Kenya National Highways Authority

Quality Highways, Better Connections

UDATED ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR ILLASIT-NJUKINI-TAVETA ROAD PROJECT

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CHAPTER ONE: INTRODUCTION

1.1 Background information

The updated Environmental and Social Management Plan (ESMP) for the proposed Dualing of Illasit – Njukini – Taveta Highway through Public Private Partnership (PPP) mechanism, has been prepared to provide practical strategies through which the envisaged negative environmental and socio–economic impacts are going to be mitigated and monitored. The ESMP has been prepared based on anticipated negative impacts due to project activities, prevailing baseline environment, relevant regulations, and best international environmental management practices during construction. The ESMP has proposed measures to prevent, abate and offset or reduce the foreseeable negative consequences (impacts/risks) of the project activities to permissible levels. The ESMP shall be the guiding document for implementation of project during design, construction, operation, decommissioning and maintenance phases of each project component.

1.2 Rational and objectives of ESMP

In the light of the anticipated impacts associated with the proposed project, such as air pollution from dust particles, water pollution, noise pollution among other effects it was considered necessary to prepare this road project specific Environmental and Social Management Plan (ESMP) for the proposed intervention work which is directed at protecting and minimizing any potential adverse environmental and social impacts.

The ESMP further aims at managing and keeping the negative impacts and risks of the proposed road project at minimum while enhancing the significant positive and beneficial impacts. Specific objectives are;

1) To ensure that every project operation complies with relevant Environmental and Social Regulations and international best practices in management and coordination of environmental and social issues during construction;

2) Environmental and social performance indicators, monitoring requirements and review procedures for the Project activities;
3) To identify likely environmental, social and safety risks and impacts that may emerge as consequences of project activities during implementation and post construction period;
4) To propose remedial or corrective measures to risks and negative impacts that have been envisaged throughout projects life cycle; and
5) Propose institutional arrangements, relevant regulations, roles and responsibilities of various stakeholders that will be critical in implementation and monitoring of the ESMP.

6) Identify the roles and responsibilities of the environmental and social safeguard officers of the project; and

7) Communicate environmental and social expectations and requirements throughout the project life cycle.

1.3 Scope of the ESMP

This Environmental and Social Management Plan (ESMP) has been prepared to identify the environmental and social management and mitigation actions required to implement the project in accordance with the requirements of the relevant National and International Environment and Social Regulations. It provides an overview of the environmental and social baseline conditions on the routes of the proposed project, summarizes the potential impacts associated with the proposed construction and pavement works and sets out the management measures required to mitigate any potential impacts in a series of discipline specific Environmental & Social Management Plans (ESMPs).

1.4 Structure of the ESMP

The ESMP outlines the environmental and social management processes and procedures applicable to the project and includes the topics which are common to all environmental and social disciplines.

The ESMP is structured as follows:

- Chapter 1: Introduction and objective of the ESMP
- Chapter 2: Physical, Social-Economic and Environmental Baseline Conditions
- Chapter 3: Beneficial and Adverse Impact
- Chapter 4: Institutional and Legal Framework for Environmental Management Guiding the ESMP
- Chapter 5: Stakeholder Engagement
- Chapter 6: ESMP Matrix and Conclusion and Recommendation
- Chapter 7: : Appendices

1.5 Intended users

The aim of this document is to communicate to the Project Team (including contractor, sub–contractors and Safeguards team), the potential environmental and social issues associated with the proposed project, the procedures and mitigation measures that are required to be implemented. The Project Team will utilize this ESMP during project execution to achieve effective, appropriate environmental and social management.

1.6 Project Location and Description

The project road length is approximately 66 km and traverses Taveta Sub-County of Taita Taveta County and Kajiado West Sub-County of Kajiado County.

The project starts at the junction with A23 road at Darajani market centre and veers in a Northerly direction through Chala, Chumvini, Njukini, Olgirira, Rombo, Entarara among other market centres before ending at Illasit in Kajiado County.

1.7 Project Objectives

The main objective of the proposed road is to improve traffic movement within the region of Taita Taveta and Kajiado counties, most importantly for the road to serve as an important link to the area where large scale agriculture in crops and livestock farming are the main economic activities. The road will assist in opening up the areas along the project roads and their areas of influence, and encourage economic and social development in the region, as well as improve economic region integration between Kenya and Tanzania.

1.8 Brief Description of Project Activities

The proposed Illasit-Njukini-Taveta (66KM) project roads consist of upgrading gravelled surface to bitumen standard roads. The work will generally consists of clearing the topsoil, earthworks and excavation of longitudinal ditches, construction of culverts and several bridges, pavement construction, erosion control measures, drainage improvement, safety improvements including reflectorized paved markers , sidewalks, and other ancillary works. The project road will remain as a 2-lane and will largely follow the existing road with minor re-alignment.

1.9 Pre-Construction Phase

The pre-constructional activities cover the initial investigations and assessment phase. The main components being: road Inventory, geological and geotechnical investigation, material exploration, search for water for construction, locations of construction camps, and alignment characteristics.

1.10 Road Inventory

Inventory surveys of the road were carried out, in order to collect all the information in pre-prepared standard formats concerning the actual condition of road, existing structures and other road furniture. Requirement of additional retaining structures, cross drainage/side drainage works and remedial measures was also assessed. The inventory work also included identification of deficient geometric and weak pavement locations requiring improvements.

1.11 Geological and Geotechnical Investigation

Geological and Geotechnical Investigations were conducted for the entire project road between Illasit-Taveta. The exercise had two main objectives:

i) To investigate the sub-grade strength of the existing road,
ii) To explore sources of naturally-occurring materials for road construction within economic haulage distance along the project corridor,

1.12 Material Exploration

During the field work, the materials team explored the project corridor for various construction materials within economic haulage distance. These materials consist of:

a) Lateritic gravel materials suitable for filling, sub base and base layers.
b) Crushed rock for surfacing, concrete works, drainage structures, and also as alternative for road pavement base layer construction.
c) Naturally-occurring sand for construction purposes.

1.13 Water for Construction

The main sources of water for people within these two counties are major rivers in the project area including Tsavo, Lumi, Njoro and Mabatini (Kitobo) rivers. Also, permanent springs are fed by the hydrological system that drains from Mount Kilimanjaro. The principal and most well-known is the Mzima springs that has been tapped to supply clean water to consumers as distant as Mombasa. The other major springs in the sub-county include Njukini, Njoro, Kitobo, Kitivo, Ziwa Serengwa and Madulu. Mechanized boreholes with manual pumps are also installed. The contractor is recommended to construct boreholes along the corridor as the source of water for camp purposes and surface water for construction purposes. Where it becomes necessary to use a particular source of water with questionable quality, then, remedial measures would be recommended to ensure that the quality of concrete is not impaired.

1.14 Locations for Construction Camps

During the investigation of the project areas, many locations were identified as possible sites for camp construction. Discussions were held with officials of the two (2) counties and it was agreed that the contractor's campsite constructed at Rombo Town before the commencement of the project, the county authorities will consult with the local authorities of the designated areas to ensure that the selected locations are free of all encumbrances or traditional hindrance. The contractor will be allowed to construct it camp(s) at said location(s) on condition that the contractor abide by all traditions and norms of the locals.

1.15 Construction Phase

Two (2) typical roadway sections are envisioned to pave the existing two-lane road.

1.16 Post-Construction Phase

The post construction phase will cover issues relating to the operation and maintenance of the project such as:

a) Maintenance
b) Area wide traffic management and enforcement mechanisms, which will focused on:
c) Road Safety features (such as warning signs, speed restrictions, traffic calming measures, drains, stopping lay-bys within settlements, junction improvements and direction sign boards)
d) Environmental improvements;
e) Public education and enforcement plans.

CHAPTER TWO: PHYSICAL, SOCIAL-ECONOMIC AND ENVIRONMENTAL BASELINE CONDITIONS

2.1 Administrative Structures

The proposed project passes through Loitoktok constituency in Kajiado West Sub-county of Kajiado County, and Taveta constituencies in Taveta sub-county in Kajiado County.

Kajiado County borders the Republic of Tanzania to the southwest, Taita-Taveta County to the southeast, Machakos and Makueni counties to the east, Nairobi County to the northeast, Kiambu County to the north and Narok County to the west. It lies between longitudes 36º 5' and 37º 5' east and 1º 0' and 3º 0' south. The altitude of the county ranges between 1120m and 1960m above sea level. It covers an area approximately 21,900.97 square kilometers and is divided into five administrative constituencies.

Taveta County borders Kwale County to the southeast, Kilifi County to the east, Makueni, Kitui and Tana River counties to the north, Kajiado to the northwest and the Republic of Tanzania to the west/southwest. The county is divided into four administrative constituencies namely Mwatate, Voi, Wundanyi and Taveta. Geographically, the county lies between latitudes 30 16 south and 40 south and longitudes 3 5 east and 40 east. The altitude of the county ranges between 304m and 1000m above the sea level. The county covers an area of 17,084 km² of which a bulk 62% or 11,100 km² is within Tsavo East and Tsavo West National Parks. The remaining 5,876 km² is occupied by ranches, sisal estates, water bodies such as Lakes Chala and Jipe in Taveta and mzima springs, and the hilltop forests which occupy less than 100 km² or approximately 10 km² out of 587.5 km².

2.2 Population Structure and Distribution

According to 2009 Population census, Taita Taveta County had a population of 284,657 with 71,090 households and a population density of 16.66 people per km2. Kajiado County had a population of 687,312 with 173,464 households and a population density of 31.38 people per km2. However, the population densities in the project area influence are 19.32 per km2 and 13.2 per km2 in Taveta and Kajiado West sub-counties respectively.

2.3 Socio-Economic Indicators

According to the District development plans of 2008 – 2012 (for the Taveta and Kajiado districts before they became counties with the new constitution), the poverty situation is severe with absolute poverty affecting over 55% and 52% of the total population in Taita Taveta and Kajiado Counties respectively.

County poverty levels have been largely affected by high vulnerability to shocks and especially the frequency and intensity of droughts which have negatively affected people's livelihoods. In addition the condition of the poor is exacerbated by the HIV/AIDS pandemic and inadequate information opportunities. Poverty in the Counties is also aggravated by poor infrastructure and acute water shortages, Low literacy levels, wildlife menace, poor land tenure system, perennial flooding, inadequate entrepreneurial skills, and inadequate access to cheap credit facilities.

2.4 Health Indicators

Access to healthcare remained a major concern of the sector in the areas where the road project passes. The health problem in the sub-counties served by the road resulting from flooding requires a vibrant health sub sector to curb the spread of water borne diseases such as Malaria, Cholera and bilharzias. Taveta County has seen an increase in the number of health facilities to 11 especially with the introduction of the Constituency Development Fund. Of the 11 health facilities, 7 are GOK facilities, 3 are private while 1 is a mission health facility.

The HIV/AIDS incidence rate in Taita Taveta county stands at 12% while the prevalence rate is 4.5%.

The major drivers of HIV/AIDS in the county are; commercial sex workers, long distance truck drivers, migrant workers and transboundary traders. The situation is further compounded by high poverty levels and low literacy rates. The average distance to the nearest health facility in Taita Taveta County is 5.8 km while there are only seven (7) government health facilities. Health facilities in the Kajiado County are not adequate particularly in some divisions such as Mashuru and Namanga. Kajiado county has a total of 116 health facilities, which include 3 (1private) hospitals, 13 health centres, 49 dispensaries and 2 private nursing homes. The average distance to health facility is about 30km compared to the national average of about 6km. The HIV/AIDS incidence rate in Kajiado county stands at 12% while the prevalence rate is 4%. The prevalence rates among females are high than males mainly due to the following reasons: - Cultural practices such as FGM, early marriages, polygamy and population migrations, and Itinerant livestock trading practices because of high proceeds and accompanying risks of exposure.

2.5 Education

The education sub sector in Taveta County has 90 pre-schools, 27 GOK primary schools, 3 private primary schools, 4 secondary schools and 2 youth polytechnics. Kajiado County has 295 public schools, out of which 265 are primary while 30 are secondary. The sector has however been affected by understaffing, poor road network, flooding and The main challenges facing this sector include low staffing, poor facilities, flooding, high poverty levels, poor management in schools, especially public schools, high dropout rates, human-wildlife conflict among others.

2.6 Wildlife and Tourism

The counties are home to the world famous Tsavo West and Amboseli National Parks, and numerous eco-tourism projects. It enjoys an abundance of wildlife and visitor attraction potential primarily drawing on the national parks, and the famous Mt Kilimanjaro in the vicinity of the project. Both sub-counties are rich in wildlife of all types including elephants, buffalo, zebra, rhino cheetah, gazelles, hyenas, wildebeests, warthogs, giraffes, lions, leopards and elands. Along the project boundaries, high concentrations of wildlife are found around Tsavo West National Park, Amboseli National Park, and Chyulu areas. The significant wildlife presence has brought about Human-Wildlife conflict along the project area of influence, which is associated with intensive human activities and migratory routes along the proposed road.

2.7 Topography

The general topography is characterised by an undulating terrain which gently rises from Taveta side (Km 0+000) towards Illasit (Km 65+700). The altitude ranges from 750 m at Taveta junction through Njukini at an elevation of 992 m and rises steadily to the end of project (Illasit) which stands at 1,560 m asl. The average slope is approximately 1.5% with a maximum slope of about 6.5%.

2.8 Geology and Soils

The project area is characterized by flat terrain, with rocks of the basement system consisting of a succession of aragneisses, some of which are granitoid in composition and appearance and sometimes contain biotite or hornblende, crystalline limestone, graphitic gneisses and lesser amounts of felspathic quartzites, plagioclase amphibolites and calc-silicate rocks. The soils are derived from basement complex formations and are sandy to stony and are deep to shallow in most places. These soils are comprised of Luvisols, Lithosols, and Regosols; and are prone to erosion. The prevalent soil type is dark brown loam soil especially between Chala and Illasit while the section between Taveta and Chala bear black cotton soil. Various localised bands along the route have gravelly / rocky soil materials.

2.9 Climate and Rainfall

The road section crosses two counties; Kajiado and Taveta, in the sub-counties which are part of the 21 Arid and Semi-Arid (ASAL) areas in Kenya. These areas have a dry climate that is greatly influenced by southeasterly winds. Rainfall in the area differs a lot, mainly because this is determined by altitude. Rainfall in the project area is low, bimodal and very erratic. The section between Illasit and Njukini experience higher rainfall than the other sections of the road, mainly because of the high altitude and being near Mt Kilimanjaro. The mean annual rainfall ranges between 200mm and 1000mm. The long rains fall between March and May while the short rains occur between November and December. The average temperature in the project area ranges between 22 and 28ºC while average humidity stands at 5%.

