THE KENYA POWER AND LIGHTING COMPANY LIMITED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

PROPOSED TRANSMISSION LINE 132KV LESSOS-KABARNET-NYAHURURU-NANYUKI

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MARCH, 2010

SUBMISSION OF DOCUMENTATION

I, **Prof. Jacob K. Kibwage,** on behalf of Africa Waste and Environment Management Centre submit the following Environmental and Social Impact Assessment, Final Draft Report, for the Proposed Transmission Line 132KV Lessos – Kabarnet – Nyahururu - Nanyuki**.** To my knowledge all information contained in this report is accurate and a truthful representation of all findings as relating to the project.

Signed at **NAIROBI** on this ____ day of ____ **2010**

Signature**:**.....

Designation*:* **EIA/Audit Lead Expert Reg. No. 0126**

SUBMISSION OF DOCUMENTATION

I, ...on behalf of Kenya Power and Lighting Company, receive this Environmental and Social Impact Assessment, Draft Report, for the Proposed Transmission Line 132KV Lessos – Kabarnet – Nyahururu –Nanyuki.

Signed at **NAIROBI** on this ____ day of ……..**2010**

Signature……

Designation*:* **DEPUTY MANAGER SHE, KENYA POWER AND LIGHTING COMPANY**

PROPOSED 132KV TRANSMISSION LINE, LESSOS – KABARNET – NYAHURURU – NANYUKI

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ACRONYMS

AWEMAC	Africa Waste and Environment Management Centre
^{0}C	Degrees Celsius
bgl	Below ground level
EIA	Environmental Impact Assessment
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental Social Impact Assessment
ESMP	Environmental social monitoring plan
EMF	Electro Magnetic Field Emissions
Ha	Hectare
IMCE	Inter-Ministerial Committee on Environment
IPPS	Independent power producers
KENGEN	Kenya Electricity Generating Company
KM^2	Kilometres square
KV	Kilo Volts
KCAA	Kenya Civil Aviation Authority
KPLC	Kenya Power and Lighting Company
KWS	Kenya Wildlife Services
LGU	Local Government Unit
MW	Mega Watts
MVA	Mega Volts per Ampere
NEC	National Environment Council
NEAP	National Environment Action Plan
NEMA	National Environment Management Authority
NRPB	National Radiological Protection Board
NGOs	Non Governmental Organizations
NPEP	National Poverty Eradication Plan
PAPs	Project affected persons
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
ROWS	Right of Ways along the transmission line
SHE	Environmental health and safety
TOR	Terms of Reference
UETCL	Uganda Electricity Transmission Company Limited
V	Volts

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EXECUTIVE SUMMARY

The Government of Kenya plans to increase access to electricity in Kenya tenfold from the current 4% in the rural areas to about 40% by 2020. To do this, the transmission lines network is being considered for upgrading and with it the communication system required for line protection and management purposes. The Kenya Power and Lighting Company Limited (KPLC) least cost power development plan identified various 132 KV developments for improving the performance of the national grid network to cater for the increasing load growth and meet the objectives of 2030. KPLC is planning to construct a new single circuit 132 kV transmission line between Lessos – Kabarnet – Nyahururu - Nanyuki Power Transmission, comprising the following:

- Lessos – Kabarnet – Nyahururu – Nanyuki 235 KM

The proposed line will serve the Nanyuki and its surrounding areas. The Kenya Government policy on all new projects requires that an Environmental and Social Impact Assessment (ESIA) study be carried out at the project planning phase in order to ensure that significant impacts on the environment are taken into consideration at the construction and operations stages. Africa Waste and Environment Management Centre was contracted by KPLC to carry out an Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for the proposed Lessos – Kabarnet – Nyahururu – Nanyuki 132kV transmission line.

Environmental and Social Impact Assessment is a tool for environmental Planning and has been identified as a key component in new project implementation. The study conducted conformed to the requirements of the World Bank environmental and social policies, guidelines and assessment procedures, in addition to those of the National Environment Management Authority (NEMA) as stated in the Environmental Management and Coordination Act (EMCA) 1999 and stipulated in the Environmental (Impact Assessment and Audit) Regulations 2003, Legal Notice No. 101.

Project Justification

According to the Least Coast Power Development Plan, KPLC customer base is expected to grow by 200,000 connections every year creating an annual demand growth of about 150 MW. The national economic growths has also been on the upward trend rising from 1.8% in 2003 to 5.8% in 2005. significant effects of this growth are notable in agriculture, tourism and construction among other with a corresponding increase in power generation that rose from 4,852 GWh I 2003 (with sales of 3,801 GWh) to 5,195 GWh in 2004 (sales of 4,090 GWh). Maximum energy demand was projected at 5,641 GWh in 2006 and 24,957 GWh by year 2026.

The above overview gives a strong justification of the proposed Lessos – Kabarnet – Nyahururu – Nanyuki 132kV transmission line project. However environmental and social implications as outline I the scoping report conducted by Norconsult were studied in detailed who lead to this full ESIA which integrated the project design of this report.

This report presents in broad terms the key Environmental and Social issues that are anticipated to arise from the proposed project. The Government of Kenya is expecting to receive funds from World Bank to finance the construction of approximately 235Km of a single circuit 132 KV transmission line from Lessos, Kabarnet, Nyahururu to Nanyuki.

Chapter One entails the background information and rationale for carrying out EIA these will include scope, TOR for EIA process, Data collection procedures, EIA organization and structure, responsibilities ,methodology outline, environmental screening and scoping, site assessment, public participation meetings and Reporting.

Chapter Two gives the baseline information of the study areas where the transmission line will traverse through. There are five Gazetted Districts namely Laikipia, Baringo, Keiyo, Uasin Gishu and partially touches Nandi. This chapter gives an in depth information on the Geographical information of the Districts in terms of topography and climatic conditions, land use, drainage and hydrology, soil and

geology, forest diversity, socio economic settings in the districts gives the population profile, human settlements and health aspects.

Chapter Three gives a description of the areas where the transmission line will pass through from Lessos to Nanyuki substation. It clearly states the trading centres, towns and villages that the line will pass through and also those who are going to be affected by the line.

Chapter Four entails the various legislation and procedures outlined in the World Bank safeguard policies and regional impacts as per various regulations by NEMA and those that might be affected by the project.

Chapter Five describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed project. Views from the local residents, local leaders, surrounding institutions and development partners who in one way or another would be affected or have interest in the proposed project were sought through interviews and public meetings.

Chapter Six identifies both negative and positive impacts associated with the proposed transmission line. These impacts are identified according to the proposed project phases namely: Construction Phase, Operational Phase, and the Decommissioning Phase.

Chapter Seven highlights the mitigation measures for the expected negative impacts of the proposed transmission line. The potential impacts and the possible mitigation measures have herein been analyzed under two categories: Construction and Operational.

Chapter Eight analyses the project alternatives in terms of site, technology scale and route options.

Chapter Nine presents the ESMP that will need to be implemented by KPLC to prevent or reduce significant negative impacts to acceptable levels. Environmental

and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done.

Chapter Ten describes the Environmental Monitoring Plan as vital for any Environmental and Social Impact Assessment of a development project. The monitoring plan helps in assessing the effectiveness of proposed mitigation measures, in assessing changes in environmental conditions and to provide warning of significant deterioration in environmental quality for further preventive action. The activities and frequency of monitoring is as presented in the proposed ESMP.

Chapter Eleven gives the conclusion and recommendation of the proposed transmission line that the proponent needs to put in place.

Scope, Objective and Criteria of the Environmental and Social Impact Assessment (ESIA)

Scope of Study

The project in its entirety comprises of feasibility studies for the Energy Access Scale-Up Program to include initial system studies of the KPLC transmission system; metering system; previous studies and data collection; and the load forecast. Transmission system planning and an economic and financial analysis was also carried out, as well as cost estimates and justification and the establishment of ranking and performance targets. This study covers the 132kVTransmission Line Lessos, Kabarnet, Nyahururu to Nanyuki.

AWEMC was assigned by The Kenya Power& Lighting Company Limited to conduct an Environmental and Social Impact Assessment (ESIA) study for the proposed 132kV transmission line from Lessos, Kabarnet, Nyahururu to Nanyuki. This is in compliance with the legal requirements stipulated in the Environmental Management and Coordination Act of 1999 and its subsequent Legal supplements that require a proponent of a proposed project to assign a Lead expert or Firm of

Expert to undertake an ESIA study. The scope of the assessment covered construction works of the proposed line which included clearing of the way leave, ground preparation, erecting of the pylons, and installation of various project utilities that are required. The output of this work was a comprehensive Environmental and Social Impact Assessment study report for the purposes of applying for an EIA license.

Study Objectives

The main objective of KPLC is to construct a 132kV electricity transmission line from the Lessos sub-station to Nanyuki in order to meet the increasing demand for electricity in the project area while attaining the objectives of vision 2030. The objectives of this ESIA study is to evaluate the potential impacts of the proposed project and develop mitigation measures that aim at minimizing the negative impacts of the project while optimizing the positive impacts. The ESIA study findings cumulated into this ESIA report and a RAP document produced as a separate report. The specific objectives of this project include the following;

Identify and assess all potential environmental and social impacts of the proposed project;

- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;
- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
- Prepare an Environmental Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

- Identify and quantify different categories of project affected people (PAPs) who would require some form of assistance, compensation, rehabilitation or relocation.
- Provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project.
- Verify the adherence and compliance of the World Bank's safeguard policies.

Approach

The approach to this exercise was structured such as to cover the requirements under the EMCA 1999, the EIA Regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003, and the World Bank Safeguard Policies. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site areas, public consultations with members of the community in the project areas, survey, photography, and discussions with the project proponent.

Methodology

Environmental Screening: In screening the Consultant set out to confirm whether or not this project falls within a category that requires EIA prior to commencement. In addition, other considerations during the screening process included a preliminary assessment of the environmental sensitivity of the areas along the proposed transmission line route; this comprised of a desk study involving the analysis of project maps and proposed line route, as well as literature review of previous studies on the proposed project.

It was determined that infrastructure development activities (such as the development of the proposed power transmission line) are listed under Schedule 2 of EMCA, 1999 among projects requiring an EIA study. The Proponent has therefore commissioned this study in line with the provisions of EMCA, 1999.

Environmental Scoping: The screening exercise helped to narrow down the most critical environmental and social issues requiring detailed evaluation. Below are the key activities that were undertaken during the study:

- Consultations with the Proponent and regarding the proposed project details, the site planning and implementation plan,
- Desk review of available documentation on the project,
- Thorough field investigations along the proposed line route, photography, surveys, informal and discussions with people from the immediate neighbourhood.
- A participatory rapid assessment method using tools including literature review, questionnaires, observation, geographical positioning system device (GPS), and in-depth interviews as well as public consultative meetings were used as follows:
- 134 household interviews were conducted along the project corridor
- In-depth interviews were held with district heads of departments, provincial administration, NGOs, CBOs and Faith based Organizations.
- Evaluation of the project setting and baseline conditions;
- Consultative Public Participation in Kabarnet country hall, Kivumbini, Manyatta Tutu village and chief's camp Nanyuki.
- Analysis of the potential impacts of the proposed project on the biophysical and socio cultural/ economic environment;
- Formulation of appropriate mitigation measures and development of an environmental and social management plan, monitoring plan, and guidelines for capacity building in environmental and social management;
- Report writing;
- Submission of Project Report to NEMA for review and approval;

Public Consultations

The following were the major concerns that were raised up by various stakeholders in regard to the proposed project

- The project is good for the development of the country since it will boost power supply and improve on industrial development, and should therefore be undertaken.
- The project will improve businesses in the area and also create job opportunities to the local Youth during construction phase.
- There would be interaction with other cultures especially during construction phase.
- The project may lead to displacement of the residents.
- Resettlement of residents may interfere enormously with their livelihoods since they will have to move businesses and schools.
- The Air Force Base in Nanyuki is a protected area and the project may interfere with operations of the aircrafts.
- There would be increased pollution from transport vehicles during construction.
- There would be electromagnetic radiations and risk of electrocution that may affect those residing near the way leave.
- There would be possibility of insecurity in the areas due to the influx of other people during construction phase.
- The project will lead to cutting down of trees which are very important in some areas that are very arid.
- There would be loss of land and property since residents may be required to relocate.

The following suggestions that were raised during the various stakeholders consultation meetings:

- KPLC should provide stepped-down voltage power to the residents along the proposed line for domestic use
- The Proponent should consult with Kenya Civil Aviation Authority regarding having the line going through or near the Air Force Base airfield.
- In areas where the proposed route passes many households, the proponent should consider relocating it to ensure that not many people are displaced.
- Compensation of land should be done with consideration of the current economic situation

- The proponent should ensure that trees are not cut down unnecessarily and those that will be felled should be replaced elsewhere.
- Some residents said that since they would not benefit from the project then the line should pass underground.
- The proponent should assist the local communities in other projects since they will not directly benefit from the project e.g. construction of classrooms for schools, assist students from the villages to attend secondary schools, drill borehole for villages, assist in control of HIV/AIDS, etc.
- The Proponent should put up power sub-stations at convenient points in order to supply the residential areas with power.
- The Proponent should ensure proper environmental management practices are put in place.
- The proponent should consider employing casual workers from the local areas during construction phase of the project.
- Noise pollution should be controlled.
- The affected residents should be given ample notice to move and be compensated before relocating.
- The proponent should put up security lights.

Assessment of Potential Impacts and Proposed Mitigation Measures

The following key project impacts were identified based on assessment and comments that were received from the various stakeholders who were involved in public participation they include;

- Terrestrial Habitat Alteration
- Alteration of Aquatic Habitats
- Wildlife Species
- Soil
- Air Quality
- Water Quality
- Hazardous Substances
- Fire Risk
- Loss of plant species and communities

- Impacts on health and safety
- Noise
- Aircraft Navigation Safety
- Electromagnetic Fields (EMFs)
- Maintenance of Transmission Line System
- Electrocution from Live Power Lines
- Possible exposure of workers to diseases
- Physical Hazards
- Socio-Cultural Impacts
- Visual Amenity
- Spread of Disease
- Land Acquisition and Resettlement
- Employment creation
- Additional Power Capacity
- Increased Revenue
- Increase in volume of national electricity grid

Policy, Legal and Regulatory Framework

The Environmental Management and Co-ordination Act 1999, is the legislation that governs EIA studies in Kenya. This project falls under the Second Schedule of EMCA 1999, which lists the type of projects that are required to undergo EIA studies in accordance with Section 58 (1- 4) of the Act. Various other key national laws that govern the management of environmental resources in the country have been discussed in the report. This study is also based on internationally respected procedures recommended by the World Bank, covering environmental guidelines. Reference was made to the World Bank Safeguard Policies and Environmental Assessment Source Book Volume II, which provide relevant sectoral guidelines.

Project description

The proposed project is part of the Proponent's energy access scale-up program, which involves extension of the transmission and distribution lines and installation of new 132/33kV substations, as well as new and reinforced distribution lines with

the aim of reducing technical losses and improving voltage conditions, thereby coping with additional demand, Increasing access to electricity to 20% by 2010 by accelerating connection rates, Voltage upgrading to increase supply capacity and reduce system losses and Provide alternative electricity supply paths to increase reliability and improve power quality in the regions. The proposed Lessos – Kabarnet – Nyahururu – Nanyuki 132kV transmission line will be 235 Kms longs with a Right of Way (RoW) of 40 metres also called way leave or trace.

Findings

Compliance with legislations and policies

This project needs to comply with the international safeguard policies of the World Bank as well as the relevant core national legislation and regulations, including The Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003). Furthermore the project needs to meet the requirements of all the international conventions, protocols and treaties which Kenya is a party to.

Summary of anticipated positive impacts include:

- Possibility of connecting more households and institutions to the national grid;
- The major impacts of the transmission line will be reduced poverty and improved living standards within and beyond the district served. These will result from employment creation (direct and indirect) and increased investments especially in value addition processing of primary products.
- Improved incomes and poverty reduction will also occur through provision of opportunities to invest in heavy industries and facilitate direct and indirect employment
- Job creation for both skilled and unskilled labour for vegetation clearing, menial works, drivers and machine operators. The total number of local jobs created by this project as will depend on availability of labour and policies of the contractor and KPLC

- Boost the economy through investment and expansion of businesses and income generation opportunities. This will increase productivity and competition
- Connect more households and institutions with electricity thereby providing household level lightning system. This will create market for electronic goods
- Improve security in the beneficiary communities through better lighting.

Summary of potential negative impacts on the environment include:

- Terrestrial Habitat Alteration
- Aquatic habitat alteration
- Soil erosion
- Air Pollution: dust from breaking of hard ground, benzene and other from the motorized chain saws used for clearing of vegetation
- Pollution of watercourses
- Generation of solid waste
- Risk of fire
- Electrocution from Live Power Lines
- Safety concerns from working at heights
- Exposure to fumes from the motorized chain saws
- Spread of diseases including HIV/AIDS
- Noise induced hearing problems
- Social/cultural disruption
- Land acquisition and involuntary resettlement

Table 1: Summary Project Impacts and Mitigation Measures

ENVIRONMENTAL IMPACT	IMPACT TYPE								MITIGATION		
	Positive		Negative								
	Significant	Not Significant	Significant	Not Significant	Short Term	Long Term	Irreversible	Cumulative	No mitigation required	Mitigation required	Ref. to mitigation section
Employment Opportunities	x				x				x		
Gains in the Local and National Economy	x					x			x		
Market for Supply of structural and building materials	x				X				x		
Impacts on Agricultural Land			X			x				X	
Noise pollution			X		X					X	
Minimal Excavation of soil				X	x					X	
Oil Spills				x	X					X	
Minimal water demand				X	X					X	
General safety and Dust Emissions			X		X					X	
Destruction of existing vegetation			X			X				X	
Generation of Exhaust Emissions				x	X					X	
Possible exposure of workers to diseases				X	X					X	
Solid Waste Generation				X	X					X	
Loss of plant species and communities			X			x	x			X	

Loss of Wildlife and Wildlife Habitat				x	x					x	
Relocation and displacement			x			x	x			x	
Right Of Way Easements				x		x				x	
Extraction and use of construction materials				x	X					x	
Energy consumption				x	x			X		x	

Impact Matrix (Operation and decommission)

ENVIRONMENTAL IMPACT	IMPACT TYPE								MITIGATION		
	Positive		Negative								
	Significant	Not Significant	Significant	Not Significant	Short Term	Long Term	Irreversible	Cumulative	No mitigation required	Mitigation required	Ref. to mitigation section
Employment creation	x					x		X	x		
Additional Power Capacity	x					X		x	x		
Increased Company and Government Revenue	x					X		x	x		
Increase in volume of national electricity grid	x					X		x	x		
Impacts on Flora and Fauna				x		X				X	
Effects of Electric Power Lines			x			x				x	
Impacts to Endangered/Threatened and Protected Species				x	x					x	
Noise, Ozone and Corona				x		x				x	
Impacts on Airstrips				x		x				x	-
Radio and Television Reception Interference				x		x				x	-
Social Impacts				x	x			x		x	-

Impact on Settlements and Community facilities			x			x	x			x	-
Minimal pressure on infrastructure				x	x					x	-
Electricity loss				x		x				x	
DECOMMISSIONING PHASE IMPACTS											
Solid Waste			x		x					x	
Minimal Dust			x		x					x	
Noise & vibration			x		x					x	
Rehabilitation	x					x			x		
Employment opportunities	x				x				x		-

Analysis of Project Alternatives

The following were project alternatives that were discussed in regard to this project they include; no project option, relocation option, the proposed development option, analysis of alternative construction materials and technology and Alternative route for the transmission line. These options have been discussed and various merits and demerits have been highlighted so as to enhance environmental sustainability as regards to the project.

Environmental and social management and monitoring plans

The Environmental and social management and monitoring plans address specific concerns and mitigation measures encountered during the construction, operation and decommissioning phases of the proposed project. To ensure that the negative environmental impacts can be mitigated effectively a stringent management and monitoring plan has been prepared. The ESIA proposes to utilize the existing structures in KPLC management especially in Safety Health and Environment (SHE) department and existing resettlement unit in taking the responsibility of ensuring environmental and social issues are achieved in regard to the proposed transmission project. SHE department shall take the responsibility of conducting annual audits to ensure the project complies with the set regulations and the proposed Environmental and social management and monitoring plans.

Conclusion

It is quite evident from this study that the construction and operation of the proposed construction of approximately 235 Km of a single circuit 132 KV transmission line from Lessos Kabarnet, Nyahururu to Nanyuki project will bring

positive effects in the study area including creation of employment, availability of social amenities, Increase in power to the national grid and increase in revenue among others. However, although the project will come with various positive impacts, negative impacts will also be experienced hence the need to assess them and put in place appropriate mitigations. The negative impacts of this project include: Increased population in the project area, which is mostly rural and lacking essential services and facilities; increased pressure on infrastructure; social crime among others.

The consultant wishes to document the following based on the above conclusion:-

i. For a comprehensive Resettlement Action to be done the proponent has to do a detailed survey and marking of the proposed line.
ii. The negative impacts that will arise during the project cycle will be mitigated
iii. The impacts that will be adverse will be temporary during the construction phase and can be managed to acceptable levels with the implementation of the recommendation of the mitigation measures for the project
iv. The main issue will revolve around relocation and resettlement of those who will be affected by the transmission line in term of creating way.

Recommendations

It is our recommendation that the project be allowed to go on provided the following recommendation have been made:-

i. Mitigation measures outlined in this report should be adhered to and the Environmental Management Plan (EMP) implemented to the letter. The implementation of this EMP the entire life cycle of the proposed project (i.e. construction, operation and de-commissioning) is considered to be the key in achieving the appropriate environmental management standards as detailed for this project.
ii. KPLC should undertake environmental audits (EA) of the project after every 12 months after completion of the project to confirm the efficiency and adequacy of ESMP.
iii. KPLC should carry out a survey and demarcate the boundaries shown on the proposed line to identify those who will be affected.

iv. KPLC should resettle the displaced PAPs and provide them with social amenities like water and rural electrification.

v. KPLC should liase with relevant agencies like the Forestry Department for permission to clear the way leave however the company shall ensure re afforestation is done in the cleared forests areas retain the aesthetic value.

1. INTRODUCTION

1.1 Background and Rationale for an Environmental Impact Assessment

Kenya Power and Lighting Company Limited (KPLC), also referred to as the Proponent, is a limited liability company responsible for the transmission, distribution and retailing of electricity throughout Kenya. The Proponent owns and operates the national transmission and distribution grid, and as at June 2009 was retailing electricity to approximately 1,262,309 customers throughout the nation. The Proponent proposes to construct and operate approximately 235 Km of single circuit 132 kV transmission line between Lessos – Kabarnet – Nyahururu – Nanyuki 132kV transmission line.

The registered office and contact addresses of the Proponent are:
Kenya Power and Lighting Company
Stima Plaza, Kolobot Road
P. O. Box 30099
00100 – NAIROBI.
Tel. 254 20 3201000
E-mail: jguda@kplc.co.ke

The Government of Kenya plans to increase access to electricity in Kenya tenfold from the current 4% in the rural areas to about 40% by 2020. To do this, the transmission lines network is being considered for upgrading and with it the communication system required for line protection and management purposes.

The generating system in Kenya consists of hydropower as well as thermal power plants, in total 1,197 MW installed capacity. The largest power plant is Gitaru hydropower plant with an installed capacity at 225 MW (as at the end of FY 2007). The transmission system voltage as of June 2007 consisted of 1,323 km 220 kV and 2,122 km 132 kV. Almost all the 220 kV and 132 KV lines are single circuit lines with the conductor Goat at 220 kV and Wolf or Lynx for more than 50 % of the 132 kV

lines. Kenya is today interconnected with Uganda through a 132 kV double circuit line. (Norconsult AS, August 2009).

The KPLC least cost power development plan identified various 132 KV developments for improving the performance of the national grid network to cater for the increasing load growth and meet the objectives of 2030. To meet this objective KPLC intends to construct a single circuit 132KV transmission line from Lessos – Kabarnet – Nyahururu – Nanyuki. The proposed transmission line offers an opportunity to expand the dedicated telecommunications network so as to offer enhanced protection of the lines and upgrade the communication system. (Norconsult AS, August 2009)

1.2 ESIA STUDY

The Kenya Government policy on all new projects requires that an Environmental and Social Impact Assessment (ESIA) study be carried out at the project planning phase in order to ensure that significant impacts on the environment are taken into consideration at the construction and operations stages.

AWEMAC, also referred to as the Consultant, has been contracted by KPLC to carry out an Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for the proposed 132kV transmission line. The goal of this assignment is to ensure that any potentially adverse environmental and social impacts can be minimized to the extent feasible, and the positive impacts can be enhanced. The RAP exercise on the other hand will set out the framework for policies, principles, institutional arrangements, schedules, and other indicative budgets to facilitate any resettlement process that will be necessitated as a result of this project.

The ESIA assignment has been implemented in accordance with the requirements or the Environment Management and Coordination Act (1999) of Kenya and the Environmental Impact Assessment and Audit Regulations of Kenya (2003). The study also incorporates The World Bank Safeguard Policy guidelines. The Consultant shall seek to obtain approval of this Project Report from the National

Environment Management Authority (NEMA). The Terms of Reference for carrying out the ESIA and RAP studies provided detailed information on the scope of the studies and the expected outputs.

1.3 Study Objectives

The broad objective of this assessment was to identify potential environment and social impacts of the project and formulate recommendations to ensure that the proposed development takes into consideration appropriate measures to mitigate/minimize any adverse impacts through all phases of its implementation. The assessment was undertaken in compliance with the Environmental Management and Coordination Act (EMCA) 1999 and also the Environmental (Impact Assessment and Audit) Regulations under the Kenya Gazette Supplement No. 56 of 13th June, 2003.

The specific objectives of this ESIA are to:

- Identify and assess all potential environmental and social impacts of the proposed project;
- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;
- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
- Prepare an Environmental Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

- Identify and quantify different categories of project affected people (PAPs) who would require some form of assistance, compensation, rehabilitation or relocation.
- Provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project.
- Verify the adherence and compliance of the World Bank's safeguard policies.

1.4 Scope of the Study

The project in its entirety comprises of feasibility studies for the Energy Access Scale-Up Program to include initial system studies of the KPLC transmission system; metering system; previous studies and data collection; and the load forecast. Transmission system planning and an economic and financial analysis was also carried out, as well as cost estimates and justification and the establishment of ranking and performance targets. This study covers the 132kV Transmission Line from Lessos – Kabarnet – Nyahururu – Nanyuki.

The study has been structured such as to cover the requirements under the EMCA 1999, the EIA Regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003. The study also takes into consideration the World Bank Safeguard Policies, specifically: OP 4.01 Environmental Assessment; OP 4.04 Natural Habitats; OP 4.10 Indigenous Peoples; OP 4.11 Physical Resources; OP 4.12 Involuntary Resettlements; OP 4.36 Forests; OP 4.37 Safety of Dams; OP 7.50 International Waterways; and OP 7.60 Projects in Disputed Areas.

1.5 Study Approach

The approach to this exercise was structured such as to cover the requirements under the EMCA 1999, the EIA Regulations as stipulated under the Gazette Notice No. 56 of 13th June 2003, and the World Bank Safeguard Policies. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the project site areas, desktop studies, and public consultations with members of the community in the project areas, survey, photography, and discussions with the project Proponent.

1.6 Study Methodology

1.6.1 Environmental Screening:

In screening the Consultant set out to confirm whether or not this project falls within a category that requires EIA prior to commencement. In addition, other considerations during the screening process included a preliminary assessment of the environmental sensitivity of the areas along the proposed transmission line route; this comprised of a desk study involving the analysis of project maps and proposed line route, as well as literature review of previous studies on the proposed project. It was determined that infrastructure development activities (such as the development of the proposed power transmission line) are listed under Schedule 2 of EMCA, 1999 among projects requiring an EIA study. The project proponent therefore commissioned this study in line with the provisions of EMCA, 1999.

The consultants used screening, scoping and detail analysis methodology for the ESIA study. The approach and methodology applied during the study enabled collection of both primary and secondary data. The consultant used both qualitative and quantitative methods to obtain the primary data. Qualitative data was obtained through filed visits/site walks, photography, and stakeholders' consultation while quantitative data was obtained through the use of predefined questionnaires.

The key activities undertaken during the assessment included the following:

- Consultations with the key project stakeholder including the proponent, community members, administrative authority, opinion leader and district departmental heads. The consultations were based on the proposed project, site planning and the project implementation plan;
- Physical inspections of the proposed project area which included observation of available land marks, photography and interviews with the local residents;
- Evaluation of the activities around the project site and the environmental setting of the wider area through physical observations and literature review;
- Review of available project documents; and

- Report writing, review and submissions.

1.6.2 Data collection tools and equipments

Several data collection tools were used to document available data during the study these included use of checklists, photography, geographical positioning systems (GPS), questionnaires and computers among others. All data collected were analyzed for production of the EIA report. Samples of the questionnaires used during the study are provided under Annex of this report. The main steps undertaken to meet the objective of the study were as follows:

Step 1: Environmental Screening

Screening of the project was undertaken to evaluate the need of conducting an EIA study and the level of study. The screening stage was concluded based on the requirements of the second schedule of EMCA which requires transmission lines to undergo a full EIA study.

Step 2: Environmental Scoping

The project scoping stage which followed the screening stage was applied to narrow down the project issues to that requiring detail analysis. The process involved conducting discussions with the proponent on the project issues and, collection of primary and secondary data. The primary data was collected through the qualitative and quantitative methods of data collection. Qualitative data was collected through filed visits/site walks, public and stakeholders consultation while quantitative data was collected through the use of sampled questionnaires. The secondary data was collected through literature review which included study of the following documents:

- Policies, Acts and Regulations;
- District Development Plans;
- Project area topographical and cadastral maps;
- Previous project study documents; and

- Literature materials on project including those on IBA, Plant Species, Culture, Power Project Installation and Management among other project parameters.

Step 3: Desk study

Desktop studies were conducted through review of secondary data to establish the following:

- Legal Policies, Legislative and Institutional Framework governing the proposed project;
- Licenses and permits requirements and conditions;
- Project area baseline information including documented sensitive environmental receptors;
- Types of waste to be generated, proposed management and disposal methods; and
- Potential positive and negative impacts.

The secondary data was obtained by reviewing several literature materials including:

- Policies, Acts and Regulations
- District Development Plans for Nandi District
- District Development Plan for Uasin Gishu District
- District Development Plan for Keiyo District
- District Development Plan for Baringo District
- District Development Plan for Laikipia District
- The Sectoral Environmental Impact Assessment Study, August 2009
- Project area cadastral and topographical maps

Step 4:-Field Assessment and baseline survey

Detailed field surveys for this study were undertaken within the proposed project area and its surrounding from the 23rd November to 18th December 2009. This involved conducting systematic field traversing to quantify perceived impacts on:

- Land ownership, usage and conflicts;

- Vegetation cover of the area;
- Underground and surface waters;
- Waste management; and
- The general environment and its sensitive receptors found within the project area.

The EIA study experts traversed the whole project area and identified the status of the environment and socio-economic indicators which included the following:

- Baseline data on the bio-physical environment
- Socio-economic and cultural environment;
- Project Affected Persons (PAP) and Project Affected Households (PAH);
- The level of project impact on affected persons and the environment;
- The opinion of the stakeholders including the local communities and on the proposed project; and
- The project alternatives routes

Site walks also indicated that the proposed line will traverse areas of different land uses including agricultural land, schools, trading centres, public land owned by institutions, road reserves among other areas.

Step 5: Public Consultations

Detailed stakeholders consultations for this study were also undertaken from the 17th to 18th November 2009. These consultations meetings were conducted in the form of:

- Focus group discussions (FGDs):- FGD were conducted with men, women and the youth. The composition of the groups were determined after consultation with the Chiefs and Assistant Chiefs of the areas;
- Key Informant Interviews and Semi-Structured Interviews:- These interviews were conducted with the District Officers (D.Os), Chiefs, Assistant Chiefs, Councilors and Village Elders;
- Open-ended and Pre-coded questionnaires: -These questionnaires were administered to target groups in order to obtain their views on the proposed project and its perceived impacts.

