

ACKNOWLEDGEMENT

NEMA expert is grateful to the proponent (KILIFI COUNTY GOVERNMENT AND MUNICIPALITY OF MALINDI) for according us the privilege of undertaking this SPR report. We are also grateful to the residents of Malindi for according us the much needed support as we conducted this project in respect to the proposed up grading of Barclays – Mtangani road to bitumen standard in Malindi municipality, Kilifi county. We are also very grateful to the community neighboring the site of the proposed project for forwarding their views both written and oral during the public participation process.

Further, we extend our sincere appreciation to all our able associates who worked hard throughout the entire process of preparing this SPR report and sacrificing a lot in ensuring that it is completed professionally. Not to be forgotten are the other members of our assessment team who played a critical backup role for their unreserved commitment and dedication throughout the entire SPR process. Thank you and May God bless you all abundantly.

DISCLAIMER

This Environmental Impact Assessment report has been prepared for and behalf of proponent in accordance with the Environmental Management and Coordination Act (EMCA) and the Environmental (Impact and Audit) Regulations Act 2019. It is one of the documents required for approval of a proposed development project. The approval of the project report does not override other legal requirements.

ACRONYMS AND ABRIVIATIONS

CPP	Consultations and Public Participation
EA	Environmental Audit
EHS	Environmental Health
EMCA	Environmental Management and Coordination Act
EIA	Environmental Impact Assessment
EMP	Environmental Management/Monitoring Plan
ESMP	Environmental and Social Management Plan
GoK	Government of Kenya
m	Meters
KPLC	Kenya Power and Lighting Company
MAWASCo	Malindi Water and Sewerage Company
MoM	Municipality of Malindi
NCA	National Construction Authority
NEAP	National Environment Action Plan
NEMA	National Environmental Management Authority
OHS	Occupational Health and Safety
PDO	Project Development Objective
PLUPA	Physical and Land Use Development Plan
PPE	Personal Protective Equipment
PPP	Public Private Partnership
SDG	Sustainable Development Goals
SPR	Summary project report
TOR	Terms of Reference
WB	World Bank
WRMA	Water Resources Management Authority
WSSD	World Summit for the Sustainable Development
°C	Degrees Celsius

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EXECUTIVE SUMMARY

For a very long time, many development projects worldwide had not taken into account the effects of projects on the environment. As a result, there has been unprecedented environmental degradation due to lack of environmental conservation resulting to unsustainable development. Some of these problems have been irreversible and costly. In Kenya for instance, the policies, programs and strategies did not integrate environmental issues into development. A comprehensive environmental policy was therefore needed to take care of the environment in a holistic way. This was achieved through enactment of the Environmental Management and Coordination Act (EMCA), 1999. The Act stipulates that Environmental Impact Assessment (EIA) is carried out on all the projects listed in the Second Schedule. It is in response to this provision, that this report has been prepared.

The proponent, The Municipality of Malindi, appointed the environmental experts to carry out the ESIA for the proposed upgrading of Barclays-Mtangani Road to Bitumen standard and prepare an SPR report according Environmental Management and Coordination Act (EMCA) and the Environmental (Impact and Audit) Regulations Act 2019. The purpose of undertaking an EIA for the proposed project was to identify potential positive and negative environmental impacts associated with the proposed project and provide recommendations on how to mitigate the negative environmental impacts while maximizing on the positive impacts of the project. The EIA team has evaluated the possible environmental, occupational health and safety impacts of the proposed project during design, construction, operation and decommissioning phases. The report has documented relevant and suitable methods of mitigating likely adverse impacts that may arise out of all the phases of the proposed project. The Project is financing investments in infrastructure and service delivery in the Municipality of Malindi, the main Project Development Objective (PDO) is to strengthen urban services and infrastructure in the Municipality of Malindi.

Scope and Objectives and Terms of Reference

The scope of the project summary report covered the physical extent of the project's site and its immediate environs, proposed Borehole drilling; the output of the study was the production of an Environmental summary report for submission to NEMA for the purposes of seeking clearance. The objective by the proponent is to investigate and assess the groundwater resources in the area to determine viability of a production borehole that can be used to supply water to be used for domestic use. The main objective of this summary report was to establish the baseline conditions of the proposed

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site, evaluate the existing and the anticipated impacts and propose measures to enhance the positive impacts and measures to reduce the effects of the negative impacts.

