



**AFRICAN DEVELOPMENT
BANK GROUP**

PROJECT: EAST AFRICAN COASTAL CORRIDOR
DEVELOPMENT PROJECT: BAGAMOYO –
TANGA – HOROHORO/ LUNGA LUNGA –
MALINDI ROAD PROJECT: PHASE 1

COUNTRIES: KENYA AND TANZANIA

**ESIA SUMMARY FOR THE PROPOSED UPGRADING OF
MOMBASAMTWAPA – KWA KADZENGO-KILIFI (A7) SECTION, KENYA**

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1. INTRODUCTION

1.1. The Government of the Republic of Kenya, through its implementing agency, the Kenya National Highways Authority (KeNHA) and support of the African Development Bank (AfDB) is upgrading of the Mombasa – Mtwapa – Kwa Kadzengo - Kilifi Section of the Multi National A7 Highway. Towards this, KeNHA has commissioned a Consultancy Study to Review the Feasibility Study, Environmental and Social Impact Assessment, Resettlement Action Plan and Detailed Engineering developed under auspices of the wider Multinational Malindi – Lunga Lunga/Tanga–Bagamoyo Road Corridor Development.

1.2. As part of the contract, and in line with existing national legislation and international practice, the Consultant is expected to undertake Review of the Environmental and Social Impact Assessment (EIA) Report previously prepared for the wider Project as specified in the Terms of Reference. This Report highlights salient social and environmental issues associated with the design, construction and operational aspects of the Project. The Report has been prepared under contract by Lead Experts from Repcon Associates, an Environmental Firm of Experts duly registered and licensed by NEMA (NEMA Registration No. 0002) and other Government of Kenya (GoK) agencies.

2. SCOPE OF THE ESIA STUDY

2.1. The ESIA Study covers the alignment of the proposed road in Mombasa and Kilifi counties details of which are outlined in Chapter two below. Detailed scope of the ESIA is captured in the TORs for the Broader Study as follows:-

- Detailed engineering design through all necessary data collection, field surveys and analysis to cover all aspects of detailed design; including consideration of alternative routes and pavement options, road safety and land acquisition,
- Environmental and Social Impact Assessment (ESIA) in accordance with Kenyan legislation, NEMA guidelines; and AfDB guidelines for Integrated Social Safeguards (ISS).
- RAP Report to be in line with the current status of the road to ensure all issues regarding ROW are addressed. Prepare a full Resettlement Action Plan (RAP) and associated surveys to identify and value of property that will be affected by the road upgrading works along the road reserve
- Carrying out of gender analysis in relation to the proposed project as outlined in the detailed Terms of Reference.
- Design of geometrics and pavement and all other aspects of the design in accordance with the applicable Kenyan Road Design Manuals and current international engineering practices

2.2. The ESIA Report previously prepared for Multinational Malindi – Lunga Lunga Road was reviewed against set standards namely:-

- **Kenyan Standards:** EMC(A) 2015 and LN 101 of 2003 (of EMCA); other Kenyan legislation.
- **AfDB Standards: Operational Safeguards** for Integrated Social Safeguards (ISS).

Upon review of the existing ESIA Report, a full stand-alone Supplementary ESIA Study was mounted to bridge all existing gaps. The decision to mount full supplementary ESIA Study was informed by findings that:- The EIA License previously issued for the Multinational Malindi – Lunga Lunga Road had lapsed and hence required to be updated. As well, and from the gap analysis undertaken of Malindi-Lunga Lunga ESIA process as summarised in Tables 1 sustainable environmental and social management for the proposed dualling of the Mombasa – Mtwapa – Kwa Kadzengo - Kilifi inclusive of the proposed Second Mtwapa Bridge.

Other reasons that would warrant a full cycle study include the following:-

- **Culturally sensitive sites:** The section of the A7 highway targeted for upgrading traverses several sites of cultural interest including the Kisauni Bell Tower (Kengeleni Tower) gazetted as a National

Monument by the NMK since 1983, the Frere Town Community Church among others which required clear mapping for preservation as part of the ESIA process.

- **Ecologically Sensitive sites:** Sites that will require focused attention during an ESIA process include Bamburi Forest Block and its Haller Park, the Mtwapa Creek Ecosystem, seasonal lakes (marshlands) such as Kadzengo, water courses such as Mtopanga among others. The Kadzengo marshland is habitat for 5 AWEA Bird Species.
- **Drainage challenges:** On account of a largely flat, sometimes internally draining topography, the entire A7 highway section between Kongowea and Mtwapa Bridge suffers a huge drainage problem which spills over into sections of the Nyali Estate.
- **The Question of economic displacement:** The A7 Road between Mombasa and Mtwapa is an Economic Corridor. There are many citizens deriving livelihoods through trading in the reserve of the A7 Highway and their potential displacement in road upgrading is currently a major concern. As well, Mtwapa is a dormitory town which houses labour for Mombasa Town and the latter is transported through the A7 Road. Any disruption in passenger transport is likely to cause economic shocks in Mombasa.

3. PROJECT DESCRIPTION AND JUSTIFICATION

3.1 **Project Components:** Fig 1 provides a geographic overview of the Mombasa-Mtwapa-Kadzengo-Kilifi pass Road Project. The Project comprises of two sections amounting to 55.8 km as follows:-

- **Linear Profile:** Detailed components of the Project deemed to have displacement impact and which is the subject of the RAP Study are summarized in Table 1 below while Figure 1. below traces the entire traverse of the Project. The Project is packaged into two lots as follows:-

Table 3.1: Dimensions of the Road

Project Lot	Linear extension	Length (Km)
One	Nyali Bridge to Mtwapa Bridge	13.5 km
Two	Mtwapa Bridge to Kwa Kadzengo	7.3 km
	Kwa Kadzengo to Kilifi bridge	35.0 km
Total road length		55.8 km

- **Lot 1** starts from Mombasa (Nyali Bridge) and runs through Bombolulu, Bamburi and Shanzu to terminate at the beginning of the Mtwapa Bridge (excluding the bridge) with a total length of 13.5 km.
- **Lot 2** starts from Mtwapa Bridge (Including Bridge) through Mtwapa Township, Kikambala, Kanamai, Kazdengo all through to Kilifi Town, with a total length of 42.3km. The scope for this lot will include preliminary and detailed engineering design of a dualed Mtwapa Bridge (long span bridge).

