Kenya National Highways Authority

Quality Highways, Better Connections

The Government of Kenya
Kenya Highway Administration

Eastern Africa Regional Transport, Trade and Development Facilitation Program
(P148853)

Environmental and Social Impact Assessments for three sections: Lesseru – Marich Pass; Marich Pass – Lodwar; and Lodwar – Nakodok

EXECUTIVE SUMMARY

February 2015

LIST OF ACRONYMS

ADT	Average Daily Traffic
a.s.l	Above Sea Level
CBO	Community Based Organization
CPP	Consultative Public Participation
dB	Decibels
EIA	Environmental Impact Assessment
EMCA	Environmental Management and coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HIV/AIDs	Human Immunodeficiency Virus/ Acquired immune deficiency syndrome
KeNHA	Kenya National Highways Authority
Km	Kilometer
MCA	Member of County Assembly
MDG	Millennium Development Goal
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NGO	Non- Governmental Organization
NMT	Non Motorized Transport
NPEP	National Poverty Eradication Plan
PAPS	Project Affected Persons
PCU	Passenger Car Unit
PEC	Poverty Eradication Commission
PRSP	Poverty Reduction Strategy Paper
PWD	Persons with Disabilities
RAP	Resettlement Action Plan
ToR	Terms of Reference
URTI	Upper Respiratory Tract Infection
VCT	Voluntary Counseling and Testing
WRMA	Water Resource Management Authority

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ESIA FOR REHABILITATOIN OF THE LESSERU – KITALE – MARICH PASS ROAD

INTRODUCTION

The Government of the Republic of Kenya has received a credit from the International Development Association (IDA) towards the cost of the South Sudan – Eastern Africa Regional Transport Trade Development and Facilitation Project. The corridor links Kenya and Sudan such as to form one of the backbones of Corridor 3 of the high priority Trans-National Road Corridors under the East African Community Road Network. Part of the credits has been utilized in the "Consultancy Services for Feasibility Study, Environmental Impact Assessment, Resettlement Action Plan, Detailed Design and Tender Document preparation of the Lesseru – Kitale – Marich Pass Road Rehabilitation Project".

PROJECT LOCATION AND DESCRIPTION

The project road commences at Lesseru junction within Uasin Gishu and Kakamega Counties to link Kitale in Trans-Nzoia County and then Kapenguria and Marich Pass in West Pokot County is a section of the Project. It is noted that over the years, the social and environmental settings have been changing with more people moving into the urban centers for business and other activities, demand for more land (settlement and agriculture) as well as increased traffic from local catchments and as well as the economic potential features in the northern zones of Kenya and the neighbouring countries. The road section was constructed in the early nineties but was reportedly not adequately maintained.

An Environmental and Social Impact Assessment Study had been undertaken (September 2014) along the preliminary design process. The study was undertaken within the provisions of the established regulations under EMCA, 1999 as well as the World Banks Social and Environmental safeguards. This ESIA review has been commissioned to provide an independent verification and update of the environment and social status along the corridor and confirm the sustainability during the project implementation.

The road physical conditions including the surface, road shoulders, roadside drainage, road furniture and culvert crossings have exceeded their design life and calls for rehabilitation and/or total reconstruction. The most attention should be between Kapenguria and Marich Pass which is in poor condition with most areas being beyond routine maintenance operations. The Lesseru – Kitale – Marich Pass section constitutes among the three sections whose ESIA and RAP are being reviewed on the International Trunk Road A1 of Corridor 3 of the High Priority Trans-National Road Corridors under the East African Community Road Network identified for rehabilitation.

The estimated 164 km long A1 section may be divided into the following three sections for purposes of this review based on the current road condition;

(i) Lesseru – Kitale ~59 km
(ii) Kitale – Kapenguria ~40 km
(iii) Kapenguria – Marich Pass ~65 km

<u>Lesseru – Kitale Section</u>
The road starts off at Lesseru and traverses a low lying marshy section for the first 5km. It the traverses terrain that is predominantly rolling through Uasin Gishu, Kakamega and Trans Nzoia Counties. This

section of the project road was constructed to bitumen standards over 20 years ago, and was not adequately maintained; despite a continuous increase in the traffic volume and loading. Traffic volumes are relatively high and mainly consisting of heavy good vehicles serving Northern Kenya and South Sudan, buses and pick-ups serving regional traffic demand. The section between Lesseru and Moi's Bridge has recently been overlaid with asphalt and is now in a reasonable state of repair but is also beginning to show signs of early distress.

Generally there are no traffic signs along the project road, besides guide posts, mostly damaged and covered with bushes were rarely observed at the section of the road with horizontal curves. The narrow road width in all built up areas and settlement areas bears a high accident risk mainly for the non-motorized traffic, e.g. pedestrian, cyclists, donkey carts. Appropriate traffic segregation by way of service roads and NMT facilities through built-up areas have also not been incorporated.

The road width varies between 6.0 and 7.0 m. The geometric condition of this road section can generally be described as fair to good. There are no paved shoulders long most of the road section making by-passing or overtaking of larger vehicles dangerous. In nearly all towns the road width originally has been increased but due to edge damage only some 6.0 m are still usable which often compromises the safety of road users as slow donkey carts and bicycles, parking Minibuses and normal traffic have to share the narrow carriageway.

Kitale – Kapenguria Section

The project road section is approximately 35km long commencing from Kitale town ending at Kapenguria town in the Trans Nzoia District. The project road was constructed as a bituminous surfaced road over 20 years ago and has been in limited maintenance works despite the increase in traffic volume. Traffic on this section is relatively lower and mainly consisting of heavy good trucks serving Northern Kenya and Southern Sudan and a low level volume serving the local demand. The road capacity does not seem to have the capacity required for future traffic volume. The pavement condition can be classified as fair but with poor roadside drainage that also seem to compromise the integrity in some of the road sections. Other challenges facing the road section include poor road signage with high risks of safety, road width especially considering the type of traffic, steep grades in some sections and also conflict with the growing urban centres along the corridor.

Kapenguria – Marich Pass

The project road section is approximately 65km long starting from Kapenguria town and ends at Marich Pass at the B4 road junction in West Pokot District. The project road was constructed as a bituminous surfaced road over 20 years ago and has experienced increasing traffic volumes and loading particularly during the relief operations in Northern Kenya and South Sudan. The first 16 km from Kapenguria town have received some emergency maintenance mainly pothole patching though the pavement still appears to be in poor state. The rest of the road section is in very poor physical condition with some sections having suffered complete pavement failure. Only two existing major structures, bridges and number of minor drainage structures, mostly of pipes culverts, were observed. The major structures are generally in good condition. Minor drainage structures are structurally in good condition though seriously affected by siltation problems. For the last 40km, the route corridor follows the Moruny river gorge and south of Sebit the road traverses hilly terrain characterized by steep gradients and sharp bends.

Anticipated Project Impacts

The overall impact of the rehabilitation project was focused on facilitating traffic movement for the local and transit traffic. Social and economic linkages including accessibility to settlements, public services, institutional growth, security management and delivery of farm inputs and produce are among the key benefits associated with the new road. Employment opportunities and income generation for the local communities were singled out as of major interest during the construction period and use of the road thereafter. On the other hand, efficient transportation of goods and people as part of the Northern Corridor to Northern Kenya and the neighbouring states has been the major justification for the project implementation.

Positive Impacts

Rehabilitation of the Lesseru – Kitale – Marich Pass – Lodwar – Nandapal road will have an overall benefit to the local social and economic activities, the northern parts of Kenya and the neighboring countries (South Sudan, Ethiopia and Uganda through efficient transit of goods and people. Efficient traffic movement will directly have a direct benefit to the environment (including climate change aspects through emissions reduction) especially through major urban areas such as Moi's Bridge, Kitale and Makutano towns. Specific positive impacts of the proposed road improvement project will need to be enhanced.