Project Description

The proposed construction of Barclays-Mtangani Bitumen Road in the Municipality of Malindi will involve construction works that shall include Excavation, backfilling and reinstatement, Concrete works and structures, drainage works, building and miscellaneous works, road and site works and any other works as instructed by the Engineer and/or as specified in this document. The length of the road is approximately 800 meter

Project Location

The proposed project is located within the Municipality of Malindi. The road starts at Barclays Bank Malindi Branch currently branded as Absa Bank area (3°12'40.60"S, 40° 7'3.32"E) with an elevation of 124M above sea level and navigates from South East to North West terminating at Mtangani (3°12'36.70"S, 40° 6'38.79"E) with an elevation of 131M above sea level.



Source: Google maps

SCREENING PROCESS

Introduction

The information needed for this Report has been drawn by the team of licensed NEMA Experts.

In addition, this report has been prepared having regard to the following document:

- Environmental Management and coordination Act of 2015 for the purpose of Environmental Impact Assessment and Audit.
- Environmental (Impact Assessment and Audit) Regulations, amended in 2019 under the Kenya Gazette Supplement No. 62, Legislative supplement No.16, Legal notice No. 31 of 2019.
- Environmental Management and Co-ordination (Waste Management) Regulations 2006.
- Environmental Management and Coordination (Air Quality) Regulations, 2014.
- The Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control, Regulation 2009.
- The county government Act 2012.

Methodology

This report was produced after the experts held site meeting with the proponent. The methodology of the process which culminated to the assessment and the subsequent project summary report included the following:

- Preliminary assessment of the site; where the experts visited the site to know the location.
- Screening: It involved the determination of whether or not the EIA study was required for the particular development activity, depending on a number of factors which include but not limited to the sensitivity of the area likely to be affected; possibility of uncertain, unique or unknown.
- Collection of Baseline Data: Data collection involved activities such as;
 - ✓ Desktop study and discussion with the proponent
 - ✓ Observation
 - ✓ Detailed physical inspection of the proposed site and the surrounding areas to determine the present and anticipated impacts of the proposed project

The data obtained was used to assess potential impacts on health, safety, environment and the community surrounding the proposed site location. From the obtained data, environmental, health, safety and social concerns were identified in relation to the proposed project location and mitigation measures proposed for the negative impacts, while enhancement measures proposed for the positive impact.

- Data Analysis and Evaluation of Alternatives: Use of checklists and the threshold limits were used in data analysis; while the proposed site location, technologies to be employed, scale of operations, potential environmental impacts, capital and operating costs, suitability under local conditions, and institutional, training, and monitoring requirements were considered in the evaluation of alternatives

Project impacts

The Project impacts during the assessment were generated based on the analysis of the proposed project activities in relation to the Project area environment. The impacts arising during each of the phases of the proposed development namely; construction, operation and decommissioning, were categorized into: Impacts on biophysical environment; Health and safety impacts; and Social-economic impacts

Positive impacts

During the study, various positive socio-economic and bio-physical impacts that could result from the proposed project were identified. These include:

- Creation of employment for the skilled and semiskilled locals such as socioeconomics, trainers, casual labourers for road construction and cooks and cleaners at the construction camps and casual workers
- Flourishing of businesses mainly business centres located along the road due to increased demand of basic commodities and services such as food, accommodation and construction materials.
- The road may also open up the area to tourists since the road traverses within the municipality which is a well-known destination for tourism.
- Creation of employment opportunities for maintenance and operation crew.
- Creation of faster means of transport for passengers and bulk cargo within the municipality
- Reduced cost of public transportation.
- Increased security.
- Reduced risk of accidents on the roads.

- Contribution of revenue to the municipality, county, national and regional governments.

Negative Impacts and proposed Mitigation Measures

The potential negative environmental impacts of the proposed project and possible mitigation measures are summarized below:

Table 1: Environmental impact and proposed mitigation measures.

Possible Impact	Mitigation Measures
1. Noise Pollution and Excessive Vibrations during construction	<ul style="list-style-type: none"> ✓ Ensure machines are switched off when not in use. ✓ Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm). ✓ Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation. ✓ Ensure that all noise is kept to prescribed exposure limits. ✓ Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections.
2. Loss of Vegetation Cover and Biodiversity	<ul style="list-style-type: none"> ✓ Only clear vegetation that is absolutely necessary for the construction activities; ✓ Retain all mature trees during this phase of the development if possible; ✓ Avoid the use of Invasive Alien Species in the landscaping activities ✓ Determine access roads which are to be used by machinery used in the construction and site clearance phase of the development to avoid the unnecessary trampling of vegetation that will be maintained within the development area.
3. Air Pollution due to Dust Generation and Exhaust Emissions	<ul style="list-style-type: none"> ✓ Sprinkling of water on dry and dusty surfaces regularly including the access murram roads and diversions. ✓ All precautions to be taken for reduction in dust emissions from batching and/or hot mix plants and crushers, etc. ✓ Adherence to personal protective clothing such as the use dust masks and respiratory masks by workers. ✓ Enforce onsite speed limit regulations. ✓ Ensure machines and vehicles are properly and regularly