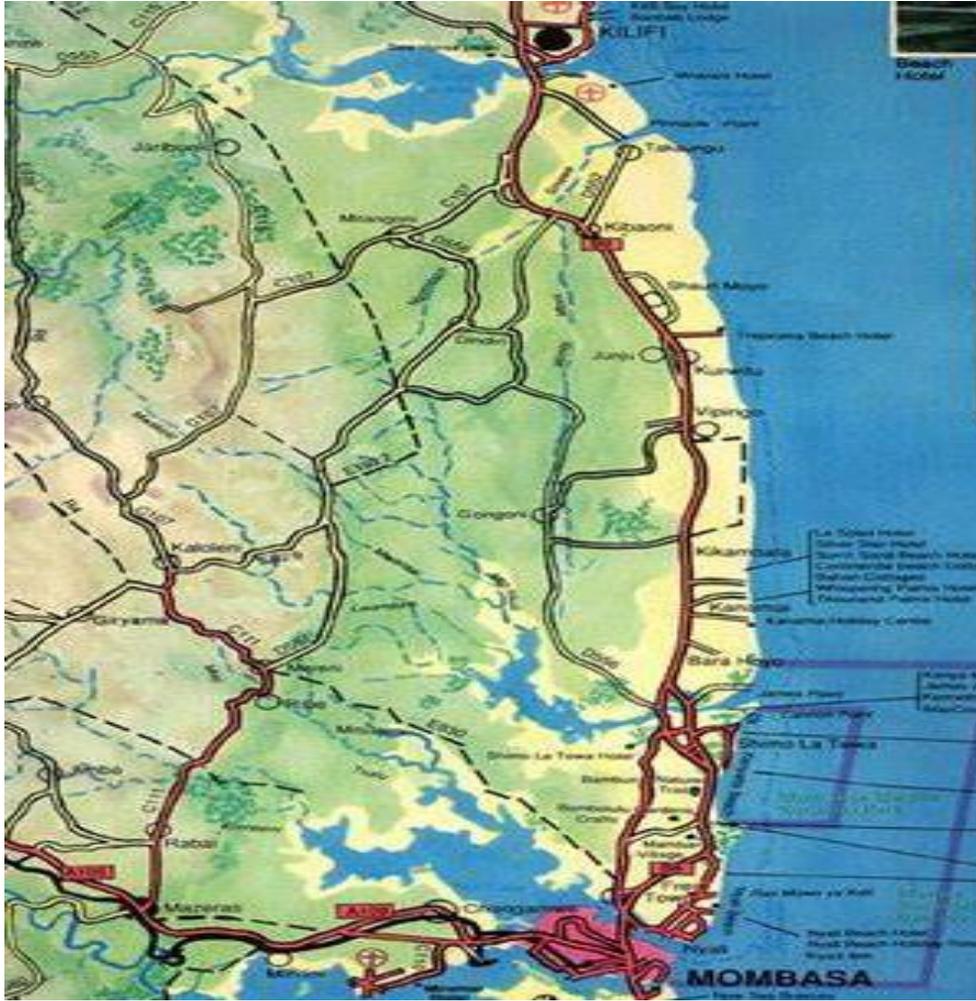


Figure 1: Map of the Project Area

3.2 **Dimensions of the Project:** In selecting road alignment and capacity, key considerations were made as follows:-

- Maximised utilisation of existing A7 Road Reserve
- Adequate capacity for projected traffic volume
- Control of access into dual carriageway – grade separation
- Circulation of Local Traffic
- Provisions of NMT facilities

3.3 **Width of road reserve and land requirement:** The Mombasa-Mtwapa-Kadzengo-Kilifi Road has been designed to Class A and will attract a reserve of 37m.

3.4 **Structures of the Project:** The main structures of the dualling project are shown in Figure 2 below. The main objectives in providing structures are as follows:-

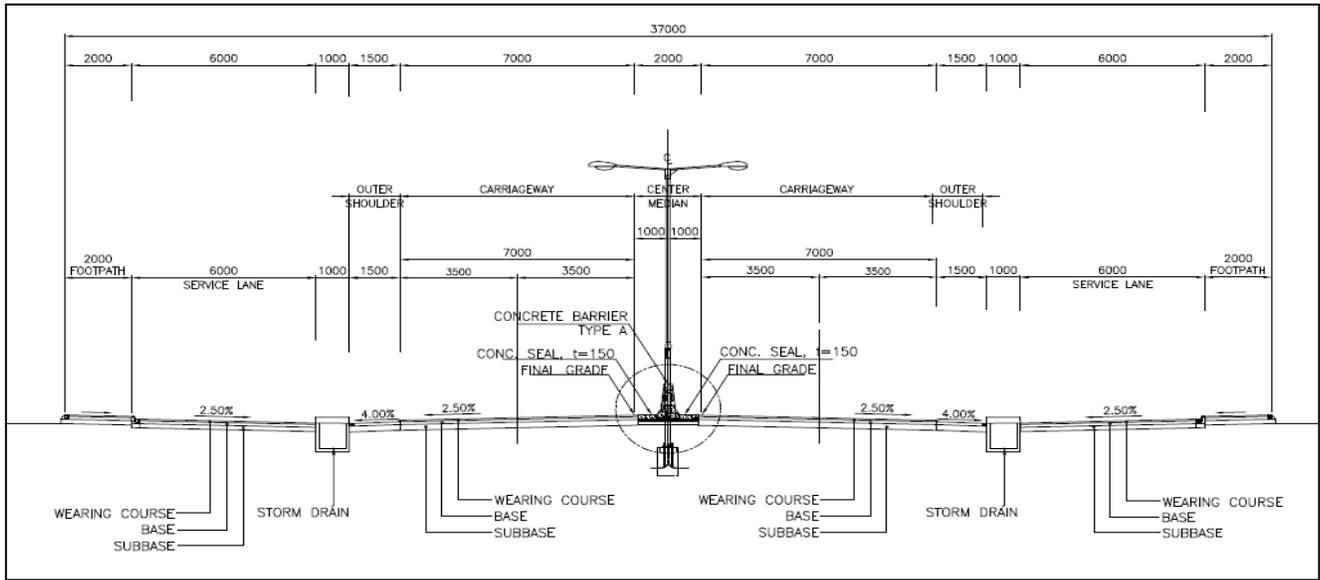


Figure 2: Typical Cross Section

- Vehicular traffic requirement in order to improve traffic flow, traffic safety and level of service;
- Pedestrian traffic in order to enable pedestrians navigate across highway safely and efficiently;
- Hydrology and hydraulic requirement in order to facilitate storm water be conveyed safely and efficiently without impeding traffic flow;
- General safety requirement to ensure all users of the road or highway do so safely and cost effectively;
- Socio-economic impact to consider minimization or mitigate adverse socio economic impact on potential Project Affected Persons (PAPs).