2. 10 Vegetation characteristics

The population density along the projects roads vary from light to medium. The main vegetation type in the project area is determined by altitude, soil type and rainfall received in the different parts of the sub-county where the project lies. Due to heavy intensive human activities, the natural vegetation of some the areas has all but disappeared, to give way for agricultural activities, especially irrigation farming between Njukini and Entarara market centers in Kajiado county side of the project road. Farming, overgrazing, charcoal burning, cutting of trees for fuel as firewood, forest fires and quarrying activities are some of the leading causes of this trend. The project area, especially between Taveta town and Chala, is predominantly covered with prosopis juliflora (Mrashia), which accounts for 50% of the vegetation cover in the Taveta Sub-county of Taita Taveta County. Apart from the food crops grown in the area, the other vegetation cover in the project area, especially in Taveta section of the road is mainly an ASAL vegetation, grassland, woodlands and shrubs lands with savanna species (Acacia sp, Commiphora sp.) where

the groundwater table is high, riverine/permanent wetland vegetation types occur with Acacia xanthophloea, Milicia excelsa, albizia sp, Ficus sp. etc

2.11 Land use and other economic activities

The main economic activities and features along the road project route is agricultural (through irrigation) and pastoralism. Land and land use change over the years in the two counties has been marked by turbulence as aresult of both man-made and nature events. The most important changes have been theloss of land and the loss of traditional mobility and flexibility characteristic of pastoralism.

2.12 Surface Water Resources and Hydrology

There are various rivers crossing the proposed roads, most of them semi perennial flowing during the wet seasons only. The major rivers in the project area include Tsavo, Lumi, Njoro and Mabatini (Kitobo) rivers. Also, permanent springs are fed by the hydrological system that drains Mount Kilimanjaro. The principal and most well-known is the Mzima springs that has been tapped to supply clean water to consumers as distant as Mombasa. The other major springs in the sub-county include Njukini, Njoro, Kitobo, Kitivo, Ziwa Serengwa and Madulu. The springs have been extensively exploited for surface irrigation.

2.13 Soil Erosion and Degradation

The rainfall at the slopes of Mt. Kilimanjaro is often heavy and run off is high causing heavy floods and gulley erosion, thus a menace to roads, bridges and irrigation projects in the project area. The road is usually impassable due to flooding in the area during the rainy seasons, especially at flat areas and near seasonal rivers. There is also land and soil degradation, and pollution arising from agricultural activities in the area, through vegetation clearing for farming activities, and livestock keeping leading to soil erosion and loss of fertility to support vegetation, and pollution to water sources in the area. Sources of pollution in agricultural production practices include agrochemicals (fertilizers and pesticides), especially in the horticulture industry particularly in the Irrigation schemes along the project area. These pollute air and water sources (rivers and groundwater). The impact of these pollutants is that they reduce the quality of both air and water, thus interfering air and marine environments.

2.13 Air Quality

The main pollutants of air quality in the area is dust emitted and blown by wind as a result of usage of the roads in the area, and farming activities during the dry seasons. Other pollutants include nitrogen oxides [NOx], carbon monoxide [CO], and total suspended particulate matter [TSP] concentrations from vehicles. The pollution of dust material would increase during construction as a result of excavations and movement of construction vehicles and use by other motorists along the roads.

2.14 Noise

The main noise pollution is from the vehicles along the road, agricultural machinery and vehicles along the road. Other noise pollution is from traders and consumers during normal business hours. Road Safety -There are a few numbers of reported cases of accidents along the project road involving human and wildlife, according to the stakeholders interviewed, because little attention has been given to road safety, especially near town centres. There is a lack of warning or directional signs, presence of speed bumps, especially near or on the approach to junctions and crossings, schools and trading/market centres.

2.15 Solid and Human Waste Disposal - Solid waste has been categorized as trade, industrial, municipal, agricultural institution, domestic, construction debris and waste from mining/quarrying operations. Unsuitable patterns of production and consumption are increasingly generating large quantities of waste in the area, as seen in market centres along the proposed road. At domestic level, solid waste is mainly managed by use of refuse pits that are then burnt or composted. The collection service in areas where the local government is supposed to collect the waste is not sufficient.

CHAPTERTHREE: BENEFICIAL AND ADVERSE IMPACTS

3.1 Positive/Beneficial Impacts

3.1.1 Employment Opportunities

The construction of the Ilasit-Njukini-Taveta road project will create employment opportunities for Kajiado and Taita Taveta Counties people both directly or indirectly during construction and operational phases. Socio-economic study infers that there are a lot of local human resources. Therefore, most people will be employed as semi-skilled and casual workers. Few skilled workers will be available.

3.1.2 Improved Local Socio-economy

The communities acknowledged that the project road will contribute to the growth and development of the local economies of the two (2) counties; business at the major towns along the road and the following socio-economic benefits:

a) Increased business opportunities at the market centres due to the presence of the project workforce during construction;
b) Employment of locals during the construction phase of the project;
c) Strengthening of local economy through the establishment of micro-enterprises such as bulking points, catering services etc.

3.1.3 Ease of Road Transport in the Project Area

Construction of the proposed road will improve transport and communication in Kajiado and Taita Taveta Counties because of improved road surface. After construction, the road will improve transportation of goods, commodities and services to and from the project area. This is a large positive impact.

3.1.4 Improved Living Standards

The implementation of the project will result in the improvement of the living conditions of population living along the road and the two counties in general, thus contributing to poverty reduction.

The communities felt that the journey time will be shortened and there will be improved access to markets to sell their produce. Both the male and female gender felt that the upgrading of the road will result in efficient traffic flow with savings in both time and cost, thus there will be improved communication, which at present is a big problem.

3.1.5 Increased Security

The area where the road traverses is neighbouring an area in Tanzania that is largely peaceful. However, incidents of theft do occur along the way due to the scarce road users at present. Better road usage with frequent passers-by would result in an improvement of security. The upgraded road will also increase easier movement by security personnel. Any improvement in security from the current level would be a major benefit to the communities of the project areas.

3.1.6 Better Education Opportunities

Better road communication would open up the area for development, which would also lead to building of more schools and other advance institutions of learning. This would eventually lead

to improvement of education institutions in the area. Any improvement in educational attainment from the current levels would be a major benefit to the communities.

3.1.7 Improved National Transport

The main mode of transportation in the area is road transport, which is used for transportation of passengers and goods to the various town centers along the project area. There are no other affordable options for transport in the project area.

With improved road conditions, it is expected that there will be improved transport within the region. This is likely to benefit the local and regional economy in the short term and the national economy in the long term. There will also be easier access to the essential services offered in the neighboring towns and cities.

3.1.8 Road Safety

Road projects can lead to reduction in accidents when they involve significant improvements in vertical and horizontal alignments, improved carriageway width, junction layout or greater separation of pedestrians, non-motorized traffic and motor vehicles.

The proposed project road design will contribute to improving road safety and the comfort of road users in several ways:

1. Sight distance and visibility especially at approaches to bridges will be improved;
2. Road signs (both warning and directional) and road markings have been included in the design; and

Adequate shoulders have been designed throughout its length.

3.1.9 Empowerment of Women

Women play an important role in agriculture and general economy of the project areas. However, the existing road makes it hard for women to access markets for their products due to the high transport costs as public transport operators are few. And as a result, the transport fares are high.

The poor state of the road leads to use of old motor cycles, converted cars, buses and trucks. These vehicles are very uncomfortable, gender insensitive and often overloaded as there is no space for comfort. It is even worse for women who are pregnant. Due to the poor state of the road, it takes very long for women to reach trading centers and hospitals. This will however change with the construction of the proposed road, thus empowering women in the counties.

3.1.10 Improved Drainage

The proposed road is expected to improve drainage infrastructure and general discharge of storm water from the road/carriageway which will reduce soil erosion in the project area. This will be a major gain to the present road condition as there are signs of serious erosion in several places.

3.1.11 Improved Access to Services

Majority of the inhabitants of the project area have difficulty in accessing markets, schools, hospitals, government offices and other amenities. This is due to high transport costs, longer travel time, low economic growth and poor/lack of services due to the poor road network in the area. This will be eliminated with the construction of the road.

3.1.12 Reversal of Rural-Urban Migration

Most of the people in the project area have shunned investing in the area and mass exit of human resources especially the youth in search of opportunities and services in urban areas. The road will enhance access to services, markets and stimulate economic activities in the area reducing and reversing rural urban migration which has become a major planning concern in the country.

3.2 Negative Impacts

3.2.1 Impact on Topography

The section of road between Rombo and Njukini Town passes through few hilly areas. During widening of the existing corridor, there would be cutting of slopes and filling which would change topography at some parts of these sections of the road. Earthwork for this would alter the existing topography, although the impact is expected to be negligible.

In addition, the project road is passing through a terrain prone to earth flows/mass movement erosion due to the geological nature of the terrain. Road work will alter the topography at a localized level.

3.2.2 Impacts on Water Ways and Drainage Sites

Several streams cross the project road. Apart from these, there are various small drains and water pans draining the areas along the project road. There are various permanent springs fed by the hydrological system that drains Mount Kilimanjaro. Minor impacts are anticipated on the surface water drainage in the area during the construction phase due to the diversion of waterway.

3.2.3 Impacts on Soil Environment

3.2.3.1 Impact on Top Soil

The impact on soil due to the project will be in terms of topsoil erosion. Strengthening and widening of the existing road will not cause significant soil erosion. Soil pollution would take place to a negligible extent due to spillage of construction material, oil, fuel, grease and asphalt around the construction yards. Care will be taken to minimize spillages of construction materials.

Loss of productive soil, during the construction stage, is envisaged at locations of workers' camps, stockyards, storage, etc. if these are located on fertile areas. The contractor should ensure that no productive areas are used for these purposes and avoid adverse impact. In any case, though it would be a direct impact, it would be reversible and insignificant in nature. The soils in the road alignment are of loam to clay loam soils being capable of producing high yields. Soils both within and outside the road corridors may be negatively impacted due to the proposed project.

The loss of productive topsoil due to road construction is a direct adverse long-term impact. Since a major portion of the proposed road is on the existing alignment and do not utilize agriculture land, there will be minimum permanent loss of agriculture soil and land due to the road construction. In addition to this, there will be temporary impact on productive soil at diversions, and construction camp due to leasing or allocation of land for the construction period

3.2.3.2 Soil Erosion

The soil in the study area varies from loam to clay loam soils. Therefore, the potential for erosion varies along the alignments. Soil erosion will be aggravated if the vegetation is removed from the sides since roots are known to hold soil together. This will however be for a temporary duration until the compensatory afforestation and roadside turfing have matured. It will not be possible to widen the existing road without removing small trees and therefore erosion will be unavoidable. Mitigation measures such as turfing of road embankment slopes with shrubs and grasses will take care of soil erosion in to a considerable extent. In borrow pits, the depth of the pits should be regulated so that the sides of the excavation will have a slope not steeper than 1 vertical to 4 horizontal from the edge of the final section of bank. The device for checking soil erosion includes the formulation of sediment basins, slope drains etc.

3.2.3.3 Contamination of Soil

Contamination of soil during construction stage is primarily due to construction and allied activities. The sites where construction vehicles are parked and serviced are likely to be contaminated because of leakage or spillage of fuel and lubricants. Pollution of soil can also occur in hot-mix plants from leakage or spillage of asphalt or bitumen. Refuse and solid waste from construction camps can also contaminate the soil. Contamination of soil during construction might be a major long-term residual negative impact. Unwarranted disposal of construction spoil and debris will add to soil contamination. This contamination is likely to be carried over to water bodies in case of dumping being done near water body locations.

During the operation stage, soil pollution due to accidental vehicle spills or leaks is a low probability but potentially disastrous to the receiving environment, if they occur. These impacts can be long term and irreversible depending upon the extent of spill. The nearest cities should have fire fight facilities in order to meet the risks during the operation phase of the highways.

3.2.4 Impacts on Water Resources Environment

There are various water bodies, along the corridors including rivers, springs, and streams. Some impacts are anticipated on the water quality of these water bodies during the construction phase. Silt load in the streams at the culvert and bridge locations may increase during construction and the spillage of hazardous chemicals during accidents may pollute the waters thereby, affecting the ecosystem. The issue of blocking of cross drainage should be taken care throughout the project stretch. Care needs to be taken during the construction of culverts and bridges. In case of any water supply system at the downstream of the bridge location, prior information should be made to the concerned towns and villages and the construction activities should avoid discharge of any hazardous chemicals in to water system.

Degradation of water quality is also possible due to accidental discharges into watercourses from drainage of workers' camps and from spillage in vehicle parking and/or fuel and lubricant storage areas. However mitigation measures such as construction works close to the streams and other water bodies shall be avoided, especially during wet seasons.

Disposal of waste arising from the project activities should be done by approved waste disposal agents and collecting and storing of bituminous wastes and taking it to approved disposal sites will minimize the impact.

3.2.5 Impacts on Atmospheric Environment

Vehicular emissions are one of the major sources of air quality impacts of road projects. As the project envisages improvement of road conditions for smooth traffic flow, the project will have beneficial impact on air quality of the region during its operation. However, when viewed with respect to the existing ambient air quality or with respect to compliance of ambient air quality standards during the post upgrading phase of the road stretch, due to the increase in the traffic volume, the impact on air quality along the project roads is likely to be minor.

Impacts on air quality during the construction phase of the project will be considerable as the amount of work involved in improvement of the road is significant, but any possible impacts will be temporary. However, provision of adequate air pollution control equipment, like dust filters and measures like dust suppression by water sprinkling and planting of green belt may further help to significantly reduce the impact.

Emission of CO_2 and NO_x due to the combustion of diesel will be a principal cause of air pollution during the construction phase.

3.2.6 Impacts on Ambient Noise Level

During the construction phase of the road, the major sources of noise pollution will be vehicles transporting the construction material to the construction yard and the noise generating activities at the yard itself. Mixing, casting and material movement are primary noise generating activities in the yard and will be uniformly distributed over the entire construction period. Construction activities are anticipated to produce noise levels in the range of 80 - 95 dB (A). The construction equipment will have high noise levels, which can affect the personnel operating the machines.

The noise likely to be generated during excavation, loading and transportation of material will be in the range of 90 to 105 dB (A) and this will occur only when all the equipment operate together and simultaneously. This however is a remote possibility. The workers in general are likely to be exposed to an equivalent noise level of 80 to 90 dB (A) in an 8-hour shift, for which all statutory precautions will be taken into consideration. Careful planning of machinery selection, operations and scheduling of operations will reduce these levels.

As the project road passes through populated areas at cities, towns and villages centers, people in these places will be exposed to the high noise levels. Uninterrupted movement of heavy and light vehicles at high speeds may cause increase in ambient noise levels on the project road. It may have negative environmental impacts on the sensitive receptors close to the project road.

3.2.7 Impacts on Fauna

The increased activities of vehicle movement will disturb the sensitive movements of fauna. The impacts are expected to be more severe during the times of accidents of vehicles carrying hazardous goods such as petroleum products or rubber latex. In the absence of proper accident management mechanisms, such accidents will be very hazardous to flora and fauna of the region.