	<p>maintained.</p> <ul style="list-style-type: none"> ✓ Installing dust nets around batching plants.
4. Contamination of soil by fuels, oil spills and lubricants	<ul style="list-style-type: none"> ✓ Vehicle, machinery, and equipment maintenance and refueling will be carried out on paved surfaces so that spilled materials do not seep into the soil. ✓ Fuel storage and refilling areas will be located at least 300 m from drainage structures and important water bodies (rivers, water pans etc.). ✓ All spills and wastes will be disposed of as per approved disposal plans in wastelands, and in consultation with the county environmental administrators and local communities. ✓ Bituminous wastes will be disposed of at approved sites with impervious linings.
5. Solid Wastes	<ul style="list-style-type: none"> ✓ Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base. ✓ Collecting road litter or illegally dumped waste and managing it according to the Waste Management Regulations 2006 and as provided in the Environmental Management and Monitoring Plan. ✓ Provision of temporary waste handling facilities (litter bins) both during construction and operation phase
6. Occupational accidents	<ul style="list-style-type: none"> ✓ Ensuring that the drivers and machine operators hired to work on the site are qualified. ✓ Workers on site must be provided with appropriate PPE. ✓ Appropriate signs must be erected on the site to warn workers and visitors. ✓ There should be safety policy clearly displayed on the site. ✓ Machines should be properly maintained. ✓ A first aid kit should be provided and a trained first aider should always be on site. ✓ Fire extinguishers should be provided. ✓ Proper scheduling of activities.

Conclusions and Recommendations

The studies conducted on the Barclays-Mtangani Bitumen Road shows that the project will pioneer development in the municipality and have significant impacts, both positive and negative, on the environment and socio-economic set up of the region through which the road will transverse.

Considering the positive socio-economic and environmental benefits which will occur as a result of the proposed development and the EIA study having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental and Social Management Plan (ESMP) together with the Environmental Monitoring Plan (EMP) to the later. Kenya as a country has a big shortage of such road project developments especially in the Northern Coastal side of the country; hence the construction of the proposed project goes a long way in solving part of the road transportation sector. It is recommended that preventive measures be given first consideration, in order to reduce the costs of undertaking the mitigation measures and at the same time reduce the overall project impacts. It is also recommended that, the project impacts be continuously monitored, and the monitoring results be documented, analysed and reviewed against recommended standards to enable take appropriate action in good time.

PROJECT ACTIVITIES AND DESIGN

The major Works to be executed under the Contract comprise mainly of but are not limited to the following: -

- Limited site clearance and top soil removal
- Earthworks
- Preparation of the sub-grade to receive the pavement layers as per the standard specifications.
- Provision of cement improved gravel for road sub-base of the specified thickness.
- Provision of cement stabilized gravel for road base of the specified thickness.
- Provision of a double surface dressing using 14/20 mm and 6/10 mm pre-coated class 4 chippings for both the carriageway and the shoulders. The shoulders shall be constructed with the same material and thickness as for sub-base, base and surfacing.
- Construction of culverts and other drainage works.
- Protection works using stone pitching and gabions as necessary.
- Relocation of services as necessary.
- Provision of road furniture, including road marking and traffic signs.
- Landscaping including top soiling and grassing.
- Maintenance of passage of traffic through and around the works.

Any other activity not listed above in either category but deemed to be necessary by the Engineer, shall be subject to the Engineer's formal instructions and within the mode of payment stipulated either by day works or on a measured basis.

PROJECT BUDGET AND DURATION

The proposed project is estimated by the project quantity surveyor to cost Sixty-Seven Million Shillings (67,000,000). The project implementation works is estimated to take 6 months to completion.

POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

Potential positive impacts

There are a number of positive benefits associated with the proposed project. They include the following:

- Creation of employment for the skilled and semiskilled locals such as socioeconomics, trainers, casual labourers for road construction and cooks and cleaners at the construction camps and casual workers
- Flourishing of businesses mainly business centres located along the road due to increased demand of basic commodities and services such as food, accommodation and construction materials.
- The road may also open up the area to tourists since the road traverses within the municipality which is a well-known destination for tourism.
- Creation of employment opportunities for maintenance and operation crew.
- Creation of faster means of transport for passengers and bulk cargo within the municipality
- Reduced cost of public transportation.
- Increased security.
- Reduced risk of accidents on the roads.
- Contribution of revenue to the municipality, county, national and regional governments.

Potential negative impacts associated with Construction Activities

The Project Construction Phase shall involve the following activities among others:

- Delivery of Construction Equipment and Materials to the Project Site including Contractor's Equipment, iron bars cement and Fittings, etc.
- Site Clearance and Excavation activities;
- Temporary stockpiling of soils, sub-soils and rock when digging up the foundation.
- Construction Works including construction of pillars, walls and pavements.
- Ground Reinstatement

These activities will be associated with less significant negative impacts to both human and natural environment, this impacts and proposed mitigation measures are described in the sub chapter below.

Negative Environmental and Social Impacts during Construction Phase

(i) Loss of Vegetation Cover and Biodiversity.

During the construction phase of the project, there will be clearance of vegetation along the corridor to pave way for the proposed road. The project area has scarce vegetation and therefore there will be minimal clearance of vegetation. It is expected that the project will require huge quantities of materials such as ballast, murrum, stones, conglomerates, sand, gravel, and soil, among others. In addition, the contractors will install several material camp sites as well as a batching plant that will impact on the environment, especially with smothering vegetation species around the camp sites.

Mitigation measures:

- ✓ Site Clearance and Construction activities will be limited to the area set out for construction.
- ✓ Reinstatement of the project sites to their original state to be carried out once construction works are completed to allow growth of vegetation.

(ii) Noise pollution and excessive vibrations

As a result of excavation, construction and demolition works, there will be high noise and vibration levels in the project area. Noise and vibrations will emanate from transportation vehicles, construction machinery, metal grinding and cutting equipment, and among others. Excavation works will also cause vibration and noise.

Mitigation measure:

- ✓ Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used.
- ✓ Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation.
- ✓ Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections.
- ✓ Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm).
- ✓ Acquire Noise and Excessive Vibrations Pollution Control Permit and comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009

(iii) Soil erosion and contamination

All construction activities have some minor impacts on the soil. Site clearance, excavation and ground leveling activities during construction can cause the top soil to be loose and susceptible to agents of erosion which include wind and water. This impact applies only to the public land that was targeted under this assessment. The soil may get contaminated by oil spill from construction machineries and from and

disruption of pit latrines. The potential of soil erosion will be greater where the gradient is steep and at outfall locations.

Mitigation measures:

- ✓ Ensure surface runoff generated on impervious surface is not channeled directly to steep slopes.
- ✓ Construct flow breaks on roadside drainage channels.
- ✓ Promote harvesting of surface runoff.

(iv) Discharge of Wastewater, Sewage and Degradation of Water Quality

There will be an increase in the generation of wastewaters and sewage during the construction phase of the project. The increases will take place in construction camp sites, including also along the road. This is attributed to increased activities in project site. There will be impact due to the oil spillage, disposal practices of used oil, oil filters during the construction of the project.

Mitigation measures:

- ✓ Construct a standard septic tank/bio-digester at the site
- ✓ Promote recycling of wastewater and storm water.
- ✓ Install meters in workers' camps to control and monitor consumption rates of water.
- ✓ Ensure regular maintenance of plumbing system and septic tanks to avoid spillage of raw sewage.
- ✓ Comply with the Environment Management and Coordination, Waste Management and Water Quality Regulations 2006.

(v) Solid Wastes Generation from Construction Activities

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

Mitigation measures:

- ✓ Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base;
- ✓ Incorporating recyclable materials (e.g. glass, scrap tires, certain types of slag and ashes) to reduce the volume and cost of new asphalt and concrete mixes.

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- ✓ Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines and Waste Management Regulations, 2006.
- ✓ Provision of bottle and can trash disposal receptacles at parking lots to avoid littering along the road.
- ✓ Obsolete products should be managed as a hazardous waste as described in the General EHS Guidelines.
- ✓ Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods.
- ✓ Composting of vegetation waste for reuse as a landscaping fertilizer.
- ✓ Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics.

(vi) Air pollution due to dust and exhaust emissions.