Junctions: The project has 9 main junctions as shown in the table below. Additionally, box culverts will be provided wherever the Bypass intersects with an existing road.

No	Operational Requirement	Structure Type	Junction Description &/or Location
1	Vehicular traffic flow & Level of service	Bridges, flyovers, box culverts and associated retaining walls	<ol style="list-style-type: none"> 1. Kengeleni/Old Malindi Road junction, Km 0+760 – 1+140 2. Bombolulu junction, Km 2+300 3. Nyali Link Road junction, Km 5+600 4. Bamburi junction, Km 7+230 5. Underpass Km 10+200 6. Shanzu/Serena junction Km 12+470 7. Mtwapa Bridge Km 13+500 8. Mtwapa Town underpasses Km 13+980 & Km 15+580 9. Kanamai underpass Km 18+680
2	Pedestrian Traffic safety & convenience	Pedestrian foot bridges	<ol style="list-style-type: none"> 1. Km 1+760; 2. Km 3+420; 3. Km 7+600 4. Km 11+680 5. Km 13+120

3.5 **Drainage Structures:** The main drainage feature within the Project Road is the Mtwapa Bridge with Mtopanga and Bongolo being the other minor structure. A new bridge across Mtwapa will be provided.

3.6 **Project Justification:** Mombasa is the second largest city in Kenya and the major gateway to East and Central Africa, therefore, serving a great hinterland with both export and import needs. The current road network was originally designed for low traffic, with the main purpose of facilitating movement of vehicles from the mainland to the islands CBD and the port of Mombasa. Most of the road network has not been improved and cars and human traffic have continually increased over the years leading to congestion.

3.7 The proposal to upgrade the Mombasa-Mtwapa-Kadzenge-Kilifi Project is driven by the desire to ease traffic flow between Mombasa and Mtwapa especially in the wake of development of Project Road. Further, connection of Project Road to the Southern Bypass Road which links Mombasa to Tanzania through the Lunga Lunga border will complete the Mombasa Western Bypass thus providing a functional bypass to traffic destined for South Coast from North Coast and the vice versa thus freeing Mombasa and by extension, the Likoni Ferry the agony of traffic congestion.

4. POLICY AND LEGAL FRAMEWORK

4.1. The Important Policies include the following

- The National Poverty Eradication Plan
- The Poverty Reduction Strategy Paper (1999)
- Sessional Paper No. 3 of 2009 on National Land Policy
- The Mombasa County Integrated Development Plan 2013-2017
- The Kilifi County Integrated Development Plan 2013-2017

4.2. The important legal framework that was reviewed for environmental management include the following:

- Constitutional Provisions
- Under Cap 387, NEMA has gazetted legal tools that govern conduct of EIAs and general environmental protection. The Proposed Road project by the KeNHA has been screened against these tools with results that (Table 4.1) all nine tools will be triggered.

Table 4.1: project screening

Regulation	Focus	Status
Legal Notice 101 of June 2003 - Environmental (Impact Assessment and Audit) Regulations, 2003	This is the tool that gives legal foundation to conduct of ESIA Studies in Kenya.	Triggered
Legal Notice 160 of 1 st Dec 2006- Environmental Management and Co-ordination Act (Conservation of Biological Diversity) Regulations 2006	This legislation requires full measures be taken to prevent introduction of alien/ invasive species of flora and fauna and is important because of the Prosopis menace in the coast.	Triggered
Legal Notice 19 (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	Regulation 17 requires special measures to be taken to prevent siltation of the seashore.	Triggered
Legal Notice 61 of 22 nd May 2009- Environmental Management and Co-ordination Act (Noise, and Excessive Vibration Pollution)(Control) Regulations, 2009	Sets standards for noise levels	Triggered

Regulation	Focus	Status
Legal Notice 120 of 29 th Sept 2006- Environmental Management and Co-ordination Act (Water Quality Standards) Regulations 2006	Regulation 24 prohibits any kind of pollution of water meant for fisheries, recreation or any other use and sets quality standards for diverse waters.	Triggered
Legal Notice 121 of 29 th Sept 2006- Environmental Management and Co-ordination Act (Waste Management) Regulations 2006	Sets standards for waste management	Triggered
Prevention of Pollution in Coastal Zone and other segments of the environment regulations, 2003	Regulation 3 prohibits discharge any hazardous substance, chemical, oil or oily mixture into the territorial waters of Kenya or any segment of the environment.	Triggered
National Sand Harvesting Guidelines, 2007	Sets guidelines for sustainable sand harvesting in Kenya	Triggered
Legal Notice 73 of 31 st May 2007 - Environmental Management and Co-ordination Act (Controlled Substances) Regulations	Sets guidelines on handling and use of controlled substances. There will be need to screen investments under the Master Plan for controlled substances	Triggered

4.3. **Inter-Sectoral Coordination in Environmental Protection:** In recognition that Cap 387 is an umbrella law coordinating diverse sectoral statutes all of which are still in force, Legal Notice 101 requires that the respective sectors be consulted as Lead Agencies in making decisions pertaining to environmental assessment for projects in respective sectors. This is to ensure that NEMA does not approve projects that contradict sector policies and legislation. In conformity with this requirement, we have screened the proposed development against most relevant statutes to map out the potential triggers. And in sections below, we highlight such sectoral laws and policies likely to be triggered by the Proposed Road project.

- Roads Act 2007:
- The County Government Act 2012
- The Urban Areas and Cities Act 2011
- The Occupational Health and Safety Act of 2007
- The Water Act 2002:
- The Physical Planning Act (Cap 286):
- The Wildlife Management and Coordination Act 2013:
- The Forest Conservation and Management Act, 2016
- The Coast Development Authority Act No 6 of 1989 (Cap 444)
- The Public Health Act (Cap. 242)
- The Penal Code (Cap. 63)
- The Traffic Act, Cap. 403
- The Lands Act No. 6 of 2012:
- The Environment and Land Court Act No.19 of 2011:
- The Agriculture Act, Cap 318:
- The Agriculture (Farm Forestry) Rules, 2009
- Public Procurement and Disposal Act 2005:
- The National Museums and Heritage Act-Cap 216 (2006):

4.4. Codes, Specifications and Standards

- **The Ministry of Roads - Environmental and Social Unit:** The Ministry of Roads has established an Environmental and Social Unit (ESU) in the Roads Department whose objectives is to achieve a

comprehensive policy in terms of environmental management in the road sub-sector and to strengthen the capacity within the Ministry to be able to handle environmental and social issues.