Some sections of the proposed upgrading of the road to asphalt standard are near forest areas. From the site visits and discussion with officials, it is inferred that there are no noticeable habitats or wild or endangered animal habitats along close vicinity of the project road. This can be inferred due to the presence of human settlements and farmlands along the existing roads. But upgrading of the road will result in increased human activities along the project area. Further, noise due to construction machineries and increased vehicular movement for raw material transportation for road construction will disturb the fauna along the area during construction phase.

3.2.8 Impact on Ecological Resources

The road passes near forest areas. These areas are rich in bio-diversity as presented in the baseline environmental profile of the project road. The envisaged borrow pits and land acquisition in the project road will bring about hill cutting and tree cutting. This would have substantial irreversible and long-term impact on the flora and fauna of the project area.

3.2.9 Construction of Site / Camp Buildings

This activity will involve construction of buildings for office, construction camps and habitation during the construction phase. This may result in clearing of vegetation and pose sanitary and health problems in the construction camps.

3.2.10 Impact on Land Use

The land use along the project road is expected to experience a change due to increased economic activities after project completion. Characteristics of areas of major concern for impact mitigation along the project road include the following:

3.2.11 Rivers / Streams

There are several small rivers/streams along the project road, which might get contaminated owing to the project activities both during and after construction. Field investigations showed that any activity that obstructs the natural flow of the streams could lead to flooding problems.

3.2.12 Rivers / Streams

There are several small rivers/streams along the project road, which might get contaminated owing to the project activities both during and after construction. Field investigations showed that any activity that obstructs the natural flow of the streams could lead to flooding problems.

3.2.13 Impacts on Public Health - HIV/AIDS/STIs

Dust borne communicable diseases, respiratory infections and minor throat and eye irritations are expected, especially during the dry season as a result of the emission of vehicular pollutants and dust (carbon monoxide and particulates). The presence of construction workers and related increase in disposable cash makes the transmission of STIs a possibility. Inadequate management

of construction waste and domestic waste generated at the work sites and sewage from the construction camp(s) would create conditions for the growth of vectors of diseases such as cholera and dysentery. The outbreak of these diseases would have far-reaching negative implications for the health of residents. The increase in health cases could bring pressure to bear on personnel and resources at the limited health posts in the county.

Nowhere is impact prevention more important than in the area of road safety and human health. The road project may have serious negative consequences for the health of local populations. Throughout the world, the spread of HIV and other sexually transmitted infections (STIs) can be linked to the construction of roads and the resultant opening-up of new regions. Although there are no empirical data to support this theory as far as Liberia is concerned, it is believed that migrant populations, particularly truck drivers and construction workers whose mobility is enhanced by new road project are the most likely vectors for these diseases. Moreover, with opening of the region, there is likely to be building of cheap lodgings along the road which is likely to turn into brothels.

3.2.14 Impacts on Occupational Health and Safety

Injuries resulting from falling from heights and falling objects, as well as from the (mis) use of equipment and tools, cuts from stepping on sharp objects such as nails and other metal off-cuts and injuries resulting from clashes between vehicles and the workers as they both operate within the same space are likely to occur during the implementation of the project.

3.3 ENVIRONMENTAL ENHANCEMENT & MITIGATION PROGRAM

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The environmental enhancement and mitigation program has been prepared to enhance the beneficial or positive impacts of the project, and mitigate the adverse or negative impacts of the project. The following matrices in Table provide a summary of the potential adverse environmental and social impacts associated with the road project and enhancement and management/mitigation plans proposes. The management plans contain measures to prevent or mitigate the impacts:

Project Activities/Impact		Air Emission Management Plan	Noise and Vibration Management Plan	Ecological Management Plan	Waste Management Plan	Water Management Plan	Erosion and Sedi-ment Control Plan	Spill Prevention and Response Plan	Hazardous Materials Management Plan	Borrow Pit/ Quarry/ Raw Materials Management Plan	Cultural Heritage Management Plan	Community Impact Management Plan	Resettlement Action Plan
PRE-CONSTRUCTION/PREPARATION PHASE													
Site Clearance (Impacts on Human Use Value, Cultural & Historical Resources)	Resettlement of Residential Structures												X
	Relocation of Businesses												X
	Relocation of Graves											X	X
	Relocation of Public Utilities											X	X
Demolition of Structures (Impacts on Human Use Value, Cultural /Historical Resources)	Reduced air quality	X		X								X	
	Noise Pollution		X									X	
	Generation of waste				X	X		X	X			X	
	Increased traffic movements/accidents	X	X									X	
Leveling and grading sites and access (Impacts on Air, Noise, Soil & Water Environments)	Reduced air quality	X		X								X	
	Noise Pollution		X									X	
	Soil Erosion						X						
	Increased traffic movements/accidents	X	X									X	
Setting up construction camps, staging and storage areas (Impacts on Air, Noise, Soil & Water Environments)	Reduced air quality	X		X								X	
	Noise Pollution		X									X	
	Generation of waste				X	X		X	X			X	
	Increased traffic generation/accidents	X	X									X	
	Spillage/Contamination of soil			X		X	X	X				X	

CONSTRUCTION PHASE													
Requirement for Construction Materials (Impacts on Topography, Soil, Water, Public & Occupation Health)	Quarrying of rocks	X	X	X	X	X	X	X	X	X	X	X	
	Extraction of sand	X	X	X	X	X	X	X	X	X	X	X	
	Extraction of soil	X	X	X	X	X	X	X	X	X	X	X	
	Use of Water					X	X			X			
	Increased traffic movements/accidents	X	X									X	

Project Activities/Impact		**Air Emission Management Plan**	**Noise and Vibration Management Plan**	**Ecological Management Plan**	**Waste Management Plan**	**Water Management Plan**	**Erosion and Sediment Control Plan**	**Spill Prevention and Response Plan**	**Hazardous Materials Management Plan**	**Borrow Pit/ Quarry/ Raw Materials Management Plan**	**Cultural Heritage Management Plan**	**Community Impact Management Plan**	**Resettlement Action Plan**
Operation of Plants (Impacts on Air, Noise, Human Use Value, Soil, Public Health and Occupational Health)	Reduced Air Quality	X		X		X		X	X	X		X	
	Noise Pollution		X	X								X	
	Increased Traffic/Accidents/Spillages	X	X					X				X	
	Land Acquisition			X									X
	Soil Contamination			X			X	X	X	X		X	
	Reduced air quality	X		X								X	
	Noise Pollution		X									X	

Sub-grading, excavating, embanking the road base and road construction (Impacts on Air, Noise, Human Use Value, Soil, Public and Occupational Health)	Traffic Disruption	X	X									X	
	Generation of waste				X	X		X	X			X	
	Restriction on access to residences and businesses											X	X
	Soil erosion						X						
	Surface water run-off					X	X						
	Soil Contamination			X		X		X					
	Impact on Cultural Sites										X	X	
Construction of Stream Flyover (Impacts on Air, Noise, Human Use Value, Cultural & Historical Resources, Soil, Public and Occupational Health)	Reduced air quality	X		X								X	
	Noise Pollution		X									X	
	Accidents and Spillages			X		X		X				X	
	Impact on Cultural Sites										X	X	
	Increased Traffic Movements/Accidents	X	X									X	
	Impact on groundwater					X		X				X	
	Discharge to surface water			X		X	X					X	
	Soil erosion						X						

Project Activities/Impact		Air Emission Management Plan	Noise and Vibration Management Plan	Ecological Management Plan	Waste Management Plan	Water Management Plan	Erosion and Sediment Control Plan	Spill Prevention and Response Plan	Hazardous Materials Management Plan	Borrow Pit/ Quarry/ Raw Materials Management Plan	Cultural Heritage Management Plan	Community Impact Management Plan	Resettlement Action Plan
General Site Maintenance Activities (Impacts on Air, Noise Waste Management & Soil Environments)	Reduced air quality	X		X								X	
	Noise Pollution		X									X	
	Waste Generation				X			X	X				
	Localized spillages					X		X					
General Community effects (Impacts on Human Use Values, Cultural & Historical Resources, Public Health)	Increased traffic movements resulting in increased risk to public	X	X									X	
	Health and safety risks to public											X	
	Impacts of site security on public											X	
	Presence of migrant workforce											X	
	Impact on local resources from construction workforce											X	
	Impact on community health from construction workforce											X	
OPERATIONAL PHASE													
Road Users (Impacts on Air, Noise, Water Resources & Public Health)	Noise Pollution		X									X	
	Reduced air quality	X		X								X	
	Surface water drainage discharge			X		X	X					X	
	Increased traffic	X	X									X	

	movements/accidents/congestion												

CHAPTER FOUR: INSTITUTIONAL AND LEGAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT GUIDING THE ESMP

The key legal instruments applicable to environmental and social management with respect to this road project are but not limited to the following:

- Constitution of Kenya, 2010 ;
- Environmental Management and Coordination Act (EMCA), 1999 ;
- Environmental Impact (Assessment and Audit) Regulations, 2003 ;
- Environmental Management and Co-ordination (Waste Management) Regulations 2006;
- Environmental Management and Coordination (Water Quality) Regulations 2006;
- Lands Act, 2012;
- Factories and Other Places of Work Act;
- National Land Commission Act, 2012 ;
- Water Act, 2002 ;
- Public Health Act, Cap 242;
- Wayleaves Act, Cap 292;
- Land Adjudication Act ;
- Public Roads and Roads of Access Act, Cap 399;
- Limitations of Actions Act Cap 22.

CHAPTER FIVE: STAKEHOLDERS CONSULTATIONS

The key stakeholders identified and consulted in the area include leaders in the communities, the national government representative DCC, ACC, area Chiefs and the host community along the road corridor. At the Barazas, the overview of the proposed project and appreciation of ESMP were presented. Furthermore, the challenges that could impede the implementation of the project and the support needed from all parties to ensure effective project and successful implementation were also discussed with the stakeholders. A summary of the issues and/comments raised by the various stakeholders and how the issues were and/are to be addressed at the meetings or by the Project are highlighted.

5.1 The Objectives of Community Consultations

- Canvass the inputs, views and concerns; and take account of the information and views of thepublic in the project design and in decision making.
- Obtain local and traditional knowledge that may be useful for decision-making;
- Ensure that important impacts are not overlooked and benefits maximized;
- Reduce conflict through the early identification of contentious issues;
- Provide an opportunity for the public to influence the designs and implementation in a positive manner; and
- Increase public confidence in the project.

5.2 Reactions from the Participants and Prompt Response from KeNHA Team.

Table.5-2

Issues/Concerns raised by the community	**Response from KeNHA Team**
Appreciation from the community and assurance for support for successful execution of the project.	The project is expected to commence very soon since the contractor is fully prepared to undertake the project activities.
Employment opportunities and procedure of recruitment	The contractor will provide employment opportunities on commencement of the project and recruitment will be done through DCC and Chiefs office.
Drainage and de siltation	The contractor will design culverts along the road corridor and the storm water will be directed to nearby rivers.
Clarification on acquisition of Material site	The contractor will make writing agreement with the land owner through the DCC office and remain with copy of the agreements,

Settlement along the road reserve	KeNHA will utilise the design by KeRRA and hence no one will be affected.
Concerns on excessive noise and vibration	The mines and geology department will carry out baseline information and licence the contractor, hence only very minimal effects will be felt.
Cooperate Social Responsibilities, the community made request for some projects as way of giving back to the community	Since the project is GoK, the government provided money only for the construction of the road. However the contractor can do some for the local communities'goodwill.
Animal and Wildlife Crossing	Designated Animal and Wildlife crossing will be made by the contractor at different positions
GBV-concerns on the upbringing of children born between foreign workers and locals.	All the works will sign KeNHA's code of conduct, where every worker will be informed of the work ethics and consequences on breaching the code of conductor.

5.3 Grievance Redress Mechanism

A grievance mechanism will be adopted before the commencement of the project. Any person having grievance will have the opportunity of submitting their grievance/complaint either via a grievance form or verbally.

5.4 Complementary Initiatives

As a policy, gender mainstreaming and inclusivity are among the development pillars of the Kenyan Goverment. As such, KeNHA ensures that project design will have to include complementary initiatives that will improve socio-economic conditions of the local communities. The complementary initiatives proposed based on the general understanding of the project area, constraints grasped during the ESIA study and consultations held are: prevention of the spread of communicable diseases, road safety education campaigns, gender mainstreaming and sensitization campaigns, youth empowerment, improvement of roadside markets and trees planting**.**

5.5 Responsibilities and Institutional Arrangements

- The following institutions will have responsibilities for the implementation of this ESMP:

1. Kenya National Highways Authority;
2. Environmental and Social Officer (ESO);
3. Contractor;
4. Local Authority; and
5. The host community

Figure: 5-1 stakeholder engagement at Njukini and Rombo

CHAPTER SIX: THE ESMP MATRIX

Outlines the;

- Environmental /Social Quality parameters likely to be impacted,
- The anticipated risks and impacts when project activities interact with the environment,
- Risk/impact indicators,
- Recommended Corrective Action Plans,
- Means and frequency of Monitoring risks/impacts
- Responsible parties for the implementation and enforcement of the mitigation measures

The Key Environmental and social components that have been considered for corrective action plans based on anticipated risks/impacts are;

- Air Quality;
- Water Quality and Supply;
- Waste and effluent Management;
- Wildlife Habitat Connectivity;
- Noise and Vibrations;
- Land Use;
- Occupational Health and Safety;
- Gender Concerns (GBV);
- HIV/AIDs;
- Terrestrial Environment(Flora &Fauna)
- Soil Quality

ESMP Matrix

Table: 6-3

Environmental and social issues	Anticipated risk/impacts	Indicators	Mitigations/action plans	Means of verification	Frequency of monitoring	Responsibility
Air Quality	• Poor air quality due to fugitive dusts (operations, road use & haulageroutes) and exhaust fumes emissions; may lead to respiratory disorders and decline in crop productivity along the construction corridor.	• Fugitive dusts • Exhaust fumes/smoke	• Watering of diversions /detour spots during dry weather shall be enhanced; • Wet crushing technology shall be adopted at quarries to reduce dust emissions; • The contractor shall procure fuel efficient machines/trucks with permissible emission limit. • Issue all the Project workers appropriate PPE	• Visibility of fugitive dusts/exhaust fumes • Frequency of watering deviations • Air quality parameters be within permissible Limits	Daily	Contractor NEMA, KeNHA to enforce implementation

Water Quality	Contamination of water resources by waste (grey & black) water from support facilities such as campsites/plants Flooding due to disruption of drainage systems during construction Localized depletion of water resources as a result of abstraction for construction and domestic(workers) utilization	• Change in water quality(BOD,COD, nutrients load; • Increase in peak flood levels ; • Reduction in water quantity (both at the source of abstraction and downstream)	• Establishing pillage/leakage containment units where there is likelihood of spillage wash-offs; • Water quality monitoring to help in managing deviations from baseline quality; • Sustainable storm water management practices during construction e.g. Cut off drains, check dams; • Water accounting to help in providing alternative (e.g. boreholes, storm water reservoirs) water supply ;'during dry spell to avoid water related stress/conflicts	• Deviation from baseline water quality (COD, BOD, Nutrients, TSS, Oils) standards • Free flow of storm water to natural catchments • Vegetation cover along finished sections	Throughout Continuous during rainy season	Contractor KeNHA,WRA & NEMA to enforce compliance
Wildlife Habitat Connectivity	The proposed alignment traverses wildlife habitats (natural forests), the construction is going to create habitat fragmentation or patches of habitats	• Wanderig of wildlife	Safe animal crossing structures will be constructed to reduce road kills and enhance habitat connectivity	• Reduction in road kills	Throughout construction phase	Contractor Collaborative enforcement by KeNHA and KWS

