Impact characteristics	Rating	Description
Nature of impact	Negative	Alteration of soil physical properties as well as exposure to erosion agents may result from the civil and general works within the road corridor Effects of soil pollution may also result from accidental oil spills
Type of impact (TI)	Direct	Soil excavation and accidental spillage
Intensity (I)	Minor	Along the road in Galma location, Mnazini, Wenje to Hola, Hola to Komorkila centre, Bura to Madogo are erosion prone areas
Extent	Localised	Soil erosion and contamination due to construction woks will affect the areas along the road corridor where there will be clearance, exposure and excavation of the top soil
Reversibility	Long term partially reversible	Soils can recover from erosion and pollution over a period of time when proper intervention and remediation measures are implemented
Persistence	Temporary effect	Largely restricted to the construction but newly created slopes and embankment could experience sustained erosion beyond construction phase

9.1.6.1 Soil erosion

Soil erosion was observed at different sections along the project road as shown in the Table below. Soil erosion is attributed to: run-off from storm water accumulated over long distance, water over flow from laggas and run-off from blocked or damaged culverts or absence of drainage structures.

Sections with severe erosion	Coordinates
Galma location	S 02.10629,E040.05398
Mnazini	S 02.06760,E040.06064
Wenje to Hola	S 01.71494,E040.03814 to S 01.51790,E039.99852
Hola to Komorkila centre	S 01.51529,E040.00294 to S 01.24921,E039.87016
Bura to Madogo	S 01.18918,E039.82821 to S 00.49106,E039.52969

Removal of vegetation cover during site clearance will further expose soil to water and wind which are agents of erosion. Excavation and ground clearance works will also have the direct effect of

loosening the soils making them easier to be washed away by water and wind. Soil erosion will be more pronounced if earth works coincide with the rainy season since runoff will enhance soil erosion.

The road crosses Sabaki River and several laggas and there are a number of water pans adjacent to the road corridor. Soil erosion will affect water quality in these water bodies by increasing sediments. Increased sedimentation in the water pans may lead to a reduction in their storage capacity by making them shallower. The water pans are an important resource for the communities along the proposed project road as most of them are pastoralists and depend on these resources to meet their cattle water needs and also their domestic needs.

Mitigation measures

- Earthworks should be controlled so that land that is not required for the road works is not disturbed;
- Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain;
- Excavated materials and excess earth should be kept at appropriate sites approved by the Supervising Engineer;
- The contractor should adhere to specified cut and fill gradients and planting embankments with shrubs and grass to reduce erosion and take care of stability problems of road embankments. Areas cleared for improving sight distance should be planted with grass to reduce erosion;
- Areas affected by construction related activities and/or susceptible to erosion should be monitored regularly for evidence of erosion, these include: areas stripped of topsoil, Soil stockpiles, Spoil sites, Borrow pits, Sites for bridges and drainage structures.
- Monitoring should also be done during the operation phase to prevent road degradation by erosion caused by flash floods.
- In sections where the risk of erosion is evident as identified above, special measures may be necessary to stabilise the areas and prevent further erosion. These may include, but not be limited to: confining construction activities, using cut off drains, using mechanical cover or packing structures such as geo-fabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls, constructing anti-erosion berms and planting of appropriate vegetation.
- Any work along watercourses to be isolated to prevent silt propagating downstream;
- Debris and other material should be prevented from entering Sabaki river; Construction SUDS (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants);
- Where possible, sieves should be placed next to water bodies so as to prevent silt and any other sediments from getting into the resources

9.1.6.2 Soil pollution

During construction soil pollution can occur in the event of accidental oil spills, or release of petroleum products and bitumen (among other liquids and solvents) into the environment. This impact is anticipated to be localized in nature and will occur in and around machinery and plant yards, base camps and areas of concentrated activities. In the event that it occurs the material may infiltrate into the soil and cause soil pollution.

Mitigation measures

- The contractor should develop emergency response plans that includes spill response strategy
- Proper maintenance of machinery and equipment to avoid or minimize leakages from machines
- Spill prevention practices and response actions should be applied in refuelling and vehicle use areas to minimize accidental contamination
- Spills should be immediately addressed per the appropriate spill management plan and initiate soil clean up and soil removal if needed. Spill kits should be availed to aid this
- Containment around the garage, fuel store and fuelling station should be ensured so that these potentially polluting substances can be properly handled and any intended escape of material from that area can be contained until such time as remedial action can be taken
- Proper handling of material through use of dip trays, directing spills to an oil sump which should be emptied into a designated disposal site
- Refuel in designated refuelling areas that include a temporary berm to limit the spread of any spill

9.1.7 Air Quality

Impact characteristics	Rating	Description
Nature of impact	Negative	Anticipated impact may originate from vehicle and machinery fumes and dust
Type of impact (TI)	Direct	Direct to occupants in the receptor areas
Intensity (I)	Low	Since there are already dust issues in some sections along the project road, the incremental impact will be low
Extent	Localized	To receptor prone areas
Reversibility	Short term and easily reversible	Impacts are restricted to the construction phase and can be reversed once the works are completed.
Persistence	Temporary	For the construction phase

Significant air pollution will most likely be attributable to particulate matter (PM), especially dust. Particulate matter is a common air quality problem at road construction works. PM mainly originates from excavations, from the movement of heavy machinery on earth roads especially along unpaved diversions, haulage activities and concrete mixing and batching. Already there is significant dust along unpaved sections of the road from Makutano junction to Kormorkila centre and Bura to Madogo. The PM generated could affect the 35 learning institutions and 5 health facilities that are within 200m of the road reserve.

Mitigation measures

- The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible;
- Do not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds
- Water sprays shall be used on all earthworks areas. Water shall be applied when need be to reduce dust generated by vehicle movements or wind

MAXIMUM PERMISSIBLE NOISE LEVELS FOR CONSTRUCTIONS SITES

(Measurement taken within the facility)

Facility		*Maximum Noise Level Permitted (Leq) in dB(A)*	
		Day	Night
(i)	Health facilities, educational institutions, homes for disabled etc.	60	35
(ii)	Residential	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

- Vehicles delivering soil materials shall be covered to reduce spills and windblown dust;
- Vehicle speeds shall be limited to minimise the generation of dust on site and on diversion and access
- Use of personal protective equipment like dust musks by construction workers in areas experiencing high dust levels

9.1.8 Noise and vibration pollution

Impact characteristics	Rating	Description
Nature of impact	Negative	Noise generated by equipment and workers could impact on sensitive receptors e.g. learning centers and health facilities within the project corridor.
Type of impact	Direct	Impact felt directly by people and animals
Intensity	Low	The project corridor has low population density and few sensitive receptors within 200m of the road reserve.
Extent	Localized	Impact affect only the sensitive receptors
Reversibility	Short term easily reversible	Can be reversed using proper mitigation measures
Persistence	Temporary effect	Restricted to construction phase only with no effects after construction

Noise generating activities such as equipment operations and the workers themselves could be a public nuisance to nearby settlements and commercial centres, health centres and schools especially those within 200m of the road reserve.

Mitigation Measures

- The Contractor shall keep noise level within acceptable limits from NEMA in Noise regulation second schedule and construction activities shall, where possible, be confined to normal working hours in the residential areas especially between Malindi and Garsen;
- Schools, hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of school hours
- Construction workers required to wear ear muffs in areas exposed to excessive noise levels
- Equipment should be maintained regularly to reduce noise resulting from friction

- No unnecessary hooting by project vehicles

9.1.9 Climate change and potential Impacts on road project

Over the recent years there are frequent droughts, floods and other extreme weather events. A slight increase in rainfall and given the number of laggas that the project road crosses renders the need for the road design to cater for floods and accommodation of high flow volumes along the laggas.

Mitigation Measures

- Cross-drainage design that accommodates 50 year flood return periods
- Designing road infrastructure that can withstand the preveling climate changes and the ones to come these include structures that can withstand high rainfall, strong winds as well as temperature
- Networks could be designed to ensure that the road structure is climate-proof over its life span

9.1.10 Construction material sourcing

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	Impacts will relate to the borrow pits and hard stone quarries. When not properly rehabilitated these sites remain of poor quality and unproductive besides being visually intrusive. Furthermore, they may be safety risks
Type of impact (TI)	Direct	Direct to the specific material sites within the project area
Intensity (I)	Medium	With proper mitigation measures the impacts can be averted
Extent	Localized	To the material sites
Reversibility	Long term and partially reversible	The impacts are short term during construction and can be partially reversed by proper rehabilitation of the material sites
Persistence	Temporary effect	Will be experienced during the construction phase when material is being sourced

Generally, materials will be sourced from different areas along the road but most likely from existing material sites. However in case of direct material sourcing such as from borrow pits and quarries, major concerns would relate to vegetation clearance, landscape scars, dust and general disturbance during excavation, and the need to reinstate or landscape the gravel sites when the contractors have completed excavation works.

Materials sites if not reinstated and rehabilitated after project completion will create a bad land type of landscape with scattered boulders and rubble of ballast on the soil surface. Further impacts in case such borrow pits or quarries are abandoned, and left without un-rehabilitated are: water ponding and steep cliffs.

Unfenced sites may be risky to public (especially children), livestock and wildlife, therefore should be fenced off when in use and illegal excavation of ballast for sale from abandoned quarries will lead to development of bad lands (barren unproductive areas), leading to erosion of topsoil. Sand harvesting on the other hand should not be done along rivers as this is prohibited by NEMA sand harvesting regulations.

Mitigation measures

- Ensure that appropriate authorization to use the proposed borrows pits and quarries has been obtained before commencing
- Carry out inspection of each of the site's soil stability before excavation;
- Borrow pits and quarries shall be located more than 20 meters from watercourses in a position that will facilitate the prevention of storm water runoff from the site from entering the watercourse;
- All roads to and from borrow pits and quarries should be made safe and accessible and transportation of material should follow a designated route
- Safety distances should be maintained in material sourcing operation; 100m to any shopping centre, school and hospital and 50m to any house irrespective of consent from the owner
- The Contractor shall give a 14 day notice to nearby communities of his intention to begin excavation in the borrow pits or quarries;
- If quarrying will be necessitated, the contractor should prepare health and safety plan before any work on the quarries is commenced;
- Where possible cordon off the quarry and borrow areas to keep livestock and children off if the site is deemed too accessible. If this is the case, maintain fences and "make good" of the sites afterwards;
- Topsoil shall be stripped prior to removal of borrow and stockpiled on site. This soil shall be replaced on the disturbed area once the operation of the borrow site or quarry is complete;
- Decommission the borrow pits and quarries upon completion of the Contract and reinstate the land to its natural condition by grading excavations and planting suitable saplings;

9.1.11 Safety and Health

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	Impacts relate to accidents, occupational diseases, ill health and damage to property which can occur if precautionary measures are not taken
Type of impact (TI)	Direct	Accidents, poor and dangerous working environments and disease spread directly affect humans
Intensity (I)	Medium	Possibility of occurrence can both be minimized and eliminated.
Extent	Localized	To the working environment
Reversibility	Long term and partially reversible	Irreversible injuries and deaths can occur in the working environment but precautionary measures can help in mitigating the impacts.
Persistence	Temporary effect	Impacts restricted to construction phase

9.1.11.1 Occupational health and safety

Health risk and work safety are concerns at any construction site. Others can be caused by storage, handling and transport of hazardous construction material

Mitigation measures

- The contractor should provide the workers with appropriate personal protective equipment at all times while on site
- The contractor should ensure there are warning signs on the construction site and on the road to protect from accidents
- The contractor shall provide standard first aid kits at the site
- A safety officer who has safety training and knowledge of safety procedures should be present on site to ensure that all workers have guidance on the safety procedures
- The contractor should have an insurance cover for all workers
- The contractor should comply with all the Occupational Safety and Health Act 2007 regulations and ILO on safety and public health in construction activities

9.1.11.2 Community Health and safety

Increased movement of vehicles may lead to increased accidents involving the public. Small centres within the project area may also be of safety concern due to relatively dense settlements. Increased traffic speeds due to the improved road may only make this situation worse and result in more accident cases. However, this impact can be rated medium to low if appropriate mitigation measures are implemented.

Mitigation measures

- Speed humps should be provided in the various centres along the project road to slow down traffic
- Speed limits appropriate to the vehicles driven should be observed at all times
- Adequate road signage of ongoing works should be provided
- In areas where the road intersects the communal watering points, bumps and proper warning signage should be erected
- Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal
- A safety and emergency response plan should be developed for all operations with emphasis on the protection of the environment prior to start up

9.1.12 HIV/AIDS

Impact Characteristics	Rating	Description
Nature of impact (NI)	Negative	Impacts involves spread of HIV/AIDS due to influx of construction workforce into the project environment and possible irresponsible behaviour between them and the locals
Type of impact (TI)	Direct	Affects the construction workers and the locals
Intensity (I)	Medium	Despite contracting the disease, it can be managed using ARVs
Extent	Dispersed	If the infected people have other sexual partners the disease can easily spread beyond the project area

Impact Characteristics	Rating	Description
Reversibility	Long term and partially reversible	The disease is incurable, but can be managed using ARVs
Persistence	Permanent	The disease is incurable

The proposed project could impact on the community in many ways and one of them is the transmission of sexually transmitted diseases. Disease transmission could be facilitated by the migration of people, which invariably will accompany road projects during construction. Work crews may bring with them or contract the diseases from the local community. Presence of construction workers earning above average incomes and often coming without their families may contribute to the spread of HIV/AIDS and STDs.

Mitigation measures

- Initiate awareness creation, prevention and training programmes on HIV/AIDS upon commencement of works
- Establish wellness centres including VCT and AVR centres at strategic locations of the project road
- Incorporate HIV/AIDS control program as part of the construction deliverables
- HIV/AIDS Awareness Program and other communicable diseases to be instituted and implemented as part of the Contractor's Health and Safety Management Plan to be enforced by the Supervising Engineer
- This should involve periodic HIV/AIDS and other communicable diseases Awareness Workshops for Contractor's Staff
- Access to Contractor's Workforce Camps by outsiders to be controlled
- Contractor to provide standard quality condoms to personnel on site

9.1.13 Vulnerable and Marginalized Groups (VMGs)

The project corridor from Madogo to Minjila traverses through Arid and Semi Arid Lands dominated which are mainly pastoralist (native Ormos) while the other category was for farmers (native Pokomos) settled along Tana River. These pastoralist communities are classified as Vulnerable and Marginalized according to according to OP 4.10 are categorized as Vulnerable and Marginalized and Kenyan Constitution 2010 as summarized below;

Kenyan Constitution 2010

Article 56 provides that the state should put in place affirmative action programmes designed to ensure that minorities and marginalized groups participate and are represented in governance and other spheres of life; are provided special opportunities in education and economic fields; are provided special opportunities for access to education; develop their cultural values, languages and practices; and have reasonable access to water, health services and infrastructure.