Air Pollution can be caused by emissions from Construction Plant and Equipment and Vehicles. Dust can be generated by vehicles travelling on unpaved roads and tracks, and dust from exposed, non-vegetated surfaces. In the construction phase, the excavations, demolitions, and transportation of building materials will result in the emissions of large amounts of dust within the project site and surrounding areas. The diversion of traffic in the construction phase will also contribute to dust emissions.

Mitigation measures:

- ✓ The contractor shall comply to the provisions of EMCA 1999 (Air Quality Regulations 2014)
- ✓ Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications
- ✓ The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilized as soon as practically possible
- ✓ The contractor shall not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds
- ✓ Vehicles delivering construction materials and vehicles hauling excavated materials shall be covered to reduce spills and windblown dust
- ✓ Water sprays shall be used on all earthwork's areas within 100 meters of human settlement especially during the dry season.

(vii) Spread of STD, HIV and AIDS

The Project will attract new people to the Project area seeking employment during the construction period

and this can lead to increased transmission of HIV/AIDS and other sexually transmitted diseases (STDs). This impact applies to the settlements along the proposed road engaging to prostitution.

Mitigation measures:

- ✓ Develop a comprehensive STDS, HIV and AIDs awareness and control programmes such as provision of condoms to workers both male and female.
- ✓ Provision of STDs, HIV and AIDS prevention measures to workers.
- ✓ Creation of awareness of STDs, HIV/AIDS in workers camps through trainings and installation of posters.
- ✓ Adhere to and implement the Sexual Offences Act, 2006 and its amendment 2012.

(viii) Interference of Existing Development Infrastructure

During the field survey, it was noted that the proposed project would interfere with other infrastructural public utilities already existing along the proposed road corridor such as power lines, underground waterpipe and underground communication cables.

Mitigation measure:

- ✓ Get maps of the underground infrastructure from the relevant institutions.
- ✓ Sensitize workers carrying out excavations so that they exercise caution to minimize chances of underground infrastructure damage.
- ✓ Work closely with the responsible institutions such as Kenya Power, Orange and Telkom so that in case of damage, the services are restored within the shortest time.
- ✓ Reroute sensitive infrastructure where possible.

(ix) Increased Traffic

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

Mitigation measures:

- ✓ Provide diversion routes where possible.
- ✓ Give a construction itinerary in advance so that the potentially affected population can use alternative routes and start early to get to their destinations on time.
- ✓ Erect warning signs of ongoing works.
- ✓ Expedite construction works so as to reduce the times where roads are blocked.
- ✓ Traffic department should approve crossing plan prior to construction, and should approve

obstruction times during construction.

- ✓ Suitable warning signs should be placed at near locations and should be visible at night.
- ✓ Alternatives access ways should be communicated to the community.

(x) Risk of Accidents at Work Sites

Accidents during construction activities may occur due to failure to use Personal Protective Equipment (PPE) by workers on site and members of the public illegally accessing the work sites. Accidents may result in injuries or even death of workers or members of the public. This impact applies to all settlements under this assessment

Mitigation measures:

- ✓ Construction Workers and the Supervising Team to be provided with Personal Protective Equipment including gloves, gum boots, overalls and helmets. Use of PPE to be enforced by the Supervising Engineer.
- ✓ Fully stocked First Aid Kits to be provided within the Sites, Camps and in all Project Vehicles
- ✓ Adequate Ablution Facilities to be provided at the Camps and Work Sites and cleanliness maintained
- ✓ Isolate the site for access by the local communities during the construction for their safety and health
- ✓ Contractor to provide a Healthy and Safety Plan prior to the commencement of works to be approved by the Supervising Engineer.
- ✓ Camps and Work Sites to be fenced off and Security Guards provided to restrict access to members of the public.

Negative Environmental and Social Impacts during Operation Phase

(i) Storm Water and Impact on Drainage

Construction of sealed roads (tarmacked road) increases the amount of impermeable surface area, which increases the rate of surface water runoff flow. The project will also impact on the drainage during the operational phase of the road. There will be increased generation of surface runoff on the road. The increased or excess runoff could overwhelm local drainage system including streams with potential for increasing downstream flooding, damage to properties. Good drainage design and construction in the development of roads is critical to the success of road construction. Also, storm water generated on the road may be contaminated with oil and grease, metals (e.g. lead, zinc, copper, cadmium, chromium, and nickel), particulate matter and other pollutants released by vehicles on the road.

Mitigation measures:

- ✓ Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration.
- ✓ Regular inspection and maintenance of permanent erosion and runoff control features.

(ii) Possible Risks of Accidents on the Road.