Specific Negative Impacts

Negative impacts associated with the road project have been identified and mitigation measures established to ensure the project sustainability, not only for the short term but also on the long term. The impacts have been clustered into construction and road use such as to cover environmental (environmental pollution, water resources degradation, air quality, ground cover, land destruction, drainage management, waste management, etc.), social (health and safety, displacements, access to services and amenities, noise and vibrations, air quality, transportation efficiency, etc.), economic (access to markets, transport costs, appreciation of assets, land use developments, etc.) and cultural issues.

Environmental and Social Management Plan

This management plan presents the key management principles that then defines a scope of the plan implementation. Broad indications of the responsibilities have also been discussed along with the possible implementation constraints anticipated while detailed actions are tabulated in a matrix for ease of reference and review. It should also be noted that the matrix is not complete in itself and continuous reviews would be necessary throughout the project implementation period. The plan would provide the key environmental and social concerns, appropriate preventive actions and responsibilities, targets to be achieved and where possible estimate of the respective costs. The plan will also provide basic success indicators for monitoring purposes.

The guiding principles behind the road project are based on the national objective of enhancing environmental, social and economic benefits to the affected persons as well as sustainable national development and in compliance with the environmental laws (EMCA, 1999 and associated regulations as well as relevant sectoral statutes). To achieve these objectives, the project should be acceptable to the majority and ensure minimal effects to the physical environment through integrated stakeholder

consultations, evaluations and review of the design aspects throughout the project route and a sustained monitoring of the road upon commissioning.

The scope of this environmental and social management plan (ESMP) is to give guidelines to all parties involved during construction, maintenance and utilization of the road in fulfillment of environmental and social requirements. Precautions to ensure that damages to the environment are minimized calls for a concerted effort from the project management, the Contractor(s) and all stakeholders. The Resident Engineer is expected to discuss and convey the contents of this management plan, recommended mitigation/interventions outlined under the impact, instructions from National Environment Management Authority (NEMA) as well as the wishes of the affected stakeholders to the Contractor and construction workers for integration in the construction process. The local NEMA Offices will also be involved to take advantage of the valuable information on the environmental trends in the area.

Conclusions and Recommendations

Conclusions	Recommendations
It is appreciating that the initial ESIA Study Report provided a strong basis on the project area characteristics, especially at the County levels. However, it did cover specific linkages to environment and social aspects along the project corridor. Due to this status, impacts and management aspects had to be updated based on reviewed environment and social baseline conditions	The ESIA Study Report was validated and updated by integrating the revised environment and social baseline conditions as well as the re-established impacts and mitigation measures. An environmental and social management plan was also be updated to provide for a guided Construction Environmental Management Plan (CEMP) during the construction phase.
Demand for efficient transportation corridor to Northern Kenya (driven by the County requirements and the promising oil production) as well as the regional transport integration linking Southern Sudan, Ethiopia and Northern Uganda is justification enough for rehabilitation of Lesseru – Marich Pass as part of the Northern Corridor Transport Improvement Project. This is an existing road transport corridor and with already existing heavy transit goods movement activities. The expansion will only bring on additional volumes and potential expansion of social and economic activities, especially around the towns and markets.	The environment and social management plan developed under this report is an indication of the monitoring parameters to ensure long term sustainability of the highway. The same should be customized for actual construction works through a Construction Environment Management Plan (CEMP).

Conclusions	Recommendations
It is observed that significant portion of the road pavement is in fair condition but requires strengthening or improvement. The other portion is generally worn out or just a gravel surface calling for total reconstruction. The works, therefore, demand for intensive supply of construction materials including gravel, hard stone aggregate, sand and water among others. The materials has to be sustainably sourced locally. Similarly, identification and acquisition of construction camp sites, workmen camps and materials holding and preparation areas will be the responsibility of the Contractor(s). The site have potential implications to the environmental and social settings.	While the design process have identified potential areas with material deposits, it will be necessary for the Contractors to carry out comprehensive ESIA studies and seek approvals from NEMA before extraction. These will include gravel borrow areas, hard stone quarries, water sources and sand harvesting sources. Equally important will be undertaking ESIA studies and seeking approvals for all construction camp sites. Agreements between the Contractor(s) and the landowners hosting material areas and camp sites will need to agreements with clear responsibilities on restorations upon completion and the restoration quality.
Going by the design, there will be minimal realignment of the existing carriageway, apart from limited expansions (within the existing road Right of Way, especially through market centers) and portions within Kamatira Forest. It is anticipated that the existing RoW will be adequate for deviation routes. No significant displacements of people are anticipated though notable disruptions to social and economic activities are likely to occur through the market centres. It is noted that a RAP review was running parallel to this study. The limited realignments also have environmental effects including soil loss, interference with delicate steep slopes, vegetation removal and damages to river banks.	The Resettlement Action Plan (RAP) report provided the level of social disruptions. The affected persons (PAPs) should be compensated fully before the commencement of the works. Environmental compensation will require effective restoration for damages and re-vegetation programmes (grassing and tree planting in pre-selected areas). The construction works, should, therefore, establish and maintain a count and record of all trees (indigenous and exotic species) removed during the construction for replanting accordingly.
The road corridor is characterized with significant numbers of road safety spots, especially market centers, steep slopes and sections with sharp bends. Others include sections adjacent to schools, religious premises, livestock crossing points, river crossings (bridges) and sections with potential falling stones and landslides.	The rehabilitation should give high priority to effective safety signage and information. Traffic Management Plan including scheduling of deviation routes shall be prepared. Clear safety signage and information will be provided in all the work areas at all times.

Conclusions	Recommendations
Traffic Management during the construction through the existing pavement and deviation routes constitutes part of the safety interventions. This will be the responsibility of the Contractor(s). The safety of workers, road users and the riparian communities is an important factor during the entire works period.	Provide all workers with personal protection gear and enforce application at all times, Cordon off work areas from the public including material sites, materials preparation sites and structural sites for their safety.
Air quality arising from dust and machinery equipment is an issue of concern to the affected residents and road users.	Maintain constant watering of the corridor to the extent possible to keep the dust low. Hard stone crushers to be equipment with dust control mechanisms Materials haulage trucks be covered to reduce dust.

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ESIA FOR REHABILITATOIN OF THE ROAD FROM MARICH PASS TO LODWAR

INTRODUCTION

One of the major transport corridors identified in the Northern Corridor Infrastructure Master Plan, the Marich Pass-Lodwar Road is also part of the A1, which originates in Isebania on the border with Tanzania in southwest Kenya. In addition to a connection with South Sudan through Uganda, the Northern Corridor road network proposes two alternative connections to Juba in South Sudan, each requiring improvement of the A1 project road: (1) upgrading and paving the Juba to Nadapal road that is located at the border terminus of an extended A1, and (2) rehabilitating the Eldoret to Lokichogio road to Nadapal.

This Environmental and Social Impact Assessment (ESIA) has been undertaken in accordance with Kenya's Environmental Legislation and follows guidelines issued by National Environment Management Authority (NEMA) regulations and World Bank Safeguards policies. Kenya's Environmental Management and Coordination Act (EMCA) demands ESIA to be conducted on major infrastructure projects to promote environmental and social sustainability of the project. The Marich Pass – Lodwar Project falls in this category.

PROJECT DESCRIPTION

The project involves upgrading of the Marich Pass – Lodwar road, totalling 197.89 Km. For the most part, the improved Marich Pass-Lodwar Road will follow the existing road alignment. However, small sections of the current road will be realigned to improve travel speeds and road safety. The right of way (ROW) and roadway will also be widened to meet international design standards. For purposes of planning and design, the project road was divided into two sections: 1) Marich Pass to Lokichar (about 110.12 kms); 2) Lokichar to Lodwar (about (86.77 km) totaling 197.89 km.

ENVIRONMENTAL AND SOCIAL BASELINE

Climate

The project area features harsh dry climate. The average annual temperature is 29°C (ranging from 23°C to 35°C) with the average annual rainfall is about 186 mm. The city of Lodwar is among the sunniest places on the planet, getting on average 3,600 hours of sunshine a year.