	Wildlife road kills during construction and operational phase is likely to increase	• Wildlife vehicle collisions	Wildlife crossing paths			
Noise and Vibrations	Noise pollution Excessive vibrations causing cracks on walls and nuisance to people around the construction sites under compaction, drilling & blasting	• Excessive use of explosives • Use of noisy equipment/plants • Public complaints	Compliance with explosives permit/license conditions Minimum 3day prior notice of impending explosive operations for the communities around to adjust psychologically Procuring machines/trucks that meet internationally recognized noise emission standards Machine operators /truck drivers will be sensitized on safe healthy driving habits to avoid unnecessary braking or hooting.	• No. of complaints from the public • Noise above maximum permissible levels (75 dB(A) day time, 65 dB(A) Night) • Compliance with the Integrated National Land use Guidelines by NEMA(2011)for Mining and Quarrying Operations	Continuous	Contractor
Occupational Health and Safety	Injuries/illness and fatalities of construction workers due to biological, physical and ergonomic	• Number frequency and severity of injuries	Providing suitable, adequate and effective PPEs to construction workers as per the kind of operation(s) to be undertaken;	• Compliance with OSHA,2007	Continuous	Contractor

	hazards at construction sites Poor road safety to road users and neighbouring communities safety, chemical,	Accidents involving road users with the construction equipment or within the construction Corridor	Preparation, implementation and enforcement of Traffic Management Plan along the construction corridor for safety of workers ,public road users and neigbouring communities ; Deployment of traffic Marshalls along the project corridor Erection of road safety signage Safeguarding all the material sites Carrying routine medical tests for all workers depending on the risks exposure			Enforcement by KeNHA
Land Acquisition and Resettlement	Displacements of people and properties along the road corridor	• Stand offs at work • Stop of work Cases reported	The existing road alignment will be maintained, and physical displacement will be minimized.	Number of grievances solved Development of plans and surveys that show the measures that have been taken to avoid and minimise displacement	Continuous	Contractor KeNHA and Government Agencies such NLC to enforce implementation
Prevention of Gender	Harassment of opposite sex,	Complains from community members	Enforce KeNHA worker code of conduct regarding GBV and sexual harassment, including training and	Presence of worker code of conduct.	continous	KeNHA and Contractor

Based Violence (GBV) and Sexual Harassment	Spread of HIV/AIDS Early Pregnancy		awareness raising within the workforce and local communities, including schools. Penalties such as termination of contract and / or imprisonment will be enforced in the case of proven incidents.	Training materials and records related to GBV and sexual harassment.		
Waste and Effluents	Degradation of valuable environmental components such as wildlife, water, Air,aquatic life, and soil Haphazard disposal of wastes is likely to reduce the aesthetic value of the environment	• Change in quality of environmental components (soil, water, Air, wildlife) • Littering	• Waste management plan shall be prepared and implemented by the contractor • Effective implementation of waste management hierarchy (avoidance, reduction, reuse, recycle and safe disposal by licensed handler) shall be practiced as feasible as possible • Construction workers shall be sensitized on sustainable waste handling and why they should practice it • No waste (grey) water runoff or uncontrolled discharges from construction sites such as washrooms shall be discharged into nearby water resources, the same precaution shall be applied to sediment –loaded runoffs • The use, storage, transport and disposal of hazardous materials used	• Compliance levels with Waste Management Regulations (2006) when handling all categories /Volumes of wastes generated • Frequency of waste collections	Periodic (weekly,quaterly) as the situation may demand	Contractor

			for the project will be carried out in accordance with all applicable Kenyan regulations and MSDS			
Soil Quality	Intense soil erosion and nutrient wash-off is anticipated because of numerous road cut and fill embankments that contribute to runoff and high sediment production Soil compaction by heavy earth moving construction machines (particularly during wet weather)may result into hard pans that reduces infiltration of water moleculesthus increasing storm water flow volumes Soil degradation due to spillage /leakage of oil, diesel and other hydrocarbon contaminants	• Change in soil colour and texture • Sediments and debris build up increasing turbidity/TSS of nearby surface water resources or pockets of pond water around • Modification of soil fertility(increasing Soil pH,low phosphorus nutrients and microbial activities)	• Confining project operations such as earthworks, excavations and bush clearing to avoid exposing adjacent soils to agents of soil erosion • Proper installation of drainage structures to channel storm water to the nearest natural catchments • Confining the movement of heavy construction machines within construction corridor • Drivers /operators will be sensitized on sustainable machine operations such as keeping trucks off vegetation or farmlands • Material sites shall be accessed through existing rural access road/pathways to avoid compaction of farm lands. • Stabilization of slopes or road embankments to reduce soil particles run off/wash-off	• Visible demarcation of vehicles and equipment outside permitted construction corridor zone • Deviation from baseline soil quality measurements • Observed hard soil pans	Continuous	Contractor KeNHA and other state agencies e.g. NEMA to enforce implementation

			• Planting grass/vegetation cover along the corridor to act as sediment/siltation traps • Soil quality monitoring with in the auxiliary facilities such as camps sites, workshop/garage area, fuel yards and nearby farms, in that respect, implementing appropriate corrective measure			
Child Protection	Child abuse/labour	Incidences of child Vices e.g. molestation ,child labour ,defilement etc.	• Implementation and enforcement of laws protecting rights and safety of children • No engagement of persons below the age of 18 to undertake any form of project related activity All construction workers to sign code of conduct integrated with child protection components	Reported cases of child vices Compliance with labour related laws in Kenya	Continuous	Contractor KeNHA and Relevant State Agencies to enforce implementation
Terrestrial Environment(Flora &Fauna)	Reduction in vegetation cover Destruction of habitats for animals	• Disappearance or relocation of Fauna Bear land	• The contractor shall be restrained from unnecessary bush clearing • The contractor shall confine the construction works within the permitted construction corridor • The contractor shall enforce Environmental Awareness Programs on workers	• Number of trees planted • Records of cleared acreages • Availability of plants and animals conservation plans	Continuous	Contractor KeNHA,

			• Compensatory tree planting and progressive re-vegetation of completed sections shall be carried out to increase vegetation cover • Biological Stabilization of road embankments using natives species will be enforced to enhance conservation of local species • Collaborative conservation of native plant and animal species outside protected areas Locating support facilities like campsites in least ecologically important sites (areas) to minimize risks and impacts on terrestrial flora and fauna			

6.2 MONITORING AND REPORTING

Monitoring the implementation of this ESMP shall be conducted to ensure that mitigation measures are implemented, effective and there is immediate response to new and emerging environmental and social concerns. The project operations are expected to comply and adhere to environmental regulations and contraction obligation hence the need for monitoring and review of the ESMP.

The monitoring programs shall be undertaken before the construction, during the construction and post construction phases. Regular Internal monitoring of project operations and audit of ESMP effectiveness shall be conducted by the contractor/consultant and submitted to the KeNHA.

The Contracting Authority (KeNHA) and other State Agencies such as NEMA, Water Resources Authority and Mines and Geology Department has the responsibility of conducting random external monitoring to confirm compliance with EIA license conditions and verify and or improve the outcomes of internal monitoring.

6.3 CONCLUSION AND RECOMMENDATIONS

The ESMP study results show some negative environmental impacts of the project, as well as socio-economic benefits to the people of Kajiado County, Taita Taveta and the Country. The associated negative impacts, to a large extent can be minimized through good engineering design, construction and operational practices.

Specific mitigation measures have been identified in this report. The contracting Authority (KeNHA) shall ensure the contractor implements all the recommendations given in the ESMP and further carrying out the environmental auditing and monitoring schedules to ensure proper implementation to the environmental measures of the road construction.

CHAPTER: SEVEN

APPENDICES

APPENDIX 1:	Air Emission Management Plan
APPENDIX 2:	Noise and Vibration Management Plan
APPENDIX 3:	Ecological Management Plan
APPENDIX 4:	Waste Management Plan
APPENDIX 5:	Water Resource Management Plan
APPENDIX 6:	Erosion and Sediment Control Plan
APPENDIX 7:	Spill Prevention and Response Plan
APPENDIX 8:	Hazardous Materials Management Plan
APPENDIX 9:	Borrow Pit/Quarry/Raw Materials Management Plan
APPENDIX 10:	Community Impact Management Plan

APPENDIX 1:

7.1 AIR EMISSION MANAGEMENT AND MONITORING PLAN

Objectives

This Air Emissions Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road project.

The objective of this plan is to minimize potential air emission impacts on receptors resulting from construction of the road. Potential receptors on the route could include local residents and businesses and specific fauna.

This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Waste Management Plan;
- Borrow Pit/Quarry/Raw Materials Management Plan;
- Erosion and Sediment Control Plan;
- Hazardous Materials Management Plan; and
- Environmental Monitoring Plan.

The table below presents a summary of the potential environmental impacts related to air quality, together with mitigation and management measures to avoid or reduce these impacts.

The Contractor shall develop an Air Emissions Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures.

The Environmental and Social Officer commissioned by KeNHA will be responsible for reviewing the Air Emissions Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-1

Mitigation/Management	**Monitoring Frequency**	**Responsible Party**
Contractor will prepare an Air Quality Management Plan	Continuous	Contractor
Monitoring to be undertaken at established monitoring sites (At nearest sensitive receptors as agreed with the residents) in accordance with the requirements of the NEMA and International Guidelines).	Continuous	Contractor
Undertake periodic monitoring in the vicinity of plant/activities with the potential for significant emissions (e.g, hot asphalt, soil storage compounds, etc).	Continuous	Contractor
Undertake air monitoring at locations with persistent air quality complaints.	As required	Contractor
Limit vehicle speed to 30 km/hr for all vehicles travelling on unpaved roads and keep vehicles to marked trafficable areas.	Continuous	Contractor
Ensure that all roadways are maintained	Continuous	Contractor
Implement wet dust suppression on Unpaved roads during works.	Continuous	Contractor
Ensure that vehicles carrying loads with the potential to generate dust are appropriately sheeted		
Situate all soil stockpiles away from site boundaries and sensitive receptors	Continuous	Contractor
Keep drop height to a minimum (vehicle offloading of soil, rubble or	Continuous	Contractor

		any other materials that will emit dust During handling).		
		Implement dust suppression measures for all stockpiles	Continuous	Contractor
		Re-vegetate long-term stockpiles.	Review prior to construction	Contractor
Emissions from plant and vehicles	Reduced air quality with consequent and project nuisance. Greenhouse gas emissions.	Select construction equipment based on industry good practice	Continuous	Contractor
		Ensure that all plants is turned-off while not in use	Continuous	Contractor
		Locate fixed and mobile equipment (E.g. asphalt plants, generators) away from sensitive receptors.	Continuous	Contractor
		Service all diesel-powered equipment on a regular basis	Continuous	Contractor
		Ensure that construction plant is maintained on a regular basis	Continuous	Contractor
		No burning of waste to be undertaken on site	Continuous	Contractor

Surveys

Contractors shall undertake air quality monitoring at established background locations. In addition, prior to the commencement of works, the contractor shall identify work locations, including haul routes, construction compounds and hot asphalt plants, which represent an air quality risk to community dwellings and other sensitive receptors (including schools, medical centres, etc.). The contractor shall then agree with the Safeguard team, site specific air quality monitoring requirements at the location of the nearest sensitive receptors and mitigation measures to be implemented at such locations, as required.

Roles and Responsibilities

The Contractor's Air Quality Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel. Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Air Quality Management Plan.

Training, Awareness and Competency

The Contractor's Air Quality Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Air Quality Management Plan are competent on the basis of education, training and experience.

The Contractor's training activity associated with the Air Quality Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Reporting and Notification

Contractor shall report to the KeNHA the results of the surveys undertaken in accordance with the relevant components of the Air Quality Management Plan and integrate the results, including additional mitigation and management measures as agreed.

Contractor's monthly/ quarterly report to KeNHA shall include:

- Number and results of verification inspections prescribed in the table above; and
- Results of Monitoring.

APPENDIX 2:

7.2 NOISE AND VIBRATION MANAGEMENT AND MONITORING PLAN

OBJECTIVES

This Noise and Vibration Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road project.

The objective of this plan is to minimize potential noise and vibration impacts on receptors resulting from construction of the road. Potential receptors on the route could include local residents and businesses and specific fauna.

This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Ecological Management Plan;
- Community Health and Safety Plan; and
- Environmental Monitoring Plan.

The table below presents a summary of the potential environmental impacts related to noise and vibration, together with mitigation and management measures to avoid or reduce these impacts.

The Contractor shall develop a Noise and Vibration Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures. The Environmental and Social Officer commissioned by KeNHA will be responsible for reviewing the Noise and Vibration Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-2:

Noise and vibration source	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
Noise from Construction vehicles and Plants	Disturbance to residents, business and local ecology	Contractor will prepare a Noise Management Plan. The plan should be designed and noise monitoring undertaken by appropriately qualified specialists. Engage with residents and businesses in areas where potentially significant noise levels are to result from construction activities.	N/A As required	Contractor Contractor/ESO
		Ensure that construction works near receptor centers are only undertaken in defined working hours (weekdays 8h00 – 17h00 and weekends 8h00 – 14h00). In the event that noisy activities are undertaken outside of the specified working hours, all noise receptors will be informed of such activities in advance.	Ongoing	Contractor

		In accordance with NEMA regulations incorporating WHO Guidelines for Community Noise (1999); the contractor should implement mitigation measures to achieve the following measured daytime noise levels at the nearest sensitive receptor: • 55 dBA for residential; and • 70 dBA for industrial/ commercial or; • Or result in a maximum increase in background levels of 3 dB at the nearest receptor location offsite.	continuous	Contractor
		Utilize noise mitigation measures (including the construction of bunds, metal sheet walls) in order to limit noise levels at sensitive receptors.	Continuous	Contractor
		Ensure that equipment to be used meets industry best standard in relation to noise attenuation.	Review prior to construction	Contractor

Surveys

During construction works, the Contractor shall undertake background noise monitoring at the receptor centers.in compliance with NEMA regulations. In addition, the contractor will also identify additional work locations, including haul routes and construction compounds, which represent a noise and vibration risk to community dwellings and other sensitive receptors (including schools, medical centers etc.). The contractor shall then agree with the Safeguard Offices, site specific noise and vibration monitoring requirements at the location of the nearest sensitive receptors and mitigation measures to be implemented at such locations, as required.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Noise and Vibration Management Plan. Contractor's Noise and Vibration Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel. The Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Contractor's responsibilities in the Noise and Vibration Management Plan

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Noise and Vibration Management Plan are competent on the basis of education, training and experience. Contractor's Noise and Vibration Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

Contractor's training activity associated with the Noise and Vibration Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken. Contractor shall ensure that all personnel responsible for the execution of tasks and requirements in the Noise and Vibration Management Plan are competent on the basis of education, training and experience.