The main target groups were the PAPs along the proposed transmission line way leave and to some extent the households surrounding the proposed project area. The PAPs were picked systematically for interviews with the aim of reaching up to 100% of those within a radius of 40m of the proposed line. The general public was also interviewed and this involved reaching communities members with property outside the way leave area through random sampling. For those households which were on the proposed transmission line and were not reachable to be interviewed, the Chiefs and Assistant Chiefs gave the team an estimated number of households, names and the villages. The names of all those interviewed during the consultation are found under public consultation chapter of this report too.

Public Barazas which were organized by the D.Os and Chiefs; and transect walks were also done to confirm the information from the discussions and observations were made on physical and environmental conditions. In addition to constant briefing of the client, this environmental impact assessment project report was prepared. The contents were presented for submission to NEMA as required by law.

2. BASELINE INFORMATION OF THE STUDY AREA

2.1 Introduction

The proposed project which is 235Km long of 132Kv single circuit transmission line from Lessos through Kabarnet off Marigat, through Rumuruti and to Nanyuki; passes through five gazetted districts, i.e. Laikipia, Baringo, Keiyo, Uasin-Gishu, and partially touches Nandi. It passes through a variety of land uses, including some settlements like: farmlands, ranches, informal settlements, forests, conservancy lands among others. It is anticipated that the most significant adverse socio-economic impacts is the need to compensate and relocate affected people by the project.

2.2 Geographical Information

2.2.1 Nandi District

Nandi district borders Kakamega district to the north-west, Uasin Gishu District to the north and east, Kericho District to the south-east, Kisumu District to the south-west and Vihiga District to the west. The District lies within Latitudes 00 and 0034"North and Longitudes 34045" and 35025"East and occupies an area of 2,784 square kilometres, with maximum distance of 90 Km from North to South and 75 Km from east to west. The district has nine administrative divisions covering areas listed in Table 2.

Table2: Area of Nandi District by Division (sq km)

Division	Area
Aldai	256
Kabiyet	273
Kapsabet	483
Kaptumo	242
Kilibwoni	254
Kipkarren	287

Kosirai	185
Nandi Hills	394
Tinderet	410
TOTAL	**2,784**

Source: District Development Plan 1997-2001

2.2.2 Uasin Gishu District

This district extends between Longitude 34050' and 35037' East and 0003' and 0055' North. The district shares common borders with Trans Nzoia District to the North, Marakwet and Keiyo District is to the east, Koibatek District to the south east, Kericho District to the south, Nandi District to the west and Kakamega District to the north-west. The total area of the district is 3,218 square km constituting slightly over 2% of the area of Rift Valley Province. From its northern tip to its southern end, it spans a length of some 68 km. The area has six administrative divisions covering areas listed in Table 3.

Table 3: Area of Uasin Gishu District by Division (sq km)

Division	Area
Ainbokoi	383
Kesses	611
Moiben	738
Kapsaret	400
Soy	762
Turbo	324
TOTAL	**3,218**

Source: District Development Plan 1997-2001

2.2.3 Keiyo District

This district was carved out of the former Elgeyo Marakwet District in 1994. It is bordered by Marakwet District to the north, Uasin Gishu District to the west, Baringo District to the east and Koibatek District to the south-east. It extends from

Latitude 001" to 0052"North and from Longitude 35025" to 35025"East. The total area of the district is 1,456 square km and constitutes about 0.38% of the total area of Kenya (380,367Km^2). The district has four administrative divisions distributed by size as in Table 4

Table 4: Area of Keiyo District by Division (sq km)

Division	Area
Tambach	281
Kamariny	277
Chepkorio	409
Soy	489
TOTAL	**1,456**

Source: District Development Plan 1997-2001

2.2.4 Baringo District

Baringo District is located in the northern part of Rift Valley Province and has a total area of 8,665 km^2. The district borders Turkana District to the north, Samburu and Laikipia Districts to the west, Koibatek District to the south, as well as Keiyo, Marakwet and West Pokot Districts to the west. The district lies between Latitudes 0012" and 1036"North and Longitudes 35036" and 36030"East. This is one of the largest Rift Valley districts, divided into 11 administrative divisions as in Table 5.

Table 5: Area of Baringo District by Division (sq km)

Division	Area
Sacho	168
Nginyang	1,689
Tenges	229
Marigat	1,224
Kipsaraman	1,083
Tangulbei	1,313
Kabartonjo	309
Mochongoi	329

Kolowa	1,231
Kabarnet	574
Barwessa	506
TOTAL	**8,655**

Source: District Development Plan 1997-2001

2.2.5 Laikipia District

Laikipia District is one of the eighteen districts located within Rift Valley Province. It borders Samburu District to the north, Isiolo to the north-east, Meru Central to the south, Nyandarua and Nakuru Districts to the southwest and Koibatek and Baringo Districts to the west. It lies between Latitudes 0018" and 0051"North and between Longitudes 36011" and 37024"East. The district has 7 administrative divisions distributed by size as in Table 6.

Table 6: Area of Laikipia District by Division (sq km)

Division	**Area**
Central	2,392
Lamuria	1,261
Mukogodo	1,103
Rumuruti	2,786
Nyahururu	167
Ol Moran	1,227
Ng'arua	757
TOTAL	**9,693**

Source: District Development Plan 2002-2008

2.3 Topography and Climatic conditions

2.3.1 Nandi District

The district's physiographic is divided into five distinct features: the rolling hills to the west: the Kapsabet Plateau (part of the Uasin Gishu Plateau); the weeded highlands and foothills of Tinderet volcanic mass in the south-east; the Kingwal swamp in the Baraton – Chepterit area; and the dissected Nyando Escarpment at the

southern border. The district lies at an altitude ranging between 1300 meters and 2500 meters above sea level.

The district has a cool and moderately wet climate. It receives an average rainfall of between 1200mm and 2000mm per annum. The long rains starts in early March and continues up to the end of June, while the short rains usually fall from mid September to the end of November. A dry spell is normally experienced between December and March but there is no single month in which the district records no rainfall.

2.3.2 Uasin Gishu District

Uasin Gishu district is a highland plateau. Its terrain varies greatly with altitude, which ranges between 1,500m above sea level at Kipkaren in the west to 2,100m above sea level at Timboroa in the east. Eldoret town at an altitude of 2,085m marks the boundary between the highest and lowest altitudes of the district. The district's general landscape is that of undulating plateau with no significant mountains or valleys.

Rainfall amounts and regime is influenced by altitude and wind direction. Rainfall in Uasin Gishu District is high, reliable and evenly distributed with annual average for the last five years being about 90mm.

Due to the high altitude in the district, temperatures are relatively low. The highest is 25^0C and the lowest is about 8.8^0C. Humidity is moderate, averaging 56%. February is the hottest month while June is the coldest month.

2.3.3 Keiyo District

Keiyo District can be divided into three main topographical zones which run parallel to each other in a north-south direction. These are the highland plateau, the Elgeyo Escarpments, and the Kerio Valley. The highland plateau rises gradually from an altitude of 2,400m above sea level on Chebiemit Hills in the north to 2,700m above sea level on the Metikai Ridges in the south. The main water divide runs along the escarpment.

The floor of the Kerio Valley has a high concentration of mineral deposits which add to the district's potential for industrial development. The Elgeyo Escarpment has medium potential in agricultural development due to its moderate rainfall and moisture availability while the valley floor has a marginal agricultural potential, but both are good for livestock rearing.

The climate of the District is hot and humid in Kerio Valley while the highlands are cold. The coldest areas are Nyaru and Iten. The rainfall pattern is bi-modal with long rains occurring from March to June and short rains occurring between June and December. The average rainfall during the wet season is 1500mm which occurs mainly in the highlands.

2.3.4 Baringo District

The rainfall is about 50% reliable and rainfall variability is very high. There is one rainy season from April to August and a prolonged dry season. Rainfall patterns are strongly influenced by local topography and long-term average annual rainfall ranges from 600mm in the lowlands (Njemps Flats) to 1000-1500mm in the highlands. The annual mean minimum and maximum temperature ranges from 16-18^{0}C and 25-30^{0}C respectively. The period between January and March is the hottest. High net radiation results in high evapo-transpiration throughout the year and there is no month when average rainfall exceeds average potential evapo-transpiration.

2.3.5 Laikipia District

The district experiences a relief type of rainfall due to its altitude and location. Annual rainfall varies between 400mm and 750mm. The long rains occur from March to May, while the short rains are in October and November. Higher annual rainfall totals are observed on the slopes of Mt. Kenya and the Nyandarua Range. North Marmanet receives over 900mm of rainfall annually, while the drier parts of Mukogodo and Rumuruti Divisions have slightly over 400mm annually.

2.4 Land use

2.4.1 Nandi District

There is a variety of land use patterns within the district, a part from residential settlements there are farm lands with different agricultural crops, including food crops such as maize, and cash crops like: tea, wheat, sunflower sugarcane coffee, pyrethrum, and sunflower among others. Livestock keeping is also done immensely within the area.

The road network is uniformly distributed throughout the district, except in the hilly areas of Tinderet Division to the south and the forest areas to the west and north-western parts of the district, which are not well linked to the rest of the district. Other rural access roads serve as an important link ways but become impassable when it rains heavily.

The district is not well covered by electricity grid and the implementation of Rural Electrification Programme has been slow. With exception of Kapsabet and Nandi Hills Towns, and some isolated areas in the district, like Meiteitei area, a larger part of the district still lacks electricity.

2.4.2 Uasin Gishu District

There is a variety of land use patterns within the district, which include residential settlements and farm lands with both food crops such as maize and cash crops like: tea farms, wheat, sugarcane, coffee, pyrethrum, and sunflower among others. Livestock keeping is an important activity within the area immensely.

The Great North Road (A104), which enters the district at Makutano and exits at Turbo, is a major driving force for industrialization and trade in the district. This road links the district to both the domestic and external markets. Generally, therefore, the road network is adequate but most of it is impassable during the rainy season, cutting off several productive areas from the rest of the district, because they are not well maintained.

2.4.3 Keiyo District

There is variety of land use patterns, including residential settlements and farm lands with different agricultural crops, some are food crops such as maize and both cash crops like: wheat, sunflower, pyrethrum, and cotton among others. There is also extensive livestock keeping within the area including goat, sheep and dairy keeping.

2.4.4 Baringo District

The main livelihood systems are livestock and crop production, wildlife-based tourism and fishing. Forestry and harvesting of sand and stones are practiced at a relatively much lower scale. About 20,000ha of the land is used for cultivation of food and cash crops. The main food crops grown are maize, beans, finger millet and sorghum while cash crops are coffee, maize and pyrethrum. Livestock is the primary livelihood system.

2.4.5 Laikipia District

Laikipia is home to ethnically diverse communities, including the Mukogodo Maasai, Kikuyu, and Meru, who live side by side by the, Turkana, Samburu, and Pokot. Cattle- rearing on large commercial ranches and community owned rangelands has for many years been the life-line of the community. These large scale ranches occupy over 50% of the total area of the district.

The District also receives over 80,000 visitors per year: therefore accounts for 10% of Kenya's total international visitors. It is estimated that 90% of Laikipia tourism facilities are based on natural wildlife areas.

2.5 Drainage and Hydrology

2.5.1 Nandi District

The District has seven major rivers, namely Anapingetuny, Kapchorua, Kimondi, Yala, Mokong, Kabutie, and Clare. All these rivers originate from the district except Rivers Anapingetuny and Kimondi. There are also other permanent streams spread all over the district, but with concentration in central and southern divisions of

Aldai, Tinderet, Nandi Hills, Kilibwoni, Kaptuma and Kapsabet. These rivers have enough water for livestock and industries in the district.

2.5.2 Uasin Gishu District

Most surface water sources originate from the southern part of the District. with a few, originating from the north eastern part. The District generally has very few rivers. all of them draining into Lake Victoria. In the northern parts Nzoia Rivers has its source in Cheboyit Forest in Marakwet District. This river and her tributaries provide water for the northern parts of the District like Moiben and Soy Divisions. River Sosiani, which passes through Eldoret, has her origin in Kaptagat Forest in the south eastern part of the district.

2.5.3 Keiyo District

The natural water source in the District is the Kerio River which has its numerous tributaries emanating from Metkei, Tenges and Kimwarer Hills. Rainfall in the district is received in two major rainy seasons of April- July and September – October. The tributes of Kerio River include seasonal rivers of Torok, Kessup and Emsoo. Ground water in the district has not been fully utilized, mainly because the nature of terrain along the highland area is not good for underground recharge. The existing boreholes are fairly deep and yield is low.

2.5.4 Baringo District

The surface water potential in the District exists in form of rivers, dams and lakes. The main rivers in the District are Pekerra, Molo, Kerio, Loboi, Suguta, Ol-Arabel and Waseges. These rivers are all fresh water sources with fluoride content of less than 1.5mg/l.

Lake Baringo is the largest of the three lakes, but the water from the lake is of limited domestic uses due to its high turbidity.

2.5.5 Laikipia District

There are two major swamps in the District which are virtually underdeveloped, namely: Marura Swamp which runs along the Moyot Valley in Ol-Pjeta Ranch and the Ewaso Narok Swamp around Rumuruti Township. The swamps have some

agricultural potential if properly protected and managed. However, they are currently under pressure through drainage for settlement and agricultural production.

2.6 Soil and Geology

2.6.1 Nandi District

Generally Nandi District is endowed with good soils suitable for cultivation of diverse crops. Seven major soil types can be identified. Soils found on the mountains and major scarps have developed from basement system, especially granite, they are shallow and excessively drained, and range from red friable clay loams to sandy clay loams. In some areas, they appear as rock outcrops. These soils are found in Songhor, the Nyando Escarpment and Lelmokwo.

2.6.2 Uasin Gishu District

There are four major soil types in the District which vary with altitude, rainfall, temperature and underlying rocks. These are red loam, red clay, brown clay and brown loam. The distribution of the soils within the area determines the land use pattern.

2.6.3 Keiyo District

The soils in the District and their suitability for farming vary with location and altitude. The District is divided into three geographical zones: the Highland plateau, the Elgeyo Escarpment and Kerio Valley. Each zone is generally homogenous on basis of soil fertility and suitability for cultivation. Soils affected by erosion are found in various parts of the district mainly on the escarpment and in the valley, while erosion in the highlands is low. Most of the erosion along the escarpment and in the valley is caused by rain water, which washes soil down the escarpment into numerous small streams during the rains.

The valley floor is covered with acacia trees and bushes; however, this vegetation is not sufficient to resist the enormous flow of water. Poor irrigation methods also contribute to erosion.

2.6.4 Baringo District

The major topographic features in the District are river valleys, plains, hills and plateaus. Altitude varies between 752m in the lowlands. The District can be divided into two major zones, namely: the highlands and the lowlands. The highlands fall in the tropical zone with well drained fertile soils that have high potential for agricultural activities and improved livestock development. The soils found in the highlands are suitable for the production of coffee and horticultural crops. Along the Kerio Valley well drained calcareous clay loam soils are found and these are suitable for the growth of cotton.

2.6.5 Laikipia District

The soils in the District can be the basis of the terrain under which they have been developed (Laikipia District Development Plan, 2002-2008). It has been found that the soils have a high level of inherent fertility and the main limiting factors to agricultural production are poor weather, characterized by frequent dry spells and poor rainfall distribution, and infrastructural constraints.

2.7 Forest Diversity

2.7.1 Nandi District

There are 6 gazetted forest reserves in Nandi District, covering an area of about 54,487.4 hectares. The largest reserves are North Nandi Forest, North Tinderet Forest and South Nandi Forest.

2.7.2 Uasin Gishu District

Forestry is the second most important activity after agriculture in the district. Forest covers 31,496ha. Or 10% of the district's land area, with woodlots scattered across the district. The East Africa Tanning Extract Company also has large plantation of wattle trees which it uses in the manufacture of tanning materials. However, as the pressure on land continues due to rising population, the forest resource is threatened as more people clear these forests to make room for cultivation.

2.7.3 Keiyo District

The forest resources are of great economic potential and can easily surpass that of any other resources in the district. The forests occupy 28,000 hectares, managed by Elgeyo, Kaptagat, Kessup, Sabor, Penon and Kipkabus Forest Stations of the Ministry of Forestry. The forests are utilized for commercial timber and also serve as water catchment areas. The forest area is gazetted and therefore no human settlement is allowed. In most of the forest areas, indigenous trees are found.

2.7.4 Baringo District

Baringo District has a forest cover of 24,346.9hectares. The gazetted forests cover a total area of 22,953.7hectares, representing about 94% of the District's forest area. Most of the gazetted forests are in highlands, where they are threatened by encroachment due to the high demand for agricultural land.

2.7.5 Laikipia District

The District has gazetted forest totaling 58,000hectares divided into both indigenous and plantation forests for industrial purposes. The plantations consist of exotic trees and include Marmanet. The indigenous forests include Mukogodo, which is a unique dry upland forest and Rumuruti, which is under threat from encroachment.

2.8 Socio-Economic Settings

2.8.1 Nandi District

- **Population Profile and Human Settlements**
  The District's population is about 676,784 with an annual growth of 3.7%. The District's human concentration is in Kapsabet, Aldai and Nandi Hills Divisions

- **Health Aspect**
  There are 56 health facilities, comprising of 3 hospitals, 9 health centres and 45 dispensaries distributed within the district. Most of the health centres, a

part except private institutions are over-utilized. Over-utilization of these facilities is compounded by lack of hospital beds and personnel for delivery services.

2.8.2 Uasin Gishu District

- **Population Profile and Human Settlements**

  The District's population is about 693,882 with an annual growth of 3.7-5%. The district's concentration is within and around the Eldoret town.

- **Health Aspect**

  Most of the health facilities particularly hospitals, are found in the Central Division and most are concentrated in and around Eldoret Town. The health facilities especially the public ones, are over utilized. Due to socio-economic difficulties, many people are unable to afford the private hospital charges; hence they resort to public facilities.

2.8.3 Keiyo District

- **Population Profile and Human Settlements**

  Keiyo District's population is about 188,253 with an annual growth rate of 3.75% per annum, with human concentration mainly along the major highway and along feeder road roads as well as within the shopping centres.

- **Health Aspect**

  Keiyo District has a large number of modern medical facilities which are well distributed within the district. The health facilities are managed by the government, religious organizations or private companies. Most of these health facilities are underutilized, mainly due to lack of staff and equipment in these facilities. Other hidden factors like socio-cultural beliefs of the community around the facilities could contribute to underutilization. The community usually prefers herbal medicine to the modern medicine provided in hospitals, health centres and dispensaries.

2.8.4 Baringo District

- **Population Profile and Human Settlement**

  Settlement patterns in the District are mainly determined by climatic conditions that also govern the type of economic activities undertaken. Divisions such as Kabarnet, Kabartonjo, Sacho and Tenges (where crop farming is practiced) have the highest population densities. The population density in the District varies significantly between the different divisions depending on the quality and quantity of the available natural resources. The mean density is 33.1 persons per square km.

- **Health Aspect**

  By the end of 2001, the number of AIDS cases diagnosed in the district exceeded 850, although the unreported cases may have been more. This figure was expected to increase tenfold by the end of the 2002-2008 district plan period. All the divisions in the district had recorded AIDS cases with Kabarnet, Marigat and Kabartonjo divisions leading in that order.

2.8.5 Laikipia District

- **Population Profile and Human Settlement**

  The settlement pattern in the district is dictated by the potentiality of land, land use system and availability of water. The population density is increasing as a result of immigration and was expected to reach a density of 47persons per square km by the end of the 2002-2008 district plan period.

- **Health Aspect**

  HIV/AIDS is of particular concern in Laikipia District given the fact that it stretches the already inadequate health facilities beyond their limits. Over 20% of all hospital beds are occupied by HIV/AIDS patients and it is estimated that 30,000 people are infected with HIV/AIDS while the district prevalence rates stands at 10%

3. PROJECT DESCRIPTION

3.1 Introduction

The electric power transmission system is often referred to as a grid. Redundant paths and lines are provided so that power can be routed from any generation facility to any customer area through a variety of routes, based on the economics of the transmission path and the cost of power. The redundant paths and lines also allow power flow to be rerouted during planned maintenance and outages due to weather or accidents.

Power transmission occurs via a system of aboveground power lines and towers located between a power plant and a substation. Transmission networks can cover thousands of kilometers and encompass tens of thousands of towers. For long distance transmission, electricity is usually transmitted at voltages between 132 and 1200 kV. Transmission towers or pylons are utilized to suspend high-voltage overhead power lines. These systems usually transmit three-phase electric power (the common method for transmission of high-voltage lines of over 50 kV) and, therefore, are designed to carry three (or multiples of three) conductors.

3.2 Project Objectives

Power generated by KENGEN, IPPs and other smaller plants is sold to KPLC in bulk under a Power Purchase Agreement for distribution. The current transmission capacity comprises of 1,323 Km of 220 kV and 2,035 Km of 132 kV main transmission lines and also about 600 Km of 66 kV sub- transmission lines. The proposed project is part of the Proponent's energy access scale-up program, which has the following objectives:

- Extending the transmission and distribution lines and installation of new 132/33kV substations; as well as new and reinforced distribution lines with the aim of reducing technical losses and improving voltage conditions, thereby coping with additional demand.
- Increasing access to electricity to 20% by 2010 by accelerating connection rates;

- Voltage upgrading to increase supply capacity and reduce system losses;
- Providing alternative electricity supply paths to increase reliability and improve power quality in the regions.

3.3 Design Considerations

The design criteria as adopted for the conceptual design are initially based on KPLC current practice, based on studies of recently composed specifications and in-situ inspections of existing transmission lines. Main criteria when concluding on the adopted conceptual design has been to ensure that the various line components are designed in a safe, cost effective and reliable manner.

3.3.1 Project Components

The proposed project will involve development of a 235km 132kV transmission line between Lessos and Nanyuki. To ensure efficient functionality of the proposed line the following components will form part of the project installations; pylons/steel towers, dumpers, conductors, optical fiber, circuit breakers and lightening arrestors. All the project components will be installed using the best electrical engineering practices. The section below discusses on each of the project components in brief.

3.3.1.1 Conductors

The conductors recommended for the various sub-project options are Aluminum Conductor Steel Reinforced (ACSR) "Wolf" and "Lynx" conductors which are in accordance with KPLC's standards. The operational performance of the selected conductors, both electrically and mechanically has proven satisfactory under Kenyan conditions. If the detailed line survey for particular sections result in limitations to the right of way resulting in a compact line design, lighter all aluminum alloy conductors (AAAC) will be considered to minimize pole sizes.

3.3.1.2 Overhead Earth Wires (OPGW)

According to KPLC practice, a single overhead shield wire is recommended for 132 kV lines. The wire would provide a 25 degree shielding angle for the line circuit

which is considered satisfactory considering the anisokeraunic level in the region ranging from 120 to 180 thunderstorm days per year.

3.3.1.3 Support Structures

Lattice steel self-supporting towers are recommended for all transmission lines. The recommendation result from an overall evaluation of lattice steel structures versus pole structures (single pole or H-frames) of wood, concrete or steel. Although wood and concrete structures could involve a 20-30% cost savings on structures compared to conventional lattice steel structures the performance of wooden poles has proved poor due to their short life time and subsequent poor reliability and very high operational and maintenance costs.

Solid concrete poles are manufactured locally but their reliability is low. The high weight (above 4 tons) of these poles also involves higher transport and erection costs as heavy lifting and erection equipment is required emphasizing line sections with poor access conditions. Internationally manufactured hollow spun concrete poles or steel poles could prove competitive to lattice steel structures due to lower maintenance and way leave costs but the same considerations with respect to transport and erections costs would apply.

3.3.1.4 Conductor Configuration

KPLC current practice is to use a triangle conductor configuration on their single circuit lines with the two lower phases on the same horizontal plane. The configuration results in a slightly lower and lighter tower with a modest cost saving compared to the typical triangular configuration with the three phases on three levels.

3.3.1.5 Foundations

Based on the observation of the ground conditions during the line route surveys conventional pad & chimney foundations, and reinforced concrete pad & chimney foundations are recommended by the design engineer. On certain sections where

poor soils or submerged conditions are identified a raft type design will be required. Hard rock foundations are not foreseen but weathered rock exists which might require heavy excavation equipment and supply of imported backfill for the pad & chimney foundations.

3.3.1.6 Grounding

All towers will be permanently grounded with an individual tower footing resistance aimed to be less than 20 Ohm. Over the first 1.5 km or 3 to 4 spans out of any substation, all towers, including the terminal towers, would be connected together by continuous counterpoise cable, which also should be connected to the substation-earthing grid. At tower sites in urban areas often frequented by people, additional protective earthing would be carried out aimed at less than 10 Ohm.

3.3.1.7 Insulator Strings

Composite silicone/polymer long rod insulators are to be used in the insulator strings for the support of the line conductors. Besides being competitive in price their low weight and compact configuration result in lower transport, installation and maintenance costs. The electromechanical ratings of the insulators to be installed are U70 and U120 according to IEC standard.

3.3.1.8 Circuit Breakers

The operation of circuit breakers causes switching surges that can result in interruption of inductive current, energization of lines with trapped charges, and single-phase ground fault. Modern circuit breakers, operating in two steps, reduce switching surges to 1.5–2 times the 60-Hz voltage.

3.3.1.9 Lightning Arresters

Lightning strikes produce high voltages and traveling waves on transmission lines, causing insulator flashovers and interruption of operation. Steel grounded shield conductors at the tops of the towers significantly reduce, but do not eliminate, the

probability of direct lightning strikes to phase conductors. The shield wire is designed to protect the power line from lightning.

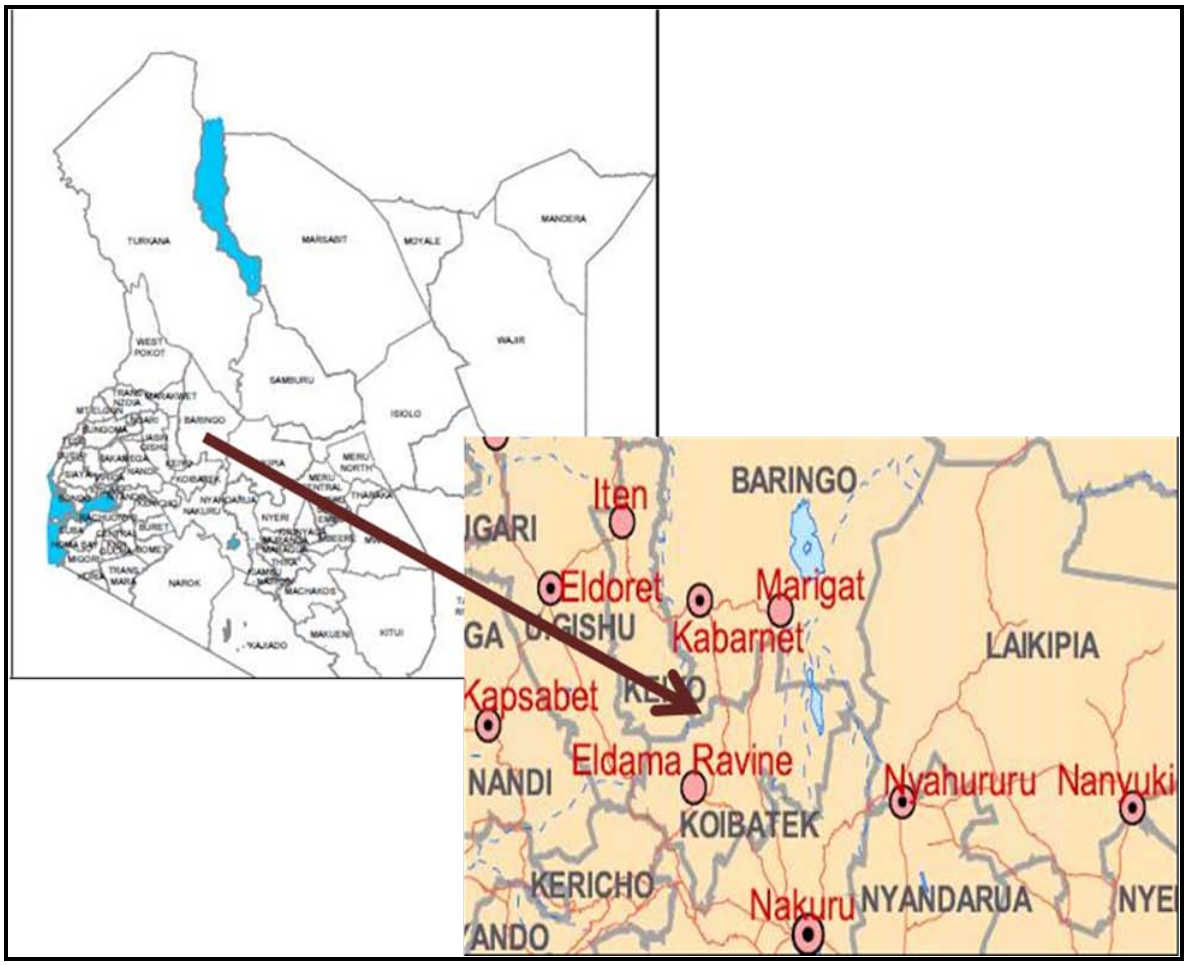
3.3.1.10 Pylons/Steel towers

Different transmission structures have different material and construction costs, and require different right-of-way widths, distances between structures (span length), and pole height. These issues also vary with different voltages. In areas where single-pole structures are preferred, weak or wet soils may require concrete foundations for support. Where a transmission line must cross a street or slightly change direction, large angle structures or guy wires may be required. Poles with guy wires impact a much larger area. Steel structures are used in transmission structures wood structures are used for distribution structures. Pylons/steel towers are preferred due to their longer life span.

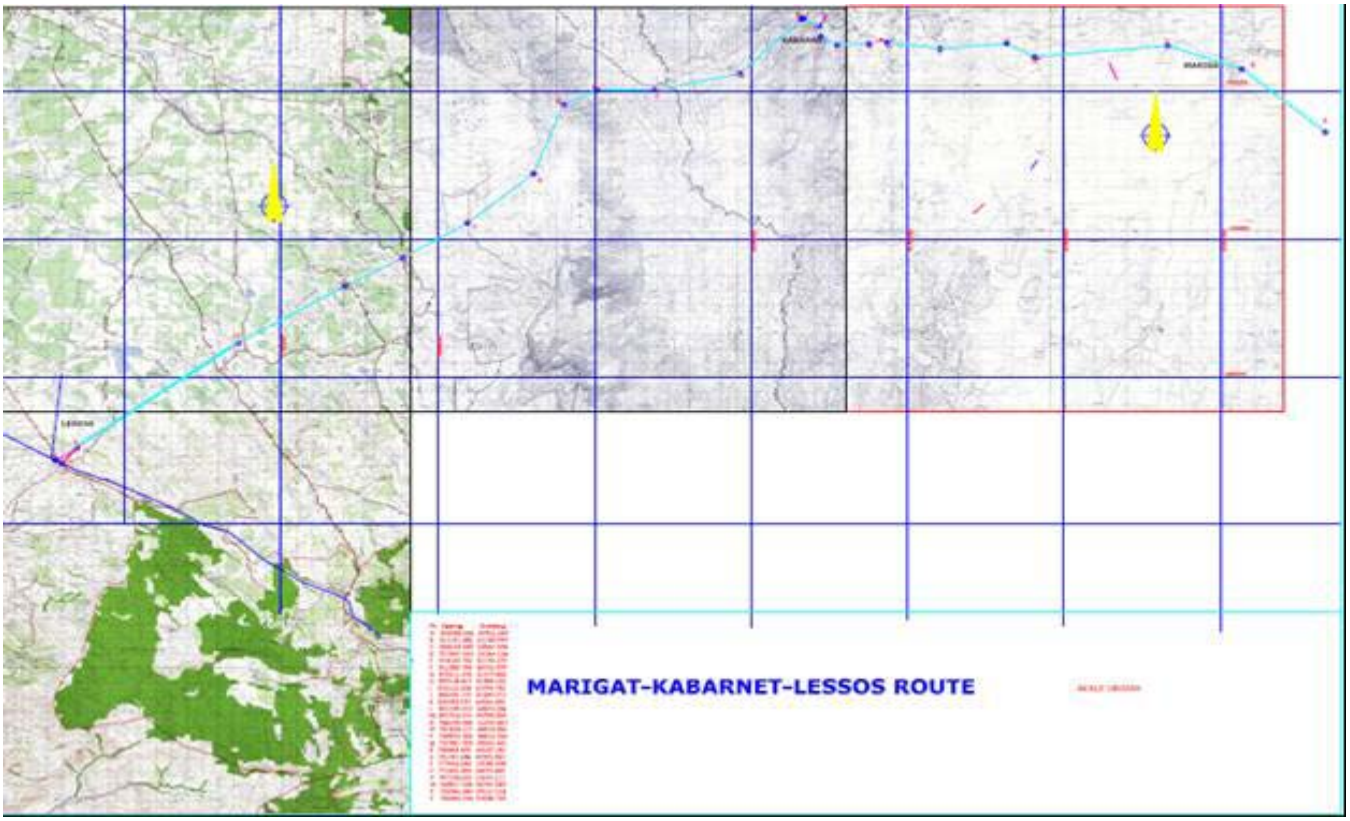
3.3.1.11 Dampers

The conductors are protected by dampers which prevent the vibrations from reaching the conductors at the clamps or supports. There are three types of vibrations; simple swinging, low frequency vibration and high frequency oscillations.