Geology and soil

The highlands south of the start of the project area in Pokot are in the Modified Tropical Zone with soils that are generally well drained and fertile. This zone has high potential for agricultural and livestock development. The lowlands in a semi-arid climatic zone further north have complex soils with various textures and drainage conditions with deep alluvial deposits on the valley floors. In Turkana, soils are highly variable and are mostly shallow and generally of light and medium texture. There are either constraints of a chemical composition, or physical limitations such as rockiness, mantle, slope, and depth.

The soils are not well developed due to aridity and constant erosion by water and wind and are often capped by stone mantles.

Water Resources

Boreholes, hand-dug shallow wells, surface water, mostly from rivers, and piped water represent the principal sources of domestic and livestock water. Piped water is distributed within Lodwar municipality by Lodwar Water & Sanitation Company (LOWASCO). Lodwar's schools are provided water from INGO-dug shallow wells. Communities in other sections of the project area depend on water from the Rivers Turkwell and Moruny. Interior communities must travel long distances to access water for themselves and their livestock, customary from dug-out sandy river beds.

Administrative Arrangements

The road originates at Marich Pass, at the village in Orwa sublocation, Sekerr location, in the Pokot Central portion of West Pokot County. Sekerr location has four sublocations comprising Mbara, Sostin, Chepkondou and Orwa, with the road project passing through Orwa sublocation towards Kainuk. Northwards, the project road crosses Lokichar district in Turkana County and further crosses Kainuk and Katilu divisions.

Demographic Characteristics

The project area is mainly inhabited by two ethnic groups –Pokot and Turkana. The Pokots, who are the dominant ethnic group in the southern section of the study area northward to the Kainuk forest, are Southern Nilotics who belong to the Kalenjin group. Pokot speakers in West Pokot totaled 500,000 (2009 census); the sub-chief in Orwa sublocation estimates the population of Orwa at 5,000, however. This sublocation population is divided between the Hill Pokots living in the rainy highlands and the Plains Pokots living in the dry plains.

The total Turkana population of Turkana South District is 135,913 of which 72,591 were male and 63,322 were female (2009 census). According to the district commissioner, 98 percent of the district's population is Turkana with the remainder (2 percent) of other ethnicities and/or nationalities. One prominent group in this 2 percent is Somalis who are involved in local businesses.

Settlement Patterns

The Hill Pokot live in the rainy highlands in the western and southern central parts of the Pokot area where these groups engage in both farming and pastoralism. Conversely, the Plains Pokot live in the dry and infertile plains where they keep cows, goats and sheep. The population in Marich Pass and Orwa Trading Centre is represented by both the Hill and Plain Pokot.

The two trading centers are developed with housing structures used mainly for commercial purposes. The most common businesses include retail shops for sale of food items such as sugar and tea leaves along with imported cereals and fruits, eating establishments and locally produced charcoal. Historically, the Turkana people are semi-nomadic pastoralists whose settlement patterns depend on availability of pasture for their animals. However, these patterns are gradually changing due to exposure to other lifestyles. The Turkana have been influenced by the pervasive benefits of urbanisation. Their settlements are concentrated around trading centers such as Kainuk, Kaakong, Kalemng'orok, Katilu and Lokichar where they can, at minimum, find work. Moreover, some centres have become densely populated because of increased government-led security.

Buildings, structures and other properties affected by the ROW in this area are found mainly in the trading centres of Marich Pass and Orwa, which are located about 2 km apart. After leaving the Moruny River, settlements are virtually non-existent until the Kainuk forest is reached. Further north there are settlements at Lokichar and Lodwar Towns.

Economic Activities

Government estimates the area's poverty level at 73 percent; however, local NGOs report that it is 94 percent. In the main, the community is semi-nomadic pastoralists, which partially accounts for high poverty rates; nevertheless, they pursue irrigated farming, particularly around Kainuk and Katilu where food crops such as maize, sorghum, English /sweet potatoes, cow pea and green gram are raised. Horticultural crops—tomatoes, kale (sukuma wiki), spinach, pumpkins, bananas and other local vegetables—are also grown. Other income sources include charcoal trade, bars, guest houses and boda boda (for-hire motorbike) businesses.

Food Security

Along with the subsistence maize they raise, the Pokot and Turkana depend upon their cattle for their protein and dairy needs. But, like their neighbors, the Turkana, to the north, the harsh climate limits their ability to produce enough food crops even for subsistence agriculture. Consequently, there are a number of food relief efforts from the government and World Food Program (WFP), when and where necessary.

Physical Infrastructure

The Marich Pass-Lodwar Road between Marich Pass and Kainuk is in extremely deteriorated condition. Moreover, the maintenance carried out on this section quickly fails. Relatively speaking, Section 3 of the project road (Lokichar to Lodwar) is in the best condition of the three road-project sections. The only paved section of the project road is located near Lodwar.

Lodwar has an airstrip which is used by commercial airlines for daily flights between Nairobi and Lodwar. The airstrip is also used by the military and NGOs when delivering relief items for the district.

Education

The Turkana County has 175 pre-primary schools, 136 primary schools, eight secondary schools, two youth polytechnics and one medical training college. Enrolment in primary school is 122,883, with a teacher to pupil ratio of 1 to 51 while secondary school enrolment is 48,004 with a teacher to pupil ratio of 1 to 27.7. There are 2 tertiary institutions. Adult Literacy Classes have an enrolment of 562.

West Pokot on the other hand has 318 Primary schools with an enrolment of 105,452 and a Teacher to Pupil Ratio of 1:50. There are 34 Secondary schools with an enrolment of 9,897 and Teacher to Pupil Ratio of 1:36 The Adult Literacy Classes enrolment is over 1,400.

Poverty Levels

The people of Turkana fundamentally depend on the natural systems and natural resources for existence and development. However, due to the harsh environmental conditions prevalent in the area, poverty levels are high, with 71% of the Turkana population living below poverty line. Poverty hinders access to basic needs such as health care, nutrition and education and in the area, poverty often leads to over-use and destruction of the environment. In West Pokot nearly 53% of population lives in abject poverty. The rural and urban areas register counts of 53% and 65%, respectively. The highest numbers of the poor are found in the divisions of Lelan, Kongelai, Alale and Chepararia. High prevalence of poverty is mainly attributed to unreliable weather patterns, unemployment, poor infrastructure and insecurity (cattle rustling).

Health

The area's most common diseases are malaria, cholera, typhoid and diarrhea. According to a 2007 study carried out among the rural Turkana population, HIV prevalence was 4.1% in rural areas and 8% in urban centers while in Pokot, the rates are lower at 1.27% In the same year, data from the AIDS and Sexually Transmitted Infections Coordinator (DASCO) in Turkana Central district indicated a prevalence rate of 6.7%, increasing to 14% in some urban centers.

The health facilities are only located on both ends of the project road. In Pokot sections, the only accessible health facility in the area is RCEA Marich dispensary; however, it is experiencing consistent shortages of medicines. The other dispensaries are located at Lodwar where there is a District Hospital.

Security

There is a level of insecurity observed along the project road. For many generations, the Pokot and Turkana have raided each other's cattle, presumably the consequence of cattle thefts. The two groups have been through many periods of war and peace. As a result, Orwa sublocation and Marich Pass are insecure because of their proximity to Kainuk where the Turkana live at the border between the two counties. In addition to accusing each another of cattle rustling and child abduction, the Pokot and Turkana also quarrel over unresolved land and border disputes—for example, at Turkwel Gorge and Kainuk forest.

Tourism

In addition to the Marich Pass Field Studies Centre which attracts national and international tourists, Pokot Central District (West Pokot County) offers unique vegetation, diverse wildlife, dramatic landscapes, ecotourism and Kapenguria Museum, which is located in Kapenguria Town outside the project study area. There are the Nasolot Nature Reserve to the East of Kainuk and the South Turkana Nature Reserve to the East. However, both Parks are hardly visited because of their remote locations and lack of road infrastructure.

Project Alternatives

As the project activities include rehabilitation of the current road, alternative alignments were not considered with exception of "no project" alternative. The socio-economic situation prevailing in the project area features over 70% poverty rates which in turn mean that majority rely on natural resources for livelihoods, especially charcoal burning. The objective of the project to road improvement which will offer numerous alternative economic opportunities since the area will be opened up and integrated with both the Kenyan and South Sudanese economies.