With the tarmacking of the road, vehicles will be travelling at a design speed of 80- 100km/h. **Mitigation**

Measure:

- ✓ Construct pedestrian and animal crossing points with foot bridges in certain key areas.
- ✓ Provide a clear and graded road side animal track to run parallel to the main road demarcated for use by the locals when transporting livestock.
- ✓ Create livestock holding pens at strategic locations along the road that enhances controlled crossing.
- ✓ Inclusion of road bumps in towns and villages and speed breakers at intersections.
- ✓ Adopt strict policing to ensure that there is no over speeding along the road.

Negative Environmental and Social Impacts During Decommissioning Phase

(i) Solid waste generation

A lot of solid waste such as tarmac waste, cement waste, and among other wastes will be generated during decommissioning of the project.

(ii) Noise and vibration

There will be noise and vibration from vehicles and machines that will be used during the decommissioning phase.

(iii) Dust emission

Dust will be emitted by moving vehicles and from the decommissioning works through digging and excavating of the tarmac surface.

(iv) Reduced/ loss of positive impacts to the project

During decommissioning people will lose employment. Drivers, conductors and turn- boys and other bus operators will be affected as a result of the decommissioning. Other positive impacts that will be accrued during the operation phase like fast movement of goods and services, cheaper transportation etc. will also be reduced.

ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMP)

Environmental monitoring is an essential component of project implementation. An Environmental Monitoring Plan (EMP) provides mechanism of monitoring environmental impacts of a project during its execution in order to reduce their negative effects and to introduce standards of good practice to be adopted for all project works. The ESMP facilitates and ensures the follow-up of the implementation of the proposed mitigation measures proposed in the ESMP. The parameters of the proposed Barclays-Mtangani Bitumen Road project that were identified for monitoring include: water quality, air quality, solid waste generation, Occupational Health and Safety risks, human accidents, HIV/AIDS incidences, soil erosion, storm water drainage, livelihood and environmental risks. This is represented in the table below.

8.1 ESMP FOR THE CONSTRUCTION PHASE

Table 2: Environmental and Social Management and Monitoring Plan during construction phase

Possible Impact	Management Actions	Target areas and responsibilities	Monitoring frequency	Estimated Cost (Kshs)
Loss of Vegetation Cover and Biodiversity.	<ul style="list-style-type: none"> Site Clearance and Construction activities will be limited to the area set out for construction. Reinstatement of the project sites to their original state to be carried out once construction works are completed to allow growth of vegetation. 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Routine inspection	50,000
Soil erosion and contamination	<ul style="list-style-type: none"> Minimize the areas to be cleared and leave as much vegetation as possible to filter runoff water from the site Divert uphill water around the building site with stabilized banks and channels Avoid stock piling topsoil, sand and other building materials on 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Routine inspection	50,000

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	<p>foot path, roads and drainage channels.</p> <ul style="list-style-type: none"> • Fill and compact trenches immediately after services have been laid down. 			
Air pollution and Dust generation	<ul style="list-style-type: none"> • The contractor shall comply to the provisions of EMCA 1999 (Air Quality Regulations 2014) • Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor’s specifications • The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilized as soon as practically possible • The contractor shall not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds • Vehicles delivering construction materials and vehicles hauling excavated materials shall be covered to reduce spills and windblown dust • Water sprays shall be used on all earthwork’s areas within 100 meters of human settlement especially during the dry season. 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Daily inspection routine maintenance	100,000

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<p>Solid Wastes Generation from Construction Activities</p>	<ul style="list-style-type: none"> • Construction wastes (residual earth, debris and scrap materials) to be collected at designated points and Contractor to dispose to designated Solid Waste Dumping Sites approved by the MoM and Kilifi County Government • Contractor’s Camps and Construction Sites to have designated waste collection points, • Use an integrated wastes management system observing the following hierarchy of options: Reduction at source; Recycling; Reuse; Combustion and Land filling. • Environmental Management, Health and Safety Training Programmes to be conducted for Contractor’s Staff to create awareness on proper solid wastes management 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	<p>Weekly checks</p>	<p>50,000</p>
<p>Increased Traffic</p>	<ul style="list-style-type: none"> • Provide diversion routes where possible. • Give a construction itinerary in advance so that the potentially affected population can use alternative routes and start early to get to their destinations on time. • Erect warning signs of ongoing works. • Expedite construction works so as to reduce the times where roads are blocked. • Traffic department should approve crossing plan prior to construction, and should approve obstruction times during 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	<p>Weekly checks</p>	<p>50,000</p>