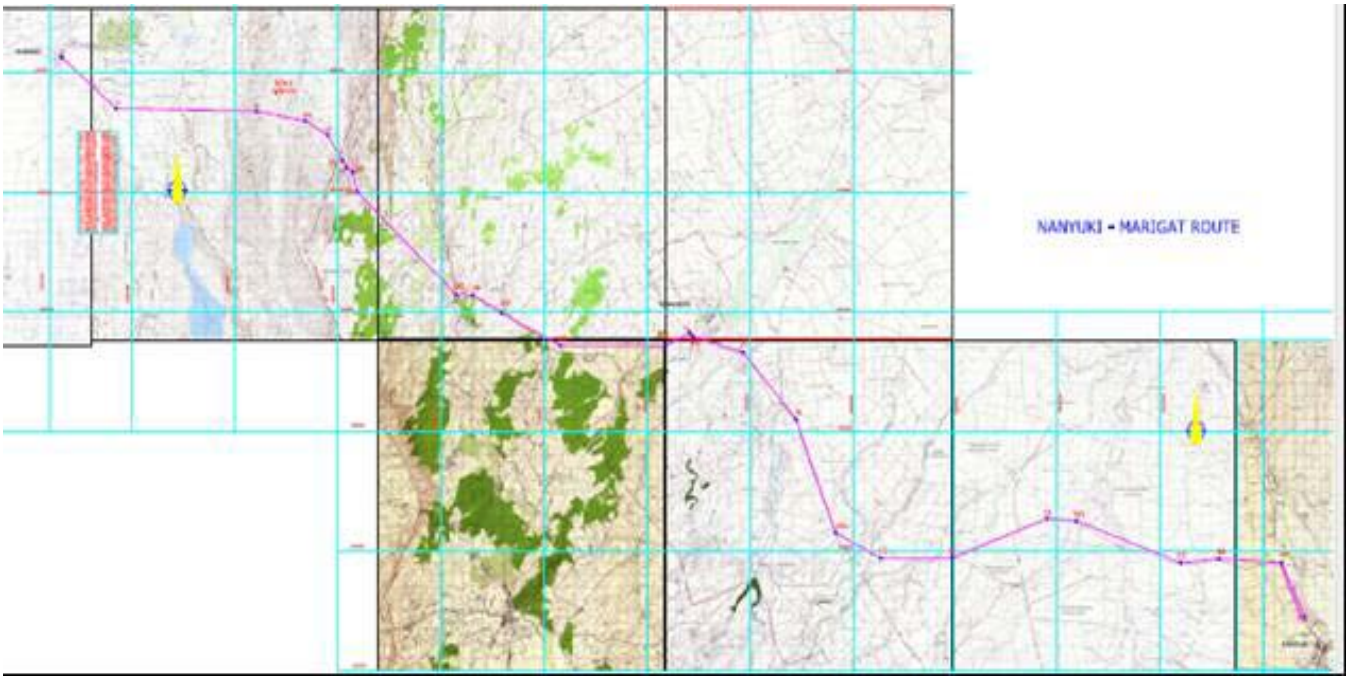
3.4 Project location



Picture 1: Map of Kenya showing the regions within which the proposed 132KV transmission line traverses; NANDI, UASIN-GISHU, KEIYO, BARINGO AND LAIKIPIA DISTRICTS



Picture 2: Section I; Lessos Substation, point Y to the left and Marigat area, point A to the right



Picture 3: Section II; Marigat area, point ZZ to the left and Nanyuki Substation, point E to the right

3.5 Lessos-Keiyo

The proposed 132KV transmission line starts the current substation at Lessos, eastward into Terige area of Kesses District which is a sparsely populated area. Maize is a major cash crop in this area. The terrain is generally flat with valleys such as Tulwet valley.

The line cuts across Mrs. Catherine Sambu's home in Kaisagat village, Tulwet Sub location at elevation 2,160m, 36N 0756872 UTM 0025354 in Uasin Gishu District. It then descends into Terige Farm with few settlements. The common vegetation found in this area being eucalyptus trees and the homes fenced with barbed wires.

The proposed line proceeds between two adjacent temporary grass thatched houses located at elevation 2,155m ,36N 0757076, UTM 0024476. The general area slopes towards a seasonal swamp in Tulwet village, where the line traverses a settled area located at 36N 0757084, UTM 0025493. Most land is privately owned and consists of medium scale farms. The proposed line then passes close to six matures eucalyptus trees located at 36N 07577399,UTM 0025793 then runs through point 36N 0757807, UTM 0026115 located in Kapserton Village, Tulwet sub-location. In the same village, the line passes near Zakayo Chepkwon's semi permanent house as it moves towards Kapserton Centre.

Picture 4: Houses within Terige Farm, in Kaisagat Village, Lessos Division, Kesses District.

The proposed 132KV transmission line shall then pass approximately 350m away from the existing Kapserton Primary School, after which it suddenly drops into Kapserton Valley, running close to Tulwet Centre. The line runs alongside a rugged hill slope through large scale Bindor Farms covering at least 8 Kilometers before crossing the Eldoret-Burnt Forest Tarmac Road, which is approximately 4 Kilometers from Cheptiret Town. In this area there will be no need for resettlement since most homes are far apart. The common vegetation in this area includes thorny bushes and Acacia Nubica trees. The region is sparsely populated and rather remote. The line then moves North-Eastward towards a forested Valley in Kapkaon Village. The line runs closer to a temporary house thatched with grass at elevation 2438m, 36N 0776600, UTM 0037856 in Kapkoan Village, Chesogor Sub-location in Uasin Gishu District.

From this village the line then crosses a 4 m wide seasonal River Chebaon, before emerging at Chebaon Village, at elevation 2443m, 36N 0777090 UTM 0038127. The 132KV transmission line crosses the Kenya Railway line that connects Eldoret and Nakuru, then ascends through point 36N 0777607, UTM 0038375, passing over Senetwo Center at 36N 0777750, UTM 0038450 In the Uasin Gishu District side. There is a murrum road that leads to Flex Centre that marks the boundary between Uasin Gishu and Keiyo District. Directly opposite the Centre is Senetwo Primary School where the proposed transmission line crosses a section of the school compound close to the eucalyptus grandis plantation at point TS1. The transmission line then traverses through maize crop farms in Senetwo Village, Marichor Sub-location, Keiyo District. Other crops grown common are kales, Irish potatoes, maize and beans, and nappier grass. Livestock kept in the area cows, goats and sheep at small scale.

Picture 5: Maize Crop and Kale within the proposed route in Kapkenda Sub-location, Keiyo District

The transmission line descends through a section of Mosorta Forest crossing the Eldoret-Eldama tarmac road at the junction within Small Town Shopping Centre. Three shops shall be affected within this area. The transmission line then emerges through a sparsely populated land at points 36N, 0784070, UTM 004251,and 36N 0784086, UTM 0042668 located in Kariange Village, Kapkenda Sub-location in Mosop Location. The transmission line then emerges at Kapkoras Village 300m east of Stage One Centre, near Dorothy Kiptoo's home. Common cash crops in the area include beans, maize and potatoes. Common livestock kept are dairy cows and sheep. The proposed transmission line then drops into Keiyo Valley and Escarpment about 10Km away from Flourspar Mine Industry. This stretch is rather remote with steep and rugged terrain. The main vegetation is Acacia tortillas and *Prosopis juliflora.*

Picture 6: Steep Escarpment dominated by Acacia tortillas trees in Kerio-Valley

3.6 Keiyo Escarpment-Kabarnet-Marigat

The transmission line emerges and runs along the right side of Iten - Kabarnet tarmac road, crossing Chebloch godge and Kerio River in an area with brown clay soils that are heavily eroded. The transmission line then passes Kapkelewa and Kiboimo area enroute to Kapkogorwa village, Kaptimbor Sublocation in Kabarnet division, Baringo District. The area is generally stoney and slopes towards Kipteitei River beneath Nandi Hills. This area is approximately 350m away from the existing Kabarnet 33KV Substation.

The proposed transmission line ascends the hills close to Kabarnet Town Westward, towards Kaprogonya, Kapsetor and Mumol villages and estates in Kaprogonya Sub-location. This is an urban set up, which is densely populated and much developed with permanent houses both for rental and as private homesteads. Most land is sub-divided into plots and is privately owned with afew spaces set aside for public facilities for example, Baringo District Hospital and National Cereals and produce Board stores.

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Picture 7: Permanent rental and residential houses within Kaprogonya, Kabarnet town

Mumol Primary School near Ewone River is one of such facilities where the proposed transmission line cuts through displacing six classes in the small school compound. The proposed 132KV transmission line was aimed at bypassing Baringo District Town Centre; however the number of urban settlements that shall be affected is high and expected to increase by the time the line is built given the level of rapid developments and this being a District Headquarters.

Picture 8: Permanent and Semi-permanent classes at Mumol Primary School within the way leave at Kabarnet Town

The transmission line then drops the steep slopes of Mumol Village into a moderately populated valley behind Kasoiyo Centre. The transmission line runs along undulating slopes of the Kapsirkong hills crossing the Kabarnet-Marigat Road, behind Christian Children Fund (CCF) –Morop Centre, located approximately 270m

away from Kituro Polytechnic. The transmission line ascends from a steep Kinyo Valley at Kituro Coffee Factory through a section of Kinyo Forest to rise at elevation 1944m, 36N 0809660, UTM 0053049. The line then traverses through Kapchesir Village, Kituro Sub-Location crossing pit latrines at Kituro Primary School, a homestead for the area Chief, and rolling over Kituro health centre five permanent blocks; Administration block, Maternity wards and Laboratory Wards Centre. The Centre is one of the Community Public Facility that serves over 11,000 people in four neighbouring sub locations.

The transmission line crosses the Kituro Market Centre running over six developed plots before passing through a reference point at elevation 1984m, 36N 081157, UTM 0052844, rising over Muitanyi Hills before dropping into Koruget Valley. This is a sparsely populated area due to the nature of terrain, which is rather rough and challenging for travel. The transmission line runs through Kapkaech Centre, where it shall displace six homes, including business premise such as BAI GAA Investment in Kapkaech Village, Katini Sub-location, then descends into Sosurwa Valley between Pechwa Hills and Kapkelewa Hills as it rises near Petkawanin Primary School. The School marks the boundary between Marigat District and Baringo District. The transmission line crosses the road twice before dropping into Koriama Valley off Kamungei Hills behind Kimalel Town Centre. This is a sparsely populated area dominated by bush land and *Prosopis juliflora*. The transmission line crosses Marigat-Nakuru-Kabarnet roads junction at points CB1 and CB2, from where it crosses Kivumbini Village, Rabai Village then turning Eastward to Naserian Village at point ZZ (37N 0168448, UTM 0051339) located in Eldume Sub-Location.

Picture 9: Permanent Shops and a Health Centre at Kituro Division, Kabarnet within the proposed transmission line

3.7 Marigat-Chebinyinyi: (Angle Point, SS-ZZ)

The proposed transmission line takes off from Point ZZ (Elevation 1007m, 37N 0168448 UTM 0051339) which is located exactly on Mr. Johnson Lekisio's temporary house in Naserian Village, Marigat Division in the new Marigat District, formally the Baringo Central District. Also within Eldume Sub location the proposed transmission line crosses Point YY1 (Elevation 1004m, 37N 0168495 UTM 005123) between YY-ZZ where a semi-permanent house for Mrs. Susan Lachumus has to be displaced to pave for ROW. The proposed line crosses River Pekerra then emerges in Lamargwen village, Eldume sub location, passing 3m close to a semi-permanent house for Mr. Johnson Tiano who has to be displaced and compensated to pave for way leave at Point YY2 (Elevation 1008m, 37N 0168744 UTM 0050457).The transmission line then crosses the river bed of Molok (a seasonal river that runs from Molo to lake Baringo) at point YY3 (Elevation 1000m, 37N 0168594 UTM 0048845). There are four mature fig trees that have to be cut to pave way for the 132 KV transmission line way leave.

The transmission line then turns off at point YY, (Elevation 1002m, 37N 0168446 UTM 0047015). This point is located within the plains of Sokotei Village; Eldume Sub-location, Elchamus Location; Division; Marigat in the new Marigat District. This is the turning point of the proposed transmission line near Lake Bogoria in Eldume area. The area is barely flat and the dominant vegetation is Cactii a desert plant

species. The proposed transmission line then connects into the Chebinyinyi hills at point XX (37N 0182059, UTM 0046795), and then turns along Risiati valley at points WW (37N 0186790, UTM 0046004) and VV (37N 0188963, UTM 0044805). The line crosses Kapsokum ridges at point UU (37N 0190389, UTM 0042667). This area is rough, and remote; dominated by the *Prosopis juliflora* ("Mathenge") trees and shrubs as the main vegetation. There are steep valleys within Laikipia Escarpments, near Muchongoi. The area is inhabited by the Jemps people as indigenous community. The line runs through Rasiati hills at point TT (37N 0190764, UTM 0042089), then takes off from point SS (37N 0191419, UTM 0041716) to RR.

Picture 10 :(Left): View shed of Chebinyinyi Hills from point YY: (Right): Point ZZ identified in Naserian Village, Eldume Sub-location, in Marigat District.

3.8 Chebinyinyi- Karandi Section: (Angle Point, RR-QQ)

This is the longest stretch that takes off from point XX (37N 0182059, UTM 0046795) through WW, VV, UU, RR (37N 0191807, UTM 0040062) to QQ. It's located in Muchongoi Division; Marigat District.Based on field observations and comments by Ol Rabel Forest Officer, the proposed transmission line passes through a section of Ol Rabel forest at this point. This is an area that has undergone much forest destruction due to settlement and is left with short stunted bushes, thorny Acacia species and a few mature stands of Blue gum and Gravelia trees.

The proposed transmission line traverses between the following spots: Lariak settlement scheme, near Kanyuka Dam, then ascends through Kamasia gate. From

this point the line descends into a sparsely populated Kapkechir valley then takes a section corner at point RR near Kapkechir Primary School, in Kapkechir village, Kapkechir Sub-location. The nearest home is 65m away.

At point RRR3 (Elevation 2068m, 37N 0194092, UTM 0038256), the proposed transmission line was supposed to cross over a the new Tuyotich Secondary School which is still under construction .This is a community school next to the existing Tuyotich Primary School. As a result of this, the team adjusted the route and above coordinates taken from point RR to avoid passing over the secondary school. The point is located at the boundary between the two schools. Three mature trees shall be cut to pave for wayleave. The line is then joined to the main QQ-RR transmission line at point RRR2 (Elevation 2062m, 37N 0193788, UTM 0038497) in Lamaiywe Village, Kapkechir Sub-location Muchongoi Division.

Picture 11: A section of Ol Rabel Forest

The proposed transmission line passes a point **RRR1** (elevation 2053m, 37N 0194328, UTM 0038148) as one ascends Kamasia gate valley near Tuyotich centre.

Picture 12: Kapsokum Ridges (Left) and Rasiat-Ngusero Valley (Right): Mochongoi Division, Marigat District

The transmission line is proposed to pass through Mr. Isaac Kahinga's compound at point **RRR** (Elevation 2027m, 37N 0195988 UTM 0036408) where, part of the wall of a temporary wooden house and iron sheet roof including a live fence with at least eight Pine trees shall be cut and therefore require compensation. Major cash crops are maize, cabbages and potatoes. A house belonging to Mr. Mwangi (Mali Mali) is also likely to be affected, since it is within the 40m way leave required for the transmission line. The owner of brick walled permanent house with green facial board and a red door together with its brick walled pit latrine at point **RR10** (37N 0196065, UTM 0036314), will require compensation.

Picture 13: Maize and potatoes crops common along the route in Thigio Village, Muchongoi Division

The proposed transmission line then passes across a sparsely populated Thigio village, which is located on the hillside of Ol Rabel forest and is dominated by maize farmland and a few scattered semi permanent houses. The road network consists of meander that goes round the hill from one level to another. The land type is mainly individually owned parcels of land. The proposed 132 KV transmission line moves along the following points including homesteads. One homestead of Mr. Kosgey at point **RR9** (Elevation 2022m, 37N 0196268, UTM 0036041) will be affected. It is envisaged that a four-room semi permanent house which is under construction, made of wooden wall and iron sheets, shall be affected. Next to it is an old grass thatched kitchen which shall also be affected. Four *Croton megallocapous* trees shall be cut to enhance construction of towers and transportation of materials at early stages of the project. The affected people require resettlement and compensation.

Point **RR8** (elevation 1961m, 37N 0197408, UTM 00035155) is within the proposed transmission line that descends through Rereshwe Village, dominated by shrubs and stony sloping terrain which is crossed at the Hill side at a point **RR7** (elevation 2006m, 37N 0196642, UTM 0035688). The proposed transmission line by passes lowly settled areas of the village avoiding most homes; therefore no resettlement shall be required. The proposed 132KV line then crosses a Point **RR6** (Elevation 2015m, 37N 0196453, UTM 0035892) characterized by bush and thicket as it ascends the hillside.

In the same Village the proposed transmission line crosses marrum road to Alpha Academy at a point **RR5** (Elevation1960m, 37N 0197367, UTM 00348980) located slightly above Lariak Settlement Scheme.

The proposed transmission line crosses Kanyuka Dam at point, **RR4** (Elevation 1953m, 37N 0197516, UTM 0034616), in Lariak Settlement Scheme where irrigated large scale farming of major crops like maize and horticultural crops like tomatoes, spinach, cabbage and kales are grown. Other common domestic animals kept are dairy cows, sheep's and chickens. The transmission line then passes through Mr. Christopher's farmland at point **RR3** (37N 0200288, UTM 0031747), within the 40m way leave. The proposed transmission line then descends into the valley with River

Ngarashi, a tributary of Ol Rabel River, in Lariak settlement scheme at a point **RR2** (Elevation 1969m, 37N 0199981, UTM 0031431).

Picture 14: Gate of Kanyuka Dam, neighboring Kanyuka swamp and irrigated tomatoes in Lariak Settlement Scheme along the route

The transmission line bisects through farmland with the nearest home, located at point **RR1** (Elevation 1970m, 37N 0199919, UTM 0031351) This is located 200m away from the Karandi-Kabel murram road that connects to Muchongoi, then the transmission line connects to angle Point (QQ, Elevation 2010m, 37N 0201424, UTM 0031462) which is 100m close to Karandi- Kinamba road.

3.9 Karandi-Rumuruti (Angle Point, MM-QQ)

The transmission line takes off at Point QQ, (Elevation 2010m, 37N 0201424, UTM 0031462) which is 100m close to Karandi- Kinamba road. It is the turning point of the line that comes from Lariak Settlement Scheme. The proposed transmission line transects through point **(NN3**, 37N 211540, UTM 0027203.8703) near Muihoto ranch and along the Lariak hills side at point (PP) in Marmanet Forest. This is forested area at its take off therefore about 34 stems of immature indigenous trees have to be cut to pave way for construction of the proposed 132 KV transmission line. However it is dominated by shrubs. The main activity in the area is livestock keeping, including goats and sheep.

The proposed transmission line crosses the road that leads to a nearby Aiyam Secondary School at point **NN2** (Elevation1994m, 37N 0211990, UTM 0033196). The area is characterized with Acacia shrubs and stems of Eucalyptus tree along most compounds in sparsely populated area of Rumuruti District. This is mostly open land and the landscape is barely flat.

Picture 15: The general landscape of the route between Rumuruti and Karandi including Lariak Hills and Marmanet Forest

The transmission line runs off the current Rumuruti 33KV Substation; located at point **NN1** (Elevation 1853m, 37N 0225641, UTM 0028760), along Rumuruti-Nyahururu road. It crosses the adjacent land next to existing Substation along the Rumuruti-Nyahururu road through a plot belonging to Mr. Bora, an Asian business man. The type of land ownership is private tenure. Previous land acquisition for the 33KV Substation was done through sale, but the owner said he prefers lease agreements. The land is still virgin and is dominated by stunted Acacia shrub that covers a stretch of about 3.5km. The proposed 132KV transmission line runs slightly Northward along the existing 33/11KV line that comes from Nyahururu to Rumuruti.

3.10 Rumuruti-Laikipia Airfield (Angle Point, MM-AA)

The proposed 132KV transmission line takes off from Rumuruti town at point MM (37N 0221751, UTM 0027215), running generally along the Rumuruti-Nanyuki road, almost parallel to the existing 33KV transmission line, crossing the road at 90 degrees at some points. From Rumuruti Substation, it crosses Ewaso-Narok River at

point MM8 (Elevation 1839m, 37N 0226033, UTM 0027658) through plain land. In this area, there are about 12 stems of mature *Acacia xanthoflea*, at point MM7 (37N 0226328, UTM 0027878), near Usalamia Girls Secondary School. The proposed transmission line crosses the road at point MM6 (Elevation 1876m, 37N 0226721, UTM 0027238) from right side to the left side, past Rumuruti Secondary School. This area is dry and stony, with vegetation consisting mainly of Acacia shrubs. The main economic activity is cattle ranching, while there is vegetable and maize irrigated crop farming at John Mwai's farm. The transmission line also crosses River Pesi at point MM5 (37N 0232919, UTM 0022369.The only developments along theprposed transmission line are, Mutara Shopping Center and Francis Asis Church at MM4 (Elevation 1878m, 37N 0239369, UTM 009650).

Picture 16: River Pesi (Left), River Mutara (Centre), and Ewaso Narok River (Rumuruti town)

In this area the transmission line passes behind the developed area, but runs within the Mutara Agricultural Development Cooperation (ADC) Ranch for Livestock, at MM3 (Elevation 1958m, 37N 0240751, UTM 0008961) covering about 20Km lengthwise and 600m away from the road. The transmission line crosses River Mutara at point MM1 (Elevation 1949m, 37N 0240058, UTM 008872). After River Mutara, the line is proposed to run along the road reserve, opposite Ol Pajeta Conservancy .The proposed transmission line then crosses the Murram road to Sagera Ranch at point LLL (Elevation 1784m,37N 0264799, UTM 0010685). The dominant vegetation is mainly Lantana camara, and Acacia thorny shrubs. Free

range livestock grazing especially of Zebu cattle, and goats is a major activity in this area.

Picture 17: Ol -Pajeta Conservancy, with Wildlife (Zebras and Antelopes)

The proposed transmission line passes near Ngare Nyiro Police station running about 60m away from the road to Nanyuki in the less habited part of Ngare Nyiro Trading Centre at KKK (Elevation 1767m, 37N 0265969, UTM 0010195). River Ngare Nyiro is crossed at point JJJ (Elevation 1758m, 37N 0266355, UTM 0010021) while Samburu Manyatta settlement located about 100m away from the road to Nanyuki at CCC (Elevation 1797m, 37N 0272752, UTM 003629). About seven temporary shelters will be affected here made of mud, polythene papers, iron sheets and grass. This is directly opposite Sweet Waters gate within Old Stock road. From the Manyatta, the proposed transmission line runs within John Jazel Ranch, about 50m from the road to Nanyuki.

Picture 18: The Samburu Manyatta in Tetu village, along Nanyuki-Rumuruti Road

At angle point BB (37N 0275465, UTM 009358), the proposed 132KV transmission line crosses the road into Nanyuki Ranching Limited on the right side, running for about 7Km within the ranch up to angle point AA (37N 028156, UTM 0009033), opposite Dol- Dol Rumuruti and Nanyuki road junction. This point is near the border between the Department of Defence (DOD) Laikipia Airfield (a protected land) and Nanyuki Ranch Limited.

3.11 Laikipia Airfield- Nanyuki Substation: (Angle Points, AA-A1)

It is proposed that the 132KV transmission line will then take off through reserved land within the DOD Laikipia Airfield but near the road, mainly characterized by black cotton soils and short stunted Acacia bushes. From point AA (37N 0281560, UTM 009033) through point A9a (Elevation 1903m, 37N 0283236, UTM 0003355), where the proposed transmission line crosses the road that leads to Laikipia Airfield main gate, to current Nanyuki Substation. Point A9a is about 100m from the neighboring Nanyuki Water and Sewerage Company (NAWASCO) sedimentation tanks and meshed wire fence. The proposed transmission line then moves up to point A8a (Elevation 1904m, 37N 0283225, UTM 0002451) near three Manyatta structures and point A7b/a (Elevation 1904m, 37N 0283222, UTM 0002402) near Kyapos live fence. It is envisaged that with the approval of Kenya Civil Aviation Authority (KCAA) and DOD, this option if used to provide a way leave for the 132KV transmission line shall have the least environmental and social impacts in the area and most likely be cost effective. This covers about 5Km, as a straight line.

Picture 19: Camels owned by one of the farmers along Nanyuki-Rumuruti road, opposite Laikipia Airfield

Picture 20: The sites neighboring Laikipia DoD Airfield fence, along the route, of transmission line: Laikipia Teachers SACCO settlement land (Left) and NAWASCO sewage sedimentation tanks (Right)surrounded by mature *Eucalyptus grandis* (Blue gum) trees.

The proposed transmission line then scales down into a remote area crossing through points **A6** (Elevation 1901m, 37N 0283335, UTM 0001589) and a seasonal swamp at point **A5** (Elevation 1900m, 37N 0283310, UTM 0001828) in Ruai village, Majengo Sub-location, Laikipia East, District. From this point, the proposed line ascends into an area under development by Laikipia Teachers SACCO, at point **A4** (Elevation 1915m, 37N 0283300, UTM 0001245). It is assumed that, by the time of construction of this project, about three homes may require resettlement. The transmission line then descends into the low land; near an earth dam in a seasonal

wetland at point **A3** (Elevation 1911m, 37N 0283252, UTM 0000704).The proposed transmission line crosses through a hay field and wheat farm as it connects the section corner of the existing 132KV transmission line from Lanet at point **A2** (Elevation 1913m, 37N 0283154, UTM 0000444). The main livestock kept in this area are dairy cows and goats.

Picture 21: Hay field near Nanyuki substation (Left); Settlements in Ruai village Laikipia Teachers SACCO.

The existing 132KV transmission line from Lanet runs to the Nanyuki substation at point A1 (37N 0284888, UTM 9999834), along the 200m wide and 1.4Km long existing Way leave. However there are about 10 homes that have encroached into this Way leave therefore may require involuntary displacement. If this way leave is utilized, it may require design and construction of a double circuit 132KV line to support the existing line from Lanet and the new proposed transmission line from Lessos. To the left side there is a Primary school and to the right there are settlements.

Picture 22: Existing Nanyuki Sub-station and the encroached way leave of the 132KV line from Lanet to Nanyuki (proposed for a double circuit)

3.12 Socio- economic data

3.12.1 Project Area

The proposed Kenya Power and Lighting Company transmission line commences from the Kenya national power grid station at Lessos which is in Nandi District and traverses other four districts to end in Nanyuki Town. The other districts where the transmission line passes are: Uasin Gishu, Keiyo, Baringo, Marigat, and Laikipia West and East Districts. The major local people found along the Lessos to Fluorspar area are the Kikuyu and the Kalenjins; from Fluorspar, Kabarnet, Marigat, Mochongoi area comprises of the Kalenjins (Turgens) and Njemps ethnic groups; and from Kabel, Rumuruti, up to Nanyuki the common communities are the Kalenjins, Kikuyu, Maasai, and Samburu ethnic groups.

The majority of the people in the affected areas depend mainly on land for agriculture (irrigated land, rain-fed land, fishing, commerce and trade), livestock keeping, woodlots, seasonal labor, and remittance; big portions of land used for conservation which is tourism attraction activity, and these are the main source of their socio-economic income as shown in Figure. 1 below:

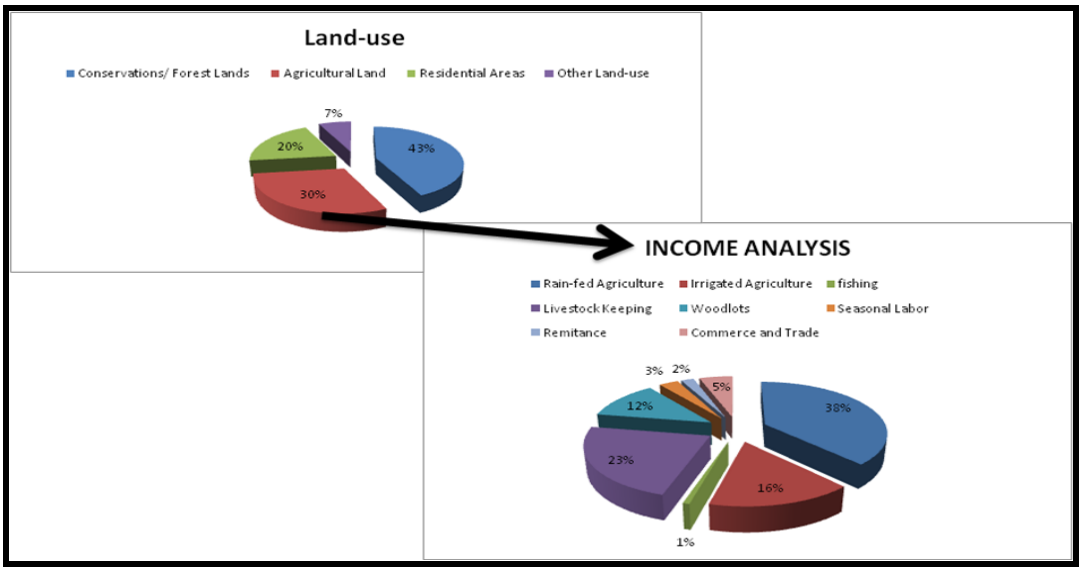

Figure 1: Land use relationship to income

As shown from the figure above, agricultural activities are the major land use activity with 30%, while livestock keeping takes about 15%, 0.75% is taken by Lake Baringo, Lake Bogoria and other water bodies which are the source for domestic

water and for fishing; while the remaining 54% is used for forest and wildlife conservation. The crops grown are maize, beans, millet, sorghum, potatoes, coffee, sunflower, and pyrethrum. Most of the agricultural land is rain-fed.

Cultivation practices especially by the use of irrigation methods have generally dictated the settlement profile. Places or areas with subsistence farming farmers tend to be located on their peripheries since this is the source of income, and to where there is a busy road tend to pull homes along it with families setting up commercial centres with small kiosks being established for income generation.

3.12.2 Households Socio-cultural Profile

The social, economic and political status of women in the entire project area is relatively weak. Apart from land ownership, most women are subjected to early marriages where their roles are confined to the household chores, agricultural production, food preparation, and child rearing. They depend on men economically who make the decision of the family. Women's access to formal education is low in the affected areas. About 60% of the female respondents did totally not attend any school. This is a high percentage as to that of men who attended school, even at primary level. Men are mainly involved in herding of livestock, busy in the burning of charcoal for economic gain and also provide security to the family and community due the effects of attack from bandits and other ethnic community, and on the other hand, young and old men are found in groups around the shopping centres idling. This is mainly noticed in the Rift Valley districts as compared to the other parts of Nanyuki where men are involved fully in supporting the family.