The World Bank Operation Policy OP 4.10 on Indigenous People

The OP 4.10 on indigenous peoples contributes to the bank's mission of poverty reduction and sustainable development by ensuring that development processes fully respects the dignity, human rights, economies and cultures of indigenous people. It is required that the borrower engages in FPIC so as to secure broad community support to the project by the affected indigenous people

However, this SIA indentified that the Project will not directly adversely affect the VMGs since it is an existing road that is planned to be strengthened within the existing corridor.

The SIA identified Project Impacts to VMGs to be included in the Project preparation as summarized below:

- Restriction of livestock crossing during Project civil works
- Pollution of Water pans and river channels used to water livestock by effluent from plant and equipment
- Siltation and sedimentation Water pans and river channels by silt from construction site
- Pasture destruction by trucks during ferrying of construction materials to and from site
- Livestock kill by plant and equipment during project implementation

Mitigation measures

Project interaction with Vulnerable and Marginalized Groups (VMGs) alon the road corridor from Madogo to Marereni Markets, the SIA provided the following provisions to mitigate against any potential Project impact to VMGS:

- Sensitize community members about the Project and consult VMGs continuously on the design of the project so that it turns out relevant, culturally appropriate and responsive to their needs and aspirations.
- Provide employment quarters for VMGs especially in unskilled or semi-skilled cadres during Project implementation.
- Provide support infrastructures for VMGs such as establishment of extra water pans along the road alignment.
- Support and facilitate the use of customary institutions for grievance and complaints handling that might arise during Project implementation

9.1.14 Labour Influx Effects

This impact is triggered during Project Construction Phase due to the Project attracting various categories of workers from local, national and international markets.
This therefore leads to concentration of people in one area a drawn from diverse social and cultural backgrounds often resulting to a number of issues as listed below;

- Strain on various resources especially water resources for road works
- Grievances from local community members over job opportunities.
- Sexual Offences
- Teenage Pregnancies

The impact is likely to happen along the entire corridor from Madogo to Malindi on the main B8 alignment and proposed Malindi Bypass

Mitigation measures

- Effective community engagement and strong grievance mechanisms on matters related to labour
- Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx, the contractor should engage a local community liaison person
- Proper records of labour force on site while avoiding child and forced labour
- Fair treatment, non-discrimination, and equal opportunity of workers including the VMGS (Along the road corridor) and women.
- Comply to provisions of WIBA 2007
- Develop and implement children Protection Strategy, this strategy will ensure that no child under the legal age of 18years in employed to the Project.

9.1.15 Human Right and Gender Inclusivity

This impact is triggered during Project Construction Phase due to the potential of the Contractor's failure to comply with the following provisions;

- Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule.
- failure to protect Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights, and interfering with Labour Rights

Mitigation measures

- Mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule.
- The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability.
- Protecting Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights and interfering with Labour Rights

9.1.16 Child Protection

The possibility of contractor children abuse is through hiring of child labour, also labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV and AIDS. The contractor will undertake the below listed mitigation measures.

Mitigation measures

- Develop and implement a Children Protection Strategy that ensures minors are protected against negative impacts associated by the Project.
- All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour
- Children under the age of 18years should not be hired on site as provided by Child Rights Act (Amendment Bill) 2014

9.2 OPERATION PHASE

9.2.1 Vegetation Resources

Impact characteristics	Rating	Description
Nature of impact	Negative	Good roads may improve charcoal business in the area which implies increased tree harvesting
Type of impact (TI)	Indirect	A secondary impact to road construction that may improve on charcoal business during operation phase
Intensity (I)	Medium	Loss of vegetation cover from charcoal burning may increase along the road on the sections mapped as charcoal hotspots; namely Vibao Viwili, Mwenda Pole, Kanagoni and Kaza roho
Extent	Localised	To the charcoal hot spots along the road
Reversibility	Long term and partially reversible	Can be reversed with strict regulations from Kenya Forest Service that work hand in hand with the local charcoal association SACCOS
Persistence	Permanent	Continued loss of vegetation to charcoal burning

A potentially high impact is the possibility of a new charcoal production industry in the project area. There are two possible scenarios:

a) Increased urbanization and enhanced immigration rates along the project road, hence greater localized demand for firewood
b) Easy transportation of charcoal and firewood to bigger urban centres beyond the project area.

Immigration and enhanced urbanization is expected to increase the population in the area due to opportunities that shall have been opened up, especially livestock trade, tourism, improved transport sector and others. This increase in population, alongside envisaged improved economic wellbeing will place increased demand on cooking energy requirements. It is not easy to estimate demand during operation, but this demand is certainly expected to increase. The focus of charcoal business are at Vibao Viwili, Mwenda Pole, Kanagoni, Wanzai and Kaza Roho

Another potential long term impact relates to the advancement of the invasive weed, *Prosopis juliflora*. Prosopis is a very prolific seeder whose seeds are dispersed through the gut of livestock with a preference to invade freshly disturbed sites. Further the paved road will act as an impervious layer channeling run-off to the roadside which will readily support proliferation of Prosopis on the roadside as already evidenced along the paved sections. Such proliferation will spread and pose visibility challenges to motorists as well as suppressing other native species. The impact of prosopis will be rampant at all disturbed sites, roadsides and borrow areas, see Table and photo below.

Picture 9-1: Tonnes of bags of charcoal awaiting transportation at Wanzai

Picture 9-2: Severe invasion of *Prosopis juliflora* invasion along the road shoulders

Areas that are severely affected by *Prosopis juliflora* along the project road have been listed in the Table below.

Table 9-1: Sections severely affected by *Prosopis juliflora*

Sections severely affected by *Prosopis juliflora*	Coordinates
Matendo Centre	S 03.08262,E040.14187
Gongoni area	S 03.05019,E040.13918
Soyosoyo village	S 02.96017,E040.13921
Kibaoni Centre	S 02.92045,E040.13941
Wanzai area	S 02.77828,E040.14611
Kurawa centre	S 02.73922,E040.14396
Kemu Salt works area	S 02.71801,E040.14278
Mwendapole area	S 02.70793,E040.14204
Hurara to Garsen	S 02.64304,E040.13823 to S 02.28382,E040.09829
Galma to Hola	S 02.13466,E040.06528 to S 01.57772,E039.97450
Hola to Komorkila Centre	S 01.51529,E040.00294 to S 01.35734,E039.91639
Lakore to Bura	S 01.23320,E039.84782 to S 01.17282,E039.81818
Bura to Bilbil	S 01.17282,E039.81818 to S 01.04525,E039.79189
Bilbil to Dukanotu	S 01.01735,E039.79204 to S 00.85270,E039.70728
Charitende Centre to Madogo Junction	S 00.83907,E039.69917 to S 00.49106,E039.52969

Mitigation measures

- Direct mitigation of Prosopis invasion is very difficult. However, the programme of utilization of Prosopis products can be enhanced through a cross-sectoral approach to check its advance
- It is strongly suggested that KeNHA dedicates labour based maintenance strategy for the most vulnerable sections of the road with clear mandate to continually clear prosopis within the RoW.
- KFS should closely monitor the cutting down of trees for those with permits and even illegal loggers
- Charcoal SACCOS should be encouraged to have tree planting programmes to avoid depletion of the environment

9.2.2 Wildlife mortality

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	The road project could expose wildlife in Tana River Primate National Reserve and the wider environment to poaching and road kills
Type of impact (TI)	Direct / Indirect	During operation phase high speed traffic could lead to increased road kills, which is a direct impact, while increased poaching due to improved access to the area which is an indirect impact
Intensity (I)	Medium	This impact is considered medium
Extent	Mainly localized but partially dispersed	The direct impacts are likely to occur within the road corridor, however considering the spatial movements of animals, the ultimate impact may be slightly dispersed
Reversibility	Long term and reversible	This may not be avoidable but can be significantly reduced or even eliminated
Persistence	Permanent	This could be a permanent feature

The project road crosses wildlife dispersal and conservation areas and roads are one of the main drivers of habitat fragmentation. Vehicle-wildlife collisions can also lead to significant losses of wildlife. Within the project area, animals of conservation status include: Tana River mangabey and Tana River red colobus. In the dispersal areas, common wildlife include; elephants, dikdik, baboons, warthogs, hyenas, squirrel and nyala (*Tragelaphus angasii)*.

The construction of a smooth road will result to higher vehicle speed that may lead to animal road mortality as most animals may be hit while crossing the road while others may also be attracted to the road for its openness and warmth at night.

Mitigation measures

- Putting up road signs indicating start and end of wildlife corridors and images of wildlife to expect
- Post speed limit sign preferably 50km/hr on either side at the point the road approaches the Tana Primate Reserve

9.2.3 Soil resources

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	Concentrated runoff alongside drains can cause accelerated erosion and gully formation
Type of impact (TI)	Direct	Erosion impacts the soil resources directly
Intensity (I)	Minor	This impact can be sufficiently mitigated in the design.
Extent	Localized	To the immediate surroundings, especially in the erosion prone areas and off-site downstream catchment
Reversibility	Long term and partially reversible	Soils can recover after a period of time when this impact is mitigated by appropriate measures
Persistence	Temporary effect but can be permanent	Resulting from improper management of storm water and runoff from the road especially in the steep sloped sections

During operation, the road cross drainage structures and side drains that will be provided for management of runoff and storm water could cause soil erosion. Deep gulleys are evident in different sections of the road and the edges of water pans. This impact may be felt even more along the proposed bypass since there are no major signs of erosion at the moment.

Storm water from the road may also erode the road shoulders depending on the type of finishing provided.

Mitigation measures

- Line the side drains with concrete or by stone pitching in erosion prone soils to avoid gulley formation
- Design run off control features like continuous distillation systems especially on the roadside drainages to minimize soil erosion

9.2.4 Noise pollution

Impact characteristics	Rating	Description
Nature of impact	Negative	Noise generated by increased traffic on the road
Type of impact	Direct	Impact felt directly by people
Intensity	Minor	The project has few sections with sensitive receptors
Extent	Localized	Impact affect only the sensitive receptors
Reversibility	long term easily reversible	Noise is event based and dissipates immediately
Persistence	Permanent effect	Felt throughout the road operational phase

Noise associated with increased traffic will be permanent and dependent on the traffic volumes along various sections. The noise will originate from the four main sources as follows:

Vehicle Noise

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

Road Noise

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

Driver and Crew Behavior

Drivers and public service vehicle (PSV) crew contribute to road noise by blaring their vehicles' horns, by playing loud music, by shouting at each other, and by causing touting. This is common in populated market centers and urban areas especially at the bus stops.

Road Maintenance

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

Mitigation measures

- Vehicles using the road should adhere to the Traffic Act where they are supposed to keep the vehicles in roadworthy conditions;
- Road users to adhere to NEMA rules on noise pollution i.e. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.
- Where possible the bus stops should be sited at a reasonable distance (200m) from the sensitive receptors

9.2.5 Air quality

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	Impact relates to air pollution as a result of vehicular emissions such as CO_2 during the operation phase of the project. The emissions will be widespread, but will be of concern to the sensitive receptors (schools, health facilities, market centres and offices) within the project areas. The emissions will also contribute to the greenhouse gases in the atmosphere
Type of impact (TI)	Indirect	Increased emission in the atmosphere will have an incremental contribution to the atmospheric degradation and climate change effects
Intensity (I)	Low	Incremental traffic is expected, however, the overall contribution of new emissions to changes in air quality is not expected to be significant Besides, the project area is mostly open country with moderate to strong winds that could facilitate rapid dispersal of air

Impact characteristics	Rating	Description
		pollutants
Extent	Disperse	Typically emissions and the greenhouse gases can only be of significant impact if it is dispersed to the atmosphere or could affect locally if concentrations are high
Reversibility	Long term and partially reversible	The effects from the operation phase are long term through the life span of the project and can be partially reversed by proper mitigation measures, including eliminating unroadworthy vehicles that have slighltly higher emissions
Persistence	Long term effect	Through the project lifespan but low and almost insignificant

Whereas air quality is expected to slightly increase along the entire alignment during the operation phase, this increase will be restricted to within 200m of the corridor and is estimated to be very low. This low impact rating is because of the mostly open country with moderate to strong winds that will facilitate rapid dispersal of air pollutants. Conversely, Malindi which is the largest urban centre within the project area is well served by paved roads so incremental traffic is expected to be minor. We would rate air quality related impacts to be insignificant for Malindi. On the other hand, the urban centres that are currently experiencing low traffic namely, Garsen, Hola and Bura are expected to experience significantly increased traffic possibly from Lamu Port traffic hence higher incremental air quality pollutants are expected. This air quality impact is rated low in the immediate future to medium in the long term.

Mitigation measures

Mitigating impacts during the operation phase is challenging. This is because increase in traffic volumes across all the project roads is inevitable and dependent on extraneous factors such as the overall performance of the economy. This impact is therefore considered permanent within the context of the current fuel sources for the internal combustion engines that are still the dominant types of motor vehicles on Kenyan roads. This state of affairs is likely to persist in the medium term.

9.2.6 Wildlife Poaching

Impact characteristics	Rating	Description
Nature of impact (NI)	Negative	The reconstruction of Malindi-Madogo road may promote poaching for personal consumption or for sale to ready market that will be the construction workers and frequent travellers along the road.
Type of impact (TI)	Indirect	Road accessibility may lead to indirect impacts such as increased hunting and poaching, agricultural development, and economic change that will greatly affect wildlife.
Intensity (I)	Minor	Poaching may only affect the wildlife in areas beyond the protected reserve areas
Extent	Localized	To the road corridor
Reversibility	Long term and	Reconstruction of the road may lead to settlement due to development that comes with good roads and accessibility

Impact characteristics	Rating	Description
	delayed	that may lead to increased hunting of bush meat
Persistence	Permanent effect	Poaching may lead to increased deaths of wild life in the area

Roads that run through a wildlife dispersal area with animals such as; warthog, zebra, hirola, east african oryx, lesser kudu, dik dik and squirrels that may be targeted for bush meat and lions, elephants, monkeys and zebras for their hides, tusks, bones or teeth used as medicine or ornamentals this may encourage or facilitate poaching. The reconstruction of Malindi-Madogo road may promote poaching for personal consumption or for sale to ready market that will be the construction workers and frequent travelers along the road.