- Standard Specification for Road and Bridge Construction Guidelines for Prevention and Control of Soil Erosion in Road Works, 2010
- Environmental Guidelines for Roads and Bridges, 2010.

4.5. National legal provisions on gender equity and mainstreaming

- The National Constitution of August 2010
- National Gender and Development Policy (2000):
- The Sexual Offences Act (No. 3 of 2006)
- Other Policy/legal provisions for Gender mainstreaming:
 - i. Vision 2030 Flagship projects
 - ii. The Presidential Directive of 2006 on 30% women's' appointments to all positions of leadership employment and promotions
 - iii. MTPs handbook has gender outcome indicators
 - iv. Sessional Paper No.2 of 2006
 - v. Gender Department in the Ministry for Gender Children and Social Development.
 - vi. The National Commission on Gender and Development
 - vii. A National Framework on Gender-based Violence:

4.6. **Institutional framework under Cap 387:** In 2001, the Government established administrative structures to implement EMCA, 1999 (now Cap 387) as follows:-**The National Environment Council: The National Environmental Management Authority: Public Complaints Committee:** In the capacity of Employer, KeNHA has administrative jurisdiction over the EIA process and will also act custodian of the ESMP emanating from this study.

5. DESCRIPTION OF PROJECT ENVIRONMENT

5.1. **Flora:** The Coastal Plains area traversed by the Project Road falls within the catchment of the Tudor and Mtwapa Creeks of the Indian Ocean in Mombasa which receive inflow from three sources namely as follows: **The Tudor Creek:** The Tudor creek is a multiple channel drainage system receiving inflow from numerous streams of which the Kombeni River is the longest and most dominant. The Kombeni originates in the Nyika plateau in Maji ya Chumvi area as the Magambo and Madzimbo which join at Mariakani to form the Kombeni stream to be joined by Mwangata just upstream of the C111 (Mazeras-Kaloleni) Road bridge then flowing to enter Tudor Creek at Kisauni. Other tributaries to the Tudor Creek are the Mleji/Tsalu which originates in the Coast Ridge at Kaloleni to join the Tudor Creek to the east of Bwagamoyo. The Mtsapuni originates from the Kalliangombe/Kokotoni area as the Darajani which flows southwards to cross the C111 at Mazeras, draining the coastal ridge into the coastal plateau where it is joined by other rivulets before joining the Tudor Creek at Jomvu.

5.2. **The Mtopanga River** is a small stream that originates from the Nguu Tatu Hills area and drains the Bamburi Settlement to cross the A7 near Bamburi Police Station just upstream of its Indian Ocean Mouth. **The Mtwapa Creek** is a single valley served by the Mto Mkuu river which comprises numerous tributaries:- Dzibana, Tsunguni, Lwondonyi all originating from the Kaloleni landmass and join downstream to form the Mto Mkuu tributary of Mtwapa Creek.

5.3. **Fauna:** A total of 81 bird species were recorded in diverse habitats traversed with the highest count of 41 birds being recorded around the Kadzengo marshlands. In terms of conservation status, a total of 81-bird species were counted within the traverse area. All the 81 avian species recorded were screened for conservation status against the IUCN RED LIST data and AEWA checklist with outcome that 8 birds are of concern in that three species namely;- the Gray Parrot, Fisher's Lovebird and Woolly necked Stork feature in the IUCN RED

List Data (Table 6.4) on account of being Endangered, Near Threatened and Vulnerable while 5 species namely;- the Zanzibar Sombre Greenbul, Cattle Egret, Grey Heron, Sacred Ibis and the Three-banded Plover are listed in the AEWA (Agreement on the Conservation of African-Eurasian Migratory Water Birds). All the AEWA species are found in the seasonal Kwa Kadzengo marshland (WL) habitat which makes this marsh and surrounding farmland very important habitat for migratory water birds.

5.4. **Air Quality and Noise Baseline:** Of all the six pollutants monitored, only ozone was not detected¹. Prevalence of other pollutants was recorded. Particulate matter (PM₁₀)² was detected in all the five sites but at concentrations way below both the Kenyan and WHO specifications. Sulphur dioxide was detected at only one site, near Bamburi in concentrations that are below the Kenyan threshold but way above the WHO limit possibly on account of close proximity to the Cement manufacturer. Carbon monoxide was detected in all the five sites but at concentrations much lower than the Kenyan and WHO thresholds. The concentration at Port Reitz was however much higher than elsewhere. Nitrogen oxides (NO_x) in the ambient air consist primarily of nitric oxide (NO) and nitrogen dioxide (NO₂). These two forms of gaseous nitrogen oxides are significant pollutants of the lower atmosphere. Another form, nitrous oxide (N₂O), is a greenhouse gas. At the point of discharge from man-made sources, nitric oxide, a colourless, tasteless gas, is the predominant form of nitrogen oxide. Nitric oxide is readily converted to the much more harmful nitrogen dioxide by chemical reaction with ozone present in the atmosphere. Nitrogen dioxide is a yellowish-orange to reddish-brown gas with a pungent, irritating odour, and it is a strong oxidant. A portion of nitrogen dioxide in the atmosphere is converted to nitric acid (HNO₃) and ammonium salts.

5.5. **Of the 3 known oxides of nitrogen, only Nitrogen Dioxide was detected in the study area at Bamburi but at concentrations below both the WHO and Kenyan limits.** It is acknowledged that the major sources of nitrogen dioxide are burning of fossil fuels which produce about 50% of all emissions from anthropogenic sources and the location of Port Reitz near the Cement Manufacturer may explain the higher prevalence of sulphur dioxide in the local air. This notwithstanding, levels of NO₂ measured in Mombasa are apparently quite low as annual mean concentrations of nitrogen dioxide in urban areas throughout the world in the range of 20–90 µg/m³ have been reported (www.ifc.org). Maximum half-hour values and maximum 24-hour values of nitrogen dioxide can approach 850 µg/m³ and 400 µg/m³, respectively while hourly averages near very busy roads often exceed 1,000 µg/m³. The 26 µg/m³ measured for Port Reitz area is thus low by international standards but nearer the threshold prescribed by the WHO thus meriting both monitoring and mediatory action.