Public Consultations

The public consultations for this section of the road were held in two stages. The first set of consultations was held during the period 18 to 24 June 2012 with the affected communities —either directly or indirectly— by improvement of the Marich Pass to Lodwar Road. The consultations aimed to inform the affected public about the purpose of the forthcoming project; discuss more specifically the realignments and ROW expansion planned to the existing Marich Pass-Lodwar Road and their consequences to occupants located on these lands; and, to solicit the issues and concerns from the affected communities about the forthcoming road-improvement project. The first set of consultations was held at eight locations, namely Marich-Pass, Kainuk, Kaakong'u, Kalemng'orok', Lokichar, Kasuroi, Lochaang'ikamatak, and Lodwar.

The second set of public consultations took place on January 8-17, 2015 and covered the key issues associated with potential impacts and effects of the project, such as land-take, employment opportunities, disruption of livelihoods, biodiversity, cultural heritage, pollution control, community safety, traffic management, loss of remoteness, communicable diseases and trade opportunities. The stakeholders included County and sub-county administration; Districts heads of department including the District Development Officers, Culture and social services; Agriculture and Livestock Development Officers; Educational officers and, Arid Lands; the local government – Turkana County Council officers; Members of County Assembly and political activists; Kenya Wildlife Service staff; and Kenya Forest Service staff.

Summary of Potential Environmental and Social Impacts

Environmental parameter	Potential impact	Proposed mitigation measures
Fauna	Possible poaching of wildlife by workers Possibility of poisoning animals from empty containers of bitumen and other materials especially along the section close to Turkana National Reserve	Awareness creation amongst the local people and the construction workers of laws that relate to wildlife hunting and consumption, and the importance of wildlife as a natural resource and heritage Hazardous waste that can be consumed by wildlife should be carefully managed, such as covering bitumen drums at all times. Littering of work areas should be prohibited at all times Prudent management of construction waste. Continuously consult with KWS during construction along the section close to South Turkana National Reserve to avoid possible migration season or timings across the Park to Nasolot Park to the West of the road. During operation, maintain clearance within the ROW to improve motorists sight of road corridor to avoid collisions with wildlife, erect clear signage at Kainuk all the way to Kakonga at 5 km intervals warning motorists of sudden wildlife crossings Clear warning signs for motorists to avoid unnecessary stopping across the section close to the South Turkana Reserve Warning signs to completely avoid littering close to the reserve.
Flora	Over exploitation of vegetation resources for cooking energy by the construction workers. The critical impact relates to the inability of the area to naturally regenerate after	Use of firewood by the workers housed in camps, should be controlled. Workers should be encouraged to use alternative sources of cooking fuel. Extra care should be taken when construction along the Kainuk forest should avoid unnecessary cutting of trees, and should consult Kenya Forest Service prior to cutting of any trees whether within the RoW or not. Construction workers be allowed to use cleared vegetation materials for firewood.

Environmental parameter	Potential impact	Proposed mitigation measures
	harvesting of the mature trees. Clearance of trees within the RoW across Kainuk forest The locals may see an opportunity for income generation by selling firewood and/or charcoal to workers. Increased invasion of Prosopis juliflora following soil disturbance and the road acting as water catchment that improves soil moisture at the edges of the road.	Management of Prosopis juliflora, an invasive weed that colonizes the road edges following soil disturbance could be managed by incorporating labour based clearance of the weed on a regular basis during O&M.
Drainage and Soil erosion	Erosion activities are expected during March-May. In general the first contract between Marich Pass and Kainuk is more prone to erosion due to the mountainous terrain and higher rainfall. Soil may erode along the road alignment, particularly during the wet season (March through May) in the initial years after decommissioning.	Optimize new drainage structure positions and improved capacities of the structures used in combination with specific erosion protection works Culvert outfall should be lined for an appropriate distance, especially between Marich Pass and Kainuk which experiences flush floods from the Pokot hills. Scour checks should be constructed alongside drains on steep slopes within this section.

Environmental parameter	Potential impact	Proposed mitigation measures
Construction water sources	Since water is a scarse resource in this area, issues relating to access to water can lead to inter community conflicts and conflicts between communities. Other potential negative impacts include livestock-wildlife-human conflict, disease, salinity and water quality.	Acquire WRMA permit for water abstractions. Water sources are subject to separate ESIA that will be prepared independently of this report. To avoid potential conflicts, the project will identifying water sources (e.g. boreholes) to be handed over to the community have been presented in the main report. These are to avoid future conflicts.
Noise and ground vibration	This impact can be of concern only at construction sites within the larger urban environments of Kainuk and Lodwar. Where explosives will be used, especially at quarries, there will be serious noise and vibrations in the vicinity of the site.	Minimize noise, especially noise from heavy equipment when construction is ongoing through Kainuk and Lodwar. Construction activities to be undertaken during normal working hours. Special care should be taken when construction is taking place near sensitive receptors such as schools and hospitals (Most sensitve sites – Kainuk, Lokichar and Lodwar).
Visual intrusion	On the whole, there are few scenic sites, but opened up quarries and borrow pits could be of visual intrusion	Progressively rehabilitate quarries and borrow pits as work progresses before the contracts are finalized.
Waste Management	Construction waste could be a health hazard in the area considering the poverty level which may motivate the local community to scavenge for everything especially water containers	Develop a waste management plan for use during the entire construction period, especially targeting to avoid poisoning humans and wildlife. Emptied hazardous material containers should be managed in an approved manner to avoid them being used by locals as this could be a health hazard

Environmental parameter	Potential impact	Proposed mitigation measures
Urbanization	The road could trigger rapid development of Kainuk and Lokichar since these could be used as rest-stops for transit traffic	Collaborate with the county governments to prompt proactive physical planning in the area to be directed by the Pokot and Turkana County officials.
Public Health	The indirect impacts of the project on health and safety are associated primarily with human behaviour, and this includes the potential for transmission of HIV-AIDS and other STIs	Integrate HIV AIDS and STIs awareness programme amongst the workers and adjacent population. Maintain a health clinic within the camps and mobile first aid kits within working crews since health facilities are far between
Soil pollution	Soil pollution may occur in the event of accidental oil spills, and petroleum products and bitumen (amongst other liquid waste) particularly in and around machinery and plant yards, base camps and areas of concentrated activities, may infiltrate into soils and cause soil pollution.	Mitigation actions will mainly involve maintenance of machinery, bunding the garage, and directing spills to an oil sump which should be empties into a designated final disposal site. Storage of topsoil in the borrow areas to be rehabilitated during closure of the site (before the contracts are finalized).
Air quality	The project site is dominated by a hot, dry and windy environment which exacerbates generation and blowing away of dust beyond the project site. Dust pollution could be significant within Kainuk, Lokichar and Lodwar and adjoining settlements.	Use dust suppressants as far as possible, especially within Kainuk, Lokichar and Lodwar towns. All workers should wear dust masks at all times when at the sites of high dust generation Warn the neighbourhood of the road at the three main centres of possible generation of dust beyond normal levels.

Environmental parameter	Potential impact	Proposed mitigation measures
Road safety	Local people in the area have lived so long without good roads that there is a lack of awareness of the dangers of the roadways and fast moving vehicles.	Install elaborate road safety signs along the entire road; mount road safety awareness campaigns amongst the locals. Involve local leaders and institutions such as schools in road safety campaigns.
Conflicts	Potential conflicts related to water sources or job opportunities	Involve the local communities while selecting material sites and employ local workers during construction activities where possible. Establish a conflict resolution mechanism in regards to water sourcing and re-settlement and compensation issues Compensate the Project Affected Persons in full before beginning of civil works on the project (as per project RAP).

Resettlement and Compensation

An estimated total of 314 structures, buildings and/or properties will be affected by improvement of the Marich Pass-Lodwar Road; of this number, an estimated 169 buildings/structures are to be displaced in Section 2 (Lokichar to Lodwar), the highest estimated number of displacements. Section 1 (Marich Pass to Kainuk) follows Section 2 with 145 displacement. Ground-truthing and other mitigating circumstances (e.g., minor changes in the road's alignment to avoid important cultural features) may require adjustment in these numbers at construction commencement. The project has developed a Resettlement Action Plan (RAP), which is a stand-alone publicly disclosed document.