Upon completion of the road immigrants from other parts of the country and due to development that comes with good roads and accessibility but this may lead to indirect impacts such as increased hunting and poaching, agricultural development, and economic change that will greatly affect wildlife.

Mitigation measures

- Hunting, poaching of wild animals to be strictly prohibited and contractor should warn their labour accordingly
- Camps to be located at least 500 m away from the nearest wild life area (if any) and their source of food as well as water;
- The camps should be properly fenced and gated to check the entry of animals in search of eatable goods. Similarly, wastes of the camps will be properly disposed of to prevent the chances of attracting wild animals that may lead to their killing

9.2.7 Road safety

Impact characteristics	Rating	Description
Nature of impact	Negative	Impacts relate to accidents and incidences involving humans, wildlife and livestock.
Type of impact (TI)	Direct	Impacts would be occasioned by improved traffic volumes and speeds
Intensity (I)	Medium	May involve loss of lives and livelihoods
Extent	Disperse and localized	Localized to the road environs
Reversibility	Long term and irreversible	Injuries and mortalities are irreversible
Persistence	Permanent	This could be a consequence that will stay with the road although can be avoided.

Improved roadway complete with paved surface will undoubtedly encourage more vehicular traffic and higher average speeds. There will be increased possibility for accidents between vehicles, and with non-motorized transport such as cyclists, pedestrians and both domestic and wild animals. This was also highlighted by the community during consultations.

Paved road surfaces will allow vehicles to travel at faster speeds. Although the improved road will be wider in certain areas, thus making it safer to travel at higher speeds, there are still likely to be more collisions between vehicles and, pedestrians, livestock and wildlife. This area is dominated by pastoralists and livestock that were observed walking along the road. Wildlife such as baboons, hyenas and the stripped antelope among others were also observed close to the road. These animals are at risk of getting hit by vehicles if preventive measures are not put in place.

Picture 9-3: Livestock on the road

Local people in the area have lived so long without good roads that there is a lack of awareness of the dangers of the roadways and fast moving vehicles. Due to poor road conditions over the years, people, animals, NMTs, and particularly children are unaware of the danger of a fast approaching vehicle and may cross the road in front of it. This impact is likely to be serious during daytime hours when traffic is heavier and when drivers are able to move faster. Because of insecurity and the road conditions, there is currently little traffic from sunset to sunrise, the most active time for most wildlife.

However, as security and road conditions improve, there will be increased chances for vehicle-wildlife/livestock collisions. These impacts are considered in the long-term.

Mitigation measures

- Initiate road safety awareness within the project area targeting schools, places of worship and chief's meetings
- Install appropriate reflectorized road safety signs along the entire stretch of the road
- After careful assessment, introduce speed calming humps at sections that are deemed of critical safety concern
- Livestock crossing signs should be placed close to water pans along the road to allow easy movement of livestock to water points and reduce accidents. Some of the suggested points are 02.10387^0S,040.05408^0E, 02.09333^0S,040.05486^0E, 02.08574^0S,040.05682^0E, 01.98573^0S,040.07495^0E, 01.96487^0S,040.08764^0E, 01.94557^0S,040.08694^0E

9.2.8 Impacts of outfall to the community

Impact characteristics	Rating	Description
Nature of impact	Negative	Impacts related to flooding, destruction of property, soil erosion and storm water pollution
Type of impact (TI)	Indirect	A secondary impact that come as a result of road construction improving drainage systems along the road
Intensity (I)	Medium	May involve loss of livelihoods
Extent	Localized	Localized to the communities staying close to the outfalls
Reversibility	Long term and irreversible	Injuries and mortalities are irreversible
Persistence	Permanent	During the rainy seasons of the year

Efficient stormwater drainage is essential in periods of high rainfall to quickly divert water and reduce the risk of flooding. However, rapid discharge can have detrimental effects on the community living close to the outfalls; flooding, destruction of settlements, scaring and eroding farm lands and storm water pollution especially if the water is used by the community.

Mitigation measures

- Diverting water into an alternative receiving body such as a water pan

Promoting infiltration of stormwater by vegetating the areas combining outfalls with soak pits that have overflow capacity for high rainfall events

SECTION 10

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The Environmental and Social Management Plan (ESMP) has been prepared as a separate volume. It is intended to describe how site specific concerns should be avoided or mitigated through the construction and operation phases of the project.

10.1 OBJECTIVES OF THE ESMP

The ESMP describes the range of environmental issues associated with the project and broadly outlines corresponding management strategies that will be employed to mitigate potential adverse environmental impacts. The ESMP conveys the project's environmental and social constraints.

The project should comply with all local laws and regulations, which seek to ensure that the construction work does not adversely affect the environment and social community resources. The Supervising consultant may revise the ESMP in consultation with the Contractor, and subject to the approval from Kenya National Highways Authorities (KeNHA) with copies to the National Environment Management Authority. Revisions may be made to accommodate changes in work, weather and site conditions. The ESMP should be made available to all project staff.

The objectives of the ESMP are:

- To bring the project into compliance with applicable national environmental and social legal requirements;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts;

10.1.1 Responsibilities

In order to ensure the sound development and effective implementation of the ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project.

The following entities will be involved on the implementation of this ESMP:

- National Environmental Management Authority (NEMA)
- The contractor
- Kenya National Highways Authorities (KeNHA)
- Resident Engineer
- Environmental and social officer
- Kenya Forest Service (KFS)
- Kenya Wildlife Service (KWS)

Construction Phase (Responsibility of the contractor)

Element	Potential Impact	Mitigation measures	Indicator
Water resources	• Impacts relate to both point and non-point contamination and pollution of water sources. Major concerns will be water abstraction, soil erosion and chemical pollutants • Road construction may increase pressure on the existing limited water resources	• No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent laggas and River Sabaki shall be permitted; • Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site where applicable • The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to River Sabaki; • Works that are likely to generate silt-laden runoff (e.g. earthworks and excavations) will be undertaken preferentially during the drier months of the year; November to April • Site compounds and stockpiles will be located away from water (River Sabaki and the laggas); • The drainage system to be developed to prevent silt-laden runoff from entering surface water drains and water pans without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances; • Where possible an 8m buffer strip of existing vegetation shall be maintained alongside River Sabaki. Where this buffer zone is necessarily breached (i.e. at crossings) the design and construction of structures will be environmental sympathetic; • Any work along River Sabaki and laggas should be isolated to prevent silt propagating downstream; • Earth stockpiles shouldl be seeded as soon as possible, covered with geotextile mats or surrounded by a bund to minimise the risk of sediment-rich runoff; • Mud to be controlled at entry and exits to the site using wheel washes and/or road sweepers; • If required, vehicles should cross River Sabaki at designated crossing point only, which will include protection to minimise silt-laden runoff/mud from entering the watercourse; • Sediment wash from work sites into River Sabaki could be minimized by constructing settlement lagoons or other temporary attenuation measures such as sand/silt traps	• Water Quality downstream of bridge works

Element	Potential Impact	Mitigation measures	Indicator
		if necessary; and • Discharges to River Sabaki will only be carried out under consent of the relevant governing bodies and only if it meets water quality standards set by WRMA • Site compounds and stockpiles to be located away from water pans, laggas and River Sabaki; The drainage system will be developed to prevent silt-laden runoff from entering surface water drains and water pans without treatment (e.g. earth bunds, silt fences, straw bales, or proprietary treatment) under any circumstances • Consultations with the communities shall be required before commencement of water abstraction in river Sabaki • Consultations with the WRUAs should be done prior to abstraction to gain their support • Water pans and laggas should not be used to meet road construction water needs	
Soil resources	• Alteration of soil physical properties as well as exposure to erosion agents may result from the civil and general works within the road corridor. • Effects of soil pollution may also result from accidental oil spills.	• The spilled oil from fuelling and servicing stations should be trapped in grit chambers for settling of suspended matter before being release into the environment • Collected oil should be properly disposed to avoid any underground water contamination • Earthworks should be controlled so that land that is not required for the road works is not disturbed; • Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain; • Excavated materials and excess earth should be kept at appropriate sites approved by the Supervising Engineer; • The contractor should adhere to specified cut and fill gradients and planting embankments with shrubs and grass to reduce erosion and take care of stability problems of road embankments. Areas cleared for improving sight distance should be planted with grass to reduce erosion; • Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion, these include: areas stripped of topsoil, Soil stockpiles, Spoil sites, Borrow pits, Sites for bridges and drainage structures. • On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be limited to:	• Newly formed gullies • Water quality downstream

Element	Potential Impact	Mitigation measures	Indicator
		confining construction activities, using cut off drains, using mechanical cover or packing structures such as geo-fabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls, mulch or chip cover, constructing anti-erosion berms and planting of appropriate vegetation. • Any work along watercoursesshould be isolated to prevent silt propagating downstream; • Debris and other material should be prevented from entering watercourses; Construction SUDS (such as settlement lagoons or other temporary attenuation) to be used during construction if necessary; Diversion of minor watercourses will be carefully managed to prevent suspension of silt (or contamination by other pollutants); • Where possible, sieves should be placed next to water bodies so as to prevent silt and any other sediments from getting into the resources • Proper maintenance of machinery and equipment to avoid or minimize leakages from machines • Spill prevention practices and response actions should be applied in refuelling and vehicle use areas to minimize accidental contamination • Spills should be immediately addressed per the appropriate spill management plan and initiate soil clean up and soil removal if needed. Spill kits should be availed to aid this • Construction of a retaining wall around the garage, fuel store and stations so that these potentially polluting substances can be properly handled and any intended escape of material from that area can be contained until such time as remedial action can be taken • Proper handling of material through use of dip trays, directing spills to an oil sump which should be emptied into a designated disposal site • Practice sound road engineering by maintaining good drainage and natural water flows. However, the drainage ditches should only be constructed where necessary. • To minimize potential soil erosion the contractor should consider planting appropriate acacia on back slope, side slope and other sites prone to erosion. • Develop an erosion control and revegetation plan that stipulates measures to minimize soil loss and reduce sedimentation to protect water quality especially for sections that	

Element	Potential Impact	Mitigation measures	Indicator
		shall interact with river Sabaki, water pans and laggas. • Design runoff control features especially on the roadside drainages channels to minimize soil erosion. • Limit cleared areas to the road corridor to avoid unnecessary exposure of soil to agents of erosion. • Proper finishing of the shoulders and side drains to ensure that water is discharged evenly so as to avoid soil erosion at the discharge point and its surrounding area	
Vegetation	• The project footprint will require, along the bypass, clearance of vegetation to create a new alignment and road corridor that covers 36.6ha, clearance of vegetation in the material sites and along A7/B8. This will lead to loss of ground cover and possible loss of biodiversity. The process may also cause loss of mature indigenous species • Invasive species	• The clearance of the site for construction purposes shall be kept to a minimum. The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc shall be encouraged; • Areas to be cleared should be agreed and demarcated before the start of the clearing operations to minimize exposure • Clearing and removal of vegetation, especially at borrow sites must be carried out in such a way that damage to adjacent areas is prevented or minimised • Stage vegetation clearance to prevent the colonization of *Prosopis juliflora* to neighbouring habitats • Steep slopes and coarse textured soils are unfavourable for the growth of *Prosopis juliflora* therefore raising the road to form slopes on the shoulders and stone pitching the road shoulders to the toe of the embankments should prevent growth of the plant • Areas to be cleared should be agreed and demarcated before the start of the clearing operations to minimize exposure • *Prosopis juliflora* cut down during construction should be given to the local communities for them to burn charcoal for their use or use as firewood • Stage vegetation clearance to prevent the colonization of *Prosopis juliflora* to neighbouring habitats	• Extent of ground cover and presence of woody plants within the road corridor • Observation of newly germinated weedy plants
Wildlife	• Impacts relate to encroachment of protected areas, habitat disturbance and interference with the feeding and	• Avoid harming the wildlife by locating the construction camp more than 500m away from Tana River Primate National Reserve and Elephant Corridor in Mnazini. • Develop construction camp site fencing in conjunction with KWS to prevent site access by wildlife species .Educate workers regarding the occurrence of Tana River primates and other wildlife in the area and the importance of their protection, including the appropriate regulatory requirements.	• Presence of informational billboards

Element	Potential Impact	Mitigation measures	Indicator
	breeding habits at specific spots. Disturbance to the mammals' habitats are likely to occur in areas like in Mnazini, Tana river primate reserve, Hurara area and between Bilbil-Madogo	• Reseed disturbed areas with native plants mainly acacia species during interim and final reclamation. Undertake reclamation activities as early as possible on disturbed areas. • Schedule activities to avoid disturbance of resources during critical periods of the day (e.g., night) or year (e.g., periods of courtship, breeding, nesting, lambing, or calving) especially the fish in Sabaki river and elephants that cross Mnazini early in the morning and late evening hours. • Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. • The contractor shall ensure that no construction worker kills any wild animal. • The construction workers shall report any cases of wildlife sighting to the contractor who will report to the RE.	
Fish resources	• Disturbance and in some cases destruction at River Sabaki crossing. • Illegal fishing by contractor's workforce at River Sabaki	• The contractor should restrict bridge construction activities to non-breeding seasons i.e. during the dry seasons that is from June to September and January to March. • The contractor should report any incidences of accidental fuel or oil spills on the river bed immediately they occur. • Prior to returning flows to the river channel the contractor should replace and restore the river bottom with suitable rock material • Best management practices should be enforced to avoid accidental spill of bitumen, concrete leachate and sediments and spill of petrochemicals through proper storage, use and clean-up of construction related materials • Workers should be prohibited from fishing in River Sabaki	• Fish population
Liquid waste	• During the construction phase, various liquid wastes including grey and black water, concrete washings, runoff from camp and workshop areas, and various liquid waste streams	• Water containing pollutants such as concrete or chemicals should be directed to a conservancy tank for removal from the site where applicable • The contractor shall prevent runoff loaded with sediments from flowing into water pans, lagga and River Sabaki. Sieves should be used • No grey water runoff or uncontrolled discharges from the site or working areas to adjacent water pans, laggas or River sabaki shall be permitted • The contractor shall ensure that the machines and equipment are in good condition to prevent leakages • Interceptors such as sand can be used to prevent pollutants from reaching	• Water Quality downstream of contractors' camp