6. PROJECT ACTIVITIES

The project shall have three major activities namely construction, operation and decommissioning; these are essentially the activities likely to account for all social and environmental impacts ensuing from the project.

6.1. **Construction of Resident Engineer and Contractor Camps:** This will include setting up of a complex comprised of Offices, laboratory, accommodation, maintenance unit, material storage yard, fuel dump, parking, messing area among others for both the RE and Contractor. Ordinarily and, depending on scope of construction, one camp is adequate to meet such needs but, given logistical challenges posed by physical barriers, there may be need to set up 3 camps to cater for Lot One and Two separately. Among other

¹ Ground-level ozone also known as ‘bad ozone’ has no direct emission sources; it is entirely a secondary pollutant, formed when nitrogen oxides and HC react in the presence of heat and sunlight (photochemical reactions in the atmosphere). These two pollutants are often referred to as ozone precursors. Ozone destroys the photo-chemical smog. Its impacts include: Irritation of the respiratory system leading to chest pain, coughing, anorexia, nausea and lung inflammation. Prolonged exposure can cause Permanent/chronic lung damage.

² PM₁₀ represents the particle mass that enters the respiratory tract and it includes both the coarse (particle size between 2.5 and 10µm) and fine particles, those below 2.5µm in size.

implication, such camps will require additional land acquisition.

6.2. **Road forming Stage:** This will entail activities such as stripping of top soil and Relocation of services: Civil works will be preceded by relocation and repair of all utilities mainly power and water mains to ensure uninterrupted supply. The utilities targeted specific action include numerous 132kV power transmission lines and water supply mains (Malindi to North Coast).

6.3. **Cut and Fill Activity:** Road formation will entail earthworks by cutting to spoil, cutting to fill and where necessary borrowing to fill. The bulk cutting will account for the bulk (61%) of earthwork estimated at 1.4 million cubic meters with filling accounting for the remainder 39% equivalent to 0.9 million cubic metres. Essentially, a net surplus of 0.52 million cubic metres of cut soil will be generated and therefore in need of safe disposal. All fill soil will be processed in layers by watering, mixing and compacting with heavy equipment to the required compaction strength.

6.4. **Material borrowing:** Gravel (Murrum) and hard stone material for construction of both sub base and subgrade will be quarried from designated material sites and transported to the construction/material bulking sites. Quantities of materials to be sourced will be analysed once the Materials Report is available. Graveling will also extend to detours, deviations, junction and accesses.

6.5. **The Bituminous Surface:** This will entail application of bituminous spray coat to the road, spreading chippings on top and rolling the layer. The process is repeated for two layers.

6.6. **Construction of Drainage Structures:** Second to road formation and construction of bridges and other drainage structure; - Culverts, headwalls for culverts and improvement of other drainage and soil erosion protection works comprise the most costly aspect of road development. Considering the terrain around the project area the project design has also included a storm drain culverts.

6.7.

6.8. **Road Furniture:** This will entail provision and erection of new road furniture (guardrails, road signs, marker posts and speed bumps).

6.9. **Landscaping works:** This target restoration/ stabilization of exposed slopes through grassing followed by restocking of displaced trees. Activities will include top-soiling, grass planting and watering until growth are ensured and tree planting and watering until growth is ensured.

6.10. **The Contractor will be required to maintain the road** for a period of 24 months during which, the main items of work will include:-

- Repair of any defects on the road and road furniture;
- Cleaning and de-silting culverts and road side drains;
- Regular road markings;
- Grass and bush clearing within the road reserve;
- Removal of construction camps, removal of un-used material stockpiled on the road, tidying and general cleanness of the road and construction sites.

7. STAKEHOLDER AND COMMUNITY ENGAGEMENT

7.1 Stakeholder identification in the ESIA applied three core criteria as follows.

- **Fundamental Right Holders (FRH):** These may hold fundamental rights to strategic resources in the traverse and receiving area.

- a. **Stakeholders to land:** This category includes individual, corporate and other categories of owners and occupants to land and land based resources in the traverse area.
- b. **Residents along the traverse:** These is the category who will have their lives changed either on account of displacement of private or common property, intensified pressure from land speculators, exposure to traffic accidents, imposition of barriers to movement and access to resources, among others.
- **Operators of capital resources:** This category includes utility providers owning water, power supply and oil pipelines which may be affected by the road,
- **Legal Mandate Holders (LMH) within target jurisdiction:** Stakeholders identified under this category include those in National Government, County Government and State Corporations whose mandates confer jurisdiction over areas traversed by the project road.

7.2 **Stakeholder engagement is a continuous process**, during the preparation of the project a total of 603 persons and there was general support for the project. The keys issues that have been integrated in the design include the following:

- Issues to integrate in the design
- Issues to integrate in the RAP implementation process
- Issues to integrate in the ESMP implementation process
- Guidance on scheduling of relocation of utilities
- Issues relating to ecological sensitive sites and proposed mitigation
- General mitigation measures.

It is expected that more stakeholder comments will be received to further shape and further inform project development

8. MAJOR BENEFICIAL AND ADVERSE IMPACTS

8.1 In predicting the potential impacts likely to ensue from implementation of project activities impacts, a checklist of environmental impacts developed by diverse authorities (FAO, 1986; EU 1993) has been employed. Interpretation of impacts was based on a ranking system of high, moderate and low depending on the nature, scope (temporal and geographical) and resilience of the impacts. Impacts can be positive or negative, direct or indirect. The magnitude of each impact is described in terms of being significant, minor or negligible, temporary or permanent, long-term or short-term, specific (localized) or widespread, reversible or irreversible. Generally, temporary impacts having no obvious long-term consequences are regarded as being minor. But those with long-term repercussions are classified as significant. Significant positive impacts are usually associated with improved access, which is the prime objective of the roads construction project. Potential impacts on various environmental components due to different project activities during pre-construction, construction and Operation stages have been identified Table 8.1 below outlines impacts anticipated from the Project Road.