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	<p>construction.</p> <ul style="list-style-type: none"> • Suitable warning signs should be placed at near locations and should be visible at night. • Alternatives access ways should be communicated to the community. 			
Noise and excessive vibration	<ul style="list-style-type: none"> • Contractor will comply with provisions of EMCA 1999 (Noise and Excessive Vibrations Regulations of 2009) • The Contractor shall keep noise level within acceptable limits (60 Decibels during the day and 35 Decibels during the night) and construction activities shall, where possible, be confined to normal working hours in the residential areas • Hospitals and other noise sensitive areas such as schools shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity • Any complaints received by the Contractor regarding noise will be recorded and communicated to the Supervising Engineer for appropriate action 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Daily observation	50,000
Occupational Accidents	<ul style="list-style-type: none"> • Construction Workers and the Supervising Team to be provided with Personal Protective Equipment including gloves, gum boots, overalls and helmets. Use of PPE to be enforced by the Supervising Engineer. • Fully stocked First Aid Kits to be provided within the Sites, 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Random checks	50,000

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	<p>Camps and in all Project Vehicles</p> <ul style="list-style-type: none"> • Adequate Ablution Facilities to be provided at the Camps and Work Sites and cleanliness maintained • Isolate the site for access by the local communities during the construction for their safety and health • Contractor to provide a Healthy and Safety Plan prior to the commencement of works to be approved by the Supervising Engineer. • Camps and Work Sites to be fenced off and Security Guards provided to restrict access to members of the public 			
Increased Transmission of HIV/AIDS	<ul style="list-style-type: none"> • HIV/AIDS Awareness Program to be instituted and implemented as part of the Contractor’s Health and Safety Management Plan to be enforced by the Supervising. This will involve periodic HIV/AIDS 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 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Routine inspection	50,000
Contamination of Surface and underground	<ul style="list-style-type: none"> • Construction wastes (residual earth, debris and scrap materials) to be • removed for safe disposal 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Routine inspection	100,000

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Water Sources	<ul style="list-style-type: none"> • Encourage recycling where possible (concrete debris for access road surfacing), • Contaminated organic matter in the work areas to be isolated for safe disposal • Material residuals to be disposed off in accordance with established regulations 			
Interference of Existing Development Infrastructure	<ul style="list-style-type: none"> • Get maps of the underground infrastructure from the relevant institutions. • Sensitize workers carrying out excavations so that they exercise caution to minimize chances of underground infrastructure damage. • Work closely with the responsible institutions such as Kenya Power, Orange and Telkom so that in case of damage, the services are restored within the shortest time. • Reroute sensitive infrastructure where possible. 	<ul style="list-style-type: none"> ✓ Contractor ✓ Safeguards Team 	Routine inspection	100,000
TOTAL				650,000

8.2 ESMP FOR THE OPERATIONAL PHASE

Table 3: Environmental and social management and monitoring plan during Operational phase

Possible Impacts	Management Action	Target areas and responsibilities	Monitoring frequency	Estimated Cost (Kshs)
Biological diversity	<ul style="list-style-type: none"> • Ensure solid refuse handlers dispose into approved grounds to avoid biodiversity degradation, • Plant trees on the open spaces continuously, • Externalize initiative for ecological conservation. 	✓ Municipality of Malindi	Throughout operation phase	To be established at operation phase and included in the operation of the projects
Storm Water and Impact on Drainage	<ul style="list-style-type: none"> • Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration. • Regular inspection and maintenance of permanent erosion and runoff control features. • Slab the hazardous wastes holding yard and install trapping arrangement for leachate and surface runoff there from. 	✓ Municipality of Malindi	Throughout operation phase	To be established at operation phase and included in the operation of the projects
Possible Risks of Accidents on the Road	<ul style="list-style-type: none"> • Construct pedestrian and animal crossing points with foot bridges in certain key areas. • Provide a clear and graded road side animal track to run parallel to the main road demarcated for use by the locals when transporting livestock. 	✓ Municipality of Malindi	Throughout operation phase	To be established at operation phase and included in the operation of the projects

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	<ul style="list-style-type: none"> • Create livestock holding pens at strategic locations along the road that enhances controlled crossing. • Inclusion of road bumps in towns and villages and speed breakers at intersections. • Adopt strict policing to ensure that there is no over speeding along the road. 			
<p>Noise pollution and excessive vibration from vehicles using the road.</p>	<ul style="list-style-type: none"> • Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation • Install speed control measures such as bumps and ramble strips in the villages and towns where the road traverses. • Install no hooting signs in sensitive areas such as near hospitals, schools, mosques etc. 	<p>✓ Municipality of Malindi</p>	<p>Throughout operation phase</p>	<p>To be established at operation phase and included in the operation of the projects</p>

PROJECT DECOMMISSIONING

Decommissioning refers to the final disposal of the project and associated materials, at the expiry of the project design life, which in this case is expected to be 20 years. Decommissioning is not anticipated in the case of this Barclays-Mtangani Bitumen Road project; instead expansion of the project will be done at the end of the design life.