Element	Potential Impact	Mitigation measures	Indicator
	from washing construction vehicle and equipment washing will be generated. These wastes pose real toxicity and quality threats to the soil and ground water, and the existing wetlands within the area.	underground water, water pans, laggas and Sabaki River • Ensure proper handling of lubricants, fuels and solvents while maintaining the equipment • Any chemical or fuel spills shall be cleaned up immediately. The spilt liquid and clean-up material shall be removed, treated and transported to an appropriate site licensed for its disposal. • A safety and emergency response plan shouldbe developed for all operations with emphasis on the protection of the environment prior to start up. • Storm water shall be diverted away from the fuel handling and storage areas. An oil water interceptor shall be provided to treat any rainwater from fuel storage and handling areas; • Measures should be taken to ensure proper storage of fuel, oil and bitumen. Oil-water interceptors or sumps should be constructed to capture discharge of oils, fats and other polluting liquids from maintenance workshops, vehicle and equipment washing bays and kitchen drains; • At the work sites the contractor shall be expected to maintain strict surveillance particularly when working within the vicinity of water supply points; water pans and the river Sabaki; • Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment or provided with own containment • In case of any form of pollution of the water bodies, the contractor should notify the RE	
Solid waste	• Pollution of the environment caused by both construction generated and domestic solid waste could occur since large volume of waste is normally generated from	• The contractor shall develop a well comprehensive waste management plan • Properly labelled and strategically placed waste disposal containers shall be provided at all places of work • Litter bins should have secured lids to prevent animals and birds from scavenging • All personnel shall be instructed to dispose of all waste in a proper manner • Recycling of construction material shall be practiced where feasible e.g. containers and cartons • Earth spoils shall be disposed of in pre identified sites • The construction camps should be situated 500m away from the primate reserve and	• Contract with a registered waste handler • Approved waste management plan

Element	Potential Impact	Mitigation measures	Indicator
	excavation of the material sites and carriageway including debris, spoil, general waste (wrapping materials and food waste).	wildlife corridors to prevent wildlife from scavenging polluted waste.	
Air quality	• Impacts relate to the receptors such as schools, health facilities, market centres and places of worship. • Additional impacts may originate from vehicles (dust and CO_2) from construction machinery and vehicles during construction.	• The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible; • Do not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds. • Water sprays shall be used on all earthworks areas. Water shall be applied when need be to reduce dust emissions caused by vehicle movements or wind • Vehicles delivering soil materials shall be covered to reduce spills and windblown dust; • Vehicle speeds shall be limited to minimise the generation of dust on site and on diversion and access roads • Use of personal protective equipment like dust musks by construction workers in areas experiencing high dust levels	• Public complaints • Records of frequency of dust suppression
Noise	• These refer to noise pollution (noise levels above 60dB(A)) in relation to the sensitive receptors such as learning centres, places of worship, health facilities, offices and market centres.	• The Contractor shall keep noise level within acceptable limits from NEMA in Noise regulation second schedule and construction activities shall, where possible, be confined to normal working hours in the residential areas especially between Malindi and Garsen; • Schools, hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of school hours • Construction workers shall be required to wear ear muffs in areas exposed to excessive noise levels • Equipment should be maintained regularly to reduce noise resulting from friction	• Public complaints

Element	Potential Impact	Mitigation measures	Indicator
	• Direct impact on the occupants of the sensitive receptors and buildings located in close proximity to the road.	• No unnecessary hooting by project vehicles	
Construction material sourcing	• Impacts will relate to the borrow pits and quarries used for material sourcing. When not properly rehabilitated the sites remain of poor visual quality and unproductive besides being of safety concern.	• Ensure that appropriate authorization to use the proposed borrows pits and quarries has been obtained before commencing • Carry out inspection of each of the site's soil stability before excavation; • Borrow pits and quarries shall be located more than 20 meters from watercourses in a position that should facilitate the prevention of storm water runoff from the site from entering River Sabaki; • All roads to and from borrow pits and quarries should be made safe and accessible and transportation of material should follow a designated route • Safety distances should be maintained in material sourcing operation; 100m to any shopping centre, school and hospital and 50m to any house irrespective of consent from the owner • The Contractor shall give a 14 day notice to nearby communities of his intention to begin excavation in the borrow pits; • If quarrying should be necessitated, the contractor should prepare health and safety plan before any work on the quarries is commenced; • Where possible cordon off the borrow areas to keep off livestock and children if the site is deemed too accessible. If this is the case, maintain fences and "make good" of the sites afterwards; • Topsoil shall be stripped prior to removal of borrow and stockpiled on site. This soil shall be replaced on the disturbed area once the operation of the borrow site is complete; • Decommission the borrow pits upon completion of the Contract and reinstate the land to its natural condition by grading excavations and planting suitable saplings	• Contractor
Health and safety	Occupational health and safety	• The contractor should provide the workers with appropriate personal protective equipment at all times	• Reported cases of work-related

Element	Potential Impact	Mitigation measures	Indicator
		• The contractor should ensure there are warning signs on the construction site and on the road to protect from accidents • The contractor shall provide standard first aid kits at the site • A safety officer who has safety training and knowledge of safety procedures should be present on site to ensure that all workers have guidance on the safety procedures • The contractor must have an insurance cover for all workers • The contractor should comply with all the Occupational Safety and Health Act 2007 regulations and ILO on safety and public health in construction activities	injuries
Communicable diseases	Impacts relate to potential spread of HIV/AIDS due to influx of construction workforce into the project environment and possible irresponsible behaviour between them and the locals	• Initiate an awareness creation, prevention and training programme on HIV/AIDS upon commencement of works • 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	• New infections amongst the work force and community
Cultural sites	Interference of cultural set up of communities	• The proponent shall ensure preservation of the cultural resources of the communities i.e. archaeological, paleontological, historical, architectural and religious including graveyards or any other culturally significant site	• Cases of conflicts and crime
Vulnerable and marginalized groups	Restriction of livestock crossing during Project civil works Pollution of Water pans and river channels used to water livestock by effluent from plant and equipment Siltation and sedimentation Water pans and river channels	• Sensitize community members about the Project and consult VMGs continuously on the design of the project so that it turns out relevant, culturally appropriate and responsive to their needs and aspirations. • Provide employment quarters for VMGs especially in unskilled or semi-skilled cadres during Project implementation. • Provide support infrastructures for VMGs such as establishment of extra water pans along the road alignment. • Support and facilitate the use of customary institutions for grievance and complaints handling that might arise during Project implementation	• Public complains

Element	Potential Impact	Mitigation measures	Indicator
	by silt from construction site Pasture destruction by trucks during ferrying of construction materials to and from site Livestock kill by plant and equipment during project implementation		
Labour influx effects	Strain on various resources especially water resources for road works Grievances from local community members over job opportunities. Sexual Offences Teenage Pregnancies	• Effective community engagement and strong grievance mechanisms on matters related to labour • Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx, the contractor should engage a local community liaison person • Proper records of labour force on site while avoiding child and forced labour • Fair treatment, non-discrimination, and equal opportunity of workers including the VMGS (Along the road corridor) and women. • Comply to provisions of WIBA 2007 • Develop and implement children Protection Strategy, this strategy will ensure that no child under the legal age of 18years in employed to the Project	• Increased population
Human Right and Gender Inclusivity	Gender Inclusivity requirements in hiring of workers Failure to protect Human Risk areas Associated with, disadvantaged Groups, interfering with Participation Rights, and interfering with Labour Rights	• Mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule • The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability • Protecting Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights and interfering with Labour Rights	• 1/3 gender rule mainstreamed in the project
Child protection	Children abused through hiring of child labour	• Develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project.	• Prevention of child labour

Element	Potential Impact	Mitigation measures	Indicator
	Labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV and AIDS	• All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour • Children under the age of 18years should not be hired on site as provided by Child Rights Act (Amendment Bill) 2014	

Operation Phase (Responsibilty of KeNHA)

Element	Potential Impact	Mitigation measures	Indicator
Vegetation	• Increased burning of charcoal	• KFS should closely monitor the cutting down of trees for those with permits and even illegal loggers • Charcoal Saccos should have tree planting programmes to avoid depletion of tree cover • The community should be sensitized on the importance of environmental conservation • Labour based road maintenance approach should be adopted so as to continuously uproot prosopis regrowth on the shoulders and indeed the entire road reserve.	• Tree nurseries established • Afforestation done in area with predominant charcoal burning
Wildlife	• Increased wildlife mortality	• Putting up road signs in Mnazini, Tana river primate reserve, Hurara area and between Bilbil and Madogo indicating start and end of wildlife corridors and images of wildlife to expect • Having a speed limit sign preferably 50km/hr to reduce wildlife road kills before wildlife areas in Mnazini, Tana river primate reserve, Hurara area and between Bilbil-Madogo	• Number of informative boards and road signs erected
Noise	• Excessive noise	• Vehicles using the road should adhere to the Traffic Act where they are supposed to keep the vehicles in roadworthy conditions; • Road users to adhere to NEMA rules on noise pollution i.e. Environmental	• Public complaints

Element	Potential Impact	Mitigation measures	Indicator
		Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. • Where possible the bus stops should be sited at a reasonable distance (200m) from the sensitive receptors	
Road safety	• Increased number of accidents	• Initiate road safety awareness within the project area targeting schools, places of worship and chief's meetings • Install appropriate reflectorized road safety signs along the entire stretch of the road • After careful assessment, introduce speed calming humps at sections that are deemed of critical safety concern • Livestock crossing signs should be placed close to water pans along the road to allow easy movement of livestock to water points and reduce accidents. Some of the suggested points are 02.10387^0S,040.05408^0E, 02.09333^0S,040.05486^0E, 02.08574^0S,040.05682^0E, 01.98573^0S,040.07495^0E, 01.96487^0S,040.08764^0E, 01.94557^0S,040.08694^0E	• Number of informative boards and road signs erected

10.2 ENVIRONMENTAL MONITORING PLAN

10.2.1 Environmental Monitoring Plan – Construction Phase

Item	Activities	Monitoring Details	Monitoring Apparatus	Schedule
Noise	Excavation Cut and fill	Safety, vibration and noise emission level to sensitive receptors	Noise meter, safety checks	Start of construction
Dust	Transportation of raw materials Loading and offloading of materials	Dust emissions level	Air quality metre, visual observation	Daily
Solid waste	Solid waste during construction	Amount of solid waste generated	Visual observation and regular checks	Weekly
Waste water	Waste water during construction	Level of waste water in temporary waste water units	Visual observation and regular checks	Weekly
Health and safety	During construction	Check health and safety requirements	Visual observation and regular checks	Daily
Prosopis juliflora	Clearance of vegetation excavation of material cut and fill	Spread of Prosopis juliflora	Visual observation	Monthly

10.3 ENVIRONMENTAL MONITORING PLAN – OPERATION PHASE

Item	Activities	Monitoring Details	Monitoring Apparatus	Schedule
Prosopis juliflora	Invading disturbed areas along the road shoulders	Growth of *Prosopis juliflora* on the road shoulders	Visual observation	Monthly
Wildlife	Speeding vehicles	Wildlife mortality rate	Visual observation	Monthly

10.4 ESTIMATED COSTS OF ENHANCEMENT AND MITIGATION MEASURES

The estimated cost of mitigation measures are presented in the Table below. It is important to note that no complementary projects were considered for this project.

Environmental / Social aspect	Description	Indicative Cost Estimate (Kenya Shillings)
Construction material sourcing	Rehabilitating borrow pits and quarries	Contained in the BoQ and use of Best Engineering Practices (BEP)
Air Pollution	Emissions from machinery and construction traffic	-
	Dust suppression at main centres only.	82,026,000
	Provision of dusk masks.	2,750,000
Noise pollution	Support for boundary tree buffers at 33 schools, 5 health centres and 30 worship centres (logistics support only since seedlings will be obtained free from another imitative). Estimated average support of Sh. 97,000 per institution.	6,596,000
Vegetation loss	Compensatory tree planting along the road in Sabaki, Garsen, Hola, Bura, Bilbil and Madogo	24,510,000
	Support to KFS and Charcoal Burners Associations' Nurseries at Kanyumbuni, Magarini	4,500,000

Environmental / Social aspect	Description	Indicative Cost Estimate (Kenya Shillings)
	and Tana Delta	
	Establishment of 2 No. road check stations (road side kiosks) for KFS for checks on transportation of illegal forest products and for monitoring Charcoal Burner's license permit compliance	1,500,000
Impacts on soils and drainage including landslides	Off road environmental mitigation measures	15,000,000
Water resources	Pollution control	No additional cost required
	Water harvesting and storage to reduce pressure on scarce water resources	7,500,000
Encroachment into conservation areas		No additional cost required
Wildlife protection and conservation	Design and erection of informative billboards on need to protect and conserve wildlife 2 No. for Tana Delta Ramsar Site 2 No. for Tana River Primate National Reserve 1 No. each for the wildlife dispersal areas (Hurara, Mnazini, Garsen-Hola, Bilbil-Madogo)	7,000,000
Contractors camp	-	To be specified in the BoQ
Sanitation	Sanitation	To be specified in construction contract
Workshops	-	Best Engineering Practices
Solid wastes	Waste disposal sites and their management	Sh. 4,500,000 per contract The operational costs to be contained in BoQ
Liquid wastes	-	Best Engineering practices
Fuels, Oils, Hazardous Substances and other Liquid Pollutants	-	Best Engineering practices
Asphalt, Bitumen and Paving	-	No additional cost
Cement / Concrete Batching	Sludge management	No additional cost
Diversion and access roads	Watering and maintenance	Contained in BoQ
Disruption of Access to Property	-	Standard construction procedures to be followed
Relocation of public utilities	-	Contained in RAP and BoQ
Occupational Health and Safety	PPEs	Included in the BoQ
Public Health	HIV/AIDS awareness	Costs normally contained in the BOQ

SECTION 11

11. CONCLUSIONS AND RECOMMENDATIONS

The findings of the Environmental Impact Assessment show that the proposed Malindi-Madogo road has positive impacts that outweigh the potential negatives. Some of the main positives impacts identified include; improved standards of living, security, access to schools and health facilities, aesthetics, promotion of tourism in the Coastal region, growth of towns along the project road among others.