Table 8.1: Project Beneficial and Negative Impacts

Project Phase	Source of Impact	Serial	Potential Impact	Severity *3	Persistence		Potential for secondary impacts
Design Stage (1)	Design Studies, field surveys and inventories	1.1	Creation of temporary opportunities for gainful employment	2P	Short-term		
		1.2	Generation of additional site-specific data /study reports	P	Long-term		
		1.3	Capacity building and sensitization	P	Long-term		
		1.4	Minor site disturbances from dredging, bush clearing etc. during survey work	N	Short-term	Reversible	None
		1.5	Minor accidents during survey work	N	Short-term	Reversible	Minor
Construction Phase (2)	Supply of materials	2.1	Business opportunities in supply and transport of construction materials	2P	Short term		
		2.2	Opening access to remote areas through construction of access routes	2P	Long-term		
		2.3	Generation of GHG in the transportation of construction materials	N	Short-term	Reversible	Climate change and impacts
		2.4	Road hazards in material transportation	N	Short-term	Reversible	Irreversible impacts
		2.5	Degradation along material sourcing and transport	2N	Long-term	Reversible	Social and economic costs
	Constructi on work	2.6	Short-term opportunities for business and employment in construction	2P	Long-term		
		2.7	Revenue to GoK and Local Authorities through taxes	P	Short-term		
		2.8	Opportunity for change	P	Long-term		
		2.9	Cash income in land acquisition and compensation	2P	Long-term		
		2.10	Displacement of people and property from ROW corridor	2N	Long term	Reversible	Escalating poverty
		2.11	Displacement from livelihoods	2N	Long-term	Reversible	Escalation of poverty
		2.12	Opportunity costs on land taken by ROW	2N	Long-term	Reversible	Economic costs

³ Assignment of a severity and likelihood factor for each potential impact to determine the residual risk rating (residual risk ranking = severity factor multiplied likelihood factor) and its significance as either low, minor, moderate, major or critical. In this case N refers to Negative and P refers to Positive.

Project Phase	Source of Impact	Serial	Potential Impact	Severity *3	Persistence		Potential for secondary impacts
		2.13	Potential impact on cultural sites and monuments	2N	Long-term	Irreversible	Loss of heritage
		2.14	Slope destabilization in riparian areas	2N	Long-term	Reversible	Economic costs
		2.15	Alteration of the physical landscape	2N	Long-term	Irreversible	Loss of identity
		2.16	Sediment deposition in mangrove and tidal flat areas	2N	Long-term	Reversible	Weakened ecological control
		2.17	Destroyed habitat for macro benthic fauna in mangrove and tidal flat areas through siltation	2N			
		2.18	Risk of fire hazards	N	Short-term reversible		
		2.19	Loss of carbon sinks in destroyed cover vegetation	2N	Long-term	Reversible	GHG concerns
		2.20	Introduction of invasive/ alien species in construction materials	2N	Long-term	Irreversible	Weakened ecological control
		2.21	Nuisances-dust, fumes, vibrations from operation of plant and equipment	2N	Short-term	Reversible	Health risks
		2.22	Socio-impacts of construction crew and labour camps	N	Short-term	Reversible	Hazards to public health
		2.23	Occupational health and safety concerns for construction crew	N	Short-term	Reversible	Impacts of injuries and occasional death
		2.24	Disruption of village life by construction activity	2N	Short-term	Reversible	Social costs
		2.25	Disruption of existing infrastructure (Water mains, Power transmission and data cables)	N	Short-term	Reversible	Economic costs
		2.26	Destruction of biodiversity held in undisturbed sites	N	Long-term	Reversible	Loss of biodiversity
		2.27	Loss of carbon sink from loss of 7200 trees	2N	Long-term	Reversible	GHG build-up
		2.27	Sanitation concerns from construction crew	N	Short-term	Reversible	
		2.28	Pressure on water resources	N	Short-term	Reversible	
		2.29	Pollution from construction waste, waste oils and spares	N	Short-term	Reversible	
Operation Phase (3.0)	Operation of the	3.1	Benefits from decommissioned contractor and Engineers Camp	2P	Long-term		

Project Phase	Source of Impact	Serial	Potential Impact	Severity *3	Persistence		Potential for secondary impacts
completed highway		3.2	Provision of a function road connection to North Coast	2P	Long-term		
		3.3	Opening up of rural areas to development and investment	2P	Long-term		
		3.4	Enhanced delivery of services in Medicare, education, admin, telecommunication, etc.	2P	Long-term	Irreversible	
		3.5	Enhanced passenger and cargo movement	2P	Long-term	Irreversible	
		3.6	Enhanced visitor access to the North Coast Tourist attractions	P	Long-term		
		3.7	Reduced traffic congestion on new road	2P	Long-term	Reversible	
		3.8	Opportunity for self-employment in public transport	2P	Long-term	Irreversible	
		3.9	Enhanced value of property along upgraded road	2P	Long-term	Irreversible	
		3.10	Pressure on resources and services from emerging urban settlements attracted by the new road	2N	Long term	Irreversible	
		3.11	Pollution of Tudor and Mtwapa creeks from road runoff	2N	Long-term	Irreversible	Ecological risks
		3.12	Curtailed access and ease of movement in villages by the physical barrier	2N	Long-term	Irreversible	Disruption of social coherence
		3.13	The hazard of traffic accidents from speeding vehicles	2N	Long-term	Irreversible	Economic costs
		3.14	Reduced productivity of vegetation shaded by new bridge	N	Long-term	Reversible	Weakened ecological control
		3.15	Curtailed movement of reptiles and small mammals by the road embankment	2N	Long-term	Irreversible	
		3.16	Alteration of local hydrology and drainage by paved road surface	2N	Long-term	Irreversible	Land degradation from erosion
3.17	Loss of biodiversity from settlements along new road	N	Long-term	Reversible	Reduced habitat for avian fauna		
3.19	Increased atmospheric pollutants and noise from motor vehicles	N	Long-term	Irreversible	Will compound an existing problem		
Net environmental worth of the project pre-mitigation		60	31P (31 positive outputs, mainly long-term), 54N (54 adverse outputs, 22 long-term, 19 irreversible),			Some adverse impacts area irreversible	

Project Phase	Source of Impact	Serial	Potential Impact	Severity *3	Persistence	Potential for secondary impacts
		Net score=23N (Overwhelming net negative impact before mitigation)				

9. MAJOR MITIGATION MEASURES

9.1 The Impact Mitigation Plan summarized in Table 9.1 below reflects respective action at the design, construction and operation phases of the Project Road. Site disturbance during field surveys have been minimized through use of existing tracks to access sites of interest and always to avoid crop damage. As well, for field work, sober and serious-minded survey teams were selected and sensitized on the need to observe safety requirements during enumeration and site surveys and this has greatly mitigated incidence of accidents.