Conclusions and Recommendations

The road crosses a semi-arid environment that has low rainfall, limited economic opportunities and sparsely populated. The environment is fragile with poor ground cover for half of the road while the other half has shrubby vegetation cover. There are some important potential environmental impacts that will accompany the project, both in the short and long term. During construction potential negative impacts that are considered significantly high relate to impacts on vegetation, public health, water resources and soil degradation. One of the significant adverse impacts from the road design, construction activities and operation is disturbance of the natural habitat for wildlife at the location of South Turkana and Nasolot National reserves. Such disturbance will also have long term effects on known elephant migration

corridors, increased risk of animal kills and likelihood of opening up the area for poachers of game trophies.

Other operation phase impacts include increased urbanization and immigration into the area, road safety issues and cultural conflicts. The latter two impacts could be addressed by a programmatic approach involving all the stakeholders in the road safety and social sectors. Similarly, the other negative socio-economic impacts such as increased urbanization and immigration can be effectively handled through proactive regional and urban planning.

The adverse environmental and social impacts are largely reversible with easily identified mitigation measures, albeit at an increased cost to the realisation of the project. The expected cost of Environmental and Social mitigation is K. Shs.538, 950,000.

After the completion of the road, the benefits that will accrue for the local people, the Kenyan economy and that of Southern Sudan will be substantial. The road rehabilitation will open up the area for international traffic to South Sudan, wider reach to the Turkana Region from other parts of the country thereby eliminating long-standing isolation and local travels for subsistence occupation. The ripple effect will be to open up the area for accelerated economic growth accruing from increased trade, access to goods and services, increased agricultural and livestock production, tourism circuits educational and health facilities. It will also facilitate exploitation and export of the recently discovered oil among other economic benefits.

Kenya National Highways Authority

Quality Highways, Better Connections

ESIA FOR REHABILITATOIN OF THE ROAD FROM LODWAR TO NAKODOK

INTRODUCTION

The Government of Kenya through Kenya National Highways Authority (KeNHA) is planning to upgrade the road from Lodwar Town to Nakodok covering a total distance of 240km. The project has the potential to generate environmental and social impacts as listed in the Environmental and Social Impact Assessment (ESIA) Study Report for the proposed upgrading of the Lodwar-Lokichogio-Nakodok 240Km (A1) Road that was compiled in 2013.

The present study is being carried out to review, update and validate the earlier ESIA Study carried in 2013. This ESIA Study has been carried out according to the requirements of the Environmental Management and Co-ordination Act (EMCA), 1999, part II of the Environmental Impact Assessment and Audit Regulations (2003) and subsequent NEMA Regulations and World Bank Safeguard Policies for any triggers.

PROJECT BACKGROUND

The Government of Kenya, through the Kenya National Highways Authority (KeNHA) has proposed to improve and upgrade the Lodwar – Lokichogio – Nakodok (A1) Road. The road is part of the Northern Corridor Transport Improvement Project (NCTIP) whose aim is to enhance connectivity between Kenya's coastal ports of Mombasa and Lamu with neighbouring countries in East and Central Africa with a view to enhancing the economic profile of the East African region as a strategic investment and export hub. Improving the road and upgrading it to international standard is considered an important investment that will enhance regional connectivity and integrate South Sudan and northern Uganda with East African neighbouring countries by increasing transport efficiency, facilitating cross border trade and improve access to export markets through Kenya's coastal ports. In addition, Turkana County, which has remained under-developed for a long time, will be the important link in the envisaged international integration and is, therefore, expected to attract tremendous investment opportunities and economic development. The purpose of this study is to evaluate the environmental consequences of construction and operation phases of the proposed road project and identify measures to mitigate adverse environmental and social impacts of the project.

DESCRIPTION OF THE PROJECT

The project road commences at Lodwar, at the roundabout on the road from Kitale, and ends at Nadapal at the border with South Sudan. The Lodwar – Lokichogio – Nakodok road has a total length of 240km. From Lodwar the road runs in a north westerly direction generally traversing flat to rolling terrain. It passes through Nasiger, Makutano Gold, Nakalale and Songot market centres and the towns of Kakuma and Lokichogio. In essence the route can be divided into three major sections:

1) The 69 km section between Lodwar and Lokitaung turnoff at Makutano Gold, which was constructed in the late eighties. This section is completely worn-out;
2) The 146 km section between Lokitaung turnoff and Lokichogio, which was constructed in the early nineties. This section is in fair to poor condition;

3) The 30 km section between Lokichogio and Nakodok (Sudan Border) is essentially an earth track widened at many locations with a grader. This section is a very poor earth road with very sharp boulders.

The section from Lodwar up to Lokichogio consists of a two lane bituminous carriageway with narrow shoulders of about 0.5 to 1m wide. From Lokichogio to the end at Nadapal, only a gravel / earth track of approximately 2 lane width exists.

The condition of the thin bituminous pavement is generally fair to poor and extensive patch works and potholes are observed throughout the road stretch. Low embankment of 1m to 1.5m is generally available and the condition of side slope is stable in most of the sections. The condition of the gravel track in the Nadapal section is very poor and with many large pot holes.

DESCRIPTION OF ENVIRONMENTAL AND SOCIAL BASELINE

Topography

The main topographical features in the County are low-lying open plains interspersed with isolated mountain ranges and hills, Lake Turkana and the river drainage patterns. Most of the Turkana region consists of low-lying plains. The altitude rises from about 900 m at the foot of the escarpment marking the Uganda border to the West and then falls to 369 m to the shores of Lake Turkana in the East. The isolated mountains are mainly found in the central area with plains around Lodwar and more specifically the Lotikipi plains in the north. In the southeast, the Suguta valley follows a tectonic trough bordering the Samburu uplands.

Climate

Turkana County is classified as an arid area where the climatic conditions are characterized as warm to hot, with temperatures ranging between 24 to 38 degrees Celsius. Rainfall is erratic and unpredictable both in timing and distribution. The western border with Uganda and Sudan receive more than 500 mm per year. The highlands in the north-eastern parts bordering Ethiopia and the hills in the south and southwest bordering Pokot also register higher rainfall. The lowest rainfall occurs along the shore of Lake Turkana and in the central plains around Lodwar with an annual average 150 mm per year).

Geology and Soils

The region is characterized by four dominant geological formations which include: Cenozoic sediments, tertiary volcanic rocks; Quaternary volcanic rocks and Quaternary to Recent sediments. The Mozambique Belt rocks underlie the entire region except for the western parts of Turkana, which are completely covered by volcanic formations.

Vegetation

A quarter of the county is devoid of trees and two thirds support only scattered trees while reliable sources of grass with high productivity are small and widely scattered. The presence of plant biomass is related to altitude except for riverine areas. The two main types of woody vegetation found in Turkana are riparian and non-riparian. Forests with a canopy cover of over 12% are limited to the mountain ranges, especially the Loima Hills, which are relatively humid, and also along the main rivers (Turkwel and Kerio),

which have significant areas of riverine forest. The shores of Lake Turkana are dominated by *Acacia spp* and Doum palm (*Hyphene compressa)* and more recently invaded by *Prosopis* spp on some sites along the rivers, especially the Kalokol to Turkwel stretch.

Prosopis juliflora is an introduced tree species that is rapidly gaining the status of an invasive weed in a large swathe of the project area.

Fauna

Being arid and semi-arid environment coupled by years of hunting, Turkana in general has relatively low diversity of fauna outside the existing protected areas. Notable are dikdiks, monkeys, guinea fowls and a wide variety of birds.

Water resources

In Turkana, only about 15 per cent of people have adequate access to water, compared to the national average of 57 per cent. For many of the communities, the main source of water is open 'scoop wells' dug in dry riverbeds.

SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

Human population size and density

Turkana County has a population of 855,399 of which 53% are male and 47% female (KNBS, 2009). The population density in this vast county is low and varies from 1 person per Km^2 in Kibish Division to 29 persons per Km^2 in Kakuma Division, with a county average of 6.9 persons km^2, with a with a sex ratio of male/female 92:100. There are 123,191 households. The total population almost doubled changing from 450,860 in 1999 to 855,399 in 2009 this population change is almost double (89.7%) when compared with the National population change of 34.6% from 1999 to 2009.

The Turkana are some of the most mobile people in the world. Traditionally, there were no permanent settlements occupied by them. Permanently and semi-permanently settled areas in the Turkana are found along Turkwel and Kerio rivers where irrigated farming is practiced and water is accessible and near Lodwar town. Along these areas, there exist peri-urban market centres with the necessary social and economic infrastructures like schools, health facilities and shopping centres.

Land tenure

Since independence to date land tenure in Turkana County has been only as Trust Land and all land in the County is administered under the Trust land Act. The existing land tenure in the trust lands can be described as a quasi-customary/communal in that land rights are held in trust by the county councils. Because there have been no formal surveys or land adjudication in the whole County, land is still held communally by various communities under customary tenure, and is managed by the County Government on behalf of the communities.

Land use

Nomadic pastoralism is the dominant land use in Turkana County. Other land use activities include small scale agriculture along river banks and flood plains, scattered settlements, urban centres etc.

Livelihoods

The Turkana County is subdivided into four main livelihood zones based on their sources of income – pastoralism (64%), agro-pastoralism (16%), fishing based (12%), and peri-urban and urban (8%). Pastoralism is the main subsistence and economic activity in the county. It is estimated that about 60% of the population derive their livelihood from livestock-based activities. Fishing is an important activity along the lakeshore. The Turkana who live along the major water courses engage in small-scale agriculture. Indigenous fruits/foods are important sources of food particularly during dry spells.

Charcoal production

Charcoal is primarily produced along the Turkwel and Kerio Rivers and is sold along the main highway between Kainuk and Lokichogio. Unfortunately, whilst charcoal production offers small returns to those that produce it, due to the destructive nature of current practices, the production and sale of charcoal is illegal in Turkana. A study by KFS indicates that a significant quantity of charcoal (approx. 25,000 bags) leave the County every month.

Mining

Gold mining has been prevalent in Turkana for many years. Whilst most gold mining operations in the contemporary period are labour intensive one man operations, gold mining in the recent past has been the domain of large businesses backed by significant political support. Currently, gold mining occurs primarily in Nakoriyek (on the road to Kanakurdio), Kimagur (on the main road before Lokichar), Lokiriama, Namorupus and Nadunga (west of Nakoriyek). Small-scale gold mining is also found in the southern part of the district at Nakwamoru and central parts at Makutano ('*Gold*') between Kakuma and Lodwar, where mining is not of a large-scale commercial nature, though an alluvial type of it is being exploited Turkana has abundant building sand and quarry materials.

Casual, waged labour and trade

The demand for casual labour in Turkana is in the form of agricultural or building jobs. However, in the case of agriculture, most casual jobs are available in the wet season with some herding opportunities becoming available in the dry season. The other job opportunities becoming available include grocery shops and supermarkets, service stations, restaurants/hotels and bookshops. These are concentrated in major towns like Lodwar, Kakuma and Lokichogio. Devolution which has brought development funds to the County headquarters is also bringing about increased development activities such as road maintenance etc.

Honey production

Honey production is a commercially viable enterprise, especially along the riverine ecosystems (Turkwel and Kerio Rivers) and higher altitude locations close to the Ugandan border. The principal areas of honey production include Turkwel, Kalemunyang and Toyarabon (Turkwel Division); Lokapel and Kanaodon (Katilu Division); Kainuk, Loyapat (Kainuk Division), Lokwar, Ekwar, Kaptir, Nakwamuru, Kapelibok and Oropio.

Basket-making and handicrafts

Commercial basket-making (and associated activities) supports a network of producers, traders and transporters in Turkana and is especially important for the livelihoods of households located near urban centres and along dry-river valleys close to Lake Turkana.

Public Health

Water Borne Diseases

The lack of water in the area is a major cause of the poor standard of health endured by the Turkana population. The health services in the area estimate that approximately 50% of the population are suffering from water borne diseases due to lack of clean water.

The major diseases that have regularly been reported in the Turkana are malaria, skin diseases, respiratory tract infections, and diarrhoea (Republic of Kenya 2007) (Figure 20). Malaria can be prevented by the use of bed nets, but not everybody has the financial means to acquire nets. Most of these diseases are associated with poverty.

Communicable diseases including HIV and Aids

The HIV and Aids pandemic is currently a major development problem in Turkana County. In 2014 HIV prevalence stands at 7.6% which is above the national prevalence rate of 6.04 %. Considering the truck traffic generated by LAPSSET and those diverted onto the road, new truck stops may encourage prostitution and other social ills in a community that is still very conservative and proud of their culture.

Education

The Turkana County has 175 pre-primary schools, 136 primary schools, eight secondary schools, two youth polytechnics and one medical training college.

Enrolment in primary school is 122,883, with a teacher to pupil ratio of 1: 51 while secondary school enrolment is 48,004 with a teacher to pupil ratio of 1: 27.7. There are 2 tertiary institutions. Adult Literacy Classes have an enrolment of 562.

Along the project road, schools are concentrated in Towns/major centres namely:

- Lodwar Town (Radius of 5km) - 12 Primary and 6 Secondary Schools;
- Lokoyo area – 1 Primary School
- Makutano – 1 Primary School
- Kakuma – 31 Primary and 4 Secondary Schools
- Kalobeyei – 1 Primary School;
- Songot – 1 Primary School
- Lokichogio – 7 Primary Schools

Many people in Turkana have not accepted formal education as a social value leave alone as a human right. Many parents still deny their children their right to study and to be educated. In spite Free Primary Education, Turkana Districts register one of the lowest gross enrolment, retention, and completion rates in the country:

Poverty Levels

The people of Turkana fundamentally depend on the natural systems and natural resources for existence and development. However, due to the harsh environmental conditions prevalent in the area, poverty levels are high, with 71% of the Turkana population living below poverty line.

Gender dynamics

Among the Turkana, division of labour exists along gender lines, dictating general social roles and distinct daily activities performed by members of the society. As with most societies in Kenya, women's roles among the Turkana continue to be centred on the house. Within the household, it is the general responsibility of the women to provide food and comfort for the household.

History and culture of the Turkana Community

The main tribe in the study area is the Turkana. They are divided into two broad groups; the forest people (*Nimonia*) and the people of the plains (*Nocuro*) which are divided into roughly twenty clans (*ategerin*).

Conflicts and cattle rustling

Cattle raids and resource-based conflicts are the main types and manifestations of conflicts in Turkana. The district's proximity to Ethiopia, Sudan, Uganda and neighbouring districts in Kenya makes it one of the most affected areas by insecurity incidences.

Physical infrastructure

The problem of poor roads and public transportation has negatively affected the livelihoods of Turkana people. It is hard to get supplies into rural areas, and this limits trade with other regions. The Turkana people have no tradition of using carts and animal power to transport commodities and goods, and rely on carrying everything themselves.

Relief operations

Kenya has over the years hosted a large number of refugees fleeing conflicts in their countries. Most of the refugees are hosted in camps located in Kakuma and Dadaab in the arid Northern parts of the country. The Kakuma Refugee Camp is located within Kakuma town in Turkana District, in the north western region of Kenya.

Oil exploration

Oil has been discovered in Turkana North District by British company Tullow Oil. Turkana County is one of seven basins mapped in Tullow's 100,000 square kilometre exploration areas in Kenya and Ethiopia.

Trade, tourism and industry

Trade and Industry

The Project County and districts connects the rest of Kenya and is a transit area from port of Mombasa with the emerging markets of Southern Sudan. Internally, the major sectors that enable trade to thrive are the food sector where Turkana is a net importer of food stuffs such as maize and beans. The district is

a major producer of animal products which includes live animals that are transported to other parts of the country. Beside these, the district produces a huge supply of fish which forms the bulk of trade with other parts of Kenya. Fish production is mostly practised in Kalokol and Kerio divisions where over 70% of the households earn their livelihood. The huge traffic generated, especially of HGV from the current 12 to a total of 122 AADT will imply improved investments and trade occasioned by rest stops by truckers.