Children are the most vulnerable members of the population due to the effects of drought, famine, effects of diseases, and to the long distances of schools where they can go and acquire primary education. This is experienced in all along the five districts. Infant mortality rate has drastically reduced along the study areas. Out from our observation were that the rates were generally low due to the introduction of the government's Constituency Development Fund (CDF) health projects and with presence of different kinds of NGOs around the study districts women are getting training and medical facilities for their children.

Table 7: Level of Education of Respondents

Gender	Highest Level of Education of Respondent				
	Primary	Secondary	Tertiary	Never attended	Total
Male	52.12%	21.61%	8.05%	18.22%	100.0%
Female	54.73%	23.05%	2.06%	20.16%	100.0%
Average	53.44%	22.34%	5.01%	19.21%	100.0%

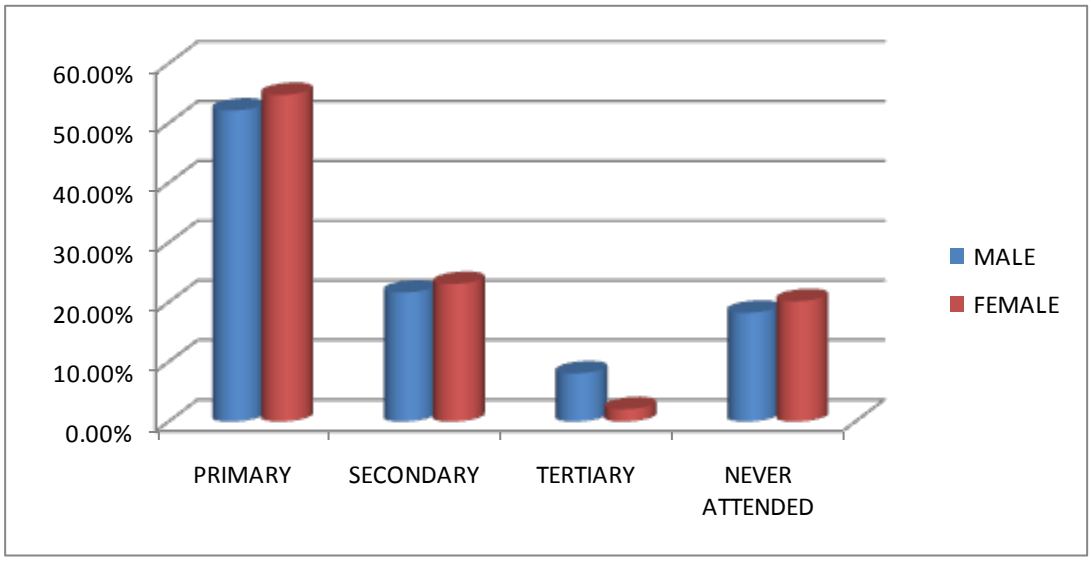

Figure 2: Level of education of the attendants

3.12.3 Housing

The types of housing in the project affected areas consist of different kind of housing such as permanent, semi-permanent and temporary housings. The temporary housing are those ones which are grass thatched, made of polythene materials, iron sheets, and some made of timber. Plates 1 and 2 are some of the houses found in the project area.

From our study in the project area shows that 10% of the respondents are living in permanent housing structures, 65% in semi-permanent housing, and the rest 25% live in temporary housings. These results give a clear picture of the socio-economic situation of poor standards of living and high poverty level of the households within the project study area.

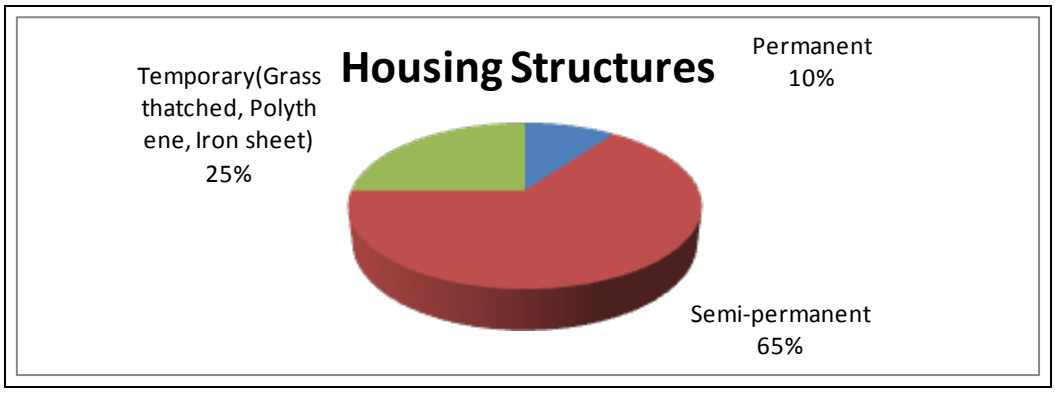

Figure 3: Types of housing

3.12.4 Food Security

The areas between Rumuruti and Mochongoi, then from the Kapkenda Sub-location to Lessos town are agriculturally productive even though most of the areas are ASAL areas, as compared to areas like district where there are limited farming activities as they depend on rain for harvesting. Households within these areas practice mixed subsistence farming and cash crop farming. The subsistence farming consists of crops such as maize, beans, cowpeas, potatoes, among others. These harvests are used for household consumption and for economic purposes, and this has improved food security within these areas. The cash crops grown in these areas include coffee, pyrethrum, sunflower, cotton among others. The produce from cash crops are also used for buying food for the families hence contributes to food security in the households.

Areas within Baringo and Kerio Valley where the land is covered by the invaded alienated species (*Prosopis juliflora*), and with top soil has been washed down the streams due to the effects of erosion. Along these areas, there are limited agricultural activities. People tend to keep goats and cattle and the other activity is the charcoal burning since there are a lot of acacia trees and shrubs available in Baringo and Keiyo Districts.

4. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

According to the Kenya National Environment Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregarded environmental sustainability. Following on this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished or is in the process of development. The NEAP process introduced environmental assessments in the country culminating into the enactment of the Policy on Environment and Development under the Sessional Paper No. 6 of 1999.

An EIA is a legal requirement in Kenya for all development projects. The Environmental Management and Co-ordination Act 1999, is the legislation that governs EIA studies. This project falls under the Second Schedule that lists the type of projects that are required to undergo EIA studies in accordance with section 58 (1- 4) of the Act. Projects under the Second Schedule comprise those considered to pose potentially negative environmental impacts.

Kenyan law has made provisions for the establishment of the National Environment Management Authority (NEMA), which has the statutory mandate to supervise and co-ordinate all environmental activities. Policies and legislation highlighting the legal and administrative requirements pertinent to this study are presented below. This ESIA has been prepared to fully comply with environmental legislations and Procedures as outlined in the World Bank Safeguard Policies for Projects with regional Impacts and as per various Regulations by National Environment Management Authority, in Kenya.

4.1 World Bank Safeguard Policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and

projects. Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations. (World Bank, 1999-2006)

4.1.1 Environmental Assessment: OP/BP 4.01

The environmental assessment process provides insights to ascertain the applicability of other WB safeguard policies to specific projects. This is especially the case for the policies on natural habitats, pest management, and physical cultural resources that are typically considered within the EA process. The policy describes an environmental assessment (EA) process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale, and potential environmental impact of the proposed project. The policy favours preventive measures over mitigatory or compensatory measures, whenever feasible.

The operational principles of the policy require the environmental assessment process to undertake the following

- Evaluate adequacy of existing legal and institution framework including applicable international environmental agreements. This policy aims to ensure that projects contravening the agreements are not financed.
- Stakeholder consultation before and during project implementation
- Engage service of independent experts to undertake the environmental assessment
- Provide measures to link the environmental process and findings with studies of economics, financial, institutional, social and technical analysis of the proposed project.
- Develop programmes for strengthening of institutional capacity in environmental management

The requirements of the policy are similar to those of EMCA which aims to ensure sustainable project implementation. Most of the requirements of this safeguard

policy have been responded to in this report by evaluating the impact of the project, its alternatives, existing legislative framework and public consultation.

4.1.2 Forests: OP/BP 4.36

This safeguard policy provides measures for protection of forests through impact evaluation and conservation of forest during project development. This policy is triggered because the proposed project area has two natural forests namely Ol Arabel and Lariak. It is advisable that the trees be preserved as much as possible as the sections neighbouring the trees are open land that can be used to re-align the route of the transmission line. If other project factors necessitate the harvesting of the trees, then it is recommended that rehabilitation programmes be developed. This impact will be a short lived because thereafter the vegetation will be left to grow.

4.1.3 Natural Habitats: OP/BP 4.04

This safeguard policy requires that the study use precautionary approach to natural resources management to ensure environmental sustainability. The policy requires conservation of critical habitat during project development. To ensure conservation and project sustainability the policy requires that:

- Project alternative be sought when working in fragile environment areas;
- Key stakeholders be engaged in project design, implementation, monitoring and evaluation including mitigation planning.

The requirements of this policy were observed as much as possible during the EIA study. The consulting team engaged several stakeholders during project impact evaluation and those consulted included the KWS, WRMA, KFS and Nature Kenya among others. This policy was not triggered by the proposed project as the project area has no protected forest and wildlife conservation areas. Despite this, the line shall traverse several areas with swamps, rivers and streams though the field visits indicated that the project impact on them will be minimal. This is because it was seen that the lines will traverse over the wetlands and the proponent has proposed not to install pylons on the wetlands riparian. There is a seasonal wetland between

Nanyuki substation and Laikipia airfield and wetland near Kanyuka Dam. The study recommends that the pylons will be located about 900m away from the area sensitive ecosystem like the wetlands.

4.1.4 Physical Cultural Resources: OP/BP 4.11

This policy assists in preserving physical cultural resources and helps reduce chances of their destruction or damage. The policy considers Physical Cultural Resources (PCR) to be resources of archeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic or other cultural significance. The project shall traverse several homes in rural Kenya thus it shall stumble onto several burial sites within the affected homesteads; since the tradition of burying the deceased within the homesteads is practiced in the project area. The community members likely to be affected by the project have suggested that such sites should be avoided as much as possible through consultations with individual home owners before project implementation to enable develop appropriate mitigation measures. The proposed project will have no effect to the physical cultural resources because they are not present in the proposed route for the transmission line.

4.1.5 Indigenous Peoples: OP/BP 4.10

The objective of this policy is to ensure that;

i). The development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples;

ii). Adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and

iii). Indigenous peoples receive culturally appropriate and gender and inter-generationally inclusive social and economic benefits.

This policy will not be triggered since there are no indigenous people who live on the proposed line that will be affected by the project.

4.1.6 Involuntary Resettlement: OP/BP 4.12

Resettlement due to infrastructure development is not a new phenomenon in Kenya but the government has no Policy Document or Act that aims at ensuring that persons who suffer displacement and resettlement arising from such development

activities can be compensated adequately for their losses at replacement costs. The proponent plans to implement the World Bank's Operational Policy 4.12 which has been designed to mitigate against impoverishment risks associated with Involuntary Resettlement and the restoration or improvement of income-earning capacity of the Project Affected People (PAP). The policy requires full public participation in resettlement planning and implementation and describes the conditions that borrowers are obliged to meet in operations involving involuntary resettlement.

The proposed project triggers resettlement and relocation in the project area especially for community members with small parcels of land. The scope of study included development of a Resettlement Action Plan (RAP) as an integral part of the EIA study in order to facilitate evaluates the project impacts holistically.

4.1.7 Projects in International Waters: OP 7.50

The objective of this policy is to ensure that Bank-financed projects affecting international waterways would not affect: Relations between the Bank and its borrowers and between states (whether members of the Bank or not); and the efficient utilization and protection of international waterways. This policy is triggered if Any river, canal, lake or similar body of water that forms a boundary between, or any river or body of surface water that flows through two or more states, whether Bank members or not; Any tributary or other body of surface water that is a component of any waterway described under Any bay, gulf strait, or channel bounded by two or more states, or if within one state recognized as a necessary channel of communication between the open sea and other states, and any river flowing into such waters. This policy is not triggered since the proposed project will not interfere whatsoever with the international water.

4.1.8 OP 7.60 Projects in Disputed Areas

The objective of this policy is to ensure that projects in disputed areas are dealt with at the earliest possible stage:

a) So as not to affect relations between the Bank and its member countries;
b) So as not to affect relations between the borrower and neighboring countries;

c) So as not to prejudice the position of either the Bank or the countries concerned.

This policy is triggered if the proposed project will be in a "disputed area". Questions to be answered include:

- Is the borrower involved in any disputes over an area with any of its neighbors?
- Is the project situated in a disputed area?
- Could any component financed or likely to be financed as part of the project be situated in a disputed area?

The proposed transmission line does not pass through any disputed area. It is recommended any dispute over area earmarked for project development should be dealt with at the earliest possible stage.

4.1.9 World Bank Safeguard Policy BP 17.50- Public Disclosure

This policy encourages Public Disclosure (PD) or Involvement as a means of improving the planning and implementation process of projects. This procedure gives governmental agencies responsibility of monitoring and managing the environmental and social impacts of development projects particularly those impacting on natural resources and local communities. The policy provides information that ensures that effective PD is carried out by project proponents and their representatives. The BP requires that Public Involvement should be integrated with resettlement, compensation and indigenous peoples' studies. Monitoring and grievances address mechanism should also be incorporated in the project plan.

The proposed project incorporated public participation and stakeholders' consultation as part of the E&SIA studies in order to collect the views of the local communities and their leaders for incorporation in the project mitigation plan. The consultation was successful and the community members gave a number of views that have been considered in the mitigation plan.

4.1.10 Bank Safeguard Policy 4.37-Safety of Dams

This policy aims to assure quality and, safety in the design and, construction of new dams and, the rehabilitation of existing dams and in carrying out activities that may be affected by an existing dam. This policy is not triggered as the alignment of the proposed project was seen to leave an existing Kanyuka dam about 900m to the South.

4.1.11 Bank Safeguard Policy 4.12-Indigenous People

This policy requires project to be designed and implemented in a way that fosters full respect for Indigenous Peoples' dignity, human rights and cultural uniqueness and so that they receive culturally compatible social and economic benefits and do not suffer adverse effects during the development process. This policy is not triggered as the proposed project area is not occupied by Indigenous People who identifies with the areas.

4.2 KENYA'S ENVIRONMENTAL LEGISLATION

According to the Kenya National Environment Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregarded environmental sustainability. Following on this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished or is in the process of development. The NEAP process introduced environmental assessments in the country culminating into the enactment of the Policy on Environment and Development under the Sessional Paper No. 6 of 1999.

An EIA is a legal requirement in Kenya for all development projects. The Environmental Management and Co-ordination Act 1999, is the legislation that governs EIA studies. This project falls under the Second Schedule that lists the type of projects that are required to undergo EIA studies in accordance with section 58 (1- 4) of the Act. Projects under the Second Schedule comprise those considered to pose potentially negative environmental impacts.

Kenyan law has made provisions for the establishment of the National Environment Management Authority (NEMA), which has the statutory mandate to supervise and co-ordinate all environmental activities. Policies and legislation highlighting the legal and administrative requirements pertinent to this study are presented below.

4.3 National Environment Management Authority (NEMA) Environmental Laws

4.3.1 Environmental Management and Co-ordination Act (EMCA)

The Environmental Management and Co-ordination Act, 1999, is the legislation that governs Environmental Impact Assessment (EIA) studies. Kenya Power and Lighting Company Limited carried out an Environmental Impact Assessment (EIA) as per the second schedule of this act. This schedule lists the projects required to undergo EIA studies in accordance with section 58 (1-4) of the act. Electrical infrastructure is covered in part 10 of this schedule and this includes electrical transmission lines; and electrical sub-stations. The proposed, Lessos – Kabarnet – Nyahururu – Nanyuki 132 KV transmission line falls in this category of projects for which EIA is mandatory. This transmission line can also be classified as rural per-urban and urban development. The Act provides for the National Environmental Management Authority (NEMA) whose objective and purpose is to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government in the implementation of all policies relating to the environment.

Following the introduction of Environmental Impact Assessment and Audit Regulations, (2003) issued through Kenya Gazette Supplement No. 56 of 13 June 2003, the submission of environmental reports became mandatory. According to these regulations no proponent shall implement a project likely to have a negative environmental impact or for which an Environmental Impact Assessment has not been concluded and approved in accordance with these regulation.

This Project falls within Schedule 2 of EMCA 1999 and therefore requires an EIA. The Proponent has commissioned the environmental and social impact assessment study in

compliance with the Act. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA, prior to being issued an EIA license.

4.3.2 Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003

Environmental Impact Assessment (EIA) is a critical examination of the effects of a project on the environment. The goal of an EIA is to ensure that decisions on proposed projects and activities are environmentally sustainable. An EIA is conducted in order to identify impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of the various alternatives on the project and propose mitigation measures for the significant negative impacts of the project on the environment.

The EMCA, 1999 requires that during the EIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity through posters, newspaper, radio and hold at least three public meetings with the affected parties and communities. The Project proponent pays for the entire EIA process. The fee payable to NEMA is 0.05% of the project cost.

Environmental Audit (EA) is the systematic documentation, periodic and objective evaluation of activities and processes of an ongoing project. The goal of EA is to establish if proponents are complying with environmental requirements and enforcing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. A comprehensive EA ensures a safe and healthy environment at all stages of project operations and decommissioning.

An initial environmental audit and a control audit are conducted by a qualified and authorized environmental auditor or environmental inspector who is an expert or a firm of experts registered by the Authority. In the case of an ongoing project the Authority requires the proponent to undertake an initial environmental audit study

to provide baseline information upon which subsequent environmental audits shall be based.

Self Audits are carried out after the environmental impact assessment study report has been approved by the Authority or after the initial audit of an ongoing project. The proponent shall take all practical measure to ensure the implementation of the environmental management plan by carrying out a self auditing study on a regular basis.

This Report complies with the requirements of the Environmental Regulations in the coverage of environmental issues, project details, impacts, legislation, mitigation measures, management plans and procedures. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA.

4.3.3 Environmental Management and Coordination (Water Quality Regulations)

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment. The regulations provide for the creation of a buffer zone

for irrigation schemes of at least fifty (50) metres in width between the irrigation scheme and the natural water body. Standards for irrigation water are given in schedule nine of the regulations.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA) Gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings

4.3.4 Environmental Management and Coordination (Waste Management Regulations)

The Minister for Environment and Natural Resources gazetted these regulations in 2006. These Regulations may be cited as the Environmental Management and Co-ordination (Waste Management) Regulations, 2006. Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

The Proponent shall observe the guidelines as set out in the environmental management plan laid out in this report as well as the recommendation provided for mitigation /minimization /avoidance of adverse impacts arising from the Project activities.

4.3.5 Environmental Management and Coordination Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements.

Under these regulations, NEMA will be publishing a list of controlled substances and the quantities of all controlled substances imported or exported within a particular. The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations.

The regulations stipulate that controlled substances must be clearly labeled with among other words, "Controlled Substance-Not ozone friendly'') to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer."

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

4.3.6 Environmental Management and Coordination (Conservation of Biodiversity regulations 2006)

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection.

The country has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and

legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning

The Proponent has commissioned this environmental assessment study and seeks to obtain an EIA License from the Authority (NEMA) in compliance with the Act; the environmental management plan included in this report provides guidelines for the mitigation of potentially adverse impacts on natural resources.

4.3.7 Environmental Management and Coordination Draft Air Quality Regulations, 2008

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2008". The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

i. Back-burning to control or suppress wildfires;
ii. Fire fighting rehearsals or drills conducted by the Fire Service Agencies
iii. Traditional and cultural burning of savanna grasslands;
iv. Burning for purposes of public health protection;

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution.

4.3.8 Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009.

These Regulations determine that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

These regulations also relate noise to its vibrational effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Any person(s) intending to undertake activities in which noise suspected to be injurious or endangers the comfort, repose, health or safety of others and the environment must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions. Failure to comply with these regulations attracts a fine of KES 350,000 or 18 months jail term or both.

The Proponent shall observe policy and regulatory requirements and implement the measures proposed in this documenting an effort to comply with the provisions of the Regulations.

4.3.9 Energy Act, 2006

The Energy Act 2006 became law on 2nd January 2007. The Act establishes an energy commission, which is expected to become the main policy maker and enforcer in the energy sector. This commission among other things shall be responsible for:

- Issuing all the different licenses in the energy sector.
- Prescribing the licensing processes
- Setting and enforcing energy policies
- Collecting and disseminating energy data
- Public education and enforcing energy conservation

With this Act, all the different aspects of energy e.g. electricity, petroleum and renewable energy are brought under one ambit unlike as was the case before.

4.9.1.1 Generation, Transmission, Distribution

The act prescribes the manner with which licenses shall be obtained for generating, transmitting and distributing electricity. It clearly exempts private users from these licensing requirements for any power less than 1MW generated at the user's premises.

However, a license is required if:

- Generating is more than 1MW or
- The power requires a transmission system from the generation site to the consumption site or
- The power will be distributed to others (members of the public)

The specific requirements e.g. how much to pay for a license shall be determined by the energy commission. There is an unclear clause exempting power up to 3MW from some licensing issues, but this seems to be excluded by the specific exemptions that use the 1MW figure. Section 41(A) makes provisions for treating several licenses belonging to the same licensee as one (e.g. if you have several wind energy sites and you wish to compile one amalgamated annual report). The act requires electrical installations to be done by a registered electrician. The Act also requires

that all accidents and fatalities at energy facilities be reported officially to the commission.

4.9.1.2 Rural Electrification Authority

The act in section 67 establishes a rural electrification authority. Among other tasks, this authority is mandated to:

- Facilitate the access to electricity in rural areas
- Promote the development of renewable energy (including solar, wind and micro hydro)
- Levy a fee on all electricity sold for the rural electrification fund
- Nothing in the act prevents the authority from using funds collected under the rural electrification fund for financing renewable energy - it is not a special fund just for grid electricity.

4.3.10 The Standards Act Cap 496

The Act is meant to promote the standardization of the specification of commodities, and to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.

The Act contains various specifications touching on electrical products. The Proponent shall ensure that commodities and codes of practice utilized in the project adhere to the provisions of this Act.

4.3.11 The Wildlife (Management and Conservation) Act

This Act was enacted to consolidate and amend the law relating to the protection, conservation and management of wildlife in Kenya, and for purposes connected therewith and thereto. Section 9 of the Act states that 'the Director of Wildlife Conservation shall, through the officers of the service, control, manage and maintain all national parks'. It also states that within the National Park, the Director may:

- Reserve or set aside any portion of the park as a breeding place for animals or as nurseries for vegetation;
- Authorize the construction of such roads, bridges, airfields, buildings and fences, the provision of such water supplies, and the carrying out of such other works, as may be necessary for the purposes of the park;
- With the approval of the Minister, let sites for the erection of hotels, or other accommodation for the visitors to the park provided that nothing in any document connected with the letting shall be construed as in any manner abridging the overall control of the Park by the Service, or as preventing the Director from giving directions as to the manner in which the premises concerned shall be managed.

The Proponent shall implement the proposed measures in this document towards protection and conservation of wildlife in the project areas.

4.3.12 The Agricultural Act

Legislative control over soil conversation and land development are mainly controlled within this Act, and many of the provisions can be generally applied beyond those lands suitable for agriculture. The Minister administering the Act, after concurrence with the Central Agricultural Board and consultation with the District Agricultural Committee, can impose land conservation orders on lands to control cultivation, grazing and clearing. These controls may be necessary to protect the land against soil erosion, to protect fertility, and to maintain catchments. Local authorities are generally empowered to administer these sections of the Act, and the District Agricultural Committee is entitled to make regulations relating to these controls. Agricultural Rules are prescribed under the Act, whereby vegetation clearing in steep slopes areas or adjacent watercourses, without authorization, is controlled.

4.3.13 Land Acquisition Act cap 295

It is possible, under the provisions of this Act, for land to be acquired or granted access to for the purposes of new projects. Acquisition or access must be shown to be in the public benefit and compensation must be provided to the land owners whose land is acquired or damaged.

There is a plethora of enactments all governing land and transactions in land. Thus the substantive land law is to be found in two different statutes while the adjectival land law is to be found in five different statutes not forgetting the customary land law of the various tribes in Kenya.

There are two systems of substantive land law, three systems of conveyance and five systems of registration. The two systems of substantive law are under:

- The Indian Transfer of Property Act 1882 as amended by 1959 Amendment Act
- The Registered Land Act
- The three systems of conveyance are those applicable to land registered under:
- Government Lands Act Cap 280, part X Laws of Kenya and Land Titles Act Cap 282, Part III Laws of Kenya
- Registration of Titles Act
- Registered Land Act.
- Registration Systems

The five registration systems are those under:

- The Government Lands Act (G.L.A)
- Registration of Titles Act (R.T.A)
- The Land Titles Act (L.T.A)
- The Registration of Documents Act Cap 285 Laws of Kenya (R.D.A)
- The Registered Land Act (R.L.A)

The Registration of Documents Act is not peculiar to land law, as documents completely unrelated to land are resistible under it.

The Proponent has undertaken a survey and developed a Resettlement Action Plan (RAP) for those who will be affected by the proposed project. The Proponent shall adhere to the requirements of the Act in the implementation of land acquisition.

4.3.14 Way Leaves Act (Cap. 292)

The Act provides for certain undertakings to be constructed e.g. transmission lines, pipelines, canals, pathways etc., through, over or under any lands. This project is under the provision of the Act. Section 3 of the Act states that the Government may carry any works through, over or under any land whatsoever provided it shall not interfere with any existing building or structures of an ongoing activity.

In accordance with the Act (section 4), notice will be given before carrying out works with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per section.

4.3.15 Land Ownership

Complete ownership can be said to be in the state. Under G.L.A the commissioner of Lands, on behalf of the Republic of Kenya grants leases of town plots for any term not exceeding ninety nine (99) years and of agricultural land for 999 years. The grantee becomes owner and subject to the terms and conditions of the lease he possesses the bundle of rights of ownership. The 999-year leases can be converted into freehold and the 99 years to 999. On conversion or expiry of lease the new grant may be issued under R.T.A or R.L.A. All un alienated land other than trust land and all reversion of government leases are vested in the government. Others whether held on freehold or leasehold are vested in grantees as owners having the rights over them. The power of the state to qualify (extinguish) property rights in the public interest is embodied in Section 75 of the Kenyan Constitution. The section however makes the exercise of that power subject to the process of law. Section 117 of the Constitution further provides that an Act of Parliament may empower a county council to set apart trust land for: The use and occupation of any public body or authority for public purposes; or Prospecting or mining purposes; or The use and occupation of any person or persons for a purpose which is likely to benefit the residents of the area.

Section 117 part 4 stipulates that the setting apart is void unless the law under which it is made makes provision for the prompt payment of full compensation. The Trust Land Act, in Sub-sections 7 to 13, makes provision for the setting apart of land

and payment of compensation with regard thereto. All land in urban areas of Kenya and much of the land in rural areas has a registered title. The title to land is either freehold or leasehold. The development and use of freehold title is controlled by land planning regulations which are administered by both the Central Government and the Local Authority in which the Land is situated. (A Local Authority is either a County Council or a Municipal Council whose activities are established and controlled by Local Government Legislation). Leasehold land is held on leases from the Central Government or, less frequently, from the Local Authority and such leases will contain provisions governing the development of the land and the use to which the land can be put. The leases frequently contain provisions against any dealing with the land without the consent of the landlord. The Central Government administers its land through a Department of Lands which is headed by a Commissioner of Lands.

4.3.16 KPLC Land Acquisition Procedure

4.3.16.1 Power Lines for Low Voltage

A reconnaissance survey is first done to search for the best possible route. It is KPLC policy to avoid existing structures as much as possible. Once the best route has been established, a meeting between the KPLC staff, the locals and the local administration is arranged. During this meeting KPLC formally requests for permission to survey the area. Once this is agreed upon, the surveyor moves to site and takes detailed profiles of the area and also places pegs where the poles are to be located. The surveyor then prepares a cadastral map of the area showing the plot numbers and the route of the power lines as well as the position of the poles.

The Way leaves section of the KPLC then prepares a way leaves agreement showing the specific affected plot and the proposed route. The individual owner is then approached with this proposal and his consent is requested. The owner is compensated for buildings or crops that are on the land. However, the owner is not allowed to grow anything higher than 12 feet within five meters of the poles or line. KPLC also consult with other relevant institutions such as Telkom Kenya, County Councils, Airport Authorities, Kenya Pipeline Company, Kenya Ports Authority, Department of Defense, Kenya Wildlife Service, Conservatoire of Forests and

Ministry of Public Works and Housing to ensure that their proposal is in harmony with other proposed developments.

4.3.16.2 High Voltage Lines

A similar procedure is undertaken in assessing the best route as in the case for the low voltage lines. The land required is of 30 meters width. Once the best route is established the landowner is approached with this proposal and his consent is requested. The owner is compensated for the land through negotiations to agree on a compensation rate. The owner is also compensated for buildings or crops that are on the land.

4.3.17 The Occupational Safety and Health Act, 2007

This Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work. Some of the areas addressed here are machinery safety, chemical safety and health, safety and welfare special provisions are also provided in the ILO conventions on safety and health in construction recommendation, 1988 R175. Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer.

The report advices the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost, as a basic guideline for the management of Health and Safety issues in the proposed project.

4.3.18 Public Health Act 1986 Revision

The public Health Act regulates activities detrimental to human Health. An environmental nuisance is one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. Although the Act is primarily concerned with domestic water supplies and sources of water used for human consumption, its regime may be extended to cover rivers, streams, lakes and

underground water resources since these are the basic water sources for the majority of Kenya's population.

It also outlines the standards of construction of various facilities of any place. In terms of air pollution thermal plants are said to emit a variety of gases, volatile organic compounds and particulate matter depending on the amount and type of fuel used and method used for burning. It is therefore necessary to monitor the air pollution. The Act prohibits activities (nuisances) that may be injurious to health. The primary purpose of the Act is to secure and maintain public health. It defines nuisances on land and premises and empowers public health authorities to deal with such conditions.

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injuries or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injuries or dangerous to human health.

On responsibility of the Local Authorities Part XI, section 129, of the Act states in part "It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes. Section 130 provides for making and imposing regulations by the local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 129. This provision is supplemented by section 126A that requires local authorities to develop by laws for controlling and regulating among others private sewers, communication between drains, power lines, and sewers as well as regulating sanitary conveniences in connection to buildings, drainage, cesspools, etc. for reception or disposal of foul matter. Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of

pests shall be deemed nuisances and are liable to be dealt with in the matter provided by this Act.

The Proponent shall observe policy and regulatory requirements and implement measures to safeguard public health and safety.

4.3.19 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

During the construction phase of the project, access to the site areas will be required for the construction vehicles. Where existing roads do not exist, the Proponent shall seek permission from the appropriate authorities to create such access during the construction phase.

4.3.20 Factories and Other Places of Work Act (Cap, 514)

Before any premises are occupied or used, a certificate of registration must be obtained from the chief inspector. The occupier must keep a general register. The act covers provisions for health, safety and welfare.

Safety

The Act makes a provision that ensures that for the interest of public, all dangerous points of the projects are clearly marked. Fencing of premises and dangerous parts of other machinery is mandatory. Training and supervision of inexperienced workers, protection of eyes with goggles or effective screens must be provided in certain specified processes. Special precaution against gassing is laid down for work in confined spaces where persons are liable to come in contact with dangerous fumes. Air receivers and fittings must be of sound construction and properly maintained. Adequate and suitable means for extinguishing fire must be provided in addition adequate means of escape in case of fire must be provided.

Health

The premise must be kept clean, ensuring daily removal of accumulated dust from place of work. The circulation of fresh air must secure adequate ventilation of workrooms. There must be sufficient and suitable lighting in every part of working place. There shall also be sufficient and suitable sanitary conveniences separate for each sex, must be provided subject to conformity with any standards prescribed by rules. Food and drinks shall not be partaken in dangerous places or workrooms. Provision of suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, maintained for the use of workers in any process involving expose to wet or to any injurious or offensive substances.