Among the potential negative impacts identified, encroachment of protected/conservation areas such as the Tana River primate reserve, increased sedimentation and increased wildlife mortality associated with traffic are the high impacts.

The project will undertake reclamation on the disturbed areas and during construction the wildlife will not be harassed or disturbed hence the location of the construction camp at least 1km from the conservation areas. Increased sedimentation in water resources such as Sabaki River will mainly be prevented by use of silt traps and locating stockpiles away from water pans and increased wildlife mortalitywill be mitigated by road signs and speed limits on conservation areas and wildlife corridors. With proper implementation of the provided mitigation measures, these impacts can be avoided or minimized.

The other potential impacts identified are of low and medium intensity. These are also mitigable and most are short term only lasting through the construction phase. The overall conclusion therefore is that the project should proceed and the mitigation measures proposed for the various negative impacts should be implemented at all stages of the project.

SECTION 12

12. REFERENCES

- Department of Conservation and Environment website. www.environment.nsw.gov.au
- F.N Muchena. Soils & Irrigation of three areas in the lower Tana Region, Kenya
- Guidelines on environmental issues related to physical planning, LGED, 2003
- High grand falls multipurpose development project SEA
- Https://www.researchgate.net/publication/201118678
- International conference on Ecology and Transporation (ICOET 2013)
- IUCN red list website
- Kilifi County Integrated Development Plan
- Knoop L. Sambalino F. and F. Van Steenbergen.2012. Securing Water & Land in the Tana Basin
- Lessons for wildlife friendly road design in Colombia
- Malindi Water and Sewerage website
- Ramsar Website
- Scotts, D (2003), Key Habitats and Corridors for Forest Fauna. Occasional Paper 32. NSW NPWS
- Spread of the Introducted tree species Prosopis juliflora (SW.) DC in the Lake Baringo area, Kenya (ISSN 16-4918)
- Tana River County Integrated Development Plan
- Tana river Delta conservation and Development Management Plan, 2009

APPENDICES

APPENDIX 1 – MINUTES OF PUBLIC MEETINGS

MINITES OF PUBLIC MEETINGS AND LIST OF PARTICIPANTS

MINUTES OF PUBLIC MEETING HELD AT MADOGO CHIEFS OFFICE ON 5TH FEBRUARY 2018

Meeting session Summary of issues discussed	Date of the Meeting	Participants	Number of participants
Consultative meeting with residents of Madogo	**5th February 2018**	Assistant county commissioner, Chief Madogo location, Sociologist, E.I.A Expert, KENHA Garissa region and members of the public.	126 Total Male 87 Female 39

QUESTIONS/ISSUES RAISED		RESPONSE/WAY FORWARD
1	If the contractor would share the water with the residents due to the current drought in the area.	The contractor will share the water with the locals on request by using the correct channels.
2	Water pan construction for Community use	The contractor will be requested to secure areas after excavation for community water harvesting.
3	Dust and Noise Pollution.	The contractor will be requested to sprinkle water during construction time on the roads to minimize dust.
4	Issue about Mathenge; the plant	Routine maintenance will be done along the road corridor to cut the plant using the locals to provide employment and also improve visibility of the feeder roads
5	Employment of the locals and their non-preference of North Eastern contractors.	The contractor will be requested to give first priority to qualified locals before considering others and also the construction tender shall be advertised to get a contractor best suited for the work.

QUESTIONS/ISSUES RAISED		RESPONSE/WAY FORWARD
6	Whether a trailer park will be created.	The design team responded that various truck lay bay areas have been proposed in the design report. This truck lay bays will also be constructed in Madogo
7	If the feeder roads will be also constructed.	KENHA officials from Garrissa region explained that the feeder roads are under a different authority; KURRA and KERRA, hence those complains should be directed to their offices.
8	Resolving community land.	National Lands Commission would be requested to look into the matter.
AOB	There being no issue meeting was adjourned at 1pm	

Minutes Authentication

SIGN…….

CHIEF MADOGO LOCATION

PHOTO PLATE OF MEETING SESSION


MINUTES OF PUBLIC MEETING HELD AT CHARDENDE CHIEFS OFFICE ON 5TH FEBRUARY 2018 AT 2PM

Meeting session Summary of issues discussed	Date of the Meeting	Participants	Number of participants
Consultative meeting with residents of Chardende Location	**5th February 2018**	Assistant county commissioner and Chief Chardende location, Sociologist, E.I.A Expert, KENHA Garissa region and members of the public.	34Total Male 31 Female 3

Introduction

The meeting began at 10:00 Am with the introduction of parties' present, opening remarks from the area chief and later on an opening prayer said by a sheikh.The chief highlighted the numerous challenges that residents face which included; lack basic infrastructure like roads, luck of sufficient water supply. The table below presents an overview of discussion items in the meeting.

No	QUESTIONS/ISSUES RAISED	RESPONSE/WAY FOWARD
1	How domestic animals would be protected from wild animals.	The contractor will to be requested to dig water pans or secure dug sites where materials have been acquired to harvest water for use
2	Impacts of road to the community	The roads will trigger significant social and economic growth to the area through improved transport, improved trade through more vehicles, improved economic opportunities, and employment.
3	If the Road designs favor the physically challenged persons.	The road designs would cater those kinds of groups of people so as to improve road accessibility.
4	Crossings and accessibility during construction	The contractor will ensure that the road accessible at designated public crossing areas during construction, adequate diversions will be provided
5.	Conflict management and	A local committee comprising the chief, elders, vulnerable

	dispute resolution	representation, and physically challenged, to be formed with a liaison office to resolve this. The ESIA and RAP reports will propose appropriate Grievance Redress Mechanisms that will be adopted during Project Implementation
6	Whether diversions will be created during construction time	The contractor will be required to provide diversion as this was a standard requirement in road works contracts
7	Contractor sourcing materials locally	The meeting deliberated that the contractor shall be requested to obtain those materials that meet the standards locally, and compensate for it.
8	Community requested for water pans	The meeting deliberations were that those areas excavated for raw materials shall be secured to be water pans.
9	How dust, cement, chalk and noise pollution shall be handled	The Environmental impact assessment study that is part of the consultancy assignment. And Environment and Social Management Plan (ESMMP) will be developed. This plan provides appropriate mitigation measures to Project Impacts related to dust and general air pollution as suggested.
10	Road signage during construction to notify the general public.	The road design has incooperated safety measures associated with class B roads and that road users will be protected
11	If the public will be educated on road safety?	Officers from transport and safety shall be requested to sensitize the public on road safety.
12	Drainage system of the road.	The design team agreed to take care of that and include it in the design. The design has incooperated an elaborate drainage infrastructure that suits the area.
13	If a trailer park will be created during the construction period?	The design team informed the meeting that the Project design allows for provision of truck lay bays and that Chardende will benefit from that.

Minutes Authentication

SIGN…….

CHIEF MADOGO LOCATION

PHOTO PLATE OF MEETING SESSION




MINUTES OF PUBLIC MEETING HELD AT BURACHIEFS OFFICE ON 6TH FEBRUARY 2018 AT 2PM

Meeting session Summary of issues discussed	Date of the Meeting	Participants	Number of participants
Consultative meeting with residents of Bura	**6th February 2018**	Assistant county commissioner and Chief Bura location, Sociologist, E.I.A Expert, KENHA Tana River County and members of the public.	84 Total Male 51 Female 33

PROCEEDING OF THE MEETING.

The meeting kicked off at 10:00 Am with the introduction of parties' present, opening remarks from the area chief and later on an opening prayer said by a sheikh.

The chief highlighted the numerous challenges that residents face which included; lack basic infrastructure like roads, luck of sufficient water supply.

NO	ISSUE/QUESTION RAISED	RESPONSE
1	The locals wanted to know how conflicts between their animals and wild animals, for water was to be addressed	The meeting resolved that where possible the contractor will be requested to dig water pans or secure dug sites where materials have been acquired to harvest water for use
2.	Impacts of road to the community	The road would impact the road socially through labor influx, new cultures, improved transport, and improved trade through more vehicles, improved economic opportunities, and employment.
3.	Road access by the vulnerable groups and the physically challenged	The road designs would cater those kind of groups so as to improve road accessibility.
4.	Crossings and accessibility during construction	The contractor will be requested to make access roads during the construction period.
5.	What mechanisms will be used to compensate the affected persons?	The compensation would follow the laid down procedures that is Land for land owners, structure for structure for structure owners,

		trees and crops for their owners. Asset inventory will be done to determine their true owners and documentation, then disclosure, gazzettement, signing agreements and then payment.
6.	Conflict management and dispute resolution	The meeting resolved that a local committee comprising the chief, elders, vulnerable representation, and physically challenged, to be formed with a liaison office to resolve this.
7.	If the contractor could improve on the local public utilities like schools and health centers	It was advised that there was no budget for that along the corridor, but those that were to be affected by the road shall be considered.
8	The locals demanded that contractor should not be from North Eastern	An agreement was reached that the contract will be advertised and bidders be invited including international companies.
9.	The locals requested for diversions to be created during construction to allow for movement.	The contractor will be advised to do so.
10.	The locals requested that contractor obtains materials locally, and negotiate with them on this	An agreement was reached that the contractor shall be requested to obtain those materials that meet the standards locally, and compensate for it.
11.	Community requested for water pans	The areas excavated for raw materials shall be secured to be water pans.
12.	Handling of dust, cement, chalk and noise pollution	The contractor shall be requested to minimize the effects of the above.
13.	Locals requested for bumps and road signs be put protect road users	The contractor will be requested to do the same.
14.	The road standards	The contractor will be requested to construct quality roads
15.	The locals requested for the public to be sensitized and educated on road use and signs.	Officers from transport and safety shall be requested to do that.

16.	The locals requested for the road to take care of drainage, and be large enough to avoid blockages	The design team agreed to take care of that and include it in the design.
17.	The locals requested for a trailer park be created to provide business opportunities	The design team agreed to put that into consideration.

PHOTO PLATE

<table>
<tr>
<td>  </td>
<td>  </td>
</tr>
<tr>
<td>  </td>
<td>  </td>
</tr>
</table>

MINUTES OF PUBLIC MEETING HELD AT KALKACHA VILLAGE ON 7TH FEBRUARY 2018 AT 10AM

Meeting session Summary of issues discussed	Date of the Meeting	Participants	Number of participants
Consultative meeting with residents of HolaLocationKalkacha Village	7th February 2018	Assistant county commissioner and Chief Hola location, Sociologist, E.I.A Expert, KENHA Garissa region and members of the public.	162Total Male 135 Female 27

Introduction

The meeting began at 10:00 Am with the introduction of parties' present, opening remarks from the area chief and later on an opening prayer

QUESTIONS/ISSUES RAISED		RESPONSE/WAY FORWARD
1	How Conflict and behavioral management will be handled?	The meeting resolved that a committee be formed, contactors labor be managed through a contractual agreement, public awareness be created and be engaged. The ESIA and RAP also provides an elaborate Grievance Redress Resolution Mechanism that will be applied during implementation of the Project
2.	Road standard and safety.	Thecontractor will be advised to construct the road to high standards, design take care of drainage, and locals be educated on effects and usage of the road.
3.	How the contractor was planning to deal with the effects of Mathenge tree?	Routine maintenance will be carried out along the road to reduce hazards, and crossing areas be designated to avoid over speeding.
4.	Human-wild animal conflict and Road crossing by animals.	The gathering was informed that the road design includes elaborate speed control measures such as road bumps, signs that will control the speed of vehicles. Also, community education by carried out to protect the locals

		and their animals, and wildlife.
5.	If bridges are going to be constructed on seasonal rivers and streams and culverts be put to direct storm waters?	The design team agreed to take care of this so as to protect the road from storm waters. An inventory of all culverts has been concluded and that the Project will involve rehabilitation of these culverts
6.	Incompletion of Contract.	The contractor will work under contract and due process and law will be followed if any of these happens.
7.	Whether the contractor is going to use the locally available materials?	An agreement was reached that where possible the materials will be used.
8.	Noise and dust pollution to nearby institutions and persons.	The contractor will be requested to minimize dust and noise pollution in the said areas
9.	Security challenges during the construction period.	The Security to contractors employs, equipment and materials was discussed and locals advised to provide the same. Security from banditry attacks was to be taken by the ministry of security in liaison with county authorities.
10.	If a weighbridge could also be constructed?	The matter needed more consultations with Government Departments.
11.	Road signs and land mark indicating water points.	The meeting came into an agreement that those that fall within the jurisdiction of KENHA will be done but those without may be not.

Minutes Authentication

SIGN…….

CHIEF HOLA LOCATION

PHOTO PLATE OF MEETING SESSION



PESA

MINUTES OF PUBLIC MEETING HELD IN GANDA MARKET ON 9TH FEBRUARY 2018 AT 10AM

Meeting session Summary of issues discussed	Date of the Meeting	Participants	Number of participants
Consultative meeting with residents of Ganda area	**9th February 2018**	Chief location, Sociologist, E.I.A Expert, Design Engineer, KENHA, NLC and members of the public.	37 total 14 female 23 male

Introduction

The meeting began at 10:00 am with the introduction of parties' present, opening remarks from the area chief and later on an opening prayer

QUESTIONS/ISSUES RAISED		RESPONSE/WAY FORWARD
1	What was the Importance of by-pass?	In Malindi road reserve is small hence interferences with private property, hence ease congestion. Road shoulders and tarmac to be worked be improved
2	Pollution ie dust, noise and Vibration.	Vibration would be minimal as there would no blasting, the ESIA prepared for the Project will require the contractor to use water sprays to reduce dust menace associated with such Projects
3	How is the conflict between beacons and map going to be solved?	The meeting resolved that the issue beacons and maps will be addressed. Communication and clarity be undertaken. RAP census will to be initiated immediately so that the PAPs affected by the Project can be identified.
4	Asset inventory.	This will be done with due diligence and real owners be identified with the help of chiefs and village elders. NLC requested for understanding and all participatory engagement. NLC- land divided into private, public and community.