Tourism

Turkana County has tourism potential due to the presence of a rich cultural heritage of the Turkana people, Lake Turkana, Fishing and various wild animals. In addition, there is great potential for producing tourist goods such as mats and hats produced from the large quantity of palm leaves available. The County has 52 hotels but only two are classified.

Financial Institutions

The Lodwar-Nakodok Road is served by two major Banks (KCB and Equity) who have branches in Lodwar and Lokichogio Towns. M-Pesa Financial Services are available at major centres and towns along the project route. Towns like Lodwar, Kakuma and Lokichogio have more than five M-Pesa service providers.

PUBLIC PARTICIPATION AND CONSULTATIONS

Stakeholder Consultations and Public Consultation Meeting

The public consultation meetings were conducted on two levels, with project stakeholders at the levels of the community, religious organizations, CSO, local and national government. The outcomes of the consultations have been documented and incorporated into the ESIA.

The first set of consultations taking place during the preparation of the original ESIA from June 14 to 28, 2013. The consultations included in-depth interviews were conducted ward councilors and political activists; provincial / county administration; County heads of departments including the County Development Officers, Culture and social services; Agriculture and Livestock Development Officers; Educational officers and, Arid Lands; Turkana County Council officers; and other stakeholders interviewed were refugee officers at Kakuma and NGO staff among others.

The second level of Public Consultation Meetings (PCMs) were convened from Tuesday December 2, 2014 to Friday December 5, 2014 as elaborated in the table below.

Public Consultation Meetings (PCMs)

#	PCM Venue	Day	Date	Time	No. of Participants
1.	Mikeka Grounds	Tuesday	02/12/2014	10.30am	30
2.	Nasiger	Tuesday	02/12/2014	02.00pm	213

3.	Makutano Gold	Wednesday	03/12/2014	09.30am	105
4.	Kakuma Town – Baraza Park	Wednesday	03/12/2014	02.30pm	75
5.	Kalobeiyei	Thursday	04/12/2014	09.30am	177
6.	Songot Chiefs Office	Thursday	04/12/2014	02.00pm	125
7.	Anglican Church Grounds - Lokichogio	Friday	05/12/2014	10.00am	142

SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

#	Environmental parameter	Potential impact	Proposed mitigation measures
1.	Project area community in the road right of way	• Potential displacement of persons with homesteads along road project route	• Resettlement Action Plan Study has been done and review is underway to establish a list of Project Affected Persons (PAPS); • Determination of Size of Land, Structures, Vegetation (Trees and Crops) and Livelihood that will be affected by the project; • Sensitisation of PAPs on compensation and resettlement; • Identification of land for resettlement; • Determination of cost of affected land and property for compensation; • Payment of compensation to the satisfaction of the PAPs ahead of project civil works;; • Resettlement of PAPs • Offering of Resettlement Assistance to PAPs to ensure they settle well in new homes and that they are equal to or better than they were before the project.
2.	Soil excavation activities during road construction loosen soil	• Soil erosion is expected to occur during March-May in the East, between Lodwar and Kakuma and during March - June in the sections north-	• Do not leave excavated soil exposed for too long; • Do not deposit excavated soil long trenches or surface runoff causeways;

#	Environmental parameter	Potential impact	Proposed mitigation measures
	exposing to wind and water erosion.	west of Lokichogio. In general the sections north-west of Lokichogio are more prone to erosion due to the mountainous terrain and higher quantities of rainfall. • Soil may erode along the road alignment, particularly during the wet season (March through May) in the initial years after decommissioning. • Eroded soil will have the potential to cause the following impact: - Damage to the quality of water courses, - Erosion sediment in rivers damages the spawning grounds of fish; - Deposition of sediment from erosion may cause changes in river courses and create flood hazard downstream.	• Carry out road excavation works during dry period; • Optimize new drainage structures and improve capacities of the structures used in combination with specific erosion protection works; • Culvert outfall should be lined for an appropriate distance, especially after Lokichogio towards Nakodok • Scour checks should be constructed alongside drains on steep slopes • Road shoulders should be appropriately lined and tapered off to avoid scouring by runoff water.
3.	Air quality	• The project site is dominated by a hot, dry and windy environment which exacerbates generation and blowing away of dust beyond the project site. Dust pollution could be significant within Lodwar, Kakuma and Lokichogio Towns and adjoining settlements. • Health facilities in the project are recording significant number of patients having Upper Respiratory Tract Infections (URTI). Dust contributes to this ailment	• Regularly water excavated areas and road deviations to ensure minimal dust generation. • Road construction plan should ensure that excavated areas remain open for the shortest time period to reduce dust emission especially within the towns. • All workers should be provided with dust masks and the contractor is to sensitise workers and ensure they wear the dust masks at all times when at the sites of elevated dust generation • Issue timely warning to the neighbourhood of the project about possible generation of dust beyond normal levels

#	Environmental parameter	Potential impact	Proposed mitigation measures
4.	Project area soil quality	Pollution of soil could occur at the contractors camp or construction site in the event of: • Accidental oil spills from construction vehicles and machines (excavators, graders, rollers, road pavers etc. • Recovered oil after service of construction vehicles, trucks and machinery • Petroleum products (petrol and diesel) stored at contractor camp, • Bitumen (amongst other liquid waste) The released petroleum products may infiltrate into the soil and impact groundwater resources.	• Contractor should construct a paved and bunded area for the storage or transfer of fuels or oils. • All vehicles, trucks and machines used at the construction site should be well maintained to avoid oil leaks occurring. • The Contractor should have paved and well bunded service area for the servicing and maintenance of machinery and trucks. • The contractor should have containers (drums) for the storage of all used oils recovered from trucks and machinery during regular service. • The used oil should be collected by a NEMA approved firm for appropriate disposal.
5.	Water Sources for Construction activities	Water is scarce and precious in the project area. Impacts on water sources could arise from: • Over exploitation of a water source; • Pollution of the available water source; • Conflicts between communities; • Livestock-wildlife-human conflict; • Salinity and poor water quality.	• Apply for WRMA permit for any required water abstractions; • Water sources are subject to separate ESIA to be prepared independent of this report. • A set of factors to consider when identifying water sources to be handed over to the community have been presented. These are to avoid future conflicts. • Assess and determine the available quantity of water from every water source: • Develop an independent water source (boreholes) that can be used for construction and later handed over to the community as a CSR activity

#	Environmental parameter	Potential impact	Proposed mitigation measures
6.	Flora	• Potential over-exploitation of vegetation resources for cooking energy by construction workers. • The critical impact relates to the inability of the area to naturally regenerate after harvesting of the mature trees. • The locals may see an opportunity for income generation by selling firewood and/or charcoal to workers. • Increased invasion of *Prosopis juliflora* following soil disturbance and the road acting as water catchment that improves soil moisture at the edges of the road.	• KeNHA and Contractor are to carry out sensitisation and awareness creation on use of firewood and why it is important to control its use (Health Benefits and Preservation of Biodiversity). • Use of alternative source for cooking energy is to be encouraged. Locals should be encouraged to preserve Biodiversity • Construction workers may be allowed to use cleared vegetation materials for firewood. • Management of *Prosopis juliflora*, an invasive weed that colonizes the road edges following soil disturbance could be managed by incorporating labour based clearance of the weed on a regular basis.
7.	Fauna	• Possible poaching of wildlife by workers • Possibility of poisoning of animals from empty containers of bitumen and other materials	Carry out sensitisation and awareness creation amongst the local people and the construction workers on: • Laws that relate to wildlife hunting and consumption and the related penalties; • The importance of wildlife as a natural resource and heritage • Prudent management of domestic waste from the contractor's camp and construction waste. • Contractor to make available waste receptors/bins at the contractors camp and construction site • All waste is to be gathered together for collection and appropriate disposal by a NEMA