Welfare

An adequate supply of both quantity and quality of wholesome drinking water must be provided. Maintenance of suitable washing facilities and, accommodation for clothing not worn during working hours must be provided. Sitting facilities for all female workers whose work is done while standing shall be provided to enable them take advantage of any opportunity for resting. Section 42 stipulates that every premise shall be provided with maintenance, readily accessible means for extinguishing fire and person trained in the correct use of such means shall be present during all working periods. Section 45 states that regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earning for the employees and if possible within normal working hours. Section 55B provides for development and maintenance of an effective program of collection, compilation and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illness including disabling during working hours, are adhered to.

4.3.21 Local Government Act

The Local government Act is concerned with a wide range of matters that affect the day to day activities of individuals and organizations. The sections, which have the most direct relevance, are Sections 145, 146, 147 and 163:

Section 145 is concerned with the miscellaneous powers of local authorities. Subsection (w) empowers a local authority to take measures that may be necessary or desirable for the preservation or protection of wildlife, and provide amenities for the observation of wildlife. Section 146, Subsection (d) empowers a local authority, with the consent of the Minister, to make grants for the establishment and maintenance of game parks and other related facilities. Section 147, Subsection (d) controls the cutting of timber and the destruction of trees and shrubs.

Section 163, Subsection (e) empowers municipal councils, town councils and urban councils to control or prohibit all businesses, factories and workshops which by reason of smoke, fumes, chemicals, gases, dust, smell, noise or vibration or other cause may be a source of danger discomfort or annoyance to the neighbourhood and to prescribe the conditions subject to which business, factories and workshops shall be carried on.

The Proponent has commissioned a RAP study to identify such Trust Lands that may be affected by the construction of the transmission line. The Proponent shall comply with the provisions of the Act in seeking the required authorizations from the Local Authorities as stipulated in the Act.

4.3.22 Kenya Electricity Grid Code & Kenya Safety Code

The consultant also reviewed the Kenya Electricity Grid Code, which sets out detailed arrangements for the regulation of the Kenya electricity supply industry and is enforceable under the Electric Power Act, No 11 of 1997. In addition to the Kenya Electricity Grid Code, the consultant reviewed the Kenya Safety Code, which recognizes the Factories Act, 1962 (Rev.1972) which requires an employee to use any means or appliance provided by the Employer for securing safety and also not willfully to do anything likely to endanger himself or others.

4.3.23 The Water Act

The water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and

management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 59 (4) of the Act states that the national water services strategy shall contain details of:

- Existing water services
- The number and location of persons who are not being provided with basic water supply and basic sewerage
- Plans for the extension of water services to underserved areas
- The time frame for the plan; and
- An investment programme

The project shall have no adverse impact on the local water supply during operations as there are no requirements for the installation of water supply and sanitation facilities on-site. Observation of the requirements of the act shall be observed by the Proponent especially during the construction phase.

4.3.24 The Constitution of Kenya

The provisions of Chapter V (Protection of Fundamental Rights and Freedoms of The Individual) shall have effect for the purpose of affording protection to those rights and freedoms subject to such limitations of that protection as are contained in those provisions, being limitations designed to ensure that the enjoyment of those rights and freedoms by any individual does not prejudice the rights and freedoms of others or the public interest. The constitution protects citizens from deprivation of property. No property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired, except where it is necessary for public interest.

4.3.25 Forests Act 2005

The Act highlights the integration of the community on the management, utilization and conservation of forests and its resources. It prohibits wanton destruction of the forests. As hydro dams depends on good water catchments protection and

management, on the upstream and around the reservoirs the enforcement of this Act will minimize the flow of sediments into the rivers which are being utilized for generation of hydro electric power generation. There are no formally identified forests along Assignment-I transmission line routes, but there are some localities with significant tree and vegetation cutting needs.

4.3.26 Government Lands Act, Cap. 280 (revised 1984)

This Act deals with all actions, suits and proceedings by or on behalf of the Government respecting; Government land or any contract relating to Government land or any breach of any such contract, any trespass on Government land or any damages accruing by reason of such trespass, the recovery of any rent, purchase money or other monies in respect of Government land, any damages or wrongs whatsoever in any way suffered by the Government in respect of Government land or any other land, the recovery of any fine or the enforcement of any penalty under this Act The Government may at any time enter upon any land sold, leased or occupied under a license under this Act, and may there set up poles and carry electric lines across such land, and may lay sewers, water-pipes or electric lines therein, without paying compensation, but making good all damage (Sec 86). Where any damage or loss has been caused to any land by or as a result of entry thereon under section 86 or section 87 by reason of the injury or destruction of trees, bushes or shrubs planted thereon, a reasonable sum, not exceeding the market value of the standing trees, bushes or shrubs, shall be paid by way of compensation for the damage or loss notwithstanding that compensation is not otherwise payable under any of those sections.

4.3.27 Trust Lands Act Cap. 288 of 1962 (revised 1970)

This Act applies to all land which for the time being is Trust land. Under section 38 a way leave license may be granted to any person empowering him and his servants and agents to enter upon Trust land vested in the council and to lay pipes, make canals, aqueducts, weirs and dams and execute any other works required for the supply and use of water, to set up electric power or telephone lines, cables or aerial ropeways and erect poles and pylons therefore, and to make such excavations as may be necessary for the carrying out of any such purposes, and to maintain any

such works as aforesaid. However compensation for loss of the use of land in any case where the usefulness of the land for agricultural purposes is impaired must be made before the license is awarded.

4.3.28 Land Adjudication Act, Cap. 284 of 1968 (revised 1977)

This Act applies to any area of Trust land where the county council in whom the land is vested so requests; and the Minister considers it expedient that the rights and interests of persons in the land should be ascertained and registered; and where the Land Consolidation Act does not apply to the area.

The Proponent has undertaken a survey and commissioned a Resettlement Action Plan (RAP) study which complies with the provisions of the Act. Public consultations have also been undertaken extensively in the affected project area

4.3.29 Physical Planning Act (Cap 286)

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes enacted by the Parliament of Kenya Under this Act, no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. If on the expiry of the ninety days notice given to the developer such restoration has not been affected the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

The site layout plan appended to this report shows the proposed route for the transmission line. The Proponent shall secure all mandatory approvals and permits as required by the law.

4.3.30 Registered Lands Act, Cap 300 of 1963

This is an Act of Parliament to make further and better provision for the registration of title to land, and for the regulation of dealings in land so registered, and for purposes connected therewith.

The project traverses some areas with Registered Land. The Proponent shall comply with the provisions of the Act in the acquisition of Registered Land.

4.3.31 Geothermal Resources Act 1982

This act is geared towards licensing of geothermal wells while taking into consideration the need to dispose the waste products from the geothermal processes appropriately. Whilst part of the projects enters into a geothermal power station and reserve, it is not expected this legislation will impact on the project.

4.3.32 Employment Act No 11 of 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. Its purpose is to promote sound labour relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute the protection and promotion of settlement conducive to social justice and economic development for connected purposes. This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the energy sector.

4.3.33 Labour Institutions Act No. 12 of 2007

The purpose of the Act is to establish labour institutions and to provide for their function, powers and duties. The Act provides for the establishment of National Labour Board, which provides advice to the Minister on all matters concerning employment and labour.

4.3.34 Building Code 1997

The Local Government By-Laws include Building By-Laws that give the Municipalities or County Councils powers to approve building plans. Such plans are expected to provide for public buildings and factories among others. The By-Laws covers factory chimney shafts, stairs, lifts, rain water disposal, refuse disposal, ventilation of buildings, drainage, sanitary conveniences, sewers, septic and conservancy tanks, fire and means of escape in case of fire. Compliance with this Act in up scaling of power supply is necessary. Section 194 requires that where sewer

exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and all the wastewater must be discharged into sewers. The code also prohibits construction of structures or buildings on sewer lines and under power lines.

4.3.35 Use of Poisonous Substances Act rev. 1983 Cap 247

This Act under Sections 3,4,6,8 imposes restrictions and conditions on the use of poisonous substances and requires that persons concerned with storage, transportation and disposal or use of poisonous substances be registered or licensed. It also requires observance of precautions against poisoning and provides for periods of exposure to risk of poisoning.

4.3.36 Traffic Act Cap 403

This Act specifies that motor vehicles use proper fuel. The Traffic regulations promulgated under the Act specifies that every vehicle is required to be so constructed, maintained and used so as not to emit any smoke or visible vapour.

4.3.37 Penal Code Cap 63

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

The Proponent shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation/ minimization/ avoidance of adverse impacts arising from the project activities.

4.3.38 Local Authority Act (Cap. 265)

Under this act, the Local Authority is the custodian of Trust Land and has to authorized various sites where the lines could be passing.

The Proponent has commissioned a RAP study to identify such Trust Lands that may be affected by the construction of the transmission line. The Proponent shall comply with the provisions of the Act in seeking the required authorizations from the Local Authorities as stipulated in the Act.

4.3.39 Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009.

This Act applies to all wetlands in Kenya whether occurring in private or public land. It contains provisions for the utilization of wetland resources in a sustainable manner compatible with the continued presence of wetlands and their hydrological, ecological, social and economic functions and services.

The project traverses several rivers and streams. The Proponent shall comply with the provisions of the Act in protecting wetlands, preventing and controlling pollution and Siltation in rivers.

4.3.40 The Civil Aviation Act, Cap 394

Under this Act, the Kenya Civil Aviation Authority (KCAA) has to authorize and approve the height of the mast for the purpose of ensuring the safety of flying aircraft over the proposed project area.

The Proponent shall comply with the provisions of the Act in seeking authorization from KCAA for the installation of the lattice steel self-supporting towers along the transmission line route.

4.3.41 The Antiquities and Monuments Act, 1983 Cap 215

The Act aim to preserve Kenya's national heritage. Kenya is rich in its antiquities, monuments and cultural and natural sites which are spread all over the country. The National Museums of Kenya is the custodian of the country's cultural heritage, its principal mission being to collect, document, preserve and enhance knowledge, appreciation, management and the use of these resources for the benefit of Kenya and the world. Through the National Museums of Kenya many of these sites are protected by law by having them gazetted under the Act.

The report includes consultations held with the National Museums of Kenya to identify physical cultural resources that may be impacted by the implementation of the proposed project as well as the appropriate mitigation measures to protect such resources.

4.3.42 Relevant International Conventions and Treaties

Kenya is signatory to several international conventions and treaties that would need to be adhered to in implementing this project and are geared towards environmental protection and conservation. Some of these include;

a) ILO Conventions ratified by Government of Kenya- Kenya have ratified 43 ILO conventions and those that are relevant to this study includes
- Safety and Health in Construction Recommendation, 1988
- Recruiting of Indigenous Workers Convention, 1936 (No.50)
- Contracts of Employment (Indigenous Workers) Convention, 1939 (No. 64)
- Minimum Age Convention, 1973 (No. 138) Minimum age specified: 16 years
- Migrant Workers (Supplementary Provisions) Convention, 1975 (No. 143)

b) Convention on Wetlands or the Ramsar Convention
c) Convention on Biodiversity
d) The Convention on International Trade in Endangered Species (CITES)
e) Convention on the Conservation of Migratory Species
f) United Nations Framework Convention on Climate Change
g) United Nations Convention to Combat Desertification
h) Important Bird Areas
i) The World Heritage Convention
j) UNESCOs Man and Biosphere
k) New Partnership for Africa Development (NEPAD)
l) East African Community.

The Ministry of Foreign Affairs deals with international treaties at the primary stages of negotiation. The ministry offers advisory guide to the government on the need to ratify such a treaty if considered to be of national interest. Implementation portfolio then moves to the line ministry, relevant departments and co-operating agencies.

5. CONSULTATIONS AND PUBLIC PARTICIPATION

5.1 Introduction

This chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed project. Views from the local residents, local leaders, surrounding institutions and development partners who in one way or another would be affected or have interest in the proposed project were sought through interviews and public meetings as stipulated in the Environment Management and Coordination Act, 1999.

5.2 Objectives of the Consultation and Public Participation

The objective of the consultation and public participation was to:

1) Disseminate and inform the stakeholders about the project with special reference to its key components and location.
2) Gather comments, suggestions and concerns of the interested and affected parties.
3) Incorporate the information collected in the ESIA study.

In addition, the process enabled;

1) The establishment of a communication channel between the general public and the team of consultants, the project proponents and the Government.
2) The concerns of the stakeholders to be known to the decision-making bodies at an early phase of project development.

5.3 Interested and Affected Parties Consulted

The following list outlines the parties that will be affected or have interest in the proposed 132KV Transmission Line project to be undertaken by the proponent (see full list of the people/Stakeholders consulted in the appendix)

1. Government institution/ officials
2. NGOs
3. Ordinary citizens
4. Local community representatives (Local chairmen, Community leaders and community members)

5.4 Methodology used in the CPP

The Consultation and Public Participation (CPP) Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development. The environmental and social assessment exercise was conducted on the 23rd - 27th November 2009 by a team of experienced registered environmental experts in three ways, namely, (i) Focus group and Key informant interviews and discussion, (ii) Field surveys and observations and (iii) Public meetings. Comprehensive public meetings held on17th and 18th December 2009 captured the concerns of the people especially those directly affected by the project.

It was possible to meet a representative population at the time of these meetings due to the nature of the project and the number of people affected and the interest groups. Completion of the questionnaires and the issues raised during the public meeting enabled the identification of the specific issues from the stakeholders' response which provided the basis upon which the aspects of the Environmental Impact Assessment were undertaken.

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

In general, the following steps were followed in carrying out the entire CPP process:-

I. Identification of institutions and individuals interested in the process and compiling a database of the interested and affected parties
II. Administration of questionnaires to the different target groups and local community members along the proposed project Site
III. Meetings at various levels and with different target groups

Comprehensive stakeholders meetings were held at various stations including; (Nanyuki, Manyatta Village, Muchongoi, Marigat, Kabarnet, Small Town, and Tulwet), The exercise was exhaustive as the stakeholders consulted were found to be truly representative of the target groups.

5.5 Background

From the field work, it was apparent that the majority of the stakeholders were not aware of the proposed project, therefore the consultant and KPLC explained to the public and relevant stakeholders that the proposed development would involve construction of a 235 Km of 132KV transmission line from Lessos, Kabarnet, Nyahururu to Nanyuki, and also responded to the queries that the public sought to know about the project.

The proposed project was nevertheless received with mixed reactions by the community as they anticipated numerous impacts (both negative and positive). The local communities and major stakeholders independently gave their views, opinions, and suggestions in their best interest, bringing out the factors that affected the circumstances, influences, and conditions under which their organizations exist. However, all the environmental issues which were raised can be adequately mitigated exhaustively as explained in chapter seven of this report. Other issues surrounding the project were successfully settled during the public meetings since representatives of the proponent were in attendance and responded to the issues which were unclear to the public.

The consultant particularly gave close attention to persons within the proposed way leave corridor. The views of these stakeholders were considered and their names, identification numbers and contacts were taken for future references as required by NEMA. (See appendix for the list of participants in the Consultation and Public Participation).

5.6 Issues Raised

Interviews with the stakeholders were carried out on 24th to 27th November 2009 through administering well-structured questionnaires. Comprehensive public participation meetings were held on 17th and 18th December 2009 with various Administrative leaders, community leaders and the residents who are likely to be affected by the project along the way leaves trace. The views of these stakeholders were captured and minutes of the meetings taken.

5.6.1 Positive Issues

The following is a summary of the views of the stakeholders interviewed:

- The project is good for the development of the country since it will boost power supply and improve on industrial development, and should therefore be undertaken.
- The project will improve businesses in the area and also create job opportunities to the local Youth during construction phase.
- There would be interaction with other cultures especially during construction phase.

5.6.2 Negative Issues

Some of the stakeholders had a few reservations about the project and raised the following concerns:

- The project may lead to displacement of the residents.
- Resettlement of residents may interfere enormously with their livelihoods since they will have to move businesses and schools.
- The Air Force Base in Nanyuki is a protected area and the project may interfere with operations of the aircrafts.
- There would be increased pollution from transport vehicles during construction.
- There would be electromagnetic radiations and risk of electrocution that may affect those residing near the way leave.
- There would be possibility of insecurity in the areas due to the influx of other people during construction phase.

- The project will lead to cutting down of trees which are very important in some areas that are very arid.
- There would be loss of land and property since residents may be required to relocate.

5.6.3 Stakeholders' Suggestions

The following suggestions were raised during the consultations:

- KPLC should provide stepped-down voltage power to the residents along the proposed line for domestic use
- The Proponent should consult with Kenya Civil Aviation Authority regarding having the line going through or near the Air Force Base airfield.
- In areas where the proposed route passes many households, the proponent should consider relocating it to ensure that not many people are displaced.
- Compensation of land should be done with consideration of the current economic situation
- The proponent should ensure that trees are not cut down unnecessarily and those that will be felled should be replaced elsewhere.
- Some residents said that since they would not benefit from the project then the line should pass underground.
- The proponent should assist the local communities in other projects since they will not directly benefit from the project e.g. construction of classrooms for schools, assist students from the villages to attend secondary schools, drill borehole for villages, assist in control of HIV/AIDS, etc.
- The Proponent should put up power sub-stations at convenient points in order to supply the residential areas with power.
- The Proponent should ensure proper environmental management practices are put in place.
- The proponent should consider employing casual workers from the local areas during construction phase of the project.
- Noise pollution should be controlled.
- The affected residents should be given ample notice to move and be compensated before relocating.

- The proponent should put up security lights.

5.7 Comprehensive Public Meetings Held

The comprehensive public meetings were held on 17th and 18th December, with the local residents, Chiefs, Village elders, and other local administrative leaders in attendance. The views/ concerns of the stakeholders present were noted and their identification and contact details taken as required by NEMA. The lists of attendance are attached as Appendix I.

5.7.1 Nanyuki – Rumuruti – Mochongoi – Marigat

Along this section of the proposed line, the meetings were held as follows:

Meeting 1: Held on 17th December 2009 at the Chief's office in Nanyuki location, Laikipia District (10.25am-11.30am)

In attendance: 15 people

Agenda:

- Introduction and brief remarks by the chair
- Project Description brief by the project team leader
- Project ramifications and impacts
- Project alternatives
- Issues raised
- Recommendations

Issues Raised:

Human Health – Some were wary of the presence of the high-voltage wires in their immediate environment, especially risks of Leukemia but the team leader explained that studies were not yet completed and hence these are at present only perceived risks that cannot be quantified empirically.

Air Force area and effects on birdlife – The conservationists wondered if the birdlife and migratory animals would be affected by the development as they cross

the area coupled with the presence of the airfield in the immediate neighbourhood and were assured that these issues were to be mitigated fully in the ESIA.

Alternative route – Some tried to explain that an alternative route could be found from those who own the large ranches at Ndurukuma; as these are not only tourist circuit about three Kilometres from the town and are largely undeveloped expanse of about 120 acres.

Generation options and underground cabling – Some wondered if the line can be diverted to other existing lines.

Picture 23: Meeting in Nanyuki at the chief's office

Meeting 2: Held on 17th December 2009 at Manyatta Tutu Village opposite Sweet Waters Tented Camp, Laikipia District (2.00pm – 2.40pm)

In attendance: 22 people

Agenda:

- Introduction and brief remarks by the chair
- Project Description brief by the project team leader
- Project ramifications and impacts
- Issues raised
- Recommendations

Issues Raised:

Project take off time – Most were concerned that the project may take off before they complete their preparations for relocation but were assured by the team leader that these processes take time and require proper and the due process to be followed.

Direct benefits – Some expressed concern that the direct benefits that accrue to such projects may not trickle down to the locals through employment opportunities but they were assured that they would be considered for non-technical jobs during the project cycle.

Compensation process – A few residents questioned the compensation rates to be applied for property destroyed/displaced but were assured that the national guidelines and the World Bank guidelines would be applied in the process and qualified Valuers would be incorporated in the process.

At the end of the meeting, all in attendance were of the opinion that; the project was beneficial to them and the nation at large and they would support it as long as their interests (compensation, employment, and displacement) are taken care of before the project takes off.

Picture 24: Meeting in Manyatta opposite Olpajeta tended camp gate

Meeting 3: Held on 18th December 2009 at Kivumbini Village, Marigat District (2.30pm- 3.20pm)

In attendance15 people

Agenda:

- Introductions
- Project Description
- Public Concerns

- Recommendation
-

Issues Raised:

- **Relocation of residents.** The residents requested to be informed about what would be relocated and where they would move to.
- **Health hazard.** Some worried that the line passing close to their surrounding may be risky to their health and their children.
- **Compensation criteria.** They wanted to know the rates that would be used for compensation for their property.
- **Lack of Space for moving.** Some residents feared that they would not have land to move to if they were asked to relocate their homes since they own small plots.

5.7.2 Kabarnet Area

The meeting held here targeted stakeholders from the following areas in Kabarnet town and its outskirts: Kituro Centre, Kapropita, Kaprogonya, Kapsesat, Cereals, and Mumol. These areas was densely settled, with numerous household likely to be affected

Meeting 1: Held on 17th December 2009 at Kabarnet County Hall (10.40am – 12.35pm)

In attendance: 69 people

Agenda:

- Introductions
- Project Description
- Public Concerns
- Recommendation

Issues Raised:

- Some residents feared that they would be asked to vacate their property without ample notice, but they were assured that notice would be given in good time wherever necessary.
- The residents wanted to know if they had options for compensation.
- The residents were concerned about criteria of valuation of their property
- They were also concerned about how they would benefit from the project
- They agreed that compensation should be done genuinely.

6. . IDENTIFICATION OF THE PROPOSED IMPACTS

6.1 Introduction

This chapter focuses on the positive and negative impacts that are likely to occur as a result of the proposed construction works on the Transmission Line for 235 Km Lessos – Kabarnet –Nyahururu - Nanyuki. These were identified according to the proposed project phases namely: Construction Phase, Operational Phase, and the Decommissioning Phase. For ease of reference, the impacts due to or affecting certain elements during construction and operation are presented in matrix form in the Environmental and Social Management and Monitoring Plan. The table below provides a snapshot view of the anticipated impacts (both positive and negative) of the proposed project:

Table 8: Impacts of the proposed project

Environmental & Social Impact	Positive/ Negative	Direct/ Indirect	Temporary/ Permanent	Major/ Minor	Occurrence		
					Construction	Operation	Decommissioning
Socio-Economic Impacts							
Electricity supply	Positive	Direct	Permanent	Major	x	√	x
Creation of employment	Positive	Direct & indirect	Temporary/Permanent	Major	√	√	√ x
Security	Positive	Direct	Permanent/Temporary	Major	√	√	x
Revenues to Government	Positive	Direct	Permanent	Major	√	√	x
Development of Business opportunities	Positive	Direct	Temporary/Permanent	Major	√	√	x
Growth of agro-based industries	Positive	indirect	Temporary/Permanent	Major	√	√	x
Interference with cultural set-up	Negative	Direct	Permanent	Minor/Major	√	√	x
Interference	Negat	Direct	Temporary/Per	Major/Mi	√	√	√

with socio-economic activities due to relocation & resettlement	ive	& indirect	manent	nor			
Employment Opportunities	Positive	Direct	Permanent/Temporary	Major	√	√	√
Gains in the Local and National Economy	Positive	Direct	Permanent	Major	√	√	x
Loss of property	Negative	Direct	Temporary/Permanent	Major/Minor	√	√	x
Interference with radio, television and telecommunication frequency	Negative	Direct	Temporary/Permanent	Major/Minor	√	√	x
Visual Impact	Negative	Direct	Temporary/Permanent	Major/Minor	√	√	x
Biophysical Impacts							
Micro-climate	Positive	Indirect	Permanent	Major	x	√	x
Clearance of vegetation cover	Negative /Positive	Direct	Temporary	Major	√	√	√
Increased solid waste	Negative	Direct	Temporary	Minor	√	√	√
Interference with water quality	Negative	Direct	Temporary	Minor	√	x	√
Increased demand of sanitation	Negative	Direct	Temporary	Major	√	x	√
Natural habitats	Negative	Direct	Permanent/Temporary	Minor	√	√	√
Health and Safety Impacts							

Air pollution GHG	Negative	Direct	Temporary	Major/ Minor	√	√	√
Noise and Vibrations	Negative	Direct	Temporary	Major/ Minor	√	√	√
Dust	Negative	Direct	Temporary	Minor	√	√	√
EMF Public Health and psychological perception	Scientifically impacts on health not established and psychological impacts will be relative depending on project understanding						
Increase in social vices	Negative	Direct	Permanent/Temporary	Major/Minor	√	√	√
Injuries and accidents to animals and workers	Negative	Direct	Temporary/Permanent	Major	√	√	√
Clean Energy	Positive	Direct	Permanent	Major	x	√	x
Development of other sector such as health, education, industries among others	Positive	Direct/ Indirect	Permanent	Major	x	√	x

The following are some of the potential positive impacts that could result from the proposed transmission line they include;

- Possibility of connecting more households and institutions to the national grid;
- The major impacts of the transmission line will be reduced poverty and improved living standards within and beyond the district served. These will result from employment creation (direct and indirect) and increased investments especially in value addition processing of primary products.

- Improved incomes and poverty reduction will also occur through provision of opportunities to invest in heavy industries and facilitate direct and indirect employment
- Job creation for both skilled and unskilled labour for vegetation clearing, menial works, drivers and machine operators. The total number of local jobs created by this project as will depend on availability of labour and policies of the contractor and KPLC while casual wages range from Kshs. 250 to 800 per day
- Boost the economy through investment and expansion of businesses and income generation opportunities. This will increase productivity and competition
- Connect more households and institutions with electricity thereby providing household level lightning system. This will in effect create market for electronic goods
- Reduce power problems/outages especially Nanyuki town and its neighbourhood.
- Improve security in the beneficiary communities through better lighting.

The potentially adverse impacts have been discussed in greater detail the following section:

6.2 IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

6.2.1 Terrestrial Habitat Alteration

6.2.1.1 Construction phase

The construction of transmission line rights-of-way will result in alteration and disruption to terrestrial habitat, including impacts to avian species and an increased risk of forest fires. Right-of way construction activities will transform habitats, depending on the characteristics of existing vegetation, topographic features, and installed height of the transmission lines. Examples of habitat alteration from these activities includes fragmentation of forested habitat; loss of wildlife habitat, including for nesting; establishment of non-native invasive plant species; and visual and auditory disturbance due to the presence of machinery, construction workers,

transmission towers, and associated equipment. The construction phase is also expected to be associated with woody species removal along the proposed way-leave area resulting in destruction of species habitat or its simplification. Vegetation clearing will be done manually by use of *pangas* and slashers. Where there are big trees, portable power saw mills (petrol powered) will be used

The transmission line is passing through partially settled areas which do not possess any critical habitats. The numerous but dispersed hills are known to be habitats which may be termed as IBA's (Important bird Areas) at a landscape level. These scattered hills are important for conservation and preservation of raptors and their habitats. The transmission line is expected to affect a narrow width and therefore resulting to narrow vegetation denudation.

The habitat through which the transmission line passes is widespread and well represented within the landscape and therefore cannot be termed critical. Therefore, the construction of the transmission line will not have injurious effects to the habitat owing to its widespread nature and similarly will not have significant impacts to wildlife and human communities dependent these habitats. In summary the proposed project will not affect the integrity and ecological functions of the habitats traversed by the transmission line

6.2.1.2 Operation and Maintenance

Unchecked growth of tall trees and accumulation of vegetation within rights-of-way may result in a number of impacts, including power outages through contact of branches and trees with transmission lines and towers; ignition of forest and brush fires; corrosion of steel equipment; blocking of equipment access; and interference with critical grounding equipment. Regular maintenance of rights-of-way to control vegetation will involve the use of mechanical methods, such as mowing or pruning machinery that may disrupt wildlife and their habitats, in addition to manual hand clearing

6.2.2 Alteration of Aquatic Habitats

6.2.2.1 Construction

The route of the proposed transmission line crosses several rivers and streams, such as R Ol Rabel, R. Kerio, R. Pekerra, R. Chebaon, R. Ngarenyiro, R. Ewaso Narok, R. Pesi and R. Mutara. Soil erosion from construction activities may result in siltation of watercourses. This impact is however expected to be minimal and the removal of riparian vegetation temporary. At each tower site there will be four holes dug to a depth of approximately 5m; no major earthworks will be involved in this project.

6.2.3 Wildlife Species

6.2.3.1 Construction

The construction phase is not expected to have significant negative impact on wildlife owing to the short width of the way-leave and low wildlife density in the line route. Most of the wildlife in the general area is well protected in near-by conservation areas under the management of Kenya Wildlife Service and the County Councils. The behaviour of wildlife species in this area precludes any significant negative impacts although some species may be affected during the construction phase.

6.2.3.2 Power line associated avifauna mortalities

Studies have shown that power line collision victims are birds of prey, ravens and thermal soars. Although power line designs have been suggested to be related to the possibility of collision accidents, there are no data available to support the hypothesis (Janss, et al., 2000). However, design of power line and pylons are important in determining the risk of avifauna death from electrocution, where for instance non-conductive pylons having less mortality incidences compared to metal pylons. Collision and electrocution incidences are species specific and depend on the species behaviour. Raptor for instance are known to have territories which may restrict their ranging behaviour therefore reducing chances of power line mortalities compared to waterfowls e.g. the cranes. Eagles are at low risk due to their solitary behaviour compared to flocking birds like the storks, cranes and vultures. However, eagles frequently use pylons for roosting, feeding and hunting

resulting to electrocution. Flight performance is an important factor determining the chances of collision with power line where for instance birds with low wing loading are less exposed to electrocution risk, due to their agility. Poor visibility increases possibility of collision and electrocution accidents. Electrocution and collision are possible outcomes along the proposed power line affecting raptors and other birds. This will lead to bird's electrocution along their migration paths near Lake Bogoria and Baringo.

6.2.4 Soil

6.2.4.1 Construction

During the construction phase, the contractor is expected to loosen the soil along the way-leave for the pylons which may lead to soil erosion. Similarly, the way-leave will serve temporarily as a road to transport material between construction sites. The exposed soil will be prone to wind and water erosion during the construction phase. The soil problems may be exacerbated by topography of some areas, especially across riverine and dry river-beds, mainly during the wet season.

6.2.4.2 Decommissioning

During the decommissioning phase, the contractor is expected to loosen the soil along the way-leave for the purpose or removing the pylons which may lead to soil erosion. Similarly, the way-leave will serve temporarily as a road to transport decommissioning materials from the proposed project sites. The exposed soil will be prone to wind and water erosion during the decommissioning phase. The soil problems may be exacerbated by topography of some areas, especially across riverine and dry river-beds, mainly during the wet season.

6.2.5 Air

6.2.5.1 Construction

During the process of construction, some dust will be generated from the few project vehicles as they make their way through the mainly murram roads leading to project sites. This dust may not be significant in the low population density areas but may become a nuisance as the vehicles cross the areas of dense settlements

where the transmission line will pass close to houses and the road surface is murram which is in just a fair condition (The foundations for the lattice structures shall be dug manually and so will be the concrete casting for their bases.

6.2.6 Water Quality

6.2.6.1 Construction and Operation

The proposed project will not affect local water resources during both construction and operation phases of the project. During construction, water demand will be minimal.

6.2.7 Hazardous Substances

6.2.7.1 Construction

Use of engines (construction vehicles) and other equipment on site has the potential to lead to spillage of petroleum products. It is however worth noting that the risks of a major oil spillages occurring are minimal because only a few construction will be needed in the construction of the transmission line. Further, the maintenance of these vehicles will be undertaken at authorized garages and not on site. The impact during construction will not be significant.

6.2.7.2 Decommissioning

The machines on site may be containing moving parts, which will require continuous oiling to minimize the usual corrosion or wear and tear. Possibilities of such oils spilling and contaminating the soil and water along the transmission line route are likely to occur but on rear occasion because the workers will be sensitized. These dangers can be contained by maintaining the machinery in specific areas designed for this purpose.