		Sensitization, engagement and dissemination
5	If graves, shrines and sensitive cultural sites will also be affected?	All this assets will be taken care of Plus all the Physical and cultural artifacts
6	Relocation of affected persons, program and time taken	Ample time will be given for relocation after compensation
7	Baseline survey cutoff date	The meeting resolved that this would be communicated later.
8	Family and financial management	This be undertaken continuously and monitoring be done to avoid misuse of funds.

Minutes Authentication

SIGN…….

CHIEF GARSEN LOCATION

PHOTO PLATE OF MEETING SESSION

MINUTES OF PUBLIC MEETING HELD IN MALINDI TOWN AND NATIONAL MUSEUMS OF KENYA GROUNDS 10TH FEBRUARY 2018 AT 10AM

Meeting session Summary of issues discussed	Date of the Meeting	Participants	Number of participants
Consultative meeting with residents of Malindi town area	**10th February 2018**	Chief location, Sociologist, E.I.A Expert, Design Engineer, KENHA, NLC and members of the public.	37 total 14 female 23 male

Introduction

The meeting began at 10.00 a.m. at national museums ground in Malindi town

(a) Introduction by chief of Kijiwetanga
(b) Engineer Robert Ayieko introduced the project design and gave a brief
(c) Social aspects covered

The ESIA (Environmental and Social Impact Assessment) expert enlightened the community on the importance of conducting an ESIA (Environmental and Social Impact Assessment) and why the public should participate in it. He quoted the Kenyan constitution and EMCA as the main laws that support the idea of public participation. Residents were further informed that The ESIA team will identify impacts that are likely to occur during project implementation phase and come up with appropriate ways of mitigating the impacts.

No	Issue	Discussion
1	Dust, noise, vibration and tree and vegetation	The contractor will be requested To be minimize dust by sprinkling water on the construction site regularly.
2	NLC regional office in Kilifi	To help the government in land acquisition for public projects
3	Identification of actual PAPS	To be done during asset inventory data collection with due diligence and help of chief and village elders

4.	Issue of squatters	Squatters will be compensated for their structures, trees and crops only, land owners to be for their land.
5.	Locals requested for the sharing of road design and survey plans	This was agreed to and was to be deposited in the chiefs and M.C.A s offices for viewing by the public.
6	Total and partial displacement	All will be compensated according to their respective effects.
7.	Land ownership, registered and not be recognized	If proof of ownership can provided through the local committees and chiefs then will be considered
8.	Existing drainage is small, expansion can cause cracks to buildings	To be addressed though sea level is a challenge
9	Compensation options	Either Land for Land, or Land for money
10	Notices before demolition and work plan activities	This will be given and ample time provided for moving out
11	Requested for by-pass be aligned with LAPSSET project	Design team promised to look into it and see if possible
12	Representation in committee	Local administration, chiefs, elders, vulnerable, physically challenged and business community
13	Culture	Asset inventory to consider cultural issues
14	Notices	Agreed that notice be given before commencing any activity
15	Effects on business disruption	Contractor to be consulted to minimize damages to properties and businesses

Minutes Authentication

SIGN…….

CHIEF GARSEN LOCATION

PHOTO PLATE OF MEETING SESSION




ATTENDANCE LIST FOR PUBLIC MEETINGS

BURA ATTENDANCE LIST

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ..BURA.................................County..TANA RIVER......

Date..6/2/2018..............Venue..CDF....Hall...................

No	Name	Gender	Area	Telephone	Sign
	YUSSUF WARE	MALE	BURA	0786283332	[signature]
	MOHAMED MOHAMUD	MALE	BURA	0713202871	[signature]
	MOHAMED BODOLE	MALE	BURA	0700433768	[signature]
	YAKUB BUTE	MALE	BURA	0790786410	[signature]
	SULEIMAN RHOBA	MALE	HOSINGO	0713354359	[signature]
	Judith onkundi	Female	Roughton	0725758149	[signature]

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ..BURA.....County..TANA RIVER.....

Date..6/12/2018.....Venue..CDF Hall.....

No	Name	Gender	Area	Telephone	Sign
1	MOSES GAMBO	MALE	BURA	0781419990	
2	Mukewa Kennedy . W.	"	KeNHA - HQ	0728 358005	
3	Edwin K. Mambo	Male	KeNHA - N.E.R	0703807529	
4	NANCY MARWA	F	Roughton →	0728095767	
5	Oman Adhe	M	Chief	0727073192	
6	Hussein Macharia Gachoka	Male	P.M. Rep	0724242005	

NO:	Name	Gender	Area	Telephone	Sign
	Abdullah Bodha	M	Bura	0727464289	
	Mohamed Imana	M	Bura	0712488750	
	Omar Omarte Gobo	M	Bura	0717414667	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Bura County Tana River

Date 6/2/2018 Venue CDF Hall Bura

No	Name	Gender	Area	Telephone	Sign
	Njiru Njue	M	KeNHA HQ	-	
	Raphael Kosir	M	KeNHA HQ	—	
	Rachael Mithamo	F	KeNHA HQ	—	
	Habiba Bodhole	F	Bura	07 —	
	Adhey Gororo	F	Bura	—	
	Bataka Omaro	F	Bura	—	

NO	Name	Gender	Area	Telephone	Sign
	Fatuma Sadacha	F	BURA	——	
	Nur Hassan	M	Bura	0713147762	
	Abdikadir Bodhole	M	Bura	0718954487	
	Hassan Golecha	M	Bura	0717684462	
	Amina Ide Omar	F	Bura	0705028817	
	Fatuma Suleiman	F	Bura	——	
	Fatuma Mohamed	F	Bura	0792725719	
	Zeinab Mohamed	F	Bura	0723636828	
	Zeinab Idris	F	Bura	~~07~~ ——	
	Fatuma Dahir	F	Bura	~~07~~ ——	
	Alia Yussuf	F	Bura	0740947892	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ...Bura.................................County..Tana River......

Date..6/2/2018..............Venue..CDF Hall Bura..........

No	Name	Gender	Area	Telephone	Sign
	Omar Godhana Hunto	M	Bura	0799090752	[signature]
	Haguta Shombaro	F	BURA	07——	[signature]
	Jimale Abdi	M	BURA	0704348220	[signature]
	Asha Mahamud odhowa	F	BURA	—	[signature]
	Ralia Ali	F	BURA	0733663987	[signature]
	Hawa Hussein	F	BURA	0785538874	[signature]

	ZEINAB Adhan	F	BURA	0798312262	[signature]
	Sofia Adam	F	BURA	0795940035	[signature]
	Mwanaidi Ibrahim	F	BURA	07——	[signature]
	Badhula Mui	F	BURA	0710605810	[signature]
	John Karanja	M	BURA	0715398477	[signature]
	IDRIS SALAT	M	BURA	0723301715	[signature]

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ...BURA.....County...TANA RIVER

Date 6/2/2018.....Venue...CDP HALL BURA.....

No	Name	Gender	Area	Telephone	Sign
	Fatuma Nasoro	F	BURA	0795462768	
	Abshire .G. Juma	F	BURA	0725302914	
	Maka Hajir	M	BURA	0712398676	
	RALIA GARGO HUSSEIN	F	BURA	0717064781	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village BURA County TANA RIVER

Date 6/2/2018 Venue CDF Hall

No	Name	Gender	Area	Telephone	Sign
	Mohamed Gagglolo	MALE	BURA	0728126640	[signature]
	MOHAMED ROBA	M	BURA	0718040544	[signature]
	Ali Mula	M	BURA	0716038845	[signature]
	Ibrahim Mintohamed	M	BURA	0711408560	[signature]
	Abdullah Godhana	M	BURA	0789707464	[signature]
	Osman Guyo	M	BURA	0716415409	[signature]

NO	Name	Gender	Area	Telephone	Sign
	IBRAHIM ABDI GOBU	MALE	BURA	0719286511	[signature]
	ABAHOLA KANCHORU	MALE	BURA	—	[signature]
	HASSAN BAKARI	MALE	BURA	0798231074	[signature]
	ABDULLAHI OSMAN	MALE	BURA	0713566623	[signature]
	ABDULLA BODOLO	MALE	BURA	0703371051	[signature]
	ISSA GORICHA	MALE	BURA	0792185473	[signature]
	YUSUF BODA SIAT	MALE	BURA	0723301437	[signature]
	ROBB BILE	MALE	BURA	0791640220	[signature]
	HUSSEIN GOLOCHA	MALE	BURA	0798972733	[signature]
	MOHAMED DUBE	MALE	BURA	—	[signature]
	HASSAN GUYO	MALE	BURA	0714	[signature]

Kenya National Highways Authority

Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ~~Jaridede~~ Charidende County Tana River

Date 5/2/2018 Venue Chief's Office

No	Name	Gender	Area	Telephone	Sign
	ABUBAKAR ABDI	M	JARIDEDE	0710326519	[signature]
	Yusuf AHMED			0727335295	[signature]
	Jacob Langat	M	CHARIDENDE	0727495946	[signature]
	ADHAN ABDI	M	CHARIDENDE	0718297748	[signature]
	OMAR A SOMAN	M	CHERIDENDE	0708752228	
	NASSIR Mohamed	M	Charidende	0720412162	[signature]

CHARIDENDE MEETING

	NAME	GENDA	AREA	TEL	SIG.
	A/CHIEF AREA MATANI R. DAKANE	M	CHARIDENDE	0736526655	[illegible]
	CHIEF DUKANOTU IDRIS J. ABDILLE	M	DUKANOTU	0737949598	[illegible]
	Judith Onkundi	F	Roughton	0725738149	[illegible]

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Charindede ....County Tana River

Date 5/2/2018 ....Venue chief's office

No	Name	Gender	Area	Telephone	Sign
	John Gitari	M.	Charindede	0718836328	
	L-JICHO PEVU junior	m	chari	0728423972	
	DAKANE RAGO	m	chari	0786148345	
	OSMAN HUSSEIN	M	cha	0780409210	
	Hussey M Dere	M	chariden de	0729866129	
	[illegible]	M	Charidede	0704772483	
	MOHAMEDAMIN ABDI	M	CHARIDENDE	0742469340	
	SADICK YUSSUF	M	CHARIDENDE	0729598057	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Charidende County Tana River

Date 5/2/2018 Venue chief's office

No	Name	Gender	Area	Telephone	Sign
1	Gerald WIKENZO	male	Garissa	0722507101	
2	Edwin K. Maubo	Male	Garissa	0703807529	
3	NANCY MARWA	F	NAIROBI	0728095767	
4	ABDI ICARIM MOGO	M	CHARIDENDE	0722745131	
5	MOHAMED KOHOS FARAH	M	CHARI DENDE	0734581859	
6	YUSSUF JIRON ABDILLE	M	CHARIDENDE	0736614991	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Charidende County Tana River

Date 5/2/2018 Venue Chief's office

No	Name	Gender	Area	Telephone	Sign
1	Gerald WITKENZO	male	Garissa	0722507101	
2	Edwin K. Mamba	Male	Garissa	0703807529	
3	NANCY MARWA	F	NAIROBI	0728095767	
4	ABDI ICARIM MOGO	M	CHARIDENDE	0722745131	
5	MOHAMED KOROS FARAH	M	CHARI DENDE	0734581859	
6	YUSSUF JIRON ABDILLE	M	CHARIDENDE	0736614991	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Kilifi County

Date 9/2/2018 Venue Chief's office

No	Name	Gender	Area	Telephone	Sign
19	ALI OMARI	MALE	MKAOMOTO	0727826814 TELE0727826	
20	SULUBY KIDHEMBE	MALE	GANDA	0712726172	SULUBY
21	SALIM ABDUL-RAHAMAN MGOMOKA	MALE	GANDA	0734522385	
22	SAID .N MGOMOKA	MALE	GANDA	0716655790	Mgomoka
23	HUSSEIN SUB	MALE	GANDA	0726779500	
24	MOSES MBARUKU ULODI	MALE	GANDA	0715158561	

GANDA ATTENDANCE LIST

25	OMAR ATHMAN	MALE	GANDA	0796351256	[signature]
26	MUJAHID SAID	M	GANDA	0722-971902	[signature]
27	SALIM OMAR MOHAMED	MALE	GANDA	0714831289	[signature]
28	LUCAS SAFARI CHARO	MALE	GANDA	0720896971	[signature]
29.	ERIC A. RANDU	MALE	GANDA	0720284322	[signature]
30	HENRY KARISA	MALE	GANDA	0739425759	[signature]
31	GIBSON UNDA NZAI	MALE	GANDA	0725208443	[signature]
32	JOSEPH NZAI RUWA	MALE	GANDA	0720875850	[signature]
33	KAZUNGU KAINGU KAZUNGU	MALE	GANDA	0715124369	[signature]
34.	LENNY MARIK	MALE	K/MKONGANI	070883466	[signature]
35	SAMUEL W CHARO	MALE	GANDA	0713272672	[signature]
36	HERMAN M. RUWA	MALE	GANDA	0727493152	[signature]

Kenya National Highways Authority

Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village GANDA County KILIFI

Date 9/2/2018 Venue GANDA CHIEF'S OFFICE

No	Name	Gender	Area	Telephone	Sign
1	BARTHOLOMEW N. KIRUNGA	MALE	GANDA	0727954539	[signature]
2	OMAR HASSAN MAZOA	MALE	GANDA	0727-843820	[signature] 9/2
3	BONIFACE SHAHA MZUNGU	MALE	GANDA	0724027696	[signature]
4	DAMA KITHI NGOMBO	FEMALE	GANDA	0735692398	DAMA
5	JUMWA TSUWI	FEMALE	GANDA	0737316279	[signature]
6	ZAWADI TSUWI	FEMALE	GANDA	0737316279	[signature]