Table 9.1. Matrix for Mitigation Measures

Project Phase	Source of Impact	Serial	Potential Impact	Severity *	Mitigation	Legal provision	Post mitigation severity
Design Stage	Design Studies, field surveys and inventories	1.1	Creation of temporary opportunities for gainful employment	2P			
		1.2	Generation of additional site-specific data /study reports	P			
		1.3	Capacity building and sensitization	P			
		1.4	Minor site disturbances from dredging, bush clearing etc during survey work	0	Rehabilitation	EMCA 1999	0
		1.5	Minor accidents during survey work	0	Safety precautions	OSHA 2007	0
Construction Phase	Supply of materials	2.1	Business opportunities in supply and transport of construction materials	2P			
		2.2	Opening access to remote areas through construction of access routes	2P			
		2.3	Generation of GHC in material transport and road construction	N	Minimize distance travelled	EMCA 1999	0
		2.4	Road hazards in material transportation	N	Follow traffic code	Traffic Act	0
		2.5	Degradation along material sourcing and transport	N	Source from existing quarries/subject new quarries to EIA process	EMCA 1999	0
	Construction work	2.6	Short-term opportunities for business and employment in construction	2P			
		2.7	Revenue to GoK and Local Authorities through taxes	P			
		2.8	Opportunity for change	P			
		2.9	Cash income in land acquisition and compensation	2P			
		2.10	Displacement of people and property from ROW corridor	2N	Just and fair compensation	Kenya Constitution 2010	p
		2.11	Displacement of livelihoods	N	Provide alternatives and compensation for lost income	Ditto	P
		2.12	Opportunity costs on land taken by ROW	N	Compensated for by opportunities for investment		p
		2.13	Loss of cultural assets	N	Realign to avoid displacement	Cap 261	0
		2.14	Slope destabilization in the Creek areas	N	Soil stabilization works	EMCA 1999	0
		2.15		2N	Irreversible	EMCA 1999	2N
		2.16	Interference with habitat for avifauna	N	Minimize disturbance	EMCA 1999	0
2.17	Impact on fishing due to sediment deposition	N	Adopt controlled blasting	EMCA 1999	0		
2.18	Destroyed habitat for macro benthic fauna in mangrove and tidal flat areas	N	Use of viaduct structures		P		
2.19	Sediment generation into Tudor and Mtwapa Creeks	N	Recovery for debris for safe disposal		0		
2.20	Loss of carbon sinks in destroyed cover vegetation	N	Recreation of mangrove stands		P		
2.21	Introduction of invasive/ alien species in construction materials	2N	Screening of material source areas		N		

Project Phase	Source of Impact	Serial	Potential Impact	Severity *	Mitigation	Legal provision	Post mitigation severity
		2.22	Impact on endangered flora species	2N	Mapping out distribution of the species for conservation		N
		2.23	Nuisances-dust, fumes, vibrations from operation of plant and equipment	N	Prudent phasing of civil works to minimize disturbance		0
		2.24	Socio-impacts/ public Health concerns from construction crew and labour camps	N	Implement an aggressive HIV/ AIDS control programme-Appendix 10.1		0
		2.25	Occupational health and safety concerns for construction crew	N	Follow Contractors Code- Appendix 10.1		N
		2.26	Disruption of village life by construction activity	N	Facilitate participatory management		P
		2.27	Disruption of existing infrastructure (MAWASCO pipeline, Oil pipeline, etc.)	N	Prompt replacement/ upgrading of damages		p
		2.28	Destruction of biodiversity held in non-disturbed sites	N	Soil recovery and re-use		P
		2.29	Loss of carbon sink from loss of 7200 trees	N	Recreate all lost cover		P
		2.30	Sanitation concerns from construction crew	N	Provide adequate-gender friendly toilets		0
		2.31	Pressure on water resources	N	Provide additional sources		P
		2.32	Pollution from construction waste, waste oils and spares	N	Apply 3 Rs principle		P
		Operation Phase	Operation of upgraded highway	3.1	Benefits from decommissioned contractor and Engineers Camp	2P	
3.2	Provision of a function road connection to South Coast			2P			
3.3	Opening up of rural areas to development and investment			2P			
3.4	Enhanced delivery of services in Medicare, education, admin, telecommunication, etc.			2P			
3.5	Enhanced passenger transiting Ex North Coast			2P			
3.6	Enhanced visitor access to the Rabai Kayas			P			
3.7	Reduction of accidents			P			
3.8	Reduced congestion at Mombasa CBD			P			
3.9	Reduced traffic congestion along B8 highway			2P			
3.10	Opportunity for self-employment in public transport			2P			
3.11	Enhanced value of property prices in South Coast and along Bypass			2P			
3.12	Opening up of Mtwapa hinterland			2P			
3.13	Pollution of Mtwapa and Tudor creeks from road runoff			N	Pollution threat from bridges quite small, install filter in weighbridge station alone		0
3.14	Impact on Tourism on Mtwapa Creek			2N	Review of project design to explore other alternatives		0
3.15	Curtailed access and ease of movement in villages by the physical barrier			N	Provide adequate functional crossings		N
3.16	The hazard of traffic accidents along bypass			2N	Ditto but fence out all school compounds		N
3.19	Reduced productivity of mangroves covered by the bridge			N	MRP to expand areas under mangrove cover		P
3.20	Curtailed movement of reptiles and small mammals by the road embankment			N	Provide functional tunnels		N
3.21	Alteration of local hydrology and drainage by paved road surface			N	Harnessing of runoff for water supply		P
3.22	Loss of biodiversity to increased settlement	2N	Massive reforestation with locally important spp	Forests Act 2005	P		
3.23	Increase in atmospheric pollutants and noise	N	Planting of shelter wood belts and noise abatement measures	EMCA 1999	N		

Project Phase	Source of Impact	Serial	Potential Impact	Severity *	Mitigation	Legal provision	Post mitigation severity
Net environmental worth of the project		28N (61N, 33P)		28N		41P (51P,10N)	

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

10.1 Modalities for mitigation of impacts and their phasing are presented in the Environmental Mitigation and Management Plan. However, planning for the mitigation will take place at design stage (this stage) to ensure that such mitigation is incorporated and allocated for in the project design. Thus, the first action in mitigation will be a thorough scrutiny of the Design Report to ensure that the ESMP provided in this report has been fully incorporated and allocated for. Further, all mitigation to be implemented during civil works will be allocated for in the Bills of Quantities and captured in the Contract for Construction. KeNHA will hire a qualified Resident Engineer to ensure full implementation of contractual tasks in mitigation.