6.2.8 Fire Risk

6.2.8.1 Operations

During operations, voltage power can cause a fire risk in the event of electrical faults with equipment. Bat and bird collisions with power lines may result in power outages and fires. Also, if underlying growth is left unchecked, or slash from routine

maintenance is left to accumulate within right of way boundaries, sufficient fuel can accumulate and as such promote forest fires.

6.2.9 Loss of plant species and communities

6.2.9.1 Operation

Direct impact results from disturbances that cause changes in temperature, light, moisture and nutrient levels; removal activities (e.g. clear-cutting, bulldozing); impacts resulting from air and water pollution (e.g. turbidity, eutrophication). Indirect impacts result from changes in natural community processes or invasion of non-native plant species. Loss of plant communities also results in decreased water quality, increased erosion because of unstable soil, nutrient imbalances in the soil, and/or compaction of soil. The proposed transmission line will pass through scrubland, forests, near wetlands and savannah grasslands that are a habitat to a variety of plant and animal species, both wild and domesticated.

The predominant vegetations formed along the proposed transmission line are shrub land and savannah with scattered trees and shrubs. It will pass close to protected areas such as wildlife conservancies, prehistoric sites, habitats for indigenous communities and farmland as well as grazing land. The forested areas have both indigenous and exotic tree species such as Acacia sp., *Prosopis sp, Eucalyptus sp., Grevellia sp., Dovyalis caffra, Lantana camara* and *Pinus sp.* Substantial impacts will be in areas with thick vegetation such as Lariak, Marmanet Ol Arabel, and Kabarnet, forests where tall trees exist. Whereas impact on woody vegetation is going to be more permanent, impact on grasses, scrubland, and herbaceous vegetation is mostly transient.

In order to minimize the environmental impacts it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. It is important to note that vegetation clearance in protected areas will be done through acquisition of the necessary permits and supervised by the relevant authorities.

6.3 IMPACTS ON HEALTH AND SAFETY

The health and safety impacts of the presence of high-voltage power lines are detailed briefly in the following sections.

6.3.1 Noise

6.3.1.1 Construction

There will be noise and vibrations generated during the construction phase but it will be no different from that on any other typical construction site. The noise impact during construction is expected to be negative and short-term. The major receptors are expected to be the construction workers as well as any immediate neighbouring residential premises. Sources of noise will be trucks and the off-road vehicles in transit, use of compressor to break hard ground and the use of motorized chain saws for vegetation clearing.

The noise from the project vehicles is only significant in areas where the proposed line passes through dense settlements such as close to the towns' neighborhoods. The noise from compressors will only be significant where hard ground breaking is carried out close to settlements. Noise from the motorized chain saws will only be experienced in the wooded areas but it will not be a significant impact since the density of settlements is not very high. Impacts of noise include noise-induced hearing loss for the project employees and nuisance for the affected settlements.

6.3.1.2 Operation

The acoustic noise produced by transmission lines is greater with high voltage power lines; high voltage power lines (400-800kV) generate discharges producing what is known as a "corona effect" which in turn gives rise to crackling and frying noises that may even be audible in dry weather. With this project noise impact will be insignificant as it involves the installation of 132kV voltage lines.

6.3.1.3 Decommissioning

The decommissioning works will most likely be a noisy operation due to the moving machines, communication of workers and out going vehicles transporting project materials and workers to and out of the proposed site. However, it will also be a source of disturbance in populated areas and in wildlife conservancy areas like Ol Pajeta and Mutara Ranch along the transmission line route. The immediate surrounding will experience an increase in human traffic and noise during ground preparation. In the decommissioning site, noise is likely to be produced by the decommissioning machinery. To prevent this, machine operators and workers who will be in close proximity to the machinery will be required to wear protective gears such as earmuffs. The prevalence of acute noise damages occur when the ear is exposed to a single or relatively few exposures of sound at threshold levels of 100-120 dB and these damages to the ear can be either temporary or permanent. However, during this decommissioning phase there would not be too much noise.

6.3.2 Aircraft Navigation Safety

6.3.2.1 Construction and Operation

In Kenya, KCAA gives approval for tower heights to ensure safety of aircraft. Power transmission towers, if located near an airport, air strip, or known flight paths, can impact aircraft safety directly through collision, or indirectly through radar interference. The tower heights for the tower structures to be erected are approximately 30-40m. Initial consultation with KCAA pointed out that that are about 10-15 airstrips within the study area; additionally there could be military installations also. Based on consultations with KCAA officials, a full clarification on whether or not the facilities mentioned will be impacted by the project is yet to be established; clarification needs to be obtained through an official request by the Proponent to the Director General.

6.3.3 Electromagnetic Fields (EMFs)

6.3.3.1 Operation

Perhaps the greatest fear expressed by people living in very close proximity to high-voltage power lines is exposure to EMFs. Scientific research on the effects of EMFs

on public health has not demonstrated clearly the existence of a significant risk, nor has it proven the complete absence of risk. The finding and conclusions are that the field strength on a 132 kV line at the distance of exposure (heights of 40-40m is less than what one would ordinarily be exposed to in a domestic setup. In this context, prudent avoidance is recommended.

6.3.4 Maintenance of Transmission Line System

6.3.4.1 Construction and Operation

The rights-of-way require annual maintenance to remove bush and tree growth beneath power lines so that towers and lines can be maintained. No phytocides will be used for clearing of vegetation and instead both manual (machetes and slashers) and power saws will be used. The impacts of these operations include physical hazards such as injuries sustained from the tools/equipment, ergonomical problems from poor working posture, dust inhalation, among others.

6.3.5 Electrocution from Live Power Lines

6.3.5.1 Operation

Lattice structure or conductor cable failure is the most catastrophic event that could occur in the operation of an electricity transmission system. It involves a sudden break in the structure and the rapid, uncontrolled exposure to medium to high currents leading to electrocution or loss of property through fires ignited by the fallen cables. Hazards most directly related to power transmission lines and facilities occur as a result of electrocution from direct contact with high-voltage electricity or from contact with tools, vehicles, ladders, or other devices that are in contact with high-voltage electricity during maintenance activities.

6.3.5.2 Possible exposure of workers to diseases

6.3.5.3 Construction and Decommissioning

During the construction and decommissioning phase, workers are likely to be exposed to diseases from construction and decommissioning materials. It is

therefore recommended that before the construction commences, there is need for the materials to be well inspected according to the occupational health and safety standards. Other concerns will include incidences of vector borne and water borne disease. When solid wastes are not well managed there is potential of disease outbreak due to suitable breeding conditions for vectors of cholera and typhoid. If the wastes find their way to a water body its quality may be lowered. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. The most vulnerable groups are children who could be exposed to these conditions.

6.3.6 Physical Hazards

6.3.6.1 Construction and Operation

The main aspects to be considered in site preparation activities include manual clearing of bushes (using slashers and machetes) for access through which conductor cables will be strung, manual preparations for the foundations of the lattice structures (pylons), stringing and maintenance of conductor cables at heights of approximately 30 – 40m and breaking of hard ground using compressors.

During the manual clearing of vegetation using slashers and machetes, excessive or prolonged use leads to 'white hand syndrome' which affects the palms of the worker to an extent that they are unable to engage in further physical tasks involving the hands. The manual digging for the foundations of the lattice structures is a highly physical and energy sapping activity. Prolonged digging and overexertion will lead to ergonomic issues relating to pains in the lower back and in the joints (of legs and hands/arms). Stringing of conductor cables during construction or maintenance activities is a function of work at height. Potential injuries may result from slips and falls from heights of between 30 – 40 m which is the average height of the line in this project. Such falls will cause fractures that could lead to loss of ability to use limbs normally and in extreme cases fatalities. The use of compressors in the areas of hard ground such as the stretch from Mwingi to Garissa, will subject the project employees to Whole-body vibrations that may impair functions of the chest, abdominal organs, and musculoskeletal systems, contribute to fatigue and decrease concentration.

6.4 SOCIO-CULTURAL IMPACTS

6.4.1 Community Public Participation

The Public consultation process involved visiting the areas along the 235 kilometers stretch along which the Way leave for the proposed transmission line will be sought. The stakeholders were identified and consulted with the objective of describing the existing socio-economic conditions within the proposed project area of influence and the immediate surroundings.

Public consultations were conducted from 23rd November to 18th December 2009. The specific objectives of the consultation process were:

- To create awareness on the proposed project
- To ask the local residents especially the Interested and Affected Parties about the problems they anticipate with the project and how these can be overcome
- To consult and gather recommendations from the local administration e.g. DC, D.Os, Chiefs, Assistant Chiefs, Councilors, Village Elders and communities that have a stake in the project
- To provide an opportunity to all the communities in the areas where the proposed transmission line is expected to pass to raise issues and concerns pertaining to the project, and allow the identification of alternatives and recommendations.

6.4.2 Data Collection Methodology

The social assessment team used both qualitative and quantitative techniques to collect data and information on the social and economic status of the community and area along the proposed 235 kilometer transmission line would pass. These included:

- A detailed desk study to establish and describe the socio-economic conditions Nandi, Uasin Gishu, Keiyo, Baringo and Laikipia districts. This secondary information was obtained from District Development Plans and the Poverty Reduction Strategy Papers. Most of these plans were drafts for the years 2008-2012.

- Key Informant Interviews and Semi-Structured Interviews were conducted with the D.Os, Chiefs, Assistant Chiefs, Councilors and Village Elders.
- Open-ended questionnaires were administered to obtain views about the proposed project and its perceived impacts from households along the proposed transmission line. For those households which were on the proposed transmission line and not reachable to be interviewed, the neighbours gave the team an estimated number of households, names and the villages.
- Public Barazas which were organized and chaired by the Chiefs and Assistant Chiefs.
- Transect walks, where possible were conducted to confirm the information from the discussion and observation were made on physical and environmental conditions.

Generally, all those consulted had no prior knowledge of the proposed project. The majority of the people consulted along the project corridor have positive attitude toward the project and approved the proposed project for they recognize the importance of electricity in development. The local leaders and other opinion leaders also gave the project their support. Majority want to know when it will start because they see an opportunity to gain financially due to the current harsh economic situations. The local population is willing to participate in ensuring success of the proposed project in a number of ways such as:

- Offering their land in exchange of "good" money
- Supplying both unskilled and skilled labour for the project
- Providing market for the electricity
- Reporting electric faults and vandalism
- Creating awareness among community members on dangers of electricity and tempering with electricity lines

The key issues specifically raised by the stakeholders consulted are as follows

- Timeframe of the project
- Compensation process and values of property

- Need for adequate awareness creation and social engineering before and during project construction
- Employment of the local youth
- Putting appropriate signs "Danger" on each electric installation for information to residents
- Diversion of roads during construction which may reduce business
- Design route of the project to follow, as much as possible, uninhabited areas to ensure minimal disturbance, relocation, costs and electricity related accidents
- Clearance corridor required for the transmission line which is about 20m on either side of the centre line totaling to 40 meters. Each post will require 3mx3m for the foundation, each being 10 feet apart while depth of towers will go 2m depending on the soil type.
- How communities will benefit from the project in other ways other than power supply
- Compensation procedures and legal redress procedures through the land tribunal
- For those who will be relocated, what security will the people have over the new property that they will move to as some influential people may claim the property and fence it off
- The actual beneficiary to be compensated and documents required
- Actions to be taken if the transmission line crosses public facilities such as schools
- The dangers of having the power line pass near your home or on your land and the compensation provided if injured by the power line
- How will such the project affect the environment?
- Is there alternative power planned for provision before the proposed transmission line is completed

6.4.3 Perceived Challenges to the proposed project

The correspondents mentioned the following as being the challenges that the proposed project may be faced during construction, commissioning and operation:

Challenges during construction:

- Poor topography
- Inaccessibility and transportation of materials
- Land disputes in the acquisition process
- Inadequate skilled manpower
- Clearing of vegetation
- Language barrier
- Poor weather

Challenges during commissioning:

- Conflict over allocation of job opportunities
- Insecurity (vandalism, breakages and theft of cables/wires)

6.4.4 Visual Amenity

6.4.4.1 Operation

Power transmission lines and associated accessories are necessary to transport energy from power facilities to residential communities, but may be visually intrusive to local residents. Visual intrusion as a result of the transmission line and towers was however not a major issue of concern based on the public consultations held with communities in the project areas.

6.4.5 Spread of Disease

6.4.5.1 Construction

During the construction phase of the project, construction personnel brought in from outside the community may be infected with HIV/AIDS and other sexually transmitted diseases, and could introduce these diseases to the community members they interact with.

6.4.6 Induced Settlement

6.4.6.1 Construction

During construction works, there will be some direct employment opportunities for both skilled and unskilled labour. Furthermore, indirect employment opportunities

are bound to arise from the provision of services to the construction teams. Construction teams have the potential to cause natural resource degradation in terms of accelerating tree felling, and vegetation clearance at the location, sewage, solid and oil/petroleum wastes are also usually produced at the camps.

6.4.6.2 Operation

The improved power supply will lead to further economic growth particularly in North West Kenya region; this will be coupled with subsequent growth in settlement in the area. There are a number of environmental and social issues that emanate from such increase in population, such as erection of unplanned structures, increased demand for sanitation and water supply, cultural disruption, among others.

6.4.7 Land Acquisition and Resettlement

6.4.7.1 Construction and Operation

The identified line route will lead to physical displacement of people, loss of shelter, assets, income sources and livelihood, and restriction of access to economic resources. World Bank OP 4.12 - Involuntary Resettlement is triggered by this project and therefore requires the preparation of a Resettlement Action Plan (RAP).

- Involuntary resettlement under development projects, if unmitigated, will give rise to severe economic, social, and environmental risks;
- Production systems will be dismantled;
- Relocated groups will face impoverishment when their productive assets or income sources are lost, especially if relocated to environments where their productive skills may be less applicable and the competition for resources greater;
- Community institutions and social networks will be weakened, kin groups will be dispersed; and
- Cultural identity, traditional authority, and the potential for mutual assistance will be diminished or lost.

The Proponent is in the process of developing a Resettlement Action Plan (RAP) for the proposed 132kV transmission line. The RAP study has so far identified those

persons within the project area who may be displaced as a result of the project, and those persons who may have to relinquish their land to the project. The RAP outlines the guiding principles to be followed when involuntary land acquisition is undertaken, in order to minimize the adverse impacts to PAPs and enhance positive impacts. It applies to all displaced persons regardless of the total number affected, the severity of the impact and whether or not they have legal title to the land.

The RAP aims to promote participation of displaced people in resettlement planning and Implementation, and assists displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. This is in compliance with the World Bank's OP 4.12 which states that: "Where large-scale of population displacement is unavoidable, a detailed resettlement plan, timetable, and budget are required. Resettlement plans should be built around a development strategy and package aimed at improving or at least restoring the economic base for those relocated. Experience indicates that cash compensation alone is normally inadequate. Voluntary settlement may form part of a resettlement plan, provided measures to address the special circumstances of involuntary resettlers are included. Preference should be given to land-based resettlement strategies for people dislocated from agricultural settings. If suitable land is unavailable, non land-based strategies built around opportunities for employment or self-employment may be used".

6.4.8 Employment creation

6.4.8.1 Operation

Employment opportunities are one of the long-term major impacts of the transmission line construction project that will be realized after construction and during the operation and maintenance of the project components. These will involve security personnel, waste management staff and creation of businesses that will be located within the project sites.

6.4.9 Additional Power Capacity

6.4.9.1 Operation

The project, upon completion will result in the additional sub-stations and power lines and the proponent will be able to increase the electric power reliability and power supply capacity. This additional capacity would have a positive impact on the increasing power demands across the areas, in terms of economic empowerment, because KPLC would be able to supply more electric power, which cannot be supported by the existing transmission line.

6.4.10 Increased Revenue

6.4.10.1 Operation

There will be positive gain from the revenue obtained through sale of electricity to consumers and this adds revenue base for the Company (KPLC) and the Government (GOK) at national and local levels.

6.4.11 . Increase in volume of national electricity grid

6.4.11.1 Operation

An electrical grid is an interconnected network for delivering electricity from suppliers to consumers. When referring to the power industry, "grid" is a term used for an electricity network, which may support all or some of the following three distinct operations:

- Electricity generation
- Electric power transmission
- Electricity distribution

The sense of grid is as a network, and should not be taken to imply a particular physical layout, or breadth. "Grid" may be used to refer to an entire continent's electrical network, a regional transmission network or may be used to describe a sub network such as a local utility's transmission grid or distribution grid. The electric power, which is generated, is stepped up to a higher voltage at which it connects to the transmission network. The transmission network will move (wheel)

the power long distances often across state lines, and sometimes across international boundaries until it reaches its wholesale customer (usually the company that owns the local distribution network). Upon arrival at the substation, the power will be stepped down in voltage from a transmission level voltage to a distribution level voltage. As it exits the substation, it enters the distribution wiring. Finally, upon arrival at the service location, the power is stepped down again from the distribution voltage to the required service voltage(s).

7. . IMPACT MITIGATION MEASURES

7.1 Introduction

This chapter focuses on measures that can be incorporated into the design, and taken during the improvement works and operation stages of the project in order to mitigate the negative environmental impacts and enhance the positive ones described in chapter 6.

7.2 MITIGATION MEASURES: BIOPHYSICAL ENVIRONMENT

7.2.1 Terrestrial Habitat Alteration

7.2.1.1 Construction

- Re-vegetation of disturbed areas with native plant species;
- Use human labour as opposed to heavy machinery to avoid herbaceous layer destruction and exposure of the soil to wind and water erosion
- Undertake selective clearance by removing tall woody species leaving saplings, for quick regeneration of vegetation along the way-leave
- Give the community priority on use of the removed vegetation for wood-fuel, construction or any other purpose.

7.2.1.2 Operation and Maintenance

- Implementation of an integrated vegetation management approach. The selective removal of tall growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in transmission line rights-of-way;
- Avoiding clearing in riparian areas;
- Vegetation management should not eradicate all vegetation; excessive vegetation maintenance may remove unnecessary amounts of vegetation resulting in the continual replacement of succession species and an increased likelihood of the establishment of invasive specie

7.2.2 Aquatic Habitat Alteration

7.2.2.1 Construction

- Minimizing clearing and disruption to riparian vegetation.

7.2.2.2 Wildlife (Power line-associated Avifauna Mortalities)

The following mitigation measures address the issues on avifauna electrocution and collision along the proposed power line.

- To minimize collision, undertake wire-marking to alert birds to the presence of power line, allowing them time to avoid the collision.
- Build raptors platforms on top of pylons for roosting and nesting
- Undertake monitoring data on avifauna electrocuted along the proposed transmission line (responsible agencies KWS, NMK, Nature Kenya, NGO's, CBO's,)

7.2.3 Soil

7.2.3.1 Construction

- Soils excavated for the erection of pylons should be used for re-filling and should not be left exposed to wind or water for long periods
- The contractor should avoid steep terrain during the transportation of construction material by using alternative routes or use light vehicles where appropriate
- Riverine vegetation should be minimally disturbed during the construction phase to reduce soil erosion and safeguard riverbank protection
- Re-plant degraded areas with local species common in the area to complement natural vegetation regeneration to improve ground cover.

7.2.4 Air Pollution

7.2.4.1 Construction

- Regular maintenance of construction vehicles, plant and equipment to reduce emissions
- Control speed of construction vehicles to minimize generation of dust on access roads
- Prohibit idling of vehicles on site to reduce emissions.

7.2.5 Solid Waste

7.2.5.1 Construction

- The project engineer should ensure that the contractor disposes any remaining solid wastes such as metals, paper, plastics, etc. away from the site to an approved disposal site.

7.2.6 Hazardous Substances

7.2.6.1 Construction

- Use of designated areas for repair and maintenance of vehicles (e.g. local licensed garages) and powered machinery to avoid fuel and lubricant spills at the construction site.

7.2.7 Fire Risk

7.2.7.1 Operations

- Carry out routine thinning, slashing, and other maintenance activities, within and adjacent to Rights-of-way in order to minimize the risk of fire.

7.3 MITIGATION MEASURES: HEALTH AND SAFETY

7.3.1 Noise

7.3.1.1 Construction and Operation

- Noise reduction technologies - silencers/mufflers and provision of hearing protection devices for workers using equipment such as power saws (for vegetation clearing) and compressors.
- Strict observance of the established way leaves or right of way.

7.3.2 Maintenance of Power Line Rights-of-way

7.3.2.1 Construction and Operation

- Workers engaged in the clearing of vegetation should be provided with PPE (e.g. gloves, boots, dust masks) to protect against injuries and infections.

7.3.3 Electrocution from Live Power Lines

7.3.3.1 Operation

- A maintenance system must be put into place to ensure the physical integrity of structures is maintained lest they give in to vagaries of weather and other physical factors.
- Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines;
- Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards.
- Workers should not approach an exposed energized or conductive part even if properly trained unless: the worker is properly insulated from the energized part with gloves or other approved insulation; or energized part is properly insulated from the worker and any other conductive object; or, the worker is properly isolated and insulated from any other conductive object (live line work).
- Ensuring that all electrical safety precautions are adhered to and a tier system of authorization to handle or access energized parts will mitigate against accidental electrocution.

7.3.4 Falls from Height

7.3.4.1 Construction and Operation

- Testing structures for integrity prior to undertaking work;
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures;
- Inspection, maintenance, and replacement of fall protection equipment;
- Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity). The fall protection system should be appropriate for the tower structure and necessary movements, including ascent, descent, and moving from point to point;
- Installation of fixtures on tower components to facilitate the use of fall protection systems;

- Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be compatible with the tower components to which they are attached;
- Hoisting equipment should be properly rated and maintained and hoist operators properly trained;
- Safety belts should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident;
- When operating power tools at height, workers should use a second (backup) safety strap;
- An approved tool bag should be used for raising or lowering tools or materials to workers on structures

7.3.5 Physical Hazards

7.3.5.1 Construction and Operation

- Appropriate hand and foot protection (PPE) during the manual clearing of vegetation
- Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity
- Training of workers on how to identify dangerous vibrations of the compressor

7.4 MITIGATION MEASURES: SOCIO-CULTURAL

7.4.1 Visual Impact

7.4.1.1 Operation

- To mitigate the visual impact of power distribution projects, the following mitigation measures should be implemented:
- Extensive public consultation during the planning of power line and power line right-of-way locations;
- Location of high-voltage transmission and distribution lines in less populated areas, where possible.

7.4.2 Spread of Disease

7.4.2.1 Construction

- Provide counseling and testing for HIV/AIDS to incoming construction personnel
- Strengthen advocacy through awareness training in HIV/AIDS and other STDs; encourage the use of preventive measures like condoms
- Avail condom dispensers to construction staff.

7.4.3 Land Acquisition and Involuntary Resettlement

7.4.3.1 Construction and Operation

Loss of land and crops will be compensated; the Commissioner for Lands determines the amount of compensation to be paid for private land. A Resettlement Action Plan (RAP) study has been commissioned for the proposed project. The RAP has been carried out in accordance with the legal framework of the Government of Kenya, and in line with the requirements of the World Bank's OP 4.12 (Involuntary Resettlement) and the IFC Performance Standard 5 on Land Acquisition and Involuntary Resettlement as required. Surveys are being conducted to establish which properties (land and buildings) lie within the zone affected by the proposed project. The exact number of PAPs affected and the types of properties affected will be determined. In addition, potential sites for the relocation of the PAPs will be identified, and an estimation of the total cost for the RAP obtained. The resettlement plan or resettlement policy framework shall include measures to ensure that the displaced persons are:

- Informed about their options and rights pertaining to resettlement;
- Consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and
- Provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project.

8. ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site, technology scale and route options.

8.1 Relocation Option

Relocation option to a different site is an option available for the project implementation. At present the developer does not have an alternative site. This means that he has to Design another line. Designing another route map of the proposed line will take time and money to do baseline survey.

The developer will spend another two years on design and approvals since design and planning has to be according to site conditions. Project design and planning before the stage of implementation will cost the developer millions of Kenya shillings. Whatever has been done and paid to date will be counted as a loss to the developer. Assuming the project will be given a positive response by the relevant authorities including NEMA, this project would have been delayed for about two (2) years period before implementation. This is a delay that our economy can ill afford. This would also lead to a situation like No Project Alternative option.

8.2 No Project Option

The *No Project option* in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the proponent, government and the society as a whole. The *No Project Option* is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- There will be no added values to the reference plot.
- There will be no added value to other establishments in the neighbourhood.
- The proponent will not benefit from the revenue expected from the facility.
- The government kitty will not benefit from the revenue to be earned due to the establishment of the proposed project.

- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain under utilized.
- Reduced interaction both at local, national and international levels.
- No employment opportunities will be created for thousands of Kenyans who will work in the project
- Increased urban and rural poverty and crime in Kenya.
- Discouragement for investors to produce this level of affordable facility to the public.
- Development of infrastructural facilities (roads, electrical etc. will not be undertaken).

From the analysis above, it becomes apparent that the *No Project Option* is no alternative to the proponent, local people, Kenyans, and the government of Kenya.

8.3 The Proposed Development Option

Under the *Proposed Development Option*, the developer of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed development of the Project, provided all environmental measures are complied with during the construction period and operational phases. This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

8.4 Analysis of Alternative Construction Materials and Technology

The proposed transmission line development will be constructed using modern, locally and internationally accepted materials to achieve public health, Occupational health and safety and environmental aesthetic requirements. The steel structures will be bought from local companies that have been approved by the proponent and that meet the Kenya Bureau of Standards requirements.

8.5 Alternative route for the transmission line

8.5.1 Kabarnet

For the line to avoid Kabarnet areas that has highly densely populated settlements in Kaprogonya, Mumol primary school, Kituro health centre and Business premises the transmission line should pass through Kinyo Forest, through Kapkut village in the valley then join the current station at Kaptibor.

8.5.2 Small town

The line to avoid passing through Small town centre where there are shops and also to avoid Senetwo primary school. The line should be redesigned to pass through the farm given that the people in the area have big chunks of land.

9. ENVIRONMENTAL & SOCIAL MANAGEMENT AND MONITORING

9.1 Environmental and social management

Following the desk studies, field investigations and public consultations undertaken in this study, an Environmental and Social Management Plan (ESMP) has subsequently been developed. The ESMP provides a general outlay of the environmental and social aspects, potential impacts, mitigation measures, performance indicators, monitoring means and frequency, responsibility for monitoring and associated [estimate] costs.

The responsibility for the incorporation of mitigation measures for the project implementation lies with the Supervising Engineer, who must ensure that the Contractor implements all specified mitigation measures. In order for the Contractor to carry out environmental management activities during construction, the Contractor should draw up an environmental management plan of his own to show how he will address the mitigation measures during the construction period. The Supervising Engineer is responsible for assessing the Contractor's environmental management plan.

9.2 Monitoring Environmental and Social Performance

Monitoring is a long-term process, which should begin the start of construction of the Transmission Line and should continue throughout the life of the project. Its purpose is to establish benchmarks so that the nature and magnitude of anticipated environmental and social impacts can be continually assessed. Monitoring involves the continuous or periodic review of construction, operation and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted.

Simple monitoring systems should be set up during construction by the Supervising Engineer and Contractor and during operation by the Proponent, so that potentially environmentally problematic areas can be detected well in advance and the

appropriate remedial action taken. This could simply be a checklist of items that need to be inspected as a matter of routine, or periodically, depending on the nature of the aspect. The types of parameters that can be monitored may include mitigation measures or design features, or actual impacts. In some cases, monitoring is fairly straightforward and can be done as part of routine or periodic maintenance. However, other parameters, particularly those related to socio-economic and ecological issues can only be effectively assessed over a more prolonged period of say 3 to 5 years.

The tables below overleaf summarize the ESMP for the proposed project. It describes parameters that can be monitored, and suggests how monitoring should be done, how frequently, and who should be responsible for monitoring and action.

9.3 Project design and Construction

The necessary objectives, activities, mitigation measures and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the project equipment installation and operational phases are outlined in table below

Table 9: Environmental management plan for the Construction Phase

Potential Impact	Proposed Mitigation	Monitoring Means and frequency	Responsibility for Monitoring	Performance Indicator	Cost (Ksh)
Terrestrial Habitat Alteration	• Re-vegetation of disturbed areas with native plant species; • Undertake selective clearance by removing tall woody species leaving saplings, for quick regeneration of vegetation along the way-leave	Routine inspection	Supervising Engineer and Contractor	Re-vegetation of disturbed areas	Re vegetation approx. 100 per sq m.
Aquatic habitat alteration	• Minimizing clearing and disruption to riparian vegetation.	Inspection, routine	Design Engineer and Contractor	-Siltation of soil in rivers from construction activities. -Physical water quality	Routine Inspection Internal cost
Power line related avifauna mortalities	• To minimize collision, undertake wire-marking to alert birds to the presence of power line, allowing them time to avoid the collision. • Build raptors platforms on top of	Inspection	Design Engineer, Supervising Engineer	Physical structures	Wire markers @ 5000 Platforms @ 5000

	pylons for roosting and nesting				
Soil erosion	• Soils excavated for the erection of towers should be used for re-filling and should not be left exposed to wind or water for long periods • The contractor should avoid steep terrain during the transportation of construction material by using alternative routes or use light vehicles where appropriate • Riverine vegetation should be minimally disturbed during the construction phase to reduce soil erosion and safeguard riverbank protection • Re-plant degraded areas with local species common in the area to complement natural vegetation regeneration to improve ground cover.	Inspection Routine Maintenance	Contractor Supervising engineer	Status of ground cover in constructed areas	Re-vegetation approx. 100/- per sq m.
Air Pollution (dust, fuel emissions)	• Control speed of construction vehicles • Prohibit idling of vehicles Water should be sprayed during the construction phase on excavated areas • Regular maintenance of plant	Daily inspection	Design Engineer, Supervising Engineer and Contractor	visible particulate matter in the air Increase in upper respiratory	Respiratory protection devices @ 600-200 Vehicle service

	and equipment. • Provision of dust masks for use when working in dusty conditions			tract ailments Number and status of PPE Vehicle service tags	@ 3,000-10,000
Water Pollution	• Maintenance of construction vehicles should be carried out in the Contractor's camp.	Routine inspection, Maintenance records	Supervising Engineer and Contractor	Water quality	Routine inspection - Internal cost
Management of Solid Waste	• Contractor must dispose solid wastes away from the site to an approved disposal site.	Routine Maintenance	Contractor, Supervising Engineer	Nil visible solid waste heaps on site	Routine maintenance - Internal cost
Management of Hazardous substances	• Use of designated areas for repair and maintenance of machinery e.g. garages to avoid fuels and lubricant spills at the camp-site.	Routine Maintenance,	Contractor, Supervising Engineer	Records	Not estimated depends on vehicle service and repair requirements
Risk of fire	• Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire fighting access.	Routine maintenance	Contractor, Supervising Engineer	Records	Routine maintenance - Internal cost
Electrocution	• A maintenance system to ensure	Inspection	Supervising	Medical	PPE @ 5,000

from Live Power Lines	physical integrity of structures is maintained • Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines; • Ensuring that live-wire work is conducted by trained • Workers should not approach an exposed energized or conductive part even if properly trained unless the worker is : - properly insulated from the energized part with gloves or other approved, insulation; the energized part is properly insulated from the worker and any other conductive object; the worker is properly isolated and insulated from any other conductive object (live-line work).		Engineer Contractor	Records	Training of staff @15,0000
Working at heights	• Testing structures for integrity prior to undertaking work; • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures;	Routine Maintenance Inspection Records	Supervising Engineer Contractor	Medical Records Test records Training records	Climbing equipment @ 25,000 Initial integrity tests 10,000 Training of

	• Inspection, maintenance, and replacement of fall protection equipment; • Installation of fixtures on tower components to facilitate fall protection systems; • An approved tool bag should be used for raising or lowering tools or materials to workers on structures • Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects.				staff @ 15,000
Spread of Diseases	• Education, guidance and counseling on HIV/AIDS and other STDs – construction staff • Avail condoms to construction staff	Routine examination Records	Contractor Supervising Engineer OHS Manager	Medical Records	screening approx. 1000 Education – approx. 2,000 per person per session Condoms @10/-
Land acquisition and Resettlement	Ensure that the displaced persons are: • Informed about their options and rights pertaining to resettlement;	Consultations Records Inspection Meetings	KPLC GoK	Relocation Compensation for loss Compliance with	Approx. 66 M for 1,661 acres of land

	• Consulted on, offered choices among, and provided with alternatives; • Provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project. • Offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; • Provided with development assistance in addition to compensation measures;			OP 4.12	
Visual impact	• Extensive public consultation during the planning of power line and power line right-of-way locations;	Public Consultation	Environmental and Social Manager	Complaints	No associated costs

Table 10: Operations and Maintenance Phase

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Performance indicator	Cost (KSh)
Terrestrial habitat alteration	• The selective removal of tall-growing tree species and the encouragement of low growing grasses and shrubs in transmission line rights-of-way. • Removal of alien invasive plant species, • Cultivating native plant species; • Avoiding clearing in riparian areas; • Vegetation management should not eradicate all vegetation	Annual auditing	Environmental Manager	Vegetation cover	Audit cost approx. 100,000
Risk of Fire	• Controlled burning of vegetation in transmission line rights-of-way should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored	Routine maintenance	Maintenance Engineer	Records	Routine maintenance Internal cost
Electrocution from Live Power Lines	• Workers should not approach an exposed energized or conductive part even if properly trained unless	Routine Maintenance Records	Maintenance Engineer OHS Manager	Medical Records	PPE @ 5,000 Training – internal cost

	the worker is properly insulated from the energized part with gloves or other approved insulation; the energized part is properly insulated from the worker and any other conductive object; the worker is properly isolated and insulated from any other conductive object (live-line work).				
Working at heights	• Testing structures for integrity prior to undertaking work; • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; • Inspection, maintenance, and replacement of fall protection equipment; • Installation of fixtures on tower components to facilitate fall protection systems; • An approved tool bag should be used for raising or lowering tools or materials to workers on structures • Use of helmets and other protective devices will mitigate against scratches, bruises,	Routine Maintenance Inspection Records	Supervising Engineer Contractor Maintenance Engineer OHS Manager	Medical Records Test records Training records	Climbing equipment @ 25,000 Initial integrity tests 10,000 Training of staff @ 15,000

	punctures, lacerations and head injuries due to dropping objects. • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; • Inspection, maintenance, and replacement of fall protection equipment; • Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects.				
Rights of Way Maintenance	• Provision of appropriate PPE to the workers clearing the way leave (vegetation clearing activities which will involve use of machetes and/or power saws)	Routine Maintenance Inspection Records	Supervising Engineer Contractor Maintenance Engineer OHS Manager	Records	PPE: Gloves @ 500; Noise protection @ 50; Dust masks @ 20

Table 11: Decommissioning Phase

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Performance indicator	Cost (KSh)
Noise					
Vehicular	Control of speed	Random checks	Supervising Engineer	Number of Public complaints	Nil
Compressor	Provision of hearing protection devices	Regular inspection	Supervising Engineer	Number of Public complaints	Nil
Physical Hazards					
Physical Hazards	adopting ergonomic work flow designs that tend to fit the physical tasks to the workers and not vice-versa while maintaining a balance with expected productivity	Regular inspection and redesign of work flow	Supervising Engineer	Number of ergonomic-related complaints	Nil

AIR POLLUTION					
Cement Dust	Provide appropriate hand, respiratory and body protective devices	Periodic inventory of personal protective equipment	Supervising Engineer	Number and status of existing PPE	@600 – 200 each for the hand, respiratory and body protection devices for each worker
Vehicular	Proper service of project vehicles	Service schedules e.g. every 5,000 km for off-road vehicles and every 3,000 km for truck	Supervising Engineer	Sevice tags	@ 5,000 and 10,000 for offroad vehicles and trucks respectively

9.4 Decommissioning Phase

The decommissioning phase also known as the "deconstruction," is part of the (eventual/ultimate) reversal phase, which has the additional and often dominant risk factors associated with the materials processed/produced during the life of the project (e.g., toxic and/or explosive chemicals, etc), as well as the potentially decreased structural integrity due to renovations and/or wear and tear.