7	KADZO KIDONDA KADZEHA	FEMALE	GANDA	0738710975	KK
8	REHEMA MOTI'D	FEMELI	GANDA	0720744117	
9	SAMUEL KADOMBE HARE	MALE	GANDA	0700535691	Dama
10	BEATRICE DAMA NGUMBAO	FEMEL	GANDA	0706006648	Dama
11	Sylvia Reda	Female	Makitosha	0733811299	SylReda
12	PATRICK WAWURE	MALE	MAKITOSHA	0733811298	
13	DANIEL RICCI	MALE	MAKITOSHA	0734160315	
14	ALHUMAN I BADI	BADI MALE	GANDA	0719511348	
15	FADHILI JUMA	MALE	GANDA	0733249272	
16	SAMMY KAZUNGU	MALE	GANDA	0792489930	
17	HALISI ATHMAN	MALE	GANDA	0712092333	
18	NZARO KALAMA NZARO	MALE	GANDA	—	

Kenya National Highways Authority

Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Ganda County Kilifi

Date 9/2/2022 Venue Chief's Office

No	Name	Gender	Area	Telephone	Sign
	STEPHEN RUWA HARE	M	KILIFI/TANGA	0774885979	
	SYLVIA NDOWA KADZEHA	F	KILIFI/TANGA	0707728731	
	KAHINDI KATANA	M	Ganda	0751454533	
	SHEE MOHID	M	Ganda	0713461610	
	MWARINGA NGOWA	M	GANDA	0707280940	
	AMINA SALIM	FEMALE	GANDA	0720449832	

	[illegible]	F.	[illegible]	0742910441	[illegible]
	KATSO MWERI MANGI	F.	GANDA	0742352662	
	Majid ALI Talib	M	GANDA	0721406443	
	MAULID ALI MAULID	M	GANDA	0791637547	
	ABDALLAH MOHAMED	M	GANDA	0724329938	
	CHARO KADHUA	M	Ganda	—	
	JUMA KATHINDI MGAI	M	GANDA	0791335557	
	RIZIKI OMAR	F.	GANDA	0705165143	
	KALAMA V GARAMA	M	GANDA	0720228062	
	BAKARI MOHAMED	M	GHANIM	8455857	
	ALLY MOHAMED	M	GANDA	9966178	
	DAVID MKARE	M	GANDA	0734358795	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Ganda County Kilifi

Date 9/2/2018 Venue ~~HACA~~ Chief's office Mkunumbi

No	Name	Gender	Area	Telephone	Sign
	GERSE CHAFUA	MALE	LAS.MBJT	0742910348	
	MOHAMED KUABHA	MALE	GANDA	0726988847	
	FEDRICK BURUGHE	M	GANDA	0740547529	
	SAMMY KARISA	M	GANDA	0705146959	
	JUMAA KARISA	M	KIJIWETANGA	0700863776	
	MBARAK ATHMAN	M	GANDA	0719659967	

	ZIRO WANJE	Male	Ganda	0706142238	
	DAWA MOHAMED	Female	Ganda	0700870062	
	KADZO KAINGU	Female	Ganda	07 —	
	KHADIJA SAID	FEMALE	GANDA	—	
	KHADIJA IDDI	FEMALE	GANDA	—	
	NASSER MUSA	MALE	GANDA	0719-655-677	
	BOSFACE MAKUTA	MALE	GANDA	0746-969-345	
	HAMISI SOUD TAWFIQ	MALE	GANDA	0707787006	
	JOSEPH K. KATANA	MALE	GANDA	0797767155	
	SHAMBAN ALI	MALE	GANDA	0711102603	
	Kenneth Wangema Kimani	male	Sabaki	0726380241	—
	Eleanor J. Meutha	female	Sabaki	0737 056836	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Kilifi

Date 9/2/2018 Venue Chief's Office

No	Name	Gender	Area	Telephone	Sign
	SULEMAN SHEIKH MOHAMED	MALE	KIJIWETANGA	0719466653	
	ALI TABU ASAA	MALE	KASIMBIJI	0717-568-900	
	ALI MSELLEM SULEIMAN	MALE	GANDA	0724-912159	
	GEORGE MWENI GUNGU	MALE	GANDA	0729611501	
	KAROI SALIM	MALE	GANDA	—	
	FURAHA NGUMBAO MWARE	MALE	GANDA	073956837	

	SAFARI K. MALORI	MALE	KASIMBISI	0727661865	
	ISMAIL ABDEREHEMAN	MALE	GANDA	0718818170	
	SULUBU KOMBE	MALE	K/TANGA	0712945691	
	ELIAS YERI	MALE	GANDA	0788638017	
	WYCLIFFE MCHARO	MALE.	KASIM BIJI	0711736705	
	ALBERT KARISA SAFARI	MALE	MGURURENI	0702999894	
	J. KATANA MWAKUDZA	MALE	MILIMANI	0723322916	
	SALIM MOHD	MALE	GANDA	0718866813	
	AHMED SAID BUJRA	MALE	GANDA	0722355240	
	Walter Chogo	MALE	K/TANGA	0799642159	
	KILIAN KHARE	MALE	K/TANGA	0732638787	
	MARLONE KITSAO	MALE	K/TANGA	0723914 18	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village: Ganda County: Kilifi

Date: 9/2/2018 Venue: Chief's office

No	Name	Gender	Area	Telephone	Sign
	CHARO KARISA CHENGO	MALE	GANDA	0723598588	
	DOMINIC NDONDI	MALE	GANDA	0733246463	
	KAZUNGU CHARO	MALE	GANDA	0717846742	
	KARISA CHARO	MALE	GANDA	0710251496	
	KAHINDI LAWRENCE	MALE	GANDA	0711616013	
	LIVERSON NGOMBO	MALE	GANDA	0707253891	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 9/2/2018 Venue Chief's Office

No	Name	Gender	Area	Telephone	Sign
	CHARO KARISA CHENGO	MALE	GANDA	0723598588	
	DOMINIC NDUNDI	MALE	GANDA	0733246463	
	KAZUNGU CHARO	MALE	GANDA	0717846782	
	KARISA CHARO	MALE	GANDA	0710251496	
	KAHINDI LAWRENCE	MALE	GANDA	0711616013	
	LIVERSON NGOMBO	MALE	GANDA	0707253891	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 21/2/2018 Venue YWCA Milimani

No	Name	Gender	Area	Telephone	Sign
1.	Hussein mohamed B.	m.	Minjilla	0711613018	
2	Abdilkadir salim Dulo	m	Minjilla	0702062669	
3	Shaib Gulu maliyo	m.	Minjilla	0791770991	
4	Bajila Alwi Dudu	m.	Minjilla	0702251582	
5	Said Guyo Dube	m.	Idsowe	X	
	Judith Onkundi	f	Roysambu	0725761149	

GARSEN ATTENDANCE LIST

	NAMES	Gender	AREA	Telephone	SIGN
6	Abdullah Buya Karhayu	m	Mnyilla	0705237770	
7.	Maskat Amita	m.	Idsowe	0706870203	
8	Abalangha Jillo Nickson	m.	Mnyilla	0729915723	
9.	Gedion Bill Kanson	m.	Mnyilla	0799057308	
10	Kassim Omar Juma	m.	Mnyilla	0706087815	
11	Bobyson Jalio Umuru	m.	Idsowe	0725928654	
12.	Voni Buko mwanahali	m.	Idsowe	0729626174	
13	Ibrahim Jacob sereu	m.	Idsowe	0718711977	
14	Awadh Mohamed Badirsha	m.	Mnyilla	0715959131	
15	Mohamed Abdalla Alvi	m.	Mnyilla	0700023423	
16	Joyce Akinyi Micheal	F	Idsowe	0723988540	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 6/2/2018 Venue TTI CA Mikanjiku

No	Name	Gender	Area	Telephone	Sign
17	Chingwatti lorence	m.	Idsowe	0710401857	
18	Ali Malibe	m.	Idsowe	0702805252	
19.	Mary Shari	F.	Mnyilla	0702259471 0702259471	
20	Daddah Sammy Kore	m.	Idsowe	0711675357	
21	Rukia Abdalla Makaruka	F.	Mnyilla	0714959851	
22	Henry Komora Hahori	m.	Idsowe	0704208482	

	NAMES	Gender	Area	Telephone	SIGN
23.	AINIKE Manga	F.	Idsowe	0710461222	
24	Issa Dido Guyo	M.	Dalu	0720210945	
25	Ralia Diramo Ali	F.	Idsowe	0742760573	
26	Muslima Hajila Abdikarim	F.	Idsowe	0702259348	
27	Amina Guyo Jarso	F.	Idsowe	0728411 57	
28	Halima Zainabu Guyole	F.	Idsowe	0702129693	
30	Habona Nuru Omar	F.	Idsowe	0788236842	
31	Sulaiman Bakari Ali	m	Idsowe	07	
32	Abdi Duba Duri	m.	Bilisa	07	
33	Dhirisha Haiswa	F.	Idsowe	0721484249	
34	Salim Juma Abdalla	m	Mnyilla	0704124215	
35	Taney Buko Arete	F.	Idsowe	0710504135	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 8/12/2018 Venue YWCA Meeting

No	Name	Gender	Area	Telephone	Sign
36	Ranson P. Jillo	M	[illegible]	0710817061	
37	Omar Yare Hassan	m	Garsen	0715756191	
38	Bonface Omar Jillo	m.	Idsowe	0718708731	
39.	Neekalen Wario	F.	Idsowe	0740866618	
40	Hassan Mildharo Hamara	m.	Minjilla	0781004167	
41	Said Boru Bonaya	m.	Idsowe	0723841157	

	Names	Gender	Area	Telephone	Sign
42	Mohamed Mangudo Woseso	m.	Idsowe	07	
43	Godana Dube Duri	m.	Idsowe		
44	Ndarama Maneno	F.	Idsowe	0723489566	
45	Abigael Haluku Titus	F.	Idsowe	0700199935	
46	Kerna Ndarama Jillo	F.	Idsowe	0726631147	
47	Fatuma Mohamed Abaloni	F.	Idsowe	0798152312	
48	Zena Mwanajuma Osman	F	Minjilla	0715607[illegible]	
49	Mariam Said Jillo	F.	Minjilla	0796333890	
50	Patricia Galgalo	F.	Idsowe	0716363182	
51	Josphina Kawira Anampio	F.	Minjilla	0715477236	
52	Joyson Bonaya mwaro	m.	Idsowe	0717628549	
53.	Anuny Mwanamisi Omar	F.	Minjilla	0723329973	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 8/2/2018 Venue YWCA Mikinduni

No	Name	Gender	Area	Telephone	Sign
54	Amina Osman Ali	F.	Minjilla		
55	Hadija Hajila Mohamed	F.	Minjilla	0798152018	
56	Mwanahamisi Hagerera Said	F.	Idsowe	0741166747	
57	Selina Nzai Rya	F.	Idsowe	0706885292	
58	Joynice Hainike Jillo	F.	Idsowe	0796447028	
59	Rama Bajila Alwi	m.	Minjilla	0798510341	

No	Names	Gender	Area	Telephon	SIGN
60	Jillo Mombasa Hamisi	m.	Minjilla	0743391142	
61	Mohamed Shaib Gulu	m.	Minjilla	07	
61	Adam Abdinani Omar	m.	Minjilla	0798863675	
62	Waaku Garisa	m.	Garseni	0718838541	
63	Idris Salim Buya	m	Dumi	0797642080	
64	Said Gawawa Ali	m.	Minjilla	0705631217	
65	Farah Shite Hilowle	m.	Minjilla	0742522508	
66	Hiyasa Bawata Kokana	m.	Dumi	0703165180	
67	Marera tom George	m.	Garseni	0702210660	
68	Abae Roka Buku	m.	Minjilla	0725791110	
69	Ali Abdalla Ali	m.	Minjilla	0710586291	
70	Hussein Omar Mombasa	m.	Minjilla	0703497284	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ...Garsen...County...Tana River...

Date...8/2/2018...Venue...Mungila...

No	Name	Gender	Area	Telephone	Sign
71	Omar Hassan Igu	m.	Mungila	0713061491	
72	Peter Amimo O.	m.	Mungila	0702578231	
73	Hajya Hadhidha Wayu	F.	Garseni	0715524273	
74	Halima Barnea Mohamed	F.	Garseni	0711676694	
75	Halima Gabei Mohamed	F.	Mungila	0796152700	
76	Maggo Sylivano Raya	m.	Kibusu	0702061686	

No	Names	Gender	Area	Telephone	Sign
77	Siyado Sahan Bare	F.	Garseni	0719724413	
78	Fatuma Saweini Bule	F.	Garseni	0723655562	
79	Hawa Mohamed Kuno	F.	Garseni	0723589535	
80	Fatuma Hassan Soman	F.	Garseni	0719286987	
81	Hawa Saweini Bule	F.	Garseni	0713288820	
82	Yusuf Nuno Ali	m.	Minjilla	0713554996	
83	Salim Dullo Gedo	m.	Minjilla		
84	Joyce Johnson Dhadho	F.	Idsowe	0741738819	
85	Faiza Abdi Hareth	F.	Garseni	0719288820	
86	Abdi Madhobi Galgalo	m	Minjilla	0718771749	
87	Isack Nuno Ali	m.	Gasan	0721997669	
88	Hawa Sirath	F.	Garsen	0723655562	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garseni County Tana River

Date 8/2/2018 Venue Minjila YWCA

No	Name	Gender	Area	Telephone	Sign
89	Joan Komora	F.	Idsowe		
90	Raha Abdi Abdullahi	F.	Minjilla	0719286956	
91	Abas Siad Saladh	m.	Minjilla	0725806880	
92	Muslima Gabu Boru	F.	Minjilla	0799032625	
93	Maclean Paul Ziunge	m.	Shirikisho	0729343031	
94	Hassan Haji Farah	m.	Minjilla	0705926678	

No	NAMES	Gender	Area	Telephone	Sign
95	Rukia Awadh Abdalla	F	Minjilla	0700113817	
96	Mwabaham is. Guyato Malim	F	Garseni		
97	Ahmed Abdi Guracho	m	Minjilla	0701700081	
98	Ahmed Abdi Madhobe	m	Minjilla	0728259294	
99	Geo Josphat marimbo	m	Minjilla	0704905168	
100	MWIMA MKALA	M	SHIRIKISHO	0728-273283	
101	BINTO KASSIM	F	GARISEN	0704-25353	
102	Nicksan Mwambari	M	GARSEN	0705978830	
103	MBARAK ALI SAID	m	GARSEN	0728845665	
104	BAKARI Mohamed	m	GARSEN	N/A	
105	FRACO MULA KOMOK	M	GARSEN	0796446231	
106	EMMANUEL MUDE MOKO	M	GARSEN	0714377945	