Contractor training activity associated with the Noise and Vibration Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

APPENDIX 3:

7.3 ECOLOGICAL MANAGEMENT AND MONITORING PLAN

Objectives

This Ecological Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini Taveta road project.

The objective of this plan is to:

- Avoid, where practicable, and reduce impacts on terrestrial and aquatic habitats and specific habitat features of ecological importance.

This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Water Management Plan;
- Hazardous Materials Management Plan;
- Borrow Pit/Quarry/Raw Materials Management Plan;
- Spill Prevention and Response Plan;
- Erosion and Sediment Control Plan; and
- Cultural Heritage Management Plan.

The table below presents a summary of the potential environmental impacts related to ecology, together with mitigation and management measures to avoid or reduce these impacts. The contractor shall develop an Ecological Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures. The Safeguard officers commissioned by KeNHA will be responsible for reviewing the Ecological Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-3

Source of Impacts	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
Site clearance for widening of road corridor	Habitat loss	Ensure that the extent of vegetation to be cleared is clearly identified on technical drawings and appropriately marked on the road corridor	Prior to clearance work	Contractor
		Prohibit works from exceeding the Approved working corridor.	Continuous	Contractor
Site clearance for construction of staging and storage areas	Habitat loss	Ensure that the minimum numbers of staging and storage areas required are constructed.	Prior to construction work	Contractor
		Ensure that sites chosen for staging and storage sites are located in areas of low ecological value	Prior to construction work	Contractor
		Ensure that the extent of vegetation to be cleared is clearly identified on technical drawings and appropriately marked on site.	Prior to construction work	Contractor
		Prohibit works from exceeding the approved working corridor.	Continuous	Contractor
Site clearance for construction of access roads	Habitat loss	Ensure that the extent of vegetation to be cleared is clearly identified on technical drawings and appropriately marked on site.	Prior to construction and ongoing	Contractor
		Prohibit works from exceeding the approved working corridor.	Continuous	Contractor
Dust from	Dust deposition	Ensure that dust mitigation measures outlined in the Air Emissions Management Plan are fully implemented.	Prior to construction	Contractor

construction works and plants	impacting on habitat and fauna	Ensuring that plants are not located in close proximity to ecologically sensitive areas	Continuous	Contractor
Noise from construction works, plant and vehicles	Disturbance to fauna	Ensure that noise mitigation measures outlined in the Noise and Vibration Management Plan are fully implemented.	Continuous	Contractor
Encroachment of soil from storage mounds onto vegetated areas adjacent to works areas	Sediment deposition impacting on habitat and fauna	Ensure that mitigation measures to prevent the encroachment of material from stockpiles/storage mounds outlined in the Erosion and Sediment Control Plan are implemented.	Continuous	Contractor
Soil erosion resulting from exposure and Destabilization of landforms and soils storage	Sediment entering rivers/streams/lakes from resulting in increased turbidity/ reduced water quality and impacts on biodiversity	Ensure that measures outlined in the Erosion and Sediment Control Plan are implemented.	Continuous	Contractor
Bridge/channel Construction works	Erosion of riverbanks/changes in sedimentation/ Erosion patterns resulting in increased turbidity/ reduced water quality and impacts on biodiversity	Ensure that measures outlined in the Erosion and Sediment Control Plan are implemented.	Ongoing	Contractor
		Identify land based sources of sand and avoid the requirement for dredging from river where possible	Prior to dredging works	Contractor

Dredging of sands from rivers for the Construction works	Impacts on benthic fauna	Undertake ecological surveys at proposed dredging locations prior to the commencement of dredging activities.	Continuous	Contractor
		Where surveys identify the presence of sensitive/significant ecological receptors, identify alternative source location and/or develop appropriate mitigation measures	Prior to dredging activities	Contractor
Waste deposition in rivers/streams	Reduced water quality resulting on impacts on biodiversity	Ensure that mitigation measures outlined in the Waste Management Plan are implemented.	Ongoing	Contractor
Leaks/spillages from plant, vehicles and storage compounds .	Soil contamination and impacts on vegetation	Ensure that hazardous materials management procedures, as outlined in the Hazardous Materials Management Plan are fully implemented	Continuous	Contractor
		In the event of spillages/leaks being occurring/being identified, ensure the procedures outlined in the Spill Prevention and Response Plan are implemented.	Continuous	Contractor
Light pollution during Construction phase and permanent road lighting	Disturbance to, harassment of and decreases in animal and plant individuals/communities	Direct light in construction areas and from permanent road lighting to reduce illumination of surrounding areas and minimize disturbance to nocturnal fauna, where security and health and safety factors allow.	Continuous	Contractor
Wildfires	Wildfire destroying habitat	Leave cleared vegetation to rot and prohibit burning if a fire hazard exists.	Continuous	Contractor

Development of new and existing quarries/sand and/or soil pits	Loss of habitat	Ensure that ecological surveys are undertaken prior the development of new/extension of existing quarries/sand pits/soil pits	Prior to development	Contractor
		Implement appropriate mitigation measures (including the creation of buffer zones) to protect any significant habitat/ fauna identified.	Prior to development	Contractor
Lack of awareness of Construction personnel	Damage to habitat and fauna	Ensure that all construction personnel are provided with appropriate training in ecological awareness, as appropriate to their work activities	Ongoing	Contractor

Survey and Audits

The Contractor shall undertake the following surveys/Audits:

- Ecological surveys of proposed sand dredging locations;
- Audits to confirm that measures identified in Management Plans above are implemented. These include:
    - Dust mitigation measures as identified in Air Emissions Management Plan;
    - Noise mitigation measures as identified in Noise and Vibration Management Plan;
    - Erosion and Sediment control measures as identified in the Erosion and Sediment Control Plan
    - Waste management measures as identified in the Waste Management Plan;
    - Hazardous materials management as identified in hazardous Materials Management Plan;
    - Spill Prevention and Response measures in the Spill Prevention and Response Plan.

- The contractor will undertake regular audits of storage mounds and compounds to confirm that there is no encroachment of soil from storage mounds onto vegetated areas adjacent to works areas

Baseline ecological surveys undertaken as part of the ESIA process identified that there are designated ecological areas within the site boundary and no records of any protected species. Habitat within the site boundary comprises primarily of sparse herbaceous species and secondary forest plants which provide little cover or forage for animals.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Ecological Management Plan.

The Contractor's Ecological Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Ecological Management Plan are competent on the basis of education, training and experience. The Contractor's Ecological Management Plan shall describe the training and awareness requirements necessary for its effective implementation. All training activity associated with the Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken

Reporting

Contractor shall report to KeNHA the results of the surveys/audits/inspections undertaken in accordance with the relevant components of the Ecological Management Plan. Contractor's monthly/ quarterly report to KeNHA shall include:

- Number and results of surveys/audits/ inspections.

The safeguard officers will also undertake verification audits/ inspections and will submit routine reports to KeNHA

APPENDIX 4:

7.4 WASTE MANAGEMENT AND MONITORING PLAN

Objectives

This Waste Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road project.

The objectives of the plan are to:

- Establish waste management priorities based on the understanding of the potential Environmental, Health and Safety (EHS) risks and impacts associated with the project and considering the consequences of waste generation;
- Considerate the prevention, reduction, reuse, recovery, recycling , removal and disposal of waste arising from project activities in such a manner as to minimize the potential impacts to human health and the environment;
- Disposal of waste that cannot be recovered or reused at approved facilities and in an environmentally sound manner;
- Minimize, contain, transport, handle and dispose of solid and liquid wastes arising from project construction activities in such a manner as to minimize impacts to human health and the environment; and
- Dispose of wastes on the authorization/approval of NEMA.

This plan should be read in-conjunction with other Management Plans prepared for the road project, namely:

- Ecological Management Plan;
- Spill Prevention and Response Plan;
- Community Health and Safety Plan;
- Environmental Monitoring Plan; and

The table below presents a summary of the potential environmental impacts related to waste generation, together with mitigation and management measures to avoid or reduce these impacts.

The Contractor shall develop a Waste Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures. The Environmental and Social Officer commissioned by KeNHA will be

responsible for reviewing the Waste Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-4 **WASTE MANAGEMENT AND MONITORING PLAN**

Source of waste impacts	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
Pre-construction Preparation works. To include waste associated with: • Demolition of Structures in the ROW. • Clearing trees and ground • Developing the construction site	Increased generation of waste.	It is envisaged that the majority of the waste generated during this demolition is reusable. Incorporate measures for the use of recyclable materials. Develop a waste inventory; this should detail the different waste streams, classification, quantities, storage requirements, and potential use, and treatment and disposal arrangements. Ensure the waste hierarchy is applied.	Undertake audits to demonstrate compliance with local and inter-national requirements. Periodically review the waste inventory and update as necessary. Establish recycling objectives and formal tracking of waste generation and recycling rates.	Contractor
	Pollution of nearby receptors (i.e. controlled waters)	Develop procedures and controls to ensure appropriate storage of waste to minimize risk of pollution.	Undertake audits to demonstrate compliance with local and international requirements.	Contractor
	Inappropriate disposal of waste (i.e. fly tipping)	Ensure that appropriately licensed Transportation contractors and disposal sites are identified and used. Develop procedures and controls. Gain authorization from NEMA for the disposal of waste.	Documented evidence of waste movements.	Contractor

	Generation of dust	Ensure that measures outlined in the Air Emissions Management Plan are implemented.	Continuous	Contractor
	Noise and vibration from vehicle movements	Ensure that measures outlined in Noise and Vibration Management Plan are implemented.	Continuous	Contractor
Waste generation during construction phase: To include waste associated with: • Road Construction • Drain Construction • Bridge Construction • Construction Equipment • Concrete Mixing • Work camp	Generation of stone and waste earth, toxic gas, waste oils, domestic waste.	Review waste sources during the planning and designing phases to identify expected waste generation, identify opportunities for source reduction and reuse and recycling. Incorporate into the design the use of recyclable materials. Develop a waste inventory; this should detail the different waste streams, classification, quantities, storage requirements, and potential use, and treatment and disposal arrangements. Ensure the waste hierarchy is applied.	Undertake audits to demonstrate compliance with local and inter-national requirements. Periodically review the waste inventory and update as necessary. Evidence of waste movements. Establish recycling objectives and formal tracking of waste generation and recycling rates.	Contractor
	Inappropriate disposal of waste (i.e. fly tipping)	Ensure that appropriately licensed transportation contractors and disposal sites are identified and used. Develop procedures and controls. Gain authorization from the urban environmental sanitation company for	Documented evidence of waste movements.	Contractor

		transport and treatment of waste.		
	Pollution of nearby receptors (i.e. controlled waters)	Develop procedures and controls for on-site storage, minimizing the risk of pollution. During the design phase of the project ensure that measures are developed and implemented to minimize pollution to receptors, ensure these measures are implemented (e.g. using a grating net with geotextile material during construction of the upper bridge to minimize pollution of the river.) When using the floating tank in the river, the waste oil and oily rags will be segregated and stored in labeled containers on the barge. This will be replaced when full. The full container will be stored on concrete hard standing in a secure location. Ensure the storage yard is surrounded by a fence of geo-textile. Provide storage for domestic waste on the construction sites and at the site huts. Assess options for recyclable materials.	Undertake audits to demonstrate compliance with local and inter-national requirements. Establish recycling objectives and formal tracking of waste generation and recycling rates.	Contractor
	Generation of dust	Ensure that measures outlined in the Air Emissions Management Plan are implemented.	Continuous	Contractor

	Noise and vibration from vehicle movements	Ensure that measures outlined in Noise and Vibration Management Plan are implemented.	Continuous	Contractor
Generation of hazardous waste Activities include: Replacing machine oils, Performing maintenance tasks on	Soil, groundwater and surface water contamination.	Establish and implement operational controls for on-site storage of hazardous waste. Store hazardous waste in a secure area on concrete hard standing. Ensure	Undertake audits to demonstrate compliance with local and international requirement .	Contractor

Equipment		containers are labeled so contents can be identified Ensure the waste hierarchy is applied.	Conduct regular inspections of waste storage areas and document the findings. Maintain an inventory of hazardous waste generation, to include quantities, storage requirements and disposal arrangements. Review this document periodically. Report hazardous waste information to EPA and MPW.	
		Where liquid waste is stored in volumes greater than 58 gallons, secondary containment should be implemented. The available volume of secondary containment should be at least 110% of the largest storage container of 25% of the total storage capacity.		Contractor
		When using the floating tank in the river, the waste oil and oily rags will be segregated and stored in labeled containers on the barge. This will be replaced when full. The full container will be stored on concrete hard standing in a secure location.		Contractor
	Waste contamination	Minimize hazardous waste generation by implementing stringent waste segregation in order to prevent commingling of hazardous and nonhazardous waste.	Periodic checks of hazardous waste storage area	Contractor

	Inappropriate disposal of waste (i.e. fly tipping).	Ensure that appropriately licensed transportation contractors and disposal sites are identified and used. Develop procedures and controls. Register the waste source with the EPA and MPW	Documented evidence of waste movements	Contractor

Table 7-5 Typical Waste Stream to be generated

Waste stream	Composition	Classification Proposed	Storage Method	Options for waste treatment and/or disposal	Option(s) Recommended
Construction waste	Concrete, asphalt, gravel, stone, inert materials, wood, metals, plastics, insulation, packaging (material bags), plasterboard/ gypsum, general waste	Recyclable/ Combustible	Waste skips; inert Materials stockpiled on hard standing	Crush inert materials and reuse on-site; segregate metals, wood, plastics and send to reprocess or; disposal to landfill. As part of the design phase, assess the potential for the recycling of the construction waste.	Segregate metals and send to re-processor; investigate recycling feasibility for other materials; disposal to landfill.
Topsoil	Turf, soil, gravel	Inert	On-site storage areas to await reuse	Reuse on-site (consider options for use as bunds to offer acoustic screening); reuse off-site; disposal on-site; disposal off-site	Reuse on-site bunds for acoustic screening)

Waste from vegetation clearance	Wood, plant matter	Combustible	On-site storage areas	Composting of plant matter on-site; composting of plant matter off-site; recycling of wood by reprocess or	Recycling of wood
Domestic waste	Food waste, sanitary waste, card and paper, packaging, plastics, textiles.	Recyclable/ compostable / combustible	On-site storage in wheeled bin containers	Segregate recyclable materials (glass bottles, paper, plastics, metals etc.); disposal to landfill Composting of food waste offsite. Sanitary waste to be treated at the local sewage treatment works.	Segregate recyclable materials. Composting
Waste Engine oil	Oil	Hazardous / combustible	On-site storage in bunded containers	Off-site reprocessing	Off-site reprocessing Waste engine oil can be easily reprocessed offsite

Solid hazardous waste	Oily rags Empty containers	Hazardous/ combustible	On-site storage, segregated and stored in a labeled wheeled bin container	Off-site reprocessing then reuse. Disposal to landfill	Off-site Reprocessing, then reuse.