Similar impacts encountered during the construction phase will be experienced in much the same way when the reverse process is set in motion. The table below gives an analysis of the decommissioning impacts expected in the proposed Lessos-Nanyuki 132 KV Transmission Line Project:

Table12: Impact Analysis – Decommissioning Phase

Aspect	Health And Safety Impact	Significance Level
Noise	Reduced hearing due to high noise from decommissioning activities – deconstruction such as vehicular noise and site remediation noises	Low
Air Pollutants	Acute/chronic respiratory disease caused by CO2, CO, NOx, and VOCs released by combustion engines during transportation and by obnoxious respirable particles released by speeding trucks during transportation of debris	Low
	Acute/chronic respiratory disease caused by pollutants (cement, caustics, isocyanates – lung sensitizers) released during deconstruction of storage facilities and disassembly of superstructures	Low
Water Pollutants	Public health problems as a result of consuming heavy metal contaminated drinking well water from oils, greases, hydrocarbons deposited on roads sides and leached into drinking water wells by rain water	Low
	Public health problems due to decommissioning activities that pollute potential drinking water wells	Low
Traffic	Traffic related mortality and morbidity from	Low

Accidents	transportation activities	
Physical Hazards	Injuries resulting from physical hazards such as slips, trips, and falls from a tall cabin, cabin ladder, or trailer; Injuries due to accidental bumping into unguarded rigid parts of truck or cargo; Injuries while performing field repair-work, tire change, unfastening tight bands and ropes, etc.)	Low
	Injuries resulting from physical hazards encountered by truck drivers such as chemical corrosion by dangerous chemicals such as transformer oil	Low
	Injuries resulting from physical hazards encountered by truck drivers such as explosion of over-inflated tires or car battery	Low
Ergonomic Hazards	Injuries due to poor ergonomic considerations such as pains in the low back and in the joints caused by prolonged driving; Over-exertion while moving or otherwise handling bulky and heavy loads/equipment; visual discomfort and eye problems caused by inadequate illumination and eyestrain; development of lumbago due to poor vehicle suspension/ uncomfortable seat, etc.	Low
Unstringing cables	Injuries/fatalities due to falls from height; puncture to the skin tissue and scratches	Low
Work at height	Injuries due to falls from height while maintaining power lines and base stations	Low

9.5 Capacity building and training

The effective implementation of the Environmental Management Plan of the project will require capacity and awareness building. While the Proponent must ensure that capacity and awareness building, mitigation measures and monitoring concerns are implemented, actual training activities should be the responsibility of the Supervising Engineer, who may have to commission external consultants to carry out the training component. This can be achieved by targeting specific groups for the necessary training.

Table 13: Target Groups

Target Group	Description
Group A	Transmission line (TL) Workers: This group consists of Engineers (Resident, Provincial, Project,) Contractors, Supervisors, Site Agents, Site Managers and the Environmental unit in KPLC. These are the top management staff concerned with the transmission line construction and maintenance.
Group B	TL Workers: Foremen, headmen, skilled and unskilled labourers.
Group C	Maintenance team: For this group of people, working on the TL is their core activity.
Group D	Project Affected People (PAP): area residents, farmers, pastoralists, people who have businesses that can potentially be affected by the TL, or they live close by the line route.

9.6 Training Objectives

Training will be based on modules aimed at:

- Developing awareness of the need to consider environmental issues during construction, operation and maintenance of the transmission line
- Creating awareness and understanding of the environmental legal framework pertaining to power transmission lines and energy
- Developing skills for identification and assessment of environmental, social, safety and health impacts of transmission line project
- Incorporation of mitigation measures at all stages of development
- Reviewing EIA reports and incorporating measures into decision making.

Arrangements for training in environmental awareness should be initiated as soon as possible. KPLC will either have to commission a consultant to carry out this training on site, at the Head Office, or personnel could undertake the environmental training and then in turn he/she trains other personnel.

The table below presents the recommended topic modules and costs for each of the four target groups necessary to implement the Environmental Management Plan.

Table 14: Topic Modules and Costs

Topic modules	Target Group	Estimated Cost per person, per unit (KShs)
• Understanding of legislation in Kenya, as relevant to the project • Understanding of the project cycle and how the EIA/incorporation of mitigation measures fits into the cycle • Develop awareness of the environmental implications of TL construction and maintenance activities and procedures for assessing them • Develop awareness and understanding of the human resource and institutional arrangements for pre-empting and managing environmental impacts • Importance of incorporating mitigation measures during planning and design and implementing an environmental monitoring programme • Impart skills on environmental monitoring and auditing during construction and maintenance • Need for gender balance during recruitment of labourers • Cultural aspects of target groups	Group A TL Workers	7,500
• General understanding of legislation in Kenya as relevant to the project • Sensitization on health (STDs including HIV/AIDS), littering, solid and liquid waste management • Types of environmental, social, occupational safety and health impacts that could be generated by these target groups • Cultural aspects of target groups	Group B / C TL Workers / Maintenance Team	5,500
• Brief overview of the project cycle • Understanding of EMCA 1999 and the EIA process • Legal implications of encroachment onto the TL reserve • Process for compensation and relocation/resettlement if necessary, (eligibility for compensation, compensation valuation and payment procedures; grievance redress mechanisms)	Group D PAP	2,500

10. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

10.1 Introduction

As a result of the ESIA scoping, potentially significant environmental and social impacts have been identified including the need for land acquisition and resettlement. It is our recommendation that these full ESIA and Resettlement Action Plan (RAP) were carried out according to NEMA and World Bank requirements.

10.2 General mitigation and intervention measures

10.2.1 General Conclusions

- The proposed project is expected to have impacts on various aspects of the environment as well as the socio-cultural/economic status of the project affected parties. These anticipated impacts are discussed in Chapter 5.
- Mitigation of potential impacts (environmental and social) as described in Chapter 6, and implementation of the ESMP presented in Chapter 7 of this report, will help to prevent or avert negative impacts, and enhance the positive outcomes of the project. This will help to achieve project sustainability.
- The responsibility for the incorporation of mitigation measures for the project implementation lies with the Supervising Engineer, who must ensure that the Contractor implements all specified mitigation measures.
- The World Bank's OP 4.12 on Involuntary Resettlement and Government of Kenya guidelines will be followed and used complementarily where applicable to avoid conflict.
- Community participation in planning and implementing resettlement will be encouraged;
- A Compensation and Resettlement Action Plan will be developed addressing land, housing, crops and other compensation to be provided to the adversely affected population.
- A monitoring and evaluation mechanism for resettlement activities will be carried out.

- Diligence on the part of the contractor and proper supervision by the Supervising Engineer during construction and the initial operation period is crucial for mitigating impacts. However all mitigation measures need to be specified in tender and contract documents, and must be included in the Engineering Drawings, Specifications and Bills of Quantities.

10.3 General Recommendations

Avoidance of negative environmental impacts should be the Proponent's priority. Impacts can be avoided completely by a "no-project" alternative, but it should be recognized that even existing transmission lines have impacts on their surrounding environment; these impacts can increase over time with economic growth and development, however their effect on the environment may be reduced by maintenance, rehabilitation, design and construction actions.

10.3.1 Mitigation

Mitigation is the lessening of negative environmental impacts through:

- Changes in the design, construction practices, maintenance, and operation of a project; and
- Additional actions taken to protect the biophysical and social environment, as well as individuals who have been impacted adversely by a project.

The extent and timing of mitigative actions should be based on the significance of the predicted impacts. Some aspects of impact mitigation can be incorporated into project design and can largely resolve the threat of impacts before construction commences.

However, many measures require an ongoing implementation plan to ensure that proposed actions are carried out at the correct times, that environmental measures such as planting and slope protection are maintained, and that prompt remedial actions are taken when the initial measures are not fully successful.

Some measures may not be the exclusive domain of the Proponent; Government departments, local authorities, neighbouring communities, businesses, non-

governmental organizations, and the legal system may all be involved in their design and implementation of these mitigation measures. Clear definition of responsibilities, funding, and reporting requirements can help to ensure the success of such measures.

10.3.2 Compliance Monitoring

During construction, all mitigative measures designed to reduce the impact of the construction activities should be monitored and enforced by the environmental monitoring authorities. This requires:

- Defining the proposed mitigative and compensatory measures;
- Specifying who is responsible for the monitoring activity;
- Including implementation of mitigative measures in contract specifications;
- Making environmental competence one of the selection criteria for contractors; and briefing, educating, and training contractors in environmental protection methods.

Compliance monitoring should not be confined to the right-of-way, but should cover all sites affected by the project, including disposal sites, materials treatment areas, access roads, and work camps.

10.3.3 Effects Monitoring (Evaluation)

After mitigative measures are implemented, effects monitoring or evaluation can test the validity of hypotheses formulated in the environmental impact study; they can also determine if the mitigative measures have achieved their expected results. Evaluation is necessary not only for individual projects, but also to advance methodology, assist in designing future studies, and through lessons learned - contribute to the relevance and cost-effectiveness of environmental protection measures. Responsibility for corrective action to be taken in the event of mitigation failure should be defined clearly within the Proponent's organization.

10.3.3.1 Monitoring Guidelines

Continuous observations and assessment is essential for identification of impacts unforeseen during the E&SIA of the project. To ensure success of the project

adequate consultation should be undertaken in the project area with the community members.

Monitoring parameters/indicators should be identified and programmes developed for their observation and action. When developing a monitoring programme the following should be considered:

- Frequency of monitoring
- Required personnel -Monitoring should be conducted by trained personnel
- Methods of record keeping
- Availability of calibrated and maintained equipments
- Existence of baseline information
- Data analysis and review

The environmental indicators to be monitored during the project phases namely the construction; operation and decommissioning include those listed in the table below. The monitoring parameters can be revised as the project development proceeds to enable incorporate and foreseen indicators.

Table 15: Monitoring Parameters

Environmental Indicator	Parameter to Monitor
Occupational Health and Safety	-Threshold limits Values -Biological Exposure Indices -Minimum safe working distance -Number of occupational diseases and accidents
Socio-Economic Environment	-Development Projects -Alcoholism -Mortality rate -Trend of infectious diseases for example: HIV/AIDS, STI's -Correlation between project team and local community
Air Quality	-Humming Noise -Ozone -Interference with radio telecommunication waves
Fire	-Right of way vegetation

	-Waste
Aquatic habitat Alteration	-Existence of vegetation -Water quality and quantity -Water Borne Diseases -Complaint from community members
Vegetation Cover	-Invasive vegetation -Vegetation rate of growth
Waste Management	-Existence of solid waste - Complaint from community members
Soil Erosion	-Gulley formation -Increased sediments - Complaint from community members
Resident Birds	-Presence of resident birds -Mortality rate -Existence of nesting sites

The list of the environmental parameters and their measurable indicators will guide the proponent access the effective level of the EMP and need to modify it for appropriate action.

10.3 Reporting

Constant reporting by the site contractor to the proponent is necessary to ensure the project is executed as per the plans. The safety officer/environment officer should always be available at the site to report any concerns for urgent mitigation. The officer should also ensure enforcement of Environment, Health and Safety requirements as per the relevant legislations. The contractor should always consult the project manager/engineer to maintain a clear understanding of all the project aspects and their mitigation measures.

11. ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

11.1 Introduction

This section presents the ESMP that will need to be implemented by KPLC to prevent or reduce significant negative impacts to acceptable levels. Environmental and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done.

ESMP is a vital output of an Environmental and Social Impact Assessment as it provides a checklist for project monitoring and evaluation. The ESMP outlined in the sections below has addressed the identified potential negative impacts and mitigation measures of the proposed KPLC transmission line, based on the Chapters of Environmental Impacts and Mitigation Measures of the expected Negative Impacts.

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13. ANNEXES

I. Interview questionnaire
II. List of Coordinates
III. Minutes of the public meetings
IV. Copies of notices for the public consultative meeting
V. Letter of Award

VI. Samples of filled Public questionnaires

i. Interview questionnaire

Africa Waste and Environment Management Centre
Nairobi Office:
Muthaiga Mini Market, Left Wing, 3rd Floor,
P.O. Box 63891-00619, NAIROBI
Tel : +254 20-2012408/ 0722-479061,
Email : awemac_ken@yahoo.com
Website : www.awemac.org

TITLE: ENVIRONMENTAL SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN FOR THE CONSTRUCTION OF 235 KM OF 132Kv CIRCUIT TRANSMISSION LINE
CLIENT/PROPONENT: KENYA POWER AND LIGHTING COMPANY (KPLC)
LINE: FROM NANYUKI-NYAHURURU/RUMURUTI-KABARNET-LESSOS.
QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/SURROUNDING ENTERPRISES AND ANY OTHER WOULD BE AFFECTED/INTERESTED PARTY

Our client and the proponent mentioned above is proposing to undertake the proposed Construction of 235 Km of 132kV Circuit Transmission line from Nanyuki-Nyahururu/Rumuruti-Kabarnet-Lessos. As a member of the local community/surrounding enterprises or an interested/ a would be affected party we request for your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of EMCA 1999 Section 58, on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

1). a) what is the distance between your house/enterprise/residence and the project site? (Tick where applicable)
(A). Less than 100 m (B). Between 100-500 m (C). Between 500-1000 m (D) over 1km

b) Do you think you or your enterprise(s) will be affected by the above proposed project?
( ) YES ( ) NO, If NO, go to question 5 below.

2). If YES, what positive socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?
……
……

3). what negative socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?
……
……

4). Make suggestions on the measures the developer needs to put in place during the construction and
operation stages?.....
……
……

5). What is your general opinion on the Project?
……

Name: …… Tel: ……
Signature: …….. Full address: ……

ii. List of Coordinates

LIST OF ADDITIONAL COORDINATES PICKED DURING THE ESIA STUDY FOR THE PROPOSED SINGLE CIRCUIT 132KV TRANSMISSION LINE-MARIGAT- NANYUKI ROUTE :(UTM SYSTEM FOR ZONE 37N0)

Points	Northing	Easting
YY1	005123	0168495
YY2	0050457	0168744
YY3	0048845	0168594
RRR3	0038256	0194092
RRR2	0038497	0193788
RRR1	0038148	0194328
RRR	0036408	0195988
RR9	0036041	0196268
RR8	00035155	0197408
RR7	0035688	0196642
RR6	0035892	0196453
RR5	00348980	0197367
RR4	0034616	0197516
RR3	0031747	0200288
RR2	0031431	0199981
RR1	0031351	0199919
NN3	0027203	211540
NN2	0033196	0211990
NN1	0028760	0225641
MM8	0027658	0226033
MM7	0027878	0226328
MM6	0027238	0226721
MM5	0022369	0232919
MM4	009650	0239369
MM3	0008961	0240751
MM1	008872	0240058
LLL	0010685	0264799
KKK	0010685	0265969
JJJ	0010021	0266355
CCC	003629	0272752
A9a	0003355	0283236
A8a	0002451	0283225
A7b/a	0002402	0283222
A18b	0006296	0282719

Points	Northing	Easting
A17b	0005272	0283183
A16b	0004587	0283556
A15b	0004413	0283682
A14b	0004345	0283481
A13b	0004419	0283749
A12b	0004224	0283849
A11b	0003879	0284085
A10b	0003879	0284085
A9b	0003845	0284071
A8b	0003256	0283668
A7b/a	0002402	0283222
A6	0001589	0253335
A5	0001828	0283310
A4	0001245	0283300
A3	0000704	0283252
A2	0000444	0283154
A1	9999834	0284888

Initial Coordinates for the proposed 132KV transmission line from Lessos-Nanyuki as per scoping report.

POINTS	NORTHING	EASTING
Nanyuki-Rumuruti-Marigat		
E	816140.752	53102.300
AA	9033.983	281560.284
BB	9358.869	275465.336
CC	9015.249	271775.652
DD	12524.147	261640.771
E	4529.961	283795.797
FF	9429.987	249590.228
GG	9394.424	242655.46
HH	11516.381	238283.305
H	21042.186	234401.216
JJ	26628.78	229283.701
KK	27960.063	224399.415
LL	28243.992	224076.282
MM	27215.298	221751.886
NN	27203.8703	211540.219

OO	29913.314	205835.832
PP	31423.694	203019.099
QQ	31462.705	201424.764
RR	40062.507	191807.889
SS	41716.609	191419.013
TT	42089.528	190764.71
UU	42667.364	190389.863
VV	44805.831	188963.722
WW	46004.476	186790.597
XX	46795.957	182059.672
YY	47013.56	168447.299
ZZ	51340.04	163128.402
Marigat-Kabarnet-Lessos section		
A	836480.362	47013.56
B	831161.465	51340.04
C	826418.26	52947.206
D	817947.424	52164.156
E	816140.752	53102.300
F	811890.794	52735.070
G	808513.405	53170.655
H	807348.837	53059.381
I	805333.529	53004.785
J	804283.173	53580.711
K	804208.207	54293.683
L	803200.21	54804.295
M	803034.334	54785.625
N	799108.099	51010.927
O	793629.317	49916.055
P	790010.026	49912.76
Q	787881.028	48891.441
R	785962.972	44157.191
S	781747.586	40803.897
T	777614.264	38385.606
U	773941.924	36470.662
V	767104.545	32544.331
W	756837.359	25383.244
X	755891.594	24317.339

iii. Minutes of the public meetings

MINUTES OF PUBLIC MEETING FOR THE PROPOSED KENYA POWER AND LIGHTING COMPANY (KPLC) PROJECT HELD AT TULWET SHOPPING CENTRE ON 17TH DECEMBER, 2009

AGENDER

1. Construction of 235km of 132Kv circuit transmission line from Lessos-Kabarnet-Nyahururu/Rumuruti-Nanyuki.
2. A.O.B

Preliminaries

The meeting began at 11:40am, chaired by the consultant, Dr. Kapiyo. A prayer was given by one of the community member (Mrs.Veronicah Tarus), after which everyone in the meeting introduced themselves and the consultants (Mr.Theobald Luchidio and Mr. Andala David) explained the purpose of the meeting for the further discussions and to get the view of the residents for their advice.

Min 01/12/2009: Project Description

The consultant Dr. Kapiyo gave a comprehensive project description; he explained what are to be affected with the project. Things to be affected are such as: housings, trees, land among other things. He also explained the purpose of the project to be done and thereafter being submitted to KPLC for review and compensation before the project commences. The consultant stated on the resettlement procedures.

Min 02/12/2009: Public Concerns

The views of the public were as follows:

- **Notice to Vacate**

  The attendants asked when and how long the project would take since they have small parcels of lands and would like to continue using their land. The consultant advised on procedure of acquisition of the wayleave.

- **Resettlement**

  An attendant asked of a case where the wayleave takes all of his land then forced to move to another area, then what will happen to their developments like boreholes, latrines, trees and houses among others.

- **Compensation**

The attendants requested for the payments to be done according to the prevailing rates in the market. The consultants advised on proper compensation of their properties as long as there is proper agreement after the valuation is done before the construction and the operation of the power line.

- **Construction of 132KV Transmission power line**

The attendants asked for the expected impacts of the project, where the consultants explained the types of impacts to expect and they also asked for the employment of their youths in the same project during construction.

- **Operation of the power line**

The consultant told the attendants to continue using their lands so long as on the wire line passes over.

Min 03/12/2009: Project Alternatives

The attendants had no objection of the power line passing on their lands so long as they would be paid faithfully.

Min 04/12/2009: A.O.B

The attendants requested for another meeting since the land involves community and therefore required further consultation.

The sub-chief also asked for a further study for Kapserton since there are many settlements in that area.

The attendants asked for the cultural issues to be clearly addressed in the report i.e. issues such as the line affecting the house of the mother and is forced to move to another place living behind the rest of the family like sons who already have built on the same land.

Conclusion

The local community in attendance had no objection of the proposed project since it is a government project and source of development of the country.

Adjournment

There being no other business for discussion, the meeting was adjourned at 1:00pm with a closing prayer from one of the attendants Mrs. Veronica Tarus.

SECRETARY
Name: Andala David Sign: …… Date: ……

CONSULTANT
Name: Dr. Kapiyo O. Sign: …… Date: ……

CONFIRMED BY
Name: Prof. Jacob Kibwage Sign: …… Date: ……

N/B: A copy of attendance list for the meeting is attached to these minutes.

MINUTES OF PUBLIC MEETING FOR THE PROPOSED KENYA POWER AND LIGHTING COMPANY (KPLC) PROJECT HELD AT SMALL TOWN CENTRE ON 17TH DECEMBER, 2009

AGENDER

3. Construction of 235km of 132Kv circuit transmission line from Lessos-Kabarnet-Nyahururu/Rumuruti-Nanyuki.
4. A.O.B

Preliminaries

The meeting began at 2:40pm, chaired by the consultant, Dr. Kapiyo. A prayer was given by one of the community member (Mr. Shadrack Cheum), after which everyone in the meeting introduced themselves and the consultants (Mr.Theobald Luchidio and Mr. Andala David) explained the purpose of the meeting for the further discussions and to get the view of the residents for their advice.

Min 01/12/2009: Project Description

The consultant Dr. Kapiyo gave a comprehensive project description; he explained what are to be affected with the project. Things to be affected are such as: housings, trees, land among other things. He also explained the purpose of the project to be done and thereafter being submitted to KPLC for review and compensation before the project commences. The consultant stated on the resettlement procedures.

Min 02/12/2009: Public Concerns

The views of the public were as follows:

- **Notice to Vacate**

  The attendants asked when and how long the project would take since they have small parcels of lands and would like to continue using their land. The consultant advised on procedure of acquisition of the way leave.

- **Resettlement**

  An attendant asked of how they would be settled by the proponent, and the consultant explained on the laid down procedures on how they would be effectively be resettled after compensation.

- **Compensation**

  An attendant asked whether it's we who are to pay for the compensation of the land and the properties or is it the proponent to pay for the compensation.

The consultant then clearly advised on our duties as environmental consultants.
There was a request by the attendants if they could have a cross valuation for their properties i.e. by their own valuer, government valuer, and KPLC valuer.
There was concern on the compensation issues and requested if it could be done according to the current market value.
The consultant advised them on the importance of the power line coming from Lessos to Nanyuki.

- **Construction of 132KV Transmission power line**

The attendants requested if the line can be diverted to another area since the power line was proposed to pass directly over there already developed shopping centre and the cost for development is more expensive than the cost of land. Then the consultants explained that we are working on the proposed line to give the KPLC engineers the views of the community affected and the picture on how the rout is like so that they can come up with a proper rout for the line.

- **Operation of the power line**

One of the attendants asked for the anticipated impacts of the power line, especially the effects of the radiation of the power line, but Dr. Kapiyo explained that the effects of the radiation had already been taken care of by the scientists by the use of earth wire lines.

Min 03/12/2009: Project Alternatives

The attendants especially those with business premises requested for the diversion of the line to another area since it passes over their business premises and the anticipated income for their businesses will affect many people in their families for along time about one to two years during the project acquisition and construction, and if so then there should be a proper way of compensating them.

Min 04/12/2009: A.O.B

The attendants first congratulated the team for creating awareness for the incoming project of KPLC line. Members also asked how the community would benefit from the proposed power line passing on their centre if not their area, which the consultant clearly explained on the expected benefits.
Members requested KPLC to participate in improving public utilities/amenities in their area, e.g. health centres, water facilities among others.

Members requested KPLC to improve on the sceneries they have in their area, places such as view points to the Kerio valley for the purpose of foreign and local tourist attraction point which would further benefit the community as a whole. Though Dr. Kapiyo told them to form groups with leaders who would give out their views to the KPLC which is the project proponent.
The local chief of the area was very grateful of the power line passing over their land, but requested for fair compensation from the company for the people and their properties.

Conclusion

The local community in attendance had no objection of the proposed project since it is a government project and source of development of the country.

Adjournment

There being no other business for discussion, the meeting was adjourned at 4:20pm with a closing prayer from one of the attendants Mr. Shadrack Cheum.

SECRETARY
Name: Andala David Sign: …… Date: …….

CONSULTANT
Name: Dr. Kapiyo O. Sign: …… Date: …….

CONFIRMED BY
Name: Prof. Jacob Kibwage Sign: …… Date: …….

N/B: A copy of attendance list for the meeting is attached to these minutes.

PUBLIC CONSULTATIVE MEETING
ON THE PROPOSED CONSTRUCTION OF 235 KM OF 132KV CIRCUIT TRANSMISSION LINE:
FROM LESSOS-KABARNET-NYAHURURU/RUMURUTI -NANYUKI.

CLIENT/PROPONENT: KENYA POWER AND LIGHTING COMPANY (KPLC)

ENVIRONMENTAL CONSULTANT

Africa Waste and Environment Management Centre,
Muthaiga Mini Market Complex,
Left Wing 3rd floor,
P.O. Box 63891-00619,
MUTHAIGA - NAIROBI
Tel 020 2012408 ***Email: awemac_ken@ yahoo.com*** ***Website: www.awemac.org***
NEMA Reg. No. 0527

LIST OF ATTENDANCE FOR THE MEETING HELD AT THE SITE DATE…… OF DECEMBER 2009 TIME:..2.30 pm VENUE….Small Market

NAMES	RESIDENCE	OCCUPATION	SIGNATURE
DAVID KIPTOO	CHEROTA SUB-LOC.	FARMER	
CAROLINE KIBET	FLAX	FARMER	
Sally J. Kimereng	CHEPKORIO Sub-	FARMER	Kimereng
ZIPORAH JEPKETOR	HOMIFER	FARMER	Ziporah
WILSON KIP...			
MUSA KIPLAGAT	CHEPKORIO	FARMER	
AMON KIPKORIR	CHEPKORIO	farmer	
MUSA BARTILOL	C	farmer	
SIMION KAMWORER	C	"	
JOSEPH CHEMWORI		"	
JOHN KIPLAGAT		"	
Grace Kimelo	Chepkorio C	T. Merchant	
HILLARY KIPKURUI	Chepkorio	T. Merchant	
DANIEL NGETICH	FLAX (SENETWO)	B. MAN	
Kedi Chemosyet	Chepkorio	B. man	
Julius Kiplagat	Chepkorio	B/man	
Luka Kiplagat	"	B/man	
Joel K. Seron	Chepkorio	Farmer	
Gerald KIPTARUS	Chepkorio	Farmer	
Samson Chepkwony	Chepkorio	B. man.	
Shadrack Cheruiyot	[illegible]	mkulima	
Joel Kamworor	Chepkorio	"	
Joseph Chelimo	Small Town	B/man	
PETER K MAINA	SMALL TOWN	B/man	
Nelly J. ...	Small Town	B/lady	
David K. Maina	Kaptebagi	Farmer	
SAMSON KIPLAGAT	Small	B man	
SHADRACK KIPROP	cherota sub-lo	farmer	

AGENDA

1. Public participation in KPLC Lessos-Nanyuki Transmission line
2. AOB

CONFIRMED BY:

NAME…Andala David…… SIGNATURE…………… DATE…17/12/2009

PUBLIC CONSULTATIVE MEETING

ON THE PROPOSED CONSTRUCTION OF 235 KM OF 132KV CIRCUIT TRANSMISSION LINE: FROM LESSOS-KABARNET-NYAHURURU/RUMURUTI -NANYUKI.