Table 4: Decommissioning flow chart

Stage	Action	Actor
Step 1	Initiation Development of an Objective Worksheet and checklist incorporating references, legal and policies Undertake decommissioning audit	Proponent then
Step 2	Prepare Road Map for Decommissioning Design Conduct design review to validate elements of the design and ensure design features are incorporated in the decommissioning design. Public consultations	Proponent then
Step 3	Prepare and Award Contract Prepare a contract that incorporates validated Project information and award to a contractor as per the Procurement rules.	Proponent then
Step 4	Execute Decommission Works Implement design elements and criteria on the Project in accordance with specifications and drawings. Inspect during decommissioning and at Project completion to ensure that all design elements are implemented according to design specifications.	Contractor
Step 5	Commissioning ESMP	Contractor
Step 6	Non-Conformance, Corrective/Preventive Action Determine root cause Propose corrective measures Propose future preventive measures.	Contractor

ENVIRONMENTAL PERFORMANCE MONITORING

The Environmental Monitoring Plan focuses on two generic areas: institutional strengthening and training, and environmental monitoring.

Monitoring will serve the following functions: -

- i. To ensure that the procedures recommended in the approved EIA report, are adhered to by the various agencies.
- ii. To ensure that the environmental and social mitigation and enhancement schemes, are well understood and communicated to all involved parties, including the general public.
- iii. To evaluate the effectiveness of environmental and social remedial measures, as well as various evaluation techniques and procedures.

Monitoring creates possibilities to call to attention changes and problems in environmental quality. Monitoring can also be used for policy evaluation. It is a long-term process, which should ideally begin at the commissioning stage and continue throughout the operational phase. It helps to establish benchmarks so that the nature and magnitude of anticipated environmental and social impacts can be continually assessed.

Monitoring involves the continuous or periodic review of operation and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted. Environmental monitoring allows measures to be implemented in order to prevent or avert negative impacts.

Ideally the Proponent should establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment. This includes the recording of information to track performance, relevant operational controls and conformance with the organization's environmental objectives and targets. Performance Indicators must be selected that are simple to monitor, and which will not necessitate the use of highly technical equipment or require highly specialized training. The monitoring plan in the table below lists indicators that should be monitored.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION

However, the EIA has established that the proposed project will also come along with some negative impacts. The negative environmental impacts that will result from establishment of the proposed project which include possible hydrology and water quality degradation, noise pollution, dust emissions, solid waste generation, increased water demand, increased energy consumption, generation of exhaust emissions, workers accidents and hazards during construction, possible exposure of workers to diseases, increased storm water among others can however be sufficiently mitigated. The SPR concludes that; the construction and rehabilitation of the Barclays-Mtangani Bitumen Road in Malindi should be undertaken and makes the following key recommendations:

RECOMENDATIONS

1. The development is undertaken since the project is not out of character with its surroundings.
2. The EIA has not identified any significant negative impacts related to the project that cannot be mitigated. Issues raised during public participation have all been incorporated in the EIA report and mitigation measures proposed.
3. The identified mitigating measures be incorporated into the detailed design and tender documents. The implementing and maintaining agency should address and implement all the proposed mitigation measures; as laid out in the proposed EMP.
4. During the implementation of the project, positive impacts such as labour sourcing from the local community where possible should be enforced to not only improve economic gains and local skills but also alleviate poverty.
5. The road should be well maintained during the operation phase to avoid blockages.
6. Capacity building, creating awareness, implementing proposed mitigation measures and monitoring are essential to the effective implementation of the Environmental Management Plan. To achieve this, key target groups, such as project/affected people, will need to be trained to ensure effective and timely implementation of the EMP.

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ANNEXES

1. Copy of expert practicing licenses
2. Proposed road preliminary design
3. List of participants in the public consultation
4. Copy of minutes of the Public Meeting held
5. Sample Public participation questionnaire