Auditing

During the project, the Contractor should develop and inventory of waste. This should include all waste streams, classifications, quantities, storage requirements, options for reuse / recyclability and treatment and disposal requirements. This should be reviewed periodically throughout the life cycle of the project to ensure it encompasses everything.

As waste producers, the Contractor has a 'duty of care' obligation regarding the management of waste. The Contractor is obliged to minimize the risk of pollution and ensure that those that handle and dispose of the generated waste are authorized to do so. Third party audits should be undertaken and relevant paperwork maintained to ensure that the waste generated is being handled, treated and disposed of appropriately.

Regular inspections of waste storage areas should be carried out by the Contractor and findings should be documented.

Prior to the commencement of works, the Contractor should agree with the mitigation measures to be implemented. Regular checks should be carried out to ensure that these are being implemented and that they are effective.

Roles and Responsibilities

The main Contractor will be responsible for delivering the Waste Management Plan and will be responsible for coordinating and managing day-to-day responsibilities for waste management throughout the construction period.

The main Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Waste Management Plan.

Contractor's Waste Management Plan shall describe any necessary environmental controls or mitigation measures to be implemented. The plan shall be periodically reviewed and as necessary updated.

The Contractor will monitor the performance of sub-contractors and will be responsible for appropriate collection, segregation, treatment and transfer of waste for appropriate processing and disposal of waste.

The Contractor will maintain appropriate documentation to demonstrate compliance with local and international standards.

Training, Awareness and Competency

The raising of environmental awareness is viewed as a crucial element in the appreciation and implementation of a Waste Management Plan. It is importuned that the environmental requirements are appropriately communicated. The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Waste Management Plan are competent on the basis of education, training and experience.

Contractor's Waste Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

Contractor's training activity associated with the Waste Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken. The Contractor shall ensure that all its personnel responsible for the execution of Contractor's tasks and requirements in the Waste Management Plan are competent on the basis of education, training and experience.

Contractor's training activity associated with the Waste Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Reporting and Notification

Contractor shall report to KeNHA the results of the surveys undertaken in accordance with the relevant components of the Ecological Management Plan and integrate the results, including additional mitigation and management measures as agreed with KeNHA, with the Noise and Vibration Management Plan.

Contractor's monthly report to Company shall include:

- Number and results of verification inspections prescribed in the table
- Waste transfer documentation
- The waste inventory
- Performance indicators (recycling objectives and rate

APPENDIX 5:

7.5 WATER RESOURCE MANAGEMENT AND MONITORING PLAN

Objectives

This Water Resource Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road project.

The objective of this plan is to minimize potential effects on water resources and associated receptors resulting from construction of the road.

Potential receptors along the route could include surface water features (i.e. rivers, streams, drainage channels, ponds), groundwater resources and associated users and specific flora and fauna.

This plan should be read in-conjunction with other Management Plans prepared for the road, namely:

- Ecological Management Plan; and
- Community Health and Safety Plan;

The table below presents a summary of the potential environmental impacts related to water resource, together with mitigation and management measures to avoid or reduce these impacts.

The Contractor shall develop a Water Resource Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures. The Environmental and Social Officer commissioned by KeNHA will be responsible for reviewing the Water Resource Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-5 **WATER RESOURCE MANAGEMENT AND MONITORING PLAN**

Source of impact	**Potential Impact**	**Mitigation/Management**	**Monitoring Frequency**	**Responsible Party**
Site clearance demolition and preparation	Physical (i.e. dust, sediments) and chemical (i.e. oil, petrol etc.) conta-minants resulting in a reduction in water quality	Ensure use and storage of hazardous materials is in accordance with waste management regulations and international guidelines, such as: • Ensure all hazardous substances and materials are stored in appropriate locations with impervious hard standing and adequate secondary containment; • Construction workers to be provided with adequate training on use, storage and handling of hazardous substances; • Portable spill containment and clean-up equipment to be provided at appropriate locations on site and training in the use of the equipment. (See Borrow Pit/Quarry/Raw Materials Management Plan and Spill Prevention and Response Plan).	continuous	Contractor

		Ensure that dust mitigation measures outlined in the Air Emissions Management Plan are fully implemented.	continuous	Contractor
		Develop a procedure for managing the discovery of contamination to minimize or reduce the risk to water resources.	Continuous	Contractor
		Develop an Emergency Preparedness	continuous	Contractor
		and Response Plan in accordance with OSHA General EHS Guidelines: Environmental.		
		The contractor shall undertake water quality and level monitoring at the locations monitored (as identified in the ESIA) in order to confirm general compliance with the WRA requirements.		
	Increased flood risk from surface water run-off	Ensure that the extent of vegetation to be cleared is clearly identified on technical drawings and appropriately marked on the road corridor to minimize the increase in surface water run-off	Prior to construction	Contractor
		Re-vegetate cleared areas promptly	continuous	Contractor
		Provide temporary surface water drainage system including settlement ponds /sediment traps prior to discharge points to control volume of Discharge	continuous	Contractor

Staging and storage sites	Reduction in water quality from storage of construction materials/chemicals	Ensure that the minimum numbers of staging and storage areas possible are used. Where possible, ensure that all staging and storage areas are not located within 50m of surface water courses.	Prior to construction	MPW/Contractor
		Ensure use and storage of hazardous materials is in accordance with Waste management regulations Environmental, such as: • Ensure all hazardous substances and materials are stored in appropriate locations with impervious hard-standing and adequate secondary containment. • Construction workers to be provided with adequate training on use, storage and handling of hazardous substances. • Portable spill containment and clean-up equipment to be provided at appropriate locations on site and training in the use of the equipment. (See Hazardous Materials Management Plan and Spill Prevention and Response Plan).	Continuous	Contractor

		Ensure that dust mitigation measures outlined in the Air Emissions Management Plan are fully implemented.	Continuous	Contractor
		Ensure that mitigation measures outlined within the Erosion and Sediment Control Plan are fully implemented.	continuous	Contractor
		Develop an Emergency Preparedness and Response Plan in accordance with OSHA 2007, on Environmental.	Prior to construction	Contractor
	Increased flood risk to construction workers	Ensure that staging and storage sites are not located within high water levels associated with rainy season.	Prior to construction	Contractor
		Avoid vegetation stripping immediately prior to or during rainy season, where possible.	Prior to construction	Contractor
		Ensure that appropriate temporary drainage is implemented to ensure staging and storage sites are not inundated during rainy season	Prior to construction	Contractor

Material extraction for road construction	Physical (i.e. dust, sediments) and chemical (i.e. oil, petrol etc.) contaminants resulting in a reduction in water quality	Develop measures to prevent, minimize, or control impacts caused by extraction activities in accordance with NEMA Guidelines for Construction Materials Extraction, such as: • Adoption of settlement ponds, sumps, and lagoons designed to allow adequate retention time. • Construction of a dedicated drainage network; • Installation of sediment traps along water drainages, including fascines, silt fences, and vegetation traps.	Prior to construction	Contractor
		Ensure that mitigation measures outlined within the Erosion and Sediment Control Plan are fully implemented.	Ongoing	Contractor
		Develop an Emergency Preparedness and Response Plan in accordance with OSHA 2007 Environmental.	Prior to construction	Contractor
	Effects on ecology from dredging sands from river bed	Ensure that mitigation measures outlined in the Ecology Management Plan are fully implemented.	Continuous	Contractor
	Increased flood risk from surface water run-off	Develop measures to prevent, minimize, or control impacts caused by extraction activities in accordance with	Prior to construction	Contractor

		OSHA Guidelines for		
		Construction Materials Extraction, such as: • Storm water peak runoff rate should not exceed the peak predevelopment runoff rate for a particular design storm; • Adoption of settlement ponds, sumps, and lagoons designed to allow adequate retention time.		
Road construction Including sub-grading, excavating and embanking the road base	Physical (i.e. dust, sediments) and chemical (i.e. oil, petrol etc.) conta-minants resulting in a reduction in water quality	Ensure use and storage of hazardous materials is in accordance Waste management Guidelines: Environmental, such as: • Ensure all hazardous substances and materials are stored in appropriate locations with impervious hard-standing and adequate secondary containment. • Construction workers to be provided with adequate training on use, storage and handling of hazardous substances • Portable spill containment and clean-up equipment to be provided at appropriate locations on site and training in the use of the equipment.	continuous	Contractor

		Ensure that dust mitigation measures outlined in the Air Emissions Management Plan are fully implemented	Continuous	Contractor
		Ensure that mitigation measures outlined within the Erosion and Sediment Control Plan are fully implemented.	Continuous	Contractor
		Develop an Emergency Preparedness and Response Plan in accordance with OSHA, 2007 Guidelines: Environmental.	Prior to construction	Contractor
	Reduction in water quality from increased erosion.	Ensure that mitigation measures outlined within the Erosion and Sediment Control Plan are fully implemented.	Continuous	Contractor
Bridge construction	Reduction in water quality.	Implement measures outlined in the Water Quality 2006, Guidelines: Environmental , such as: • Consider installation of free-spanning structures (e.g., single span bridges).	Prior to construction	Contractor

		• Restricting the duration and timing of in-stream activities to the dry season and avoiding periods critical to biological cycles of valued flora and fauna (e.g. migration, spawning, etc.) • For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediments to moving water	continuous	Contractor
		Ensure that mitigation measures outlined in the Erosion and Sediment Control Management Plan	Continuous	Contractor

		are fully implemented.		
		Ensure emergency response procedures are developed in line with the OSHA 2007 guidance documents in the event of an accidental release of Contamination		
	Change in river flow dynamics from bridge construction	Ensure that any channels and ditches required as part of road construction are designed to allow for post-construction flows.	Prior to construction	Contractor
	Inundation during periods of heavy rainfall	Schedule construction activities to avoid heavy rainfall periods (i.e. during the dry season) to the extent practical.	Continuous	Contractor
Water consumption	Increased water consumption associated with Construction camps	Preparation of a water management program including: • Identification, regular measurement, and recording of principal water usage associated with workers facilities. • Review of measurement should emphasize areas of greatest water use and enable further water efficiency measures to be considered.	Ongoing	Contractor

	Water consumption associated with construction/concrete batching etc.	Consideration of the following Water Quality Regulations 2006, Guidelines: Environmental water conservation measures. • Implement water use efficiency to reduce the amount of water usage. • Storm/Rainwater harvesting and use where possible.	Continuous	Contractor
		• Re-use of treated waste water to be included in project design processes where feasible. • Project design to have measures for adequate water collection, spill control and leakage control system.		

Waste water discharges	Reduction in water quality from increased waste water discharges from plant	Manage waste water discharges in line with the waste management regulations Guidelines: Environmental. Generation and discharge of wastewater of any type should be managed through a combination of: • Water use efficiency to reduce the amount of wastewater generation • If needed, application of wastewater treatment techniques to reduce the load of contaminants prior to discharge, taking into consideration potential impacts of transfer of contaminants during treatment (e.g., from water to air or land)	continuous	Contractor

	Reduction in water quality from increased waste water discharges from workers camps	Manage waste water discharges in line with Waste Management Regulation Guidelines: Environmental Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Adopt water efficiency measures to reduce the amount of wastewater generation.	Continuous	Contractor

Surveys

During construction works, the contractor will identify additional work locations, including haul routes and construction compounds and aggregate borrow pits, which may potentially represent a risk to sensitive water resource receptors (including rivers, streams, drainage ditches, springs etc.) due to their proximity. Prior to the commencement of works, the contractor shall agree with the Safeguard team on site specific mitigation measures to be implemented at such locations to mitigate potential negative effects.

The contractor shall conduct environmental assessments at surface water abstraction sites to confirm water abstraction requirements do not impact on downstream users or environmental flows.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Water Resources Management Plan.

Contractor's Water Resources Management Plan shall describe the resources allocated and responsibility for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

KeNHA shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of Contractor's responsibilities in the Water Resources Management Plan.

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Water Resources Management Plan are competent on the basis of education, training and experience. Contractor's Water Resources Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

Contractor's training activity associated with the Water Resources Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken. MPW shall ensure that all personnel responsible for the execution of Contractor's tasks and requirements in the Water Resources Management Plan are competent on the basis of education, training and experience.

Contractor's training activity associated with the Water Resources Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Reporting and Notification

Contractor shall complete regular monitoring of all mitigation measures developed to determine their effectiveness at reducing and minimizing adverse effects. Where evidence of impacts are

identified or implemented mitigation measures appear to be inadequate additional mitigation measures will be developed and implemented.

The contractor shall report to KeNHA the results of the monitoring/surveys/audits /inspections undertaken in accordance with the relevant components of the Water Resources Management Plan.

Contractor's weekly/monthly report to MPW shall include:

- Number of monitoring/surveys/audits/inspections;
- A summary of the findings and results of all monitoring/surveys/audits/inspections; and
- Where evidence of impacts are identified or implemented mitigation measures appear to be inadequate, additional mitigation measures will be developed and reported.

The contractor will also undertake verification audits/inspections and will submit routine reports to KeNHA.

APPENDIX 6:

7-6 EROSION AND SEDIMENT CONTROL MANAGEMENT AND MONITORING PLAN

Objectives

This Erosion and Sediment Control Management Plan is prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road.

The objectives of this plan are to maintain stable landforms, reduce erosion and enhance reinstatement and to reduce potential adverse effects on stream/river water quality and sedimentation.

This plan should be read in conjunction with other Management Plans prepared for the project, namely:

- Air Quality;
- Ecological Management Plan;
- Waste Management Plan;
- Borrow Pit/Quarry/Raw Materials Management Plan;
- Hazardous Materials Management Plan;
- Spill Prevention and Control Plan; and
- Water Management Plan.

The table below presents a summary of the potential environmental impacts related to erosion and sediment mobilization, together with mitigation and management measures to avoid or reduce these impacts.