10.2 Majority of impacts have readily available means for mitigation while some of the negative impacts will acquire positive effects after mitigation. Thus, upon application of the Impact Mitigation Programme, majority of the impacts are dispensed with and the project is likely to achieve an overwhelming net positive effect. It is expected that there will be no land acquisition within the scope of the proposed work.

10.3 Mitigation of impacts associated with civil works has been planned in the design and allowance has been made in the Bills of Quantities (BOQs). Also, the contract for civil works bears several relevant clauses binding the contractor to implement environmental and social mitigation as outlined in Table below.

10.4 The Compliance Monitoring Strategy: This activity is essential to ensure implementation of recommended mitigation measures and to thus secure the overall environmental quality of any project. The monitoring activities should primarily target implementation of recommended mitigation measures in addition to surveillance for new impacts. Table 10.1 provides an M&E matrix for the Project Road with a full complement of criteria and indicators. In addition to specification of impacts and required mitigation activities, the plan also identifies key players in each activity and the recommended timing of interventions. The Environmental and Social Action Plan for the Roads Project also essentially constitutes its compliance monitoring program. Key features of the compliance monitoring programme are as follows:-

10.5 The Monitoring Authority: The burden of implementing impact mitigation will fall on the Project Contractor under supervision by KeNHA in the capacity of Employer. Through the Supervisor of Works (SOW), KeNHA will monitor activities of the Contractor to ensure compliance with contractual requirements including implementation of this EMP. Where issues not anticipated in this report do arise, the SOW will notify KeNHA for action.

10.6 Need for NEMA to participate in Site Meetings: NEMA is the body charged under Cap 387 with overall coordination of environmental management in Kenya. While NEMA coordinates this by regulating the EIA process for projects, there is need for NEMA to follow-up further on implementations of ESMPs as prepared for this project. This ESMP therefore, recommends that the County Environmental Officers for Mombasa and Kilifi be invited to site meetings on this project and is facilitated to attend the same under the project. By being represented in site meetings, NEMA will enjoy an excellent opportunity to monitor implementation of the ESMP and to keep track on any emerging issues. In order to enhance impact mitigation and monitoring at local level, alongside NEMA, the District Roads Engineer should participate in the Site Meetings.

10.7 Costs in implementing the ESMP: A sum of KShs 3,312,742,369 will be required in environmental and social mitigation as detailed in Table 10.4 below. Of this, land acquisition will account for 92.35% as illustrated below.

Table 10.1: Costs in implementing the ESMP

Item	Cost (KShss)	% allocation
Env. and social mitigation	69,826,600	2.11
RAP	3,059,354,500	92.35
Contingencies and Operation Costs	183,561,270	5.54
Total	3,312,742,370	100

11. SUMMARY AND CONCLUSION

11.1 The core outcome of the ESIA Study is an ESMP developed to guide resolution of adverse impacts occasioned by development of the road project. The ESMP comprises four core elements namely: - the Impact Mitigation Plan, the Monitoring Plan, a budget for implementation and modalities for institutional coordination and role play.

11.2 The core mitigation strategy in the project was to review and adopt a route alignment that served to avoid, reduce and manage environmental and social concerns as follows:-

- Design decision to include viaducts in heavily settled sections so as to cut down on physical displacement.
- Design options which include preservation of the culturally sensitive Kengeleni Bell Tower, the Frere Community Church etc both of which are monuments associated with descendants of survivors of the slave trade.
- Selecting an alignment that avoided most of the Haller park and Bamburi Nature trail
- Selecting an alignment that could affect the least number of PAPs.
- Selecting an alignment that avoided by passing Mtwapa which would have displaced vast interests including assets of the Kenya Agriculture and Livestock Research Organization (KALRO).

11.3 To the largest extent possible, the strategy and action plan in formulating the ESMP is to prevent impact occurrence, then move to mitigate inevitable occurrence-a position secured by ensuring that recommendations made here-in are incorporated into and influence final outcome of the project design process in which case, the latter process also becomes part of the mitigation programme. In pursuit of this strategy, all mitigation will be sealed at Detailed Design Stage by adopting measures as follows:-

- ✓ The Environmental and Social Management Plan unveiled in Chapter Twelve below will be integrated into the Final Design Report- as a standalone chapter and also to moderate design decisions
- ✓ The will provided for in the BOQs to ensure funding allocation for environmental and social mitigation
- ✓ Clauses binding parties to affirmative action on the ESMP will be integrated into Contracts for Construction to ensure that the contractor is legally bound to implement impact mitigation.

The burden of mitigation largely lies with the Project Contractor under supervision by KeNHA through the Supervising Consultant. Key observations are that most adverse impacts are short-term and will disappear once civil works ends while residual impacts will require careful monitoring and coordination with relevant Lead Agencies.

11.4 A sum of KShs 3,312,742,370 will be required in environmental and social mitigation of which, 92.35% will go to land acquisition with the rest being available to the Contractor for purposes of environmental restitution. The core monitoring strategy for this project will be through site meetings, in which case, it is recommended that

respective County Environmental Coordinators for Mombasa and Kilifi be invited to such meetings. Other stakeholders such as the County Labour Officer should also initially attend such meetings to ascertain that measures towards securing the health and safety of workers have been put in environmental and quality audits during the Defect Liability Period and the Contractor will be liable to repair all defects including those pertaining to environmental mitigation.

11.5 Overall, it is the impression of this study that, the proposed road upgrading project is a major economic undertaking to which national and regional development targets are tied. It is a vital transport artery and, subject to adoption of mitigation measures and proposal made here-in, it should be supported by all.

12. REFERENCES AND CONTACTS

12.1 Reference

GOk (2019) Environmental and Social Impact Study for Proposed Upgrading of MOMBASA – MTWAPA – KWA KADZENGO-KILIFI (A7) SECTION

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