#	Environmental parameter	Potential impact	Proposed mitigation measures
			and local Authority approved waste disposal firm.
8.	Noise and ground vibration	• Potential generation of elevated noise levels from construction trucks and machinery near urban centres, schools and health facilities. • Elevated noise levels from explosives used at quarries and compressors used to level rocky areas where the road is designed to pass. • Potential generation of elevated noise levels in the remote where only wildlife is found causing disturbance to wildlife	• Use construction equipment with low noise levels; • Restrict construction activities with elevated noise generation to specific times when appropriate especially when passing through major towns like Lodwar, Kakuma and Lokichogio • Special care should be taken when construction is taking place near sensitive receptors such as schools and hospitals (Most sensitive sites – Lodwar, Kakuma, Lokichogio). • Drivers and machine operators should be sensitised and instructed to avoid raving the engines of trucks and machines to avoid air pollution from exhausts and elevated noise levels. • To the extent possible, heavy vehicles should not be used at night across populated areas (Lodwar and Lokichogio); • Construction activities to be restricted to daylight working hours in wildlife areas to avoid disturbance and disorientation of wildlife. • Use appropriate energy source. Generators should have low noise or fitted with mufflers. • Provide construction workers with earmuffs and ensure they are used when working at noisy areas.
9.	Bright light in wildlife areas	• Unnecessary attraction and disturbance of wildlife	• Carry out construction activities during daylight. • Where construction has to continue into the night to complete what cannot be

#	Environmental parameter	Potential impact	Proposed mitigation measures
			postponed, appropriate lighting has to be used to avoid disturbance of wildlife
10.	Visual intrusion	On the whole, there are few scenic sites, but the following features may cause visual intrusion: • Opened up quarries and borrow pits Excavated areas of the road • Vegetation (Trees and shrubs) cut down along the proposed road and also the deviation road. • Heaps of excavated soil from the proposed road and the deviation routes	• Progressively rehabilitate quarries and borrow pits as work progresses or convert them to usable water pans for use by the community. • Gather all the cut down vegetation and heap them appropriately in designated areas. The community and workers may be allowed to harvest the cut vegetation for use. • Soil excavated from the proposed road and deviation routes should be heaped in an organised fashion to avoid giving the project area a clattered appearance
11.	Domestic and Construction Wastes	• Potential pollution of soil and ground water resources by sanitary waste from contractors camp • Potential impact of the environment by domestic wastes including plastics, paper, glass and waste foods and wrappings for domestic appliances and foodstuff. • Potential impact of the environment by waste plastics and wrappings for construction materials like cement bags etc. • Potential impact of soil and groundwater of the Construction waste could be a health hazard in the area	• Contractors camp should have toilet facilities and mobile toilet facilities for use at the construction site • Provide the contractor's camp with appropriate solid waste bins for collection of generated solid waste • Provide appropriate waste bins for use by construction workers to keep solid waste generated at the construction site • Sensitise workers on proper waste management practices at the site and use of toilet facilities and waste bins. There should be no littering. No matter how small the waste is, it should be appropriately disposed of through use of designated waste bins. • Develop a waste management plan for use during the entire construction period. The

#	Environmental parameter	Potential impact	Proposed mitigation measures
			generated domestic and construction waste should be regularly collected by an appointed firm and disposed of appropriately. • Sensitise workers on use
12.	Urbanization	• The road could trigger rapid development of new urban centres along the road. • The current urban areas could grow as a result of transit traffic. • Potential emergence of unplanned developments along the roadside	• Local Authority to ensure proactive physical planning of any developments where the following infrastructure is provided: • Proper sanitation facilities. • Maintenance of appropriate distance away from the road for safety reasons • Planning for appropriate ways of waste collection, temporary storage and disposal • Planning and design of appropriate housing structures to be used for various commercial activities (shops, restaurants, supermarkets, hotels etc.)
13.	Public health	Potential occurrence of diseases arising from the following: • Water borne diseases from presence of stagnant water causing spread of malaria and consumption or use of contaminated water • Respiratory diseases from air pollution (excess dust and smoke emission) • Spread of sexually transmitted diseases like HIV/AIDS and other STI's from socialisation and unprotected sex • Occurrence of injury from accidents at the construction site	Carry out sensitisation of workers and local community on: • Use of potable water for consumption to avoid getting diseases like diarrhoea, cholera, dysentery etc.) • Consistent use of mosquito nets and removal of any stagnant water near homesteads to avoid contracting malaria • Suppress generation of excess dust by regular spraying of water at construction areas and road deviations. • Minimise smoke emission by carrying out proper maintenance of trucks, equipment and machines;

#	Environmental parameter	Potential impact	Proposed mitigation measures
			• Sensitise workers and local community on use of clean energy (gas and approved energy saving stoves) for cooking to avoid getting Upper Respiratory Tract Infection URTI). Firewood generates a lot of smoke and depletes forest resources. • Carry out sensitisation of workers and local community on the potential contraction of HIV/AIDS and STIs from unprotected sex and encourage workers and local community to visit VCT Centres. • Provide workers and make them available for community members.
14.	Road safety	Potential occurrence of road accidents during construction and operation of the road. This may be due to the fact that project area community have lived for long without good roads hence have become lax on the dangers of the roadways and fast moving vehicles.	To avoid occurrence of unnecessary accidents the following measures are required. • Carry out sensitisation campaigns and road safety awareness amongst the workers and local community • KeNHA and Contractor to Install elaborate road safety signs along the entire road; • Ensure that there are appropriate safety barriers around excavated areas (along the road under construction and the material borrow pits) to avoid accidents occurring.
15.	Conflicts	Potential conflicts related to water sources, material sites and job opportunities are likely to arise amongst project area communities and also between community and the contractor	• Ensure project information is disseminated to the community in a timely fashion through the local administration. • Identify water sources that will not be depleted when used by the project; • KeNHA to consider sinking and equipping boreholes to be used

#	Environmental parameter	Potential impact	Proposed mitigation measures
			for construction and later handed over to the community under CSR programme. This will enhance good relationship between community and project developer. It will also bring in a sense of ownership of the project and therefore minimise acts of vandalism of road signs etc. • Involve the local communities when selecting sites for getting road construction materials. • Purchase road construction materials locally where available to provide an opportunity of the locals gaining from the project. • Provide casual and semi-skilled job opportunities to the local community to promote their economic status and enhance good relationship and support for the project and reduce occurrence of any conflict

CONCLUSIONS AND RECOMMENDATIONS

There are some important potential environmental impacts that will accompany the project, both in the short and long term. During construction potential negative impacts that are considered significantly high relate to impacts on vegetation, fauna public health, water resources and soil degradation. These potential impacts are relatively easy to mitigate and their impacts are reversible. Potential serious post construction impacts are indirect and long term. Woodland resources will be put under immense pressure from charcoal burning due to improved accessibility into the area. *Prosopis* invasion could be enhanced on the roadside due to better soil moisture occasioned by pavement surface run-off and ease of seed establishment following construction soil disturbance. Other operation phase impacts include increased urbanization and immigration into the area, road safety issues and cultural conflicts.

The latter two impacts could be addressed by involving all the stakeholders in the road safety and social sectors. Similarly, the other negative socio-economic impacts such as increased urbanization and immigration can be effectively handled through proactive urban centre and regional planning.

The project area administration and community showed that that there has been adequate sensitisation on the project during stakeholder consultations and during the PMCs and they are just waiting for project implementation to begin.

The proposed upgrading of Lodwar-Nakodok Road is considered important, strategic and beneficial in improving connectivity between Kenya and South Sudan and promoting trade in the area. The upgraded road will also enhance economic growth of the area especially considering the recent oil finds and other potential developments that can take place with improved transport. There will be creation of job opportunities; uplifting the socio-economic status of the project area people. The significant support by the community that the project is enjoying indicates how important this project is to the project area community. The Consultant highly recommends that the project should be allowed to proceed taking into account the Mitigation Measures and Environment and Social Management Plan (EMP) proposed in this ESIA Report.