The Contractor shall develop an Erosion and Sediment Control Management Plan which will, as a minimum, incorporate the measures described in the table below, but shall not be limited to these measures. The Safeguard officers of KeNHA will be responsible for reviewing the Erosion and Sediment Control Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-6 EROSION AND SEDIMENT CONTROL MANAGEMENT AND MONITORING PLAN

Source of Impacts	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
	Soil erosion resulting in	Assess and establish erosion and sediment control requirements (particularly in relation to site preparation earthworks (soils storage mounds), riverbanks adjacent to bridge works, site drainage), detailing specific erosion and sediment controls to be implemented (e.g., diversion drains, sediment ponds and fabric silt curtains). The controls should limit the mobilization and dispersion of sediment into freshwater and estuarine environments.	Undertake visual Surveys every 3 months in dry season and monthly in wet season as a minimum.	Contractor

Sub-grading, excavating, embanking the road base and road construction	reduced water quality, flooding, reduced agricultural productivity and impact on reservoir capacity and life expectancy.	Should erosion result in any serious collapse of roadside slopes/ banks, the contractor should implement appropriate mitigation measures. These could include: - Constructing of a retaining wall, combining drainage and surface reinforcement. - Construction of a retaining wall or arranging rock or reinforcing surface to protect and contribute retaining wall to protect slope. - Planting grass to reinforce the surface in combination with drainage.	Ongoing	Contractor
		Ensure that there are no discharges of solid waste from construction and/or domestic waste into rivers.	Continuous	Contractor
		Ensure that high embankment and embankment adjacent to rivers and lakes	Continuous	Contractor

		shall be reinforced with rubble stone, mortar 10 MPa, 25cm in thickness, that is above the ballast layer, 10cm in thickness for anti-erosion purpose.		
		To prevent the risk of overflow and erosion of soil in temporary storages areas, the following measures will be implemented: • Quantity of material stored will be limited to 20-25 m^2 and mounds will be no higher than 1.5m; and • The temporary storages must be surrounded by a geotextile fabric fences and securely reinforced to avoid collapsing.	Continuous	Contractor
		Ensure that any material overflowing from stockpiles/storage embankments onto residential/agricultural land is removed immediately upon identification.	Ongoing	Contractor
		Provide a commitment to compensate for damages to agricultural land/other others caused by sedimentation.	Continuous	Contractor

		Install and regularly maintain screens to collect mud from surface water. (The mud screen should be made of geo-textile fabric and arranged at least10cm depth and consolidated to avoid falling in). Undertake regular checks of screens (at least twice per day) to ensure drainage channels are clear of mud.	Continuous	Contractor
		In order to prevent oil and solvent in the mixture of liquid asphalt used for	Continuous	Contractor

		covering road from entering into the water source, the construction of asphalt concrete road surface should only be undertaken on dry days, and when road base is dry. If it rains during the operation, it needs to cancel the construction and prepare the dry sand to cover the road surface when adhesive asphalt is spraying.		
	Erosion and landslides in wet season in the excavation areas	Program works to ensure that excavation and embankment are completed for each road base section and compacted before wet season.	Continuous	Contractor
		When undertaking excavation works in hilly and mountainous areas: • limit clearance of the vegetation cover beyond the scope of site clearance; • undertake excavations in areas with high positive slope, excavate in dry season: • Undertake slope stability and erosion protection before the peak time of wet season.	Continuous	Contractor

		For excavation works during the rainy season, construct temporary drainage channels to divert water to natural Soak-aways away from areas of potential erosion	Continuous	Contractor
		Ensure that cross-culverts are clear and new/existing drainage systems are installed and operable prior to main rain season	Continuous	Contractor
		Ensure that grass slopes on the margins of roads are replanted with grass as soon as the construction is completed.	Continuous	Contractor
Construction of bridge abutment, pier and bridge ends	Change in sedimentation/erosion regime of the river bed resulting from the change in flow velocity in the vicinity of the bridge piers and ends	Implement design measures to minimize issues of erosion of riverbanks in the vicinity of new bridges/bridge improve-ments. This could include the construction of stone embankments and the planting of vegetation on slopes.	Design Stage	KeNHA/Contractor
		When excavating foundation pits during the wet season, ensure that temporary mud screens are located around the pit and around the foundation pit. The screen should be cleared at least twice a day to operate effectively.	Continuous	Contractor
		Implement measures to ensure that there are no discharges of bentonite mixed mud into river;	Continuous	Contractor

		All bentonite mud should be appropriately transferred and stored in the temporary storage yard.		
		Prevent solid waste generated during bridge construction from entering water bodies. This should include the use of nets lined with geotextile as a barrier when implementing the construction of bridge.	Continuous	Contractor
		To prevent the collapse of road at the head of bridge, the surface of slope should be planted, to prevent erosion, and combine with the suitable drainage system.	Continuous	Contractor
Discharges from plants and dewatering of excavations and washing down of plant and equipment	Reduced water quality and associated impacts on fish and benthic fauna	Ensure that mitigation measures outlined in the Ecology Management Plan are fully implemented. Ensure that waste water from the plants is collected and treated recycled for reuse. Ensure that all water from dewatering operations is treated in settling ponds prior to discharge. Ensure that all water for used for washing down plant and equipment is collected in a settling pond prior to discharge.	Continuous	Contractor

Contaminated surface water/storm water discharge during road operation	Reduced water quality and associated impacts on fish and benthic fauna	Ensure that road drains and silt traps are maintained on a regular basis.	Continuous	Contractor

Surveys

The contractor will undertake periodic surveys of erosion on the edges of the road and of the riverbanks in the vicinity of bridge works. The surveys should be undertaken every 3 months in the dry season and every month in the wet season as a minimum.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Erosion and Sediment Control Management Plan

The Contractor's Erosion and Sediment Control Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

Training, Awareness and Competence

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Erosion and Sediment Control Management Plan are competent on the basis of education, training and experience.

The Contractor's Erosion and Sediment Control Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

The Contractor's training activity associated with the Erosion and Sediment Control Management shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Reporting and Notification

Contractor shall report to KeNHA the results of the surveys undertaken in accordance with the relevant components of the Erosion and Sediment Control Management Plan,

Contractor's weekly/monthly report to Company shall include:

- Number of surveys of erosion undertaken during the week/month and summary of the findings; and
- A summary of any actions undertaken where erosion issues have been identified

APPENDIX 7:

7.7 SPILLPREVENTION AND RESPONSE MANAGEMENT AND MONITORING PLAN.

Objectives

This Spill Prevention and Response Plan is prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Tveta road project.

The objective of this plan is to prevent spills and in the event of a spill, to minimize the environmental and social impact. This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Ecological Management Plan;
- Waste Management Plan; and
- Community Health and Safety Plan;

The table below presents a summary of the potential environmental impacts related to spill with mitigation and management measures to avoid or reduce these impacts.

Contractor shall develop a Spill Prevention and Response Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures. The KeNHA will be responsible for reviewing the Spill Prevention and Response Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-7 **SPILLPREVENTION AND RESPONSE MANAGEMENT AND MONITORING PLAN**

Source of Impacts	**Potential Impact**	**Mitigation/Management**	**Monitoring Frequency**	**Responsible Party**
Spillage of oil/fuel/chemicals during transport, storage, handling or refueling	Pollution of nearby receptors (i.e. controlled waters)	Prior to the commencement of construction activities, Contractor shall undertake a spill risk assessment to establish high risk locations and activities. The risk assessment will identify measures to reduce associated risks to as low as reasonably practical. Site and activity specific response measures will be incorporated into Contractor's Spill Prevention and Response Plan. As a minimum this should cover: - A description of activity type and operator information; - A responsible person, detailing job role and contact details; - Notification requirements; - Clear distinctions of severity ofspills, according to the size and nature of the spill, using a clearly defined tiered approach; - Spill response frameworks based on site	Periodic reviews of the risk assessment throughout the lifetime of the project.	Contractor

		specific risk assessments include location volume, type of spill and environmental sensitivity; - Strategies and equipment for managing spills; - Procedures to mobilize external resources for responding to large spills; - A full list and the location of onsite and off-site spill response equipment and the response time estimates for deploying the		

		equipment; - A plan of the surrounding area showing topography, drainage flow paths, ground and surface water resources, sensitive and protected areas, community and cultural sensitivities; - Clean up strategies and handling instructions for recovered oil, chemicals and fuels. To include transportation, temporary storage and treatment / disposal (see Waste Management Plan); - Identification and evaluation of potential discharge detection procedures and equipment; - Facility response self-inspection, training, exercises, drills and logs; - Security measures, including fences, lighting guards, etc. Risk assessments will be updated as necessary to incorporate the changes throughout the project. The mitigation measures will also need to be updated as a result of the updated risk assessment; these will be incorporated into the Contractor's Spill Prevention and Response Plan.		

		Fuel and chemical storage facilities shall be purpose-built, located in designated aboveground areas away from watercourses and provided with secondary containment. Where liquid waste is stored in volumes greater than 58 gallons, secondary containment should be implemented. The available volume of secondary containment should be at least 110% of the largest storage container of 25% of the total storage capacity. The integrity of all storage tanks and bunds will be inspected for leaks. Ensure appropriate spill kits are available at each work site as necessary. All vehicles transporting hazardous materials will carry appropriate spill kits. Identify appropriate location for the spill kits and ensure they contain the necessary spill response equipment. Carry out regular inspections of the kits to ensure they are fully stocked. Ensure relevant personnel are trained in spill response and emergency situations. Training sessions should be both desk based and practical.	Document the findings of the inspections Record in inspection logs the findings. Training records should be maintained and refresher training carried out periodically.	Contractor Contractor

		Operational practices for vehicle/ equipment refueling, which include the prevention of spillage and the use of spill containment and response equipment, are to be in place. Include a requirement for fuel delivery vehicles and equipment to be routinely inspected so as to ensure the tank, pumps, pipework and the vehicle itself are free from leaks and fit for purpose. Refueling should not be performed within 30m of surface water and any drainage systems.	Review the operational procedures throughout the lifetime of the project and update these periodically. Document the findings of the inspections.	Contractor
		Material Safety Data Sheets (MSDS) should be kept within each storage area where substances are stored and at the site office.	See Hazardous Materials Management Plan	Contractor
		Vehicles and equipment are to be maintained and inspected to a high level of safety with respects to leaks.	continuous	Contractor
		Equipment and vehicles will not be washed near to watercourses.	Continuous	Contractor

		Immediately notify the EPA and MPW of significant spills, the notification should include: - Whether the spill was contained or uncontained - Material released - The volume - Location - Cause - Proposed corrective measures - Response time - Clean up required - Initial assessment of environmental and social impact.	Incident logs to be maintained and reviewed for learning outcomes.	Contractor
		Inspect and evaluate the presence and performance of spill prevention measures. Record the findings in an inspection log.	Maintain inspection logs	Contractor
		In the event of significant spillage, assess the need for remediation of water/ground. This will require sampling water/ground to assess the impacts.	Monitoring regime to be developed depending on the nature of the spillage.	Contractor
		Carry out an initial inspection of fuels and hydrocarbon storage areas to identify any non-conformances with Waste Management Regulations guidelines. Where nonconformance is observed (e.g. the fuel and tar storage tanks at the asphalt plant), develop an action plan with	Regular inspections of the storage areas with documented findings.	Contractor

		corrective actions and a responsible person.		
		Where there is evidence of spillage present at the site, assess the activities carried out on site and review the operational procedures in place. Modify these where appropriate. Ensure relevant personnel are trained and carry out refresher training where necessary.		Contractor
Bentonite Spillage	Pollution of nearby receptors (i.e. controlled waters)	Bentonite mixed mud will not be discharged into stream or river. Bentonite mixed mud will be stored in the storage yard, The storage yard will not be within 30m of surface water.	Regular visual inspection	Contractor

Construction of bridges and working near water	Pollution of nearby receptors (i.e. controlled waters)	During the design phase of the project, ensure that measures are developed and implemented to minimize the potential for spillage and pollution of surface water, ensure these measures are implemented (e.g. using a grating net with geotextile material during construction of the upper bridge to minimize pollution of the stream/river.) Develop operational procedures where tasks are being carried out in or nearby water, this should also include maintenance of equipment and the use of spill containment booms in the water during active works.	Carry out regular visual inspections to ensure compliance.	Contractor
Underground Storage Tanks	Contamination of ground and groundwater	Evaluate the risk of existing USTs to determine if upgrades are required, including replacement with new systems or closure. Ensure underground storage tanks (UST) and associated pipework are double-walled and a leak detection system is in place. Avoid the use of USTs for storage of highly soluble organic materials. Regularly test the integrity of the USTs.	Regularly monitor the surface above the tank for indications of soil movement. Consider monitoring of groundwater down gradient of USTs.	

Risk Assessments

As part of a detailed execution plan and prior to the commencement of work, the Contractor shall carry out a detailed risk assessment. This should establish the high risk locations and activities and identify measures to mitigate impacts and reduce the risks to as low as reasonably practical. As part of the risk assessment, specific response measure should be developed. The Contractor's spill risk assessment will be subject to review and approval by the Energy Regulation and KeNHA will be responsible for reviewing the Spill Risk Assessment prepared by the contractor and for ensuring that it comprehensively covers conditions on site.

Spill Response

The level of spill response will be dependent on the nature of the spill. Clear distinctions of severity of spills, according to the size and nature of the spill, using a clearly defined tiered approach will be developed as part of the Contract risk assessment; this will indicate whether the contractor will be capable of responding to the spill or whether an external resource will be required. The spill categorization and response will be subject to MPW's approval.

Where water/ground contamination has occurred, remediation should be carried out. A specific risk assessment should be developed to identify human health and environmental risks. A remediation plan should also be developed for the works. This should include target levels for contaminants of relevance and shall detail the need for a post remediation site assessment in order to verify successful remediation and, if required, any on-going monitoring.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Spill Prevention and Response Plan.

Contractor's Spill Prevention and Response Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Spill Prevention and Response Plan are competent on the basis of education, training and experience.

Contractor's Spill Prevention and Response Plan shall describe the training and awareness requirements necessary for its effective implementation. Contractor's training activity associated with the Spill Prevention and Response Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

KeNHA shall ensure that all Contractor personnel responsible for the execution of tasks and requirements in the Spill Prevention and Response Plan are competent on the basis of education, training and experience.

Reporting and Notification

Contractor shall report to KeNHA the results of the risk assessment and include any additional mitigation and management measures as agreed with Company in the Spill Prevention and Response Plan.

Contractor shall immediately notify KeNHA of all spills as detailed above. Contractor's weekly/monthly/quarterly report to KeNHA should include:

- The number of contained and uncontained releases;
- Number of spill prevention and response drills / toolbox talks / training;
- Results of the inspections carried out;

Results of any sampling undertaken (where applicable)

APPENDIX 8:

7.8 HAZARDOUS MATERIALS MANAGEMENT PLAN

Objectives

This Hazardous Materials Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road project.

The objective of this plan is to:

- Prevent uncontrolled releases of hazardous materials during transportation, handling, storage and use;
- Ensuring that any chemicals or materials subject to national or international

bans or phase-outs are not utilized This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Waste Management Plan;
- Water Management Plan; and
- Spill Prevention and Response Plan

The table below presents a summary of the potential environmental impacts related transportation, handling, storage and use of hazardous materials, together with mitigation and management measures to avoid or reduce these impacts. Contractor shall develop hazardous materials Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures.