Kenya National Highways Authority

Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 8/2/2018 Venue YHCA Mlingila

No	Name	Gender	Area	Telephone	Sign
	Isnino Hassan	F	GRN	0701910806	
	Eshia Ahmed Gawo	F	GRN	0796388680	
	Harame M. Kenan	M	GRN	0705969761	
	Raha A. Hassan [illegible]	F	Mangilla	0710591933	
	Hussein A. Kuracha	M	Mangilla	0701700081	
	Gulsho M. Bare	F	GSR	0792724983	
	Ahmed Allan	M	Garsen	07	
	Tanmatha George	M	[illegible]	0706721636	
	George F Baya	M	Kilifi County Govt	0726-393141	
	Elvis Bullu	M	Kilifi County Govt	0729422885	
	Peter M. Mwambura	M	Kilifi County	0721100734	
	Adams Muviki	M	KeNHA	0722992768	
	Rachael Mithamo	F	KeNHA	0708392942	

Kenya National Highways Authority

Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen ……… County Tana River

Date 8/2/2018 ……… Venue YMCA Minjila ………

No	Name	Gender	Area	Telephone	Sign
	SWAT MOH'D YUSUF	M	Minjila	0796446684	
	ABDI SAHAL SAGAR	M	Minjilla	0728302161	
	MOHD ADAN MARAMORE	M	Minjilla	0719408932	
	SAHARA ABDI ABDULAHI	F	Minjilla	0713584996	[signature]
	SAHARA IBRAHIM JUBAS	F	Minjilla	0790655236	[signature]
	NANCY MARWA	F	Roughton Int	0728095161	[signature]

	KERA I. JUBAS	F	Minjilla	0792569269	[signature]
	HABIBA ALI HASSAN	F	Minjilla	0791370865	[signature]
	AMINA J. SHAKA	F	Minjilla	0796518260	[signature]
	M. ABDULLAH	M	Minjilla	0727279966	[signature]
	ISSAK N. ALI	M	Minjilla	0721997669	
	FATUMA H. FARAH	F	Minjilla	0718296179	[signature]
	RAHMA F. KUSO	F	GARSEN	0726251329	[signature]
	ASLI B. SHONGOLO	F	GARSEN	0798422420	[signature]
	HALIMA S. KASIM	F	GARSEN	0721486466	[signature]
	HALIMA M. BARE	F	GARSEN	0719551305	[signature]
	FATUMA HASSAN	F	Garsen	0714974727	[signature]
	MUMINA MARAMORE	F	GAR	0713906739	[signature]

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 8/2/2018 Venue YICA Mungila

No	Name	Gender	Area	Telephone	Sign
1	FAITH WANJA GITARI	F	TISOWE	0701306724	F.W
2.	SARAH MALUKO	F	TISOWE	0704992863	
3	LOYCE MUCHIRI	F	TSOWE		
4	HASSAN OMAR	M	MINJILA	0795967719	
5	Amalie Mutesa	F	Tisowe	0724749578	
6.	Hussein Hiribae	M	Garsen	0723653895	
7.	Jacob Gedana	M	Garsen	0703322700	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village Garsen County Tana River

Date 8/2/2018 Venue YICA Mungila

No	Name	Gender	Area	Telephone	Sign
1	FAITH WANJA GITARI	F	TISOWE	0701306724	F.W
2.	SARAH MALUKO	F	TISOWE	0704992863	
3	LOYCE MUCHIRI	F	TSOWE		
4	HASSAN OMAR	M	MINJILA	0795967719	
5	Amalie Mutesa	F	Tisowe	0724749578	
6.	Hussein Hiribae	M	Garsen	0723653895	
7.	Jacob Gedana	M	Garsen	0703322700	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- LAZA LEISURE LODGING & RESTUARANT HOLA

DATE: 12TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
1	ASAPH K. THUO	KeRRA TANA RIVER	0722767098 kingasaph2@yahoo.com	[signature]
2.	Eng. RENSIN INDECHE	KeRRA TANA RIVER	0721518596 indecher@yahoo.com	[signature]
3	Gerald Wtkongo	KeNHA	geraldwtkongo@yahoo.com 0722507191	[signature]

HOLA ATTENDANCE LIST

Kenya National Highways Authority
Quality Highways, Better Connections

4	Moses Gambo	KeNHA	0731419990 M.gambo@kenha.co.ke	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- LAZA LEISURE LODGING & RESTUARANT HOLA

DATE: 12TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
	I. A. NAKORU	C.C.T/Rivet.	0729476549	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- LAZA LEISURE LODGING & RESTUARANT HOLA

DATE: 12TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
1	RINAH M. CHIKAMAT	KeNHA	0726805618	
2	Kennedy Mukewa. W	KeNHA	0725353005	
3.	Jane Orang	KeNHA	0722253256	

Kenya National Highways Authority
Quality Highways, Better Connections

4.	LAWRENCE MARUTI	KeNHA	0725086065	
5.	Eng. Samson M. Murage	KeNHA – CST REGION	0728147933	
6.	ENG. DORCUS OMONDI	KeNHA – SPECIAL PROJECTS	0721614847	
7	LEONARD OUMA MADONGO	KERRA – LAMU REGION (CC RE)	0726877573	
8	DAN CIGUA	COUNTY GOVT OF TANA RIVER – DEPT. OF COMMUNICATIONS	0723316115	
9	Galgallo Fayo	County Govt. of Tana River office of the governor	0711699657	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- LAZA LEISURE LODGING & RESTUARANT HOLA

DATE: 12TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
	MILDRED NKADYDA	KeRRA	0700530513	
	ENG JOHN NDINIKA	KeNHA	0722752592	
	ADAMS MUREITHI	KeNHA	0722992768	

Kenya National Highways Authority
Quality Highways, Better Connections

	R. Balaji	Roughton International		
	Judith Onkundi	Roughton International	0725 [illegible]	
	Godwin Sakwa	Roughton / EASC	0721686954 godwinsakwa@gmail.com	

Kenya National Highways Authority

Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- LAZA LEISURE LODGING & RESTUARANT HOLA

DATE: 12TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
1	Eng B. G. Abdi [illegible]	KeRRA Garissa	0720819082 gedisab[illegible]	[signature]
2	BERNARD KORIR	NPS	0725424943	[signature]
3	WALTER ALINDA	POLICE	0722817334 cpo.[illegible]@gmail.com	[signature]

Kenya National Highways Authority
Quality Highways, Better Connections

4	Samuel Chepkonga	Prisons	Chepkonga.Samuel@yahoo.com	
5	Dickson Wekesa	NIS (TR)	0724616200	
6	Mohamed Arganso	Director Youth Tana-River Cnty	0715838401	
7	Hussein Abdi	Manager Constituency Office	0704768200	
8.	Soud Omar Mwid	Senator Office	0722117244	
9.	Rose Oluo	KeNHA	0720382811	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ..MADOGO..................................County.GA........................

Date.......................................Venue...

No	Name	Gender	Area	Telephone	Sign
	Gerald Wikanzo	Male	Garissa	0722507101	
	Edwin K Mambo	Male	Garissa	0703807529	
	Nancy Marwa	F		0728081617	
	Robert Atieko	M	F		
	Abak K.J.	M	N	0721778483	
	Islam Barisa				

MADOGO ATTENDANCE LIST

Kenya National Highways Authority

Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ..Madogo.............................County..Tana River..

Date..5/3/2018...............Venue..District Officer's Office

No	Name	Gender	Area	Telephone	Sign
	Abdullahi Mohamed	Male	Madogo	0721537128	[signature]
	Jimo MANSA	Male	Madogo	0727007945	
	Adhan Abogana				
	Hasan Sorana				
	Mohd Mahamed				
	Abdi Wombo				

	MANGA Said				
	IBrahim Abubakar Salim				
	Bashir Jebow				
	Ramadhan Malijo				
	Abeco Guyo				
	Ismail Dhidho				
	Abdalla Ali				
	Hussein Mohd Gullo				
	Rozza Washo				
	Hussein Lesoya				
	Jimo Mansa				
	~~Bulla~~ Dakked Wadeja				

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village MADOGO County TANA RIVER

Date 5/2/2018 Venue District Officer's office

No	Name	Gender	Area	Telephone	Sign
01	MOHAMED BADHADHA	M.	MADOGO	0725623709	[signature]
	JUSTUS M. KERE	M	"	0720247152	[signature]
	HADIJA K. BOCHA	F	"	0718016547	
	MOHAMED A. UMURO	M	"	0703864413	
	MOHAMED G. BOCHA	M	"	0708114992	
	AISHA M. RAMADHANI	F	"	0726748090	[signature]
	HASSAN D. KOLOCHO	M	MADOGO	0716576107	
	ABUBAKAR HAWADHI	M	"	0728335744	
	HASSAN ABDIRAHMAN	M	"	0720712874	
	MAHAMUD KALME BOCHA	M	"	0722759596	
	NURIA ADHAN HAJI	F		0704298777	
	FATUMA JINERI KOFA	F	"	0727838265	
	ESTER NDUNGE	F	"	0728791078	
	Judith Onkwedi	F	Roughton	0725758149	[signature]

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ...Madogo.....County...Tana River...

Date...5/2/2018.....Venue...District Officers office

No	Name	Gender	Area	Telephone	Sign
1	KATA DELLO ~~Yussuf Makafu~~	H·man	B3		
2	Hawo Dido	H·man	Bakakajiku	0718805134	
3	Zaiba Anab. Harun	H·man	Tana A.	0725289796	
4	Mohamed Abaloni	H·man	Adele V. 2	0725464043	
5	~~Mo~~hamed ~~Abdadha~~				
6	Hussein ~~Ramadhan~~				
7	Salad Dadosa.	H·man			
8	Ali Jineri Kofa				
9	Baru Osman Khalmeed.				
10	Issa Omar Gulu	H·man	Adele Kokane		
11	ISSA Bare Dokata	H man	Boji A.		
12	MAHamud Gura	H·man	Adele B		
13	Ramadha Kurawakilo	mzee			
14	Dirse Osman Mohamed	mzee			
15	Babuya Bukalle	mzee			
16	Jibril Osman				
17	Abbubakar Jillo Bukale				
18	Hussein Abdi Bulo.	Nyumba in		0726142572	

Kenya National Highways Authority
Quality Highways, Better Connections

PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

PUBLIC PARTICIPATION

Location / Village ......MADOGO............... County....TANA RIVER

Date..5/2/2018.............Venue..District officer's office

No	Name	Gender	Area	Telephone	Sign
	Abdi Hassan Waticho	M	Hagarsot	0712045829	
	Abdullahi Galgalo	M	Madogo B4	0724767266	
	Harun Said	M	Yang	0708913607	
	Mahamud Omar	M	Hagarsot	0710287809	
	Bashir Gulu	M	Vango	0712899007	
	YAKUB BARE	M	BULA BASTA	0726998815	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- TAMANI JUA RESORT MALINDI

DATE: 11TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
1	Majid Swaleh	K.n.c.of [illegible]	0721601715 malindi[illegible]@yahoo[illegible]	[signature]
2	ELIZABETH NGIGE	ACC MALINDI	723756745	[signature]
3	Eng John Ndinika	KeNHA	0722752592	[signature]

MALINDI ATTENDANCE LIST

Kenya National Highways Authority
Quality Highways, Better Connections

4	LAWRENCE MARITI	KeNHA	0725086065	
5.	Adams Muviiku	KeNHA	0722992276	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- TAMANI JUA RESORT MALINDI

DATE: 11TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
1.	PETER K. MWANYI	KENYA FORESTS SERVICE	0721278657 peterkm66@yahoo.com	
2.	JULIET. M. RUWA	NATIONAL COUNCIL FOR PERSONS WITH DISABILITIES	0713742514 ruwa@ncpwd.go.ke	
3	Eng CHARLES APONGO OPALA	KeRRA TAITA/TAVETA	0722883378 apunguopala@gmail.com apungu opala@yahoo.com	

Kenya National Highways Authority
Quality Highways, Better Connections

	John N. Munyao	WRMA	0702217499 Johnmunyaon@gmail.com	
	Eng C.M. Mukuva	KERRA-Kwale	0721881304 cmmukuva@gmail.com	
	UMI ICUCULA	NLC-KLF	0720711743 ukutoya@gmail.com	
	Leonard M. Mwakale	NLC-KLF	0728541809 lmwakale@yahoo.com	
	ANTHONY M MONGA	NLC-KLF	0710529560	
	R. Bala Kwisha	Roughton International	0	
	Judith Onkundi	Roughton International	0725758149	
	Godwin Sakwa	Roughton/EAEC	0721686959 godwinsakwa@gmail.com	

Kenya National Highways Authority
Quality Highways, Better Connections

STAKEHOLDER CONSULTATION FORUM FOR PREPARATION OF FEASIBILITY STUDY ENVIRONMENTAL IMPACT ASSESSMENT (EIA), SOCIAL IMPACT ASSESSMENT (SIA) AND RESETTLEMENT ACTION PLAN (RAP), PRELIMINARY AND DETAILED DESIGN AND PREPARATION OF TENDER DOCUMENTS FOR REHABILITATION OF MALINDI – GARSEN-HOLA- MADOGO SECTION OF MOMBASA GARRISA B8 ROAD

VENUE:- TAMANI JUA RESORT MALINDI

DATE: 11TH OCTOBER 2016

ATTENDANCE LIST

No	Name	Organisation	Mobile / Email Address	Signature
1	Edwin Adegwa	KERRA – Kilifi Region	0725744406 Box 27-80108 KILIFI	
2.	Chris Mantha	Photography Lee	0719837429	
3	Eng. Simson M. Murage	KeNHA – Snr Eng. CST Region	0728147933 smurage@kenhaco.ke	

Kenya National Highways Authority
Quality Highways, Better Connections

4	Joseph Ringo	KeNHA	0722 619776	
5.	Rose Olow	KeNHA	0720 382811	
6.	Dorcus Omondi	KeNHA	0721614847	
7.	Wafula Mukewa Kenedy	KeNHA	0728 353 005	
8.	Moses GAMBO	KeNHA	0731419990	
9.	RINAH CHIKAMAI	KeNHA	0726805618	
10.	Jane Oreng	"	0722 253256	JAO
11	Peter Kinuthia	NACC (NBI)	0722 582292	