This plan relates specifically to the transportation, handling, storage and use of hazardous materials. The requirement for to monitor and report information on hazardous wastes including the quantities generated by the project is included in the Waste Management Plan

Table 7-8 **HAZARDOUS MATERIALS MANAGEMENT PLAN**

Source	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
Transport, handling, storage and use of hazardous materials	Potential loss of hazardous material to air, soil, groundwater and surface waters	Avoid the use of hazardous materials	Ongoing	Contractor
		Prepare a register of all hazardous materials used on site, along with appropriate Material Data Safety Sheets.	Prior to construction and maintain	Contractor
		Undertake hazardous materials assessments for all materials. The level of risk should be established through an on-going assessment process based on the criteria defined in the Waste Management and OSHA Regulations Guidelines Ensure that results of assessment are incorporated into Spill Prevention and Response Plan	Continuous	Contractor
		Prepare spill management and response plans appropriate to all hazardous materials utilized on site (See Spill Prevention and Response Plan).	Prior to use and ongoing if new materials Used	Contractor
		Ensure that all hazardous materials are transported in an appropriate manner (relates to container and vehicle)	continuous	Contractor

		Ensure that all hazardous materials are stored in appropriate containers/areas with appropriate control systems (bunding, automatic alarms and shut-off systems). Avoid use of below ground storage tanks.	Prior to construction and ongoing	Contractor
		All fuel and chemical storage facilities should located away from watercourses and with appropriate secondary containment (bunding with a capacity of 110% of largest container and double-skinned tanks). This includes all temporary fuel stores.	Prior to construction and ongoing	Contractor
		Ensure that all storage facilities/tanks are clearly labeled.	continuous	Contractor
		Ensure that all storage facilities are fitted with locking systems to prevent unauthorized access.	Continuous	Contractor
		Ensure that all deliveries are supervised by appropriately trained personnel and they are undertaken in accordance with formalized Standard Operating Procedures (SOP).	Continuous	Contractor
		Ensure that all site personnel with access to hazardous materials are appropriately trained in their transportation, handling, storage and use and in spill response procedures.	Continuous	Contractor
		Ensure that appropriate spill response equipment is located in storage areas.	Continuous	Contractor

		Undertake regular audits and inspections of hazardous materials transportation, transfer and use procedures and operations and ensure that the requirements for any additional measures are addressed with both the Hazardous Materials and Spill Prevention and Response Plans.	Continuous	Contractor
		Undertake regular audits and inspections of storage facilities and tanks and ensure that the requirement for any additional measures are addressed with both the Hazardous Materials and Spill Prevention and Response Plans.	Continuous	Contractor
		Avoid use of hazardous materials subject to international bans and phase-outs.	Continuous	Contractor

Surveys

Contractor shall undertake routine audits and inspections of all hazardous materials transportation, handling and use procedures and of storage facilities.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Hazardous Materials Management Plan.

The Contractor's Hazardous Materials Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Hazardous Materials Management Plan are competent on the basis of education, training and experience.

The Contractor's Hazardous Materials Management Plan shall describe the training and awareness requirements necessary for its effective implementation. All training activity associated with the Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Reporting and Notification

Contractor shall report to KeNHA the results of the audits/inspections undertaken in accordance with the relevant components of the Hazardous Materials and Spill Prevention and Response Plans and integrate the results, including additional mitigation and management measures as agreed with KeNHA, within the Hazardous Materials Management Plan.

Contractor's monthly/quarterly report to KeNHA shall include:

- Number and results of verification inspections prescribed.

ESO will also undertake verification audits/ inspections and will submit routine reports to KeNHA.

APPENDIX 9:

7.9 BORROW PIT/QUARRY/RAW MATERIALS MANAGEMENT PLAN

Objectives

This Borrow Pit/Quarry/Raw Materials Management Plan is part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-Taveta road project.

The objective of this plan is to:

- Extract aggregate/sands from sustainable, approved locations;
- Encourage the local procurement of construction materials (iron, steel, sand, etc.).

This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Ecological Management Plan;
- Air Emissions Management Plan;
- Community Health and Safety Plan;
- Water Management Plan;
- Erosion and Sediment Control Management Plan; and
- Noise and Vibration Management Plan.

The table below presents a summary of the potential environmental impacts related to Borrow Pit/Quarry/Raw Materials, together with mitigation and management measures to avoid or reduce these impacts.

The contractor shall develop a Borrow Pit/Quarry/Raw Materials Management Plan, which will as a minimum incorporate the measures, described in the below table, but shall not be limited to these measures. The Safeguard officers will be responsible for preparing a site- specific Borrow Pit/Quarry/Raw Materials Management Plan which the contractor will then have to formally commit to implement.

Contractors responsible for multiple sections of the road project may utilize the same plan for each section provided that it is reviewed and revised to account for any site specific issues.

Table 7-9 **BORROW PIT/QUARRY/RAW MATERIALS MANAGEMENT PLAN**

Source of Impact	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
	Potential impacts associated with	Reduce the number of new quarries/soil/sand pits required (if applicable) by using existing (appropriately licensed) quarries.	As required	Contractor
		Environmental and social surveys and assessment to be undertaken for new Quarry/soil/sand pit sites.	As required	Contractor
		Confirm that quarries/soil/sandpits utilized have appropriate licenses and permits.	As required	Contractor

Quarrying of materials for use in construction	quarrying operations including: • Noise and vibration; • Loss of vegetation; • Water quality; • Air quality; • Cultural heritage; • Traffic; and • Soil erosion.	Contractors should audit/monitor management and mitigation measures and performance of the quarries identified to supply the project to ensure that they operate in accordance with the requirements of the NEMA and Land Use Guidelines on Construction Materials Extraction. This will specifically include: - Air emission (fugitive dust); - Noise and vibration (blasting and plant operation); - Water quality (erosion, run-off and water resource management); - Security and management of explosives; - Hazardous material management (transportation, storage and use); - Geotechnical stability (rock-face slopes); and - Emergency preparedness (explosion, fire, landslide, etc.).	Quarterly aud its/monitoring report	Contractor
		Should any environmental, health safety issues be identified in the quarterly	Continuous	Contractor

		auditing/monitoring reports then the contractor should work with the quarry operator to implement appropriate corrective actions/measures		
		The contractor will require the quarry operator to provide a copy of the proposed closure and rehabilitation plan prepared for the quarry. Should the operator not have a formalized plan, the contractor should work with the operator to develop an appropriate plan.	Immediately	Contractor/quarry operator
		If new quarries/soil/sand pits are required emphasis should be placed on them being located in areas with low ecological and landscape value and close to existing roads.	Ongoing	Contractor
		Avoid, where possible, the extraction of sand from rivers. Where required, undertake baseline assessments of the rivers and implement measures to avoid impacts on river flow, erosion, water quality (turbidity) and biodiversity	Prior to extraction	Contractor
Procurement of other Construction materials	Potential impacts associated with transportation of materials.	Contractors should, where possible, source construction materials (including iron, steel, concrete) from sustainable local suppliers.	Ongoing	Contractor

Surveys

Contractor shall confirm that all surveys identified in the Management Plans listed in the above table have been completed for existing and any new quarry sites.

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Borrow Pit/Quarry/Raw Materials Management Plan.

Contractor's Borrow Pit/Quarry/Raw Materials Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Borrow Pit/Quarry/Raw Materials Management Plan are competent on the basis of education, training and experience.

Contractor's Borrow Pit/Quarry/Raw Materials Management Plan shall describe the training and awareness requirements necessary for its effective implementation. The Contractor's training activity associated with the Borrow Pit/Quarry/Raw Materials Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

KeNHA shall ensure that all Contractors personnel responsible for the execution of tasks and requirements in the Borrow Pit/Quarry/Raw Materials Management Plan are competent on the basis of education, training and experience.

Reporting and Notification

The Contractor shall report to the KeNHA the results of the surveys undertaken in accordance with the relevant components of the Borrow Pit/Quarry/Raw Materials Management Plan and integrate the results, including additional mitigation and management measures as agreed with KeNHA, within the Plan.

Contractor's monthly report to KeNHA shall include:

- Number and results of verification inspections prescribed in the table above.

The Safeguard officers will also undertake verification audits/ inspections and will submit routine reports to KeNHA

7.10 COMMUNITY IMPACTS MANAGEMENT PLAN

Objectives

This Community Impacts Management Plan has been prepared as part of the Environmental and Social Management Plan (ESMP) for Illasit-Njukini-taveta road project.

The objectives of this plan are to:

- Prevent risk and resulting adverse impacts of the contractors activities on the health, safety and wellbeing of individuals and communities;
- In the event that damage or harm caused, take action to repair and return to condition comparable to pre-impact condition; and
- Implement a system to maintain communication with communities and raise awareness of proposed construction activities and the potential impacts that they may represent.

This plan should be read in-conjunction with other Management Plans prepared for the project, namely:

- Air Emissions Management Plan;
- Noise and Vibration Management Plan;
- Ecological Management Plan;
- Waste Management Plan;
- Water Management Plan;
- Erosion and Sediment Control Plan;
- Spill Prevention and Response Plan;
- Hazardous Materials Management Plan;
- Borrow Pit/Quarry/Raw Materials Management Plan; and
- Cultural Heritage Management Plan

The table below presents a summary of the potential environmental impacts related to individuals and communities, together with mitigation and management measures to avoid or reduce these impacts.

The contractor shall develop a Community Impacts Management Plan, which will as a minimum incorporate the measures, described in the table below, but shall not be limited to these measures.

The safeguard officers commissioned by KeNHA will be responsible for reviewing the Community Impacts Management Plan prepared by the contractor and for ensuring that it is consistent with this document.

Table 7-9 **COMMUNITY IMPACTS MANAGEMENT PLAN**

Source of Impact	Potential Impact	Mitigation/Management	Monitoring Frequency	Responsible Party
Land-take for project works	Required resettlement of residents	Ensure that measures outlined in the Resettlement Action Plan for the project are implemented.	Pre-commencement of works	KeNHA
	Impacts on businesses	Ensure that measures outlined in the Resettlement Action Plant relative to businesses are implemented.	Pre-commencement of works	KeNHA
Site Hazards – Community Interaction with site works	Accidents resulting in injury or death	Where there is a potential for the community (including workers) to be exposed to hazards. The Contractor shall: • Identify the hazard; • Inform all individuals/communities as to the presence and nature of the hazard. • Restrict public access to works area including construction areas, staging and storage sites via appropriate security. This will include: - Security fencing and appropriate signage; - The presence of security personnel (no security personnel will be armed); - Permitting of site access with a requirement for site induction and the use of appropriate personal protective	Continuous	Contractor

		equipment. • Mitigate the hazard by modifying, substituting or eliminating the condition or substance causing the hazard; • If the hazard conditions can't be eliminated, exercise special care to avoid or limit their exposure by restricting access to works and storage areas, erecting appropriate signs, fences and barriers, imposing vehicle speed restrictions, and substituting or eliminating the condition or substance causing the hazards; and • Ensure that all deliveries of movement of hazardous materials on site are undertaken in accordance with written procedures outlined in the Hazardous Materials Management Plan. • Consult with local emergency services to agree procedures for accidents/ emergencies relating construction activities; A procedure for the recording of all public health and safety issues/incidents should be implemented. This should include procedures for recording of issues/accidents, investigation of the issue/accident and the implementation		

		of corrective actions/remediation as required.		
Hazard to community from construction traffic-related traffic	Accidents resulting in injury or death	The Contractor will develop a Construction Traffic Management Plan. This will include: • Identification and enforcement of haul routes (including avoiding dangerous routes during specific times); • Provision of appropriate barriers and signage to demarcate areas in which construction traffic is active and prevent access to the general public; • Establishment and enforcement of speed limits for all construction related vehicles; •Improving driving skills and requiring all drivers to hold appropriate licenses; • Adopting limits for trip duration and arranging driver rosters to avoid overtiredness; • Provision of training to all drivers on the requirements for safe driving measures, e.g., speed limits; • Consult with local emergency services to agree procedures for accidents/ emergencies relating construction traffic; and • A procedure for the recording of all construction related traffic accidents	Continuous	Contractor

		should be implemented. This should include: -Date/time; - Location; and - Reason for accident. The procedure should also include actions for investigation of the accident and the implementation of corrective actions as required.		
Air Quality – emissions from site works and plant, vehicle movements	Degraded air quality and potential impact on human health/ vegetation	Ensure that all measures outlined in Air Emissions Management Plan are implemented	Continuous	Contractor
Noise and vibration – emissions from site works, plant and vehicle movements	Increased background noise levels and disruption to residents/ businesses	Ensure that all measures outlined in Noise and Vibration Management Plan are implemented	Continuous	Contractor
Inundation of agricultural land with soil from Excavations	Reduced agricultural production	Ensure that all measures outlined in the Erosion and Sediment Management Plan are implemented.	Continuous	Contractor
Land Contamination From spillages/leaks of hazardous materials on construction sites	Reduced soil quality, harm to human health, Reduced agricultural production	Ensure that all measures outlined in Hazardous Materials Management Plan and Spill Prevention and Response Plan are implemented.	Continuous	Contractor
Contamination Of Watercourses due spillages/leaks	Degraded water quality and increased turbidity resulting in reduced	Ensure that all measures outlined in the Hazardous Materials Management Plan, Spill Response Plan, Erosion and	Continuous	Contractor

from construction site and sedimentation	biodiversity and potential impacts on fisheries.	Sediment Control Plan and Water Management Plan are implemented.		
Water generation/disposal	Ground/surface water contamination, harm to human health and land-use	Ensure that all measures outlined in the Waste Management Plan are implemented	Continuous	Contractor
Improvement in road conditions	Increased volumes of traffic and traffic speed resulting in accidents	Incorporation of appropriate signage and safety measures (barriers, formalized crossing points) to reduce the risk of accidents.	Continuous	Contractor
General work activities	Impacts/nuisance to individuals and the community	The contractor shall ensure that the grievance/complaint reporting procedure Is appropriately implemented and all submissions received managed using the following mechanism: - Grievance received; - Grievance recorded in a register; - For an immediate action to satisfy the complaint, the complainant will be informed of corrective action; - Implement corrective action, record the date and close case; - For a long corrective action, the complainant will be informed of proposed action; and - Implement corrective action, record the date and close case.	Continuous	Contractor

Surveys

There are no specific surveys required in support of the implementation of this plan. However, surveys undertaken/audits undertaken to support the implementation of other plans are relevant to this plan

Roles and Responsibilities

Contractor shall ensure sufficient resources are allocated on an on-going basis to achieve effective implementation of the Community Impacts Management Plan.

The Contractor's Community Impacts Management Plan shall describe the resources allocated and responsible for the execution of each task and requirement contained therein, and shall describe how their roles and responsibilities are communicated to the relevant personnel.

Training, Awareness and Competency

The contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Community Impacts Management Plan are competent on the basis of education, training and experience.

The Contractor's Community Impacts Plan shall describe the training and awareness requirements necessary for its effective implementation.

All training activity associated with the Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

All training activity associated with the Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Reporting and Notification

The contractor shall submit to KeNHA monthly/Quarterly report.

Contractor's monthly/quaterly report to KeNHA shall include:

- Information on any complaints received from individuals and communities; and
- A summary of the Contractors response to the complaint and any residual impacts.

The safeguard officers will also undertake verification audits/ inspections and will submit routine reports to KeNHA.

7.3 Public Baraza at Chala Chief's office, Njukini

Figures 7.4 Public Baraza at Rombo Market

Figure 7-5 Section of the Road Reserve with Deep galleys