CLIENT/PROPONENT: KENYA POWER AND LIGHTING COMPANY (KPLC)

ENVIRONMENTAL CONSULTANT
Africa Waste and Environment Management Centre,
Muthaiga Mini Market Complex,
Left Wing 3rd floor,
P.O. Box 63891-00619,
MUTHAIGA - NAIROBI
Tel 020 2012408 ***Email: awemac_ken@ yahoo.com*** ***Website: www.awemac.org***
NEMA Reg. No. 0527

LIST OF ATTENDANCE FOR THE MEETING HELD AT THE SITE DATE...... OF DECEMBER 2009 TIME: 2:30 pm **VENUE.....** Small Farm

NAMES	RESIDENCE	OCCUPATION	SIGNATURE
Philip Kimetto	Chepkorio	Farmer	[signature]
M.K. MAINA	CHEPKORIO.	Farmer	[signature]
Francis K. Lachei	Chepkorio	Farmer	[signature]
WILLIAM K. KIMARU	CHEPKORIO	A/CHIEF - CHEPKORIO	[signature]
WILLIAM KAMAR	CHEPKORIO	FARMER/TECHNICIAN	[signature]
NELSON B. KIPSABIT.	MARICHOR LOCATION	CHIEF	[signature]

AGENDA

1. Public participation in KPLC Lessos-Nanyuki Transmission line
2. AOB

CONFIRMED BY:

NAME Andala David SIGNATURE [signature] DATE 17/12/2009

MINUTES OF PUBLIC MEETING ON PROPOSED 235KM TRANSMISSION LINE 132KV LESSOS-KABARNET-NYAHURURU-NANYUKI, HELD ON 18H DECEMBER 2009 AT THE D.Os OFFICE,MOCHONGOI DIVISION,MARIGAT DISTRICT

AGENDA

1. Introduction and brief remarks by the chair
2. Project Description brief by the project team leader
3. Proposed project impacts
4. Affected persons views and comments
5. Recommendations
6. A.O.B

Preliminary

The meeting was called to order at 10.20a.m, chaired by the area-acting chief, Mr. Stephen Lobeles on behalf of the D.O and flanked by the administration police inspector After this the opening prayers were said by a pastor in attendance The chairperson asked everyone in attendance to introduce himself or herself starting with the team leader. Most of those identified as Project Affected Persons (PAPS) were present or had sent their representatives. At least fifteen people attended

Min 1/09/09: Opening Remarks

The chair of the meeting cautioned about the security of the area due to it being a border area of several communities and traversing across two districts, and congratulated the team for calling upon the office on arrival at the area. He then invited the team leader to give a brief project description. The team leader gave a brief overview of the whole project in its detail and components including the background to the whole programme in which this particular project falls under. He explained that the need for Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) as stipulated in the National laws; and the World Bank guidelines regarding such projects; and stressed the need for this public consultative and hence participation He also stated that the purpose of the meeting was to create awareness of the proposed project, to

obtain views/concerns of the stakeholders, and to clarify issues that are not clear about the project

Min 2/09/09: Proposed project impacts

The project team leader went through the motions of the impacts that are expected from the setting up of such a project and not excluding; the requirement for right of way in the way leaves required that would lead to displacement hence the need for compensation of those affected by the way leave. The team leader then explained to detail the criteria, means, and standards to be used in effecting the ESIA and RAP and these were evident. He also assured them that all safeguard in terms of developed versus undeveloped plot. Alternatives to the proposed route were also deliberated as this was seen to ameliorate the anticipated impacts.

Min 3/09/09: Issues Raised

The team leader and chair invited the members to give their views regarding the project as they wished, and the following concerns were raised:

- **Access to electricity**

Most of those present at the meeting were of the opinion that they have never benefited from earlier electricity projects and therefore were wary that these would not benefit them as well but the team leader explained the smaller distribution line projects were not of equal importance and impact as the big transmission line project. They were therefore of the conclusion that the project will benefit the nation and in return other users and the future generations due to its nature and magnitude as the benefits of the commodity to be transmitted were varied and necessary.

- **Cost of electricity**

Some members' present and especially affected persons were of the opinion that despite the initial loss of property, they would also benefit from the lowered cost of electricity in the long run as most had also applied for the same commodity

- **Employment opportunities**

Those present at the meeting were aware of the benefits that would be directly befall them once the project took off, as there were many youths in the area who were unemployed. Hence, their access to non-technical jobs will benefit the youths and the communities at large.

- **Community involvement**

Most of those present decried the sorry state of the forests in the area and used this forum to appeal to the administration, project owners and other stakeholders to be involved at all stages of the project. In response, the team leader explained that the proposed line project would take all considerations so as not only to be economically viable, but also environmentally sound, and socially acceptable.

- **Census results**

Some of those present were not convinced that the list of those affected as exhaustive but were assured by the team leader that the ESIA and RAP process as continuous and further consultations would continue at all levels of the project lifecycle. They were also assured that the compensation would be guided and determined by national and World Bank standards.

Min 04/09/09: Recommendations and conclusions

Transparency in valuation and determination was seen as an issue that needed to be addressed by the proponent before negotiations commence, to remove the feeling that some people have been shortchanged.

Min 05/09/09: A.O.B

All present were supportive of the project and having being assured that their concerns would be taken into account.

Adjournment

There being no other business for discussion the meeting was adjourned at 12.09 p.m with closing prayers said by the pastor.

SECRETARY

NAME: Dominic Munyao SIGN……

DATE……

CONSULTANT

NAME: Prof Jacob Kibwage SIGN:……..
DATE……

Confirmed by:

NAME…… SIGN……
DATE……

NB/ A copy of attendance list for this meeting is attached to these minutes.

PUBLIC CONSULTATIVE MEETING
ON THE PROPOSED CONSTRUCTION OF 235 KM OF 132KV CIRCUIT TRANSMISSION LINE: FROM LESSOS-KABARNET-NYAHURURU/RUMURUTI -NANYUKI.

CLIENT/PROPONENT: KENYA POWER AND LIGHTING COMPANY (KPLC)

ENVIRONMENTAL CONSULTANT

Africa Waste and Environment Management Centre,
Muthaiga Mini Market Complex,
Left Wing 3rd floor,
P.O. Box 63891-00619,
MUTHAIGA - NAIROBI
Tel 020 2012408 ***Email: awemac_ken@ yahoo.com*** ***Website: www.awemac.org***
NEMA Reg. No. 0527

LIST OF ATTENDANCE FOR THE MEETING HELD AT THE SITE DATE 18TH OF DECEMBER 2009 TIME: 10AM VENUE D.O'S OFFICE...MUCHONGUI

NAMES	RESIDENCE	OCCUPATION	SIGNATURE	Tel:
Elijah Muthusi	Nairobi	ESIA & RAP Expert		0721802056
Dominic Munyao	Nairobi	ESIA & RAP Expert		0715780470
DAVID MAITAI	THIGIO	FARMER		0726795499
S.S PETER CH MWAI	THIGIO	FARMER		0727706668
ISAACH KAHIGA	THIGIO	FARMER		0725353249
ESTHER CHEPCHUMBA	THIGIO	FARMER		0726555553
STEPHEN MURIITHI	THIGIO	FARMER		0721 169 102
JOHN MWANGI	THIGIO	BUSINESS MAN		0729348747
JANE SANG	THIGIO	FARMER		0715348222
Yvonne Chebet	Thigio	Farmer		0722-967304/ 0710-179723
ANTHONY MBURU	NAIROBI	ESIA & RAPF		0720330732
Joshua Kandagor	Mochongoi	STAFF D.O.S		0725590421
STEPHEN LOBELS MOLOK	MOCHONGOI	AG. CHIEF. MOCHONGOI		0720852624
MOSES LEMURUKA	MOCHONGOI	INSPECTOR		0724930686
WILSON KAPSUMBA	MUCHONGUI	CHAIRMAN MUCHOS.		

AGENDA
1. Public participation in KPLC Lessos-Nanyuki Transmission line
2. AOB

CONFIRMED BY:

NAME SIGNATURE DATE.....

Elijah Muthusi 18/12/2009

DISTRICT OFFICER MOCHONGUI DIVISION

Moses Lemuruka 18/12/2009

STEPHEN MOLOK LOBELS

MINUTES OF PUBLIC MEETING ON THE KPLC PROPOSED 132 KV TRANSMISSION LINE (LESSOS-KABARNET-NYAHURURU-NANYUKI), HELD ON 17TH DECEMBER AT KABARNET COUNTY HALL

AGENDA

7. Opening Remarks
8. Project Description
9. Public Concerns
10. A.O.B

Preliminary

The meeting began at 10.40am, chaired by the Mr. Fred Juma on behalf of the Consultant, Prof. Jacob Kibwage. A prayer was given by Mr. Seroney, one of the residents, after which the area Chief, Mr. Cheserem asked everyone in attendance to introduce themselves. Those I attendance were from various locations: Kituro, Kapsesat, Kaprogonya, Kapropita,and Mumol.

Min 1/12/09: Opening Remarks

The Chairman explained that AWEMAC had been contracted by KPLC to carry out Environmental and Social Impact Assessment for the proposed project. He then gave a brief overview of the whole Environmental Impact Assessment process, acknowledging that that the Public meeting was an important stage as is a requirement in the Environmental Management and Coordination Act (EMCA). He also stated that the purpose of the meeting was to create awareness of the proposed project, to obtain views/ concerns of the stakeholders, and to clarify issues that are not clear about the project.

Min 2/12/09: Project Description

The Chairman gave a brief description of the KPLC proposed project, stating that it involves putting up a 235km 132KV transmission line from Lessos to Nanyuki through Kabarnet area. He stated that the main objective of the project is to supplement the already existing transmission lines in order to improve the National Grid.

The Chairman also reported that the consulting team had gone through the entire area where the proposed line would be passing and identified all stakeholders likely to be affected, including those on the way –leave trace (30m wide). The project will involve resettlement of affected parties and therefore, the proponent KPLC will provide compensation for the same accordingly.

Min 3/12/09: Issues Raised

The Chairman invited those in attendance to give their views regarding the project as they wished, and the following concerns were raised:

- Loss of Land

The residents were concerned that they would have no other place to relocate to since most of them especially within Kabarnet Town own plots of land whereby the 30m way leave takes up the a lot of space that would not allow moving property within the same plot.

- Fear of Eviction without Notice

Some feared of being asked to relocate without ample notice to allow them to plan but they were convinced that the resettlement process will have a plan in which they would be in involved in.

- Options for the Displaced Residents

Some residents had reservations about the line passing their area since they didn't think they have direct benefits from the project. They wanted to know if they had an option of refusing to relocate from their land. The constant team advised that there would be a committee in place to address their grievances when that time comes.

- Valuation of Property

The residents requested that the valuation of all property should be done in the presence of the owners in order to ensure that the real costs are taken and should be considered during compensation.

- Personal/ Individual on-going Projects

Some residents reported that they were having on-going projects and they wanted to know if they should halt their developments. The consultant advised that they should continue with their project since their value would still be considered during compensation.

- Compensation

The residents commented that KPLC should ensure that all compensations are done genuinely so that losses are minimized.

Min 04/12/09: A.O.B

The Area Councilor suggested that the affected residents form committees that would look in to the progress of the proposed project and all in attendance were in agreement.

Adjournment

There being no other business for discussion the meeting was adjourned at 12.36 pm with prayer from a local resident.

SECRETARY

NAME: _____ SIGN…… DATE……

CONSULTANT

NAME: Prof. Jacob Kibwage SIGN:  DATE……

Confirmed by:

NAME…… SIGN…… DATE……

MINUTES OF PUBLIC MEETING ON THE KPLC PROPOSED 132 KV TRANSMISSION LINE (LESSOS-KABARNET-NYAHURURU-NANYUKI), HELD ON 18TH DECEMBER AT KIVUMBINI VILLAGE, MARIGAT

AGENDA

11. Opening Remarks
12. Project Description
13. Public Concerns
14. A.O.B

Preliminary

The meeting began at 2.30am, chaired by the Mr. Fred Juma on behalf of the Consultant, Prof. Jacob Kibwage. A prayer was given by one of the residents, after which the Village Elder asked everyone in attendance to introduce themselves. Those in attendance were from two villages: Rabai, Kivumbini.

Min 1/12/09: Opening Remarks

The Chairman explained that AWEMAC had been contracted by KPLC to carry out Environmental and Social Impact Assessment for the proposed project. He then gave a brief overview of the whole Environmental Impact Assessment process, acknowledging that that the Public meeting was an important stage as is a requirement in the Environmental Management and Coordination Act (EMCA). He also stated that the purpose of the meeting was to create awareness of the proposed project, to obtain views/ concerns of the stakeholders, and to clarify issues that are not clear about the project.

Min 2/12/09: Project Description

The Chairman gave a brief description of the KPLC proposed project, stating that it involves putting up a 235km 132KV transmission line from Lessos to Nanyuki through Marigat town at Kivumbini Village, and Rabai. He stated that the main objective of the project is to supplement the already existing transmission lines in order to improve the National Grid.

The Chairman also reported that the consulting team had gone through the entire area where the proposed line would be passing and identified all stakeholders likely to be affected, including those on the way –leave trace (30m wide). The project will involve resettlement of affected parties and therefore, the proponent KPLC will provide compensation for the same accordingly.

The residents sought to refresh their minds on where the line would be passing and asked the consultant team to take details of all those who will be affected by the project.

Min 3/12/09: Issues Raised

The residents appreciated the effort that the team had put in getting all the information that would be required. The Chairman invited those in attendance to give their views regarding the project as they wished, and the following concerns were raised:

- Loss of Property

Some of the residents were worried that they would lose their property if were asked to relocate since they thought that the estimated costs during valuation would not be accurate. The Chairman convinced then that at the time of compensation, KPLC will consider the current values of their assets.

- Lack of land

Most of the residents lamented that there was very limited land and most of the residents live in group ranches and therefore it would be difficult to move houses and other property to other sites within the area.

- Potential Hazards

A few residents were concerned that if the line passed within their area they would suffer health risks in the long term. The Chairman reported that there had never been any reports on research done on the hazards of such a project.

- Compensation

Due to the fact that there is limited land in the area, most of the residents were in agreement that they would prefer cash settlements for compensation.

Min 04/12/09: A.O.B

The residents recommended that KPLC should give notifications on commencement of the projectin good time, to allow them enough time to plan.

Adjournment

There being no other business for discussion the meeting was adjourned at 3.22 pm with prayer from the Consultant.

SECRETARY

NAME: _____ SIGN…… DATE……

CONSULTANT

NAME: Prof. Jacob Kibwage SIGN:  DATE……

Confirmed by:

NAME…… SIGN…… DATE……

MINUTES OF PUBLIC MEETING ON PROPOSED 235KM TRANSMISSION LINE 132KV LESSOS-KABARNET-NYAHURURU-NANYUKI, HELD ON 17H DECEMBER 2009 AT MAYATTA IN TWO VILLAGE OPPOSITE SWEETWATERS TENTED CAMP, LAIKIPIA DISTRICT

AGENDA

15. Introduction and brief remarks by the chair
16. Project Description brief by the project team leader
17. Project ramifications and impacts
18. Issues raised
19. Recommendations
20. A.O.B

Preliminary

The meeting was called to order at 2.00p.m, chaired by the Manyatta elder, Mr.Peter Kuraru The chairperson asked everyone in attendance to introduce himself or herself starting with the team leader. It was noted that most of the identified project affected persons were present or their representatives. At least twenty-two people attended.

Min 1/09/09:Project description brief by team leader

The team leader gave a brief overview of the whole project in its detail and components He explained that the need for Environmental and Social Impact Assessment(ESIA) as stipulated in the National laws and the world bank guidelines and stressed the need for this public consultative and hence participation He also stated that the purpose of the meeting was to create awareness of the proposed project, to obtain views/ concerns of the stakeholders, and to clarify issues that are not clear about the project most of this issues that came to the fore are related to employment ,displacement and compensation.

Min 2/09/09: Project ramifications and impacts

The project team leader gave an overview of the real and the perceived impacts ones that include; the requirement for right of way in the way leaves required that would lead to displacement hence the need for compensation of those affected by the way leave. The team leader explained further the impacts to the natural

and built environment. The people affected by the project wanted to know the details as contained in the feasibility study details and the earlier process of identifying the affected people; and estimates of the people and property affected but later valuations would be carried out to determine the market values of the affected property before any displacement are affected. He also assured them that all safeguard policies including NEMA and World Bank guidelines regarded.

Min 3/09/09: Issues Raised

The team leader invited the members to give their views regarding the project and the following issues and concerns were raised:

- **Expected project take off**

Most of those present at the meeting were concerned that thee project may take off before they complete their preparations for relocation but were assured by the team leader that these processes take time and it would not be before one year should it take off proper and the due process is followed. They were also informed that these projects are in a major programme that is spread over the whole 2020-year plan target that involves increasing rural access from 4% to 40%..

- **Direct benefits**

Those at the meeting expressed concern at the direct benefits that accrue to such projects may not trickle down to the locals through employment opportunities but they were assured that they would be considered for non-technical jobs during the project cycle. Other indirect benefits were seen to be imminent should the project take off.

- **Compensation process**

The members of public affected by the project questioned the compensation rates to be applied in assessment of the property but were assured that the national guidelines and the World Bank guidelines would be applied in the process and qualified Valuers would be applied in the process. Another question that emerged was the property or new developments that were to be developed after the present property have been identified. These property not included in the RAP would be confirmed once a full census of the property is established.

Min 04/09/09: Recommendations and conclusions

All those present at the meeting were of the opinion that; the project was beneficial to themselves and the nation at large and would support it as long as

their interests (compensation, employment, and displacement) are taken care of before the project takes off.

Min 05/09/09: A.O.B

There was not any other business to discuss.

Adjournment

There being no other business for discussion the meeting was adjourned at 2.40 p.m.

SECRETARY

NAME: Dominic Munyao SIGN…….
DATE…….

CONSULTANT

NAME: Prof Jacob Kibwage SIGN:……..
DATE…….

Confirmed by:

NAME…… SIGN…….
DATE…….

NB/ A copy of attendance list for this meeting is attached to these minutes.

PUBLIC CONSULTATIVE MEETING

ON THE PROPOSED CONSTRUCTION OF 235 KM OF 132KV CIRCUIT TRANSMISSION LINE: FROM LESSOS-KABARNET-NYAHURURU/RUMURUTI -NANYUKI.

CLIENT/PROPONENT: KENYA POWER AND LIGHTING COMPANY (KPLC)

ENVIRONMENTAL CONSULTANT

Africa Waste and Environment Management Centre,
Muthaiga Mini Market Complex,
Left Wing 3rd floor,
P.O. Box 63891-00619,
MUTHAIGA - NAIROBI
Tel 020 2012408 ***Email: awemac_ken@ yahoo.com*** ***Website: www.awemac.org***
NEMA Reg. No. 0527

AWEMAC

Samburu Manyatta – Two Two Village

LIST OF ATTENDANCE FOR THE MEETING HELD AT THE SITE DATE 17th OF DECEMBER 2009 TIME: 2 PM. VENUE SAMBURU MANYATTA

NAMES	RESIDENCE	OCCUPATION	SIGNATURE	
Elijah Muthusi	NAIROBI	ESIA & RAP EXPERT	[signature]	
Anthony Mburu	Nairobi	ESIA & RAP EXPERT	[signature]	
LOPORE MOHGURO	Samburu Manyatta	Pastoralist	[signature]	
Peter Kurary	TWO-TWO	B/man.	[signature]	0714648484
JOHN NGITAR	TWO TWO	B/man	[signature]	0728882653
Johnson Loishuro	Two. Two	B/man	[signature]	0724128754
JOSEPH MAMTALY	TWO TWO	B/man	[signature]	0727116218
JULIUS LENGISHAN	TWO-TWO	B/man.	[signature]	0722219114
JOSEPH LEKILIPAN	TWO - TWO	B/man	[signature]	0729809478
SAMY LEMBITIR	TWO - TWO	B/man	[signature]	
NELSON RIPOI	TWO - TWO	B/Man	[signature]	0710698116
KAHAYA KAIGIZ	TWO - TWO	B/man		072465817[illegible]
LENTITAN LOLOJO	TWO - TWO	B/man	[signature]	
SIMON KORERE	TWO. TWO	Herdman	[signature]	072699[illegible]
Jestina Milto	Two - Two	B/man	[signature]	0727048993
Solomon MARYAT	Two Two	B/man	[signature]	0729953260
NYAGAKA NYAMWEYA	NAIROBI	TEAM LEADER	[signature]	
DOMINIC ONYANGO	NAIROBI	ESIA & RAP EXPERT	[signature]	0715208070
Karukai Leraman	Two - Two.	B/Man.	[signature]	N/A.
Ole Karkuli	Two - Two	Herdman.	[signature]	N/A
Lemirkishan	Two Two	Herdman	[signature]	N/A
Pifain Lekarkuli	Two Two	Herdman.	[signature]	N/A

AGENDA

1. Public participation in KPLC Lessos-Nanyuki Transmission line
2. AOB

CONFIRMED BY:

NAME	SIGNATURE	DATE……………
Elijah Muthusi	[signature]	17/12/2009
Peter Kuraru	[signature]	17/12/2009.

MINUTES OF PUBLIC MEETING ON PROPOSED 235KM TRANSMISSION LINE 132KV LESSOS-KABARNET-NYAHURURU-NANYUKI HELD ON 17H DECEMBER 2009 AT THE CHIEFS OFFICE,NANYUKI LOCATION,LAIKIPIA DISTRICT

AGENDA

21. Introduction and brief remarks by the chair
22. Project Description brief by the project team leader
23. Project ramifications and impacts
24. Project alternatives
25. Issues raised
26. Recommendations
27. A.O.B

Preliminary

The meeting was called to order at 10.25a.m, chaired by the area chief, Mr. Ramesh Gathogo The chairperson asked everyone in attendance to introduce himself or herself starting with the team leader. It was noted that most of the identified project affected persons were present or their representatives. At least fifteen people attended

Min 1/09/09: Opening Remarks

The team leader gave a brief overview of the whole project in its detail and components He explained that the need for Environmental and Social Impact Assessment(ESIA) as stipulated in the National laws and the world bank guidelines and stressed the need for this public consultative and hence participation He also stated that the purpose of the meeting was to create awareness of the proposed project, to obtain views/ concerns of the stakeholders, and to clarify issues that are not clear about the project

Min 2/09/09: Project ramifications and impacts

The project team leader gave an overview of the real impacts and the perceived ones that include; the requirement for right of way in the way leaves required that would lead to displacement hence the need for compensation of those affected by the way leave. The team leader explained at length that the process already done was identifying the affected people; and estimates of the property affected

but later valuations would be carried out to determine the market values of the affected property before any displacement are affected. He also assured them that all safeguard in terms of developed versus undeveloped plot would be put into consideration. He also tabled these guidelines so that all may see them for assurance that they would be applied in these situations.

Min 3/09/09: Issues Raised

The team leader and chair invited the members to give their views regarding the project as they wished, and the following concerns were raised:

- **Human Health**

Some of those present at the meeting were wary of the presence of the high-tension wires in their immediate environment, especially leukaemia but the team leader explained that these studies were not yet completed and hence these are at present only perceived risks that cannot be quantified empirically.

- **Air Force area and effects on birdlife**

The members present some who were conservationists wondered if the birdlife and migratory animals would be affected by this development as they cross this area coupled with the presence of the airfield in the immediate neighbourhood but were assured of these issues were to be mitigated fully in the ESIA.

- **Valuation Process**

An affected party with a developed plot near the substation at Nanyuki was wary of her plot since she had already applied for electricity and had done a lot of wiring in readiness for the electricity but was assured by the team leader that the actual valuation was site, area specific as is where is basis and the due standards would be followed to the letter in the same vein most affected persons were wary of their acceptance of the project, if direct benefits would be imminent but they were informed that this would take in first before any other benefits can trickle down. This is because; this was explained to them as a transmission line and not a distribution line with clear differences as explained earlier.

- **Alternative route**

Another member of those in the meeting tried to explain that an alternative route could be found from among the large ranches at Ndurukuma; as these are not only tourist circuit about three kilometres from the town but are largely undeveloped expanse of about 120 acres. This was his bid to ensure that the proposed route moves away from the developed areas and thus creating resettlement problems in this exercise. However, in response the team leader explained that the proposed line route was found to be the economically viable, environmentally sound, and socially acceptable.

- **Generation options and underground cabling**

One of those present wondered if the line can be diverted to other existing lines but it was seen to be a case of overloading the existing load of the line. Another member wondered if the power were produced, using other means would still need transmission lines but it was agreed that no other feasible means were available now in the country. Underground cabling was also discussed but it was found to create more risky activities due to people digging up these lines. Concerns were raised by some of those present about the risk of Maasai Moran climbing these pylons to be put up but the team leader assured them that the necessary occupational health and safety issues will be adhered to hence these risks are reduced significantly.

- **Effect on Productivity of Humans**

One of those present enquired about the impacts of these high voltage lines on the livestock, houses if not removed from the way leaves and were worried about their impact on productivity of the populace, and saw this as a cheap way of controlling the human population increase in the country.

Min 04/09/09: Recommendations and Conclusions

It was agreed that the proposed project had these attributes and certain conclusions and recommendations could be made:

- An analogy of the relationship between the proposed project and other infrastructure projects and this was seen to be in tandem with the energy sector access scale up programme goals and objectives of increasing access from 4% to 40% by 2020.

- The chair concluded that these objections to the project they are seen to be objective and not subjective as the analysis would be done to determine the best possible route.
- The residents said that they were supportive of the project as it is a good idea but on condition that the route generates alternatives

Min 05/09/09: A.O.B

The team leader and the chair upon exhaustion of the views gave a final take on the alternatives and assured them that all views would be taken down and recorded and the forwarded to the necessary authorities for further action. The team leader assured the residents that recommendations for the project would be made accordingly.

Adjournment

There being no other business for discussion the meeting was adjourned at 11.30 a.m.

SECRETARY

NAME: Dominic Munyao SIGN…… DATE……

CONSULTANT

NAME: Prof Jacob Kibwage SIGN:…….. DATE……

Confirmed by:

NAME…… SIGN…… DATE……

NB/ A copy of attendance list for this meeting is attached to these minutes.

iv. Copies of notices for the public consultative meeting

07/12/2009

AFRICA WASTE AND ENVIRONMENT MANAGEMENT CENTRE
Muthaiga Mini Market, Left Wing, 3rd Floor,
P.O. Box 63891-00619, Nairobi, Kenya
Tel: +254 20-2012408/ 0722-479061
E-mail: *awemac_ken@yahoo.com,*
www.awemac.org

PUBLIC NOTICE!

PUBLIC MEETINGS ON ENVIRONMENTALSOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN (RAP) FOR THE PROPOSED CONSTRUCTION OF 235 KM OF 132Kv CIRCUIT TRANSMISSION LINE FROM NANYUKI-NYAHURURU/RUMURUTI-KABARNET-LESSOS.

Our client and the proponent, Kenya Power and Lighting Company (KPLC) is proposing to undertake the above mentioned project. The proponent proposes to Construct 132 kV Circuit transmission line from Nanyuki-Nyahururu/Rumuruti-Kabarnet-Lessos. The local community/or neighbour to the proposed project site, are hereby asked to attend a public meeting scheduled to take place as indicated below:

Date: THURSDAY 17th December, 2009
Venue 1: MAJENGO CHIEF' S OFFICE; NANYUKI TOWN; Time: 10.00 A.M
Venue 2: OPEN GROUND AT THE SAMBURU MANYATTA in TetuVillage (NEAR SWEET WATERS TENTED CAMP / OL-PAJETA CONSERVANCY GATE) Time: 3.00.P.M

The purpose of the meeting is to collect views from the general public and any other party who in any way will/ might be affected by the proposed project within its project cycle. As a requirement of EMCA 1999 Section 58 on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

Contact persons:-
Mr. Elijah Muthusi-0721802056, Dominic Munyao- 0715708670
Mr. David Milimo (Assistant Chief Thingithu Location) 0721-290344
Mr.Kalaya Ole Kaikil (Samburu Manyatta Elder) 0724-658170
NEMA 2009 LICENCE NO.0044

Prof Jacob K.Kibwage

Lead Environmental Consultant, Africa Waste and Environment Management Centre

07/12/2009

AFRICA WASTE AND ENVIRONMENT MANAGEMENT CENTRE
Muthaiga Mini Market, Left Wing, 3rd Floor,
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Tel: +254 20-2012408/ 0722-479061
E-mail: *awemac_ken@yahoo.com,*
www.awemac.org

PUBLIC NOTICE!

PUBLIC MEETING ON ENVIRONMENTALSOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN (RAP) FOR THE PROPOSED CONSTRUCTION OF 235 KM OF 132Kv CIRCUIT TRANSMISSION LINE FROM NANYUKI-NYAHURURU/RUMURUTI-KABARNET-LESSOS.

Our client and the proponent, Kenya Power and Lighting Company (KPLC) is proposing to undertake the above mentioned project. The proponent proposes to Construct 132 kV Circuit transmission line from Nanyuki-Nyahururu/Rumuruti-Kabarnet-Lessos. The local community/or neighbour to the proposed project site, are hereby asked to attend a public meeting scheduled to take place as indicated below:

Date: FRIDAY18TH December, 2009
Venue: MUCHONGOI D.O'S OFFICE BARAZA PARK; Time: 11.00 A.M

The purpose of the meeting is to collect views from the general public and any other party who in any way will/ might be affected by the proposed project within its project cycle. As a requirement of EMCA 1999 Section 58 on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

Contact persons:-
Mr. Elijah Muthusi-0721802056, Dominic Munyao-0715708670
Chief Muchongoi 0721-290344

NEMA 2009 LICENCE NO. 0044

Prof Jacob K.Kibwage
Lead Environmental Consultant, Africa Waste and Environment Management Centre

07/12/2009

AFRICA WASTE AND ENVIRONMENT MANAGEMENT CENTRE
Muthaiga Mini Market, Left Wing, 3rd Floor,
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PUBLIC NOTICE!

PUBLIC MEETING ON ENVIRONMENTALSOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN (RAP) FOR THE PROPOSED CONSTRUCTION OF 235 KM OF 132Kv CIRCUIT TRANSMISSION LINE FROM NANYUKI-NYAHURURU/RUMURUTI-KABARNET-LESSOS.

Our client and the proponent, Kenya Power and Lighting Company (KPLC) is proposing to undertake the above mentioned project. The proponent proposes to Construct 132 kV Circuit transmission line from Nanyuki-Nyahururu/Rumuruti-Kabarnet-Lessos. The local community/or neighbour to the proposed project site, are hereby asked to attend a public meeting scheduled to take place as indicated below:

Date: FRIDAY 18th December, 2009
Venue: MARIGAT KIVUMBINI VILLAGE; Time: 3.00 P.M

The purpose of the meeting is to collect views from the general public and any other party who in any way will/ might be affected by the proposed project within its project cycle. As a requirement of EMCA 1999 Section 58 on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

Contact persons:-
Mr. Elijah Muthusi-0721802056, Dominic Munyao-0715708670
Julius Kibet (Village Elder) 0710-546507
NEMA 2009 LICENCE NO. 0044

Prof Jacob K.Kibwage
Lead Environmental Consultant, Africa Waste and Environment Management Centre

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Date: THURSDAY 17th December, 2009
Venue: TULWET CENTRE; Time: 10.00 A.M

The purpose of the meeting is to collect views from the general public and any other party who in any way will/ might be affected by the proposed project within its project cycle. As a requirement of EMCA 1999 Section 58 on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

Contact persons:-
Mr. Theobald Luchidio-0722440312, David Andalla-0722887625
Elizabeth Maiyo (Chief Tulwet) 0711-775847
Samuel Too (Village Elder) 0724-786277

NEMA 2009 LICENCE NO. 0044

Prof Jacob K.Kibwage
Lead Environmental Consultant, Africa Waste and Environment Management Centre

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Date: THURSDAY 17th December, 2009
Venue: MOSOP LOCATION AT SMALL TOWN; Time: 2.00 P.M

The purpose of the meeting is to collect views from the general public and any other party who in any way will/ might be affected by the proposed project within its project cycle. As a requirement of EMCA 1999 Section 58 on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

Contact persons:-
Mr. Theobald Luchidio-0722440312, David Andalla-0722887625
Andrew Kiptanui (Chief) 0722-598989
David Kiptoo 0720-865665

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Date: THURSDAY 17th December, 2009
Venue: KABARNET TOWN HALL; Time: 10.00 A.M

The purpose of the meeting is to collect views from the general public and any other party who in any way will/ might be affected by the proposed project within its project cycle. As a requirement of EMCA 1999 Section 58 on Environmental Impact Assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

Contact persons:-
Mr. Theobald Luchidio-0722440312, David Andalla-0722887625
Edwin Tumno (Chief Kituro) 0722-108167
Daniel Cheserem 0720-271022
NEMA 2009 LICENCE NO. 0044

Prof Jacob K.Kibwage
Lead Environmental Consultant, Africa Waste and Environment Management Centre

v. Letter of Award

Photos

Nanyuki Substation

Kerio Valley

Main Grid in Lessos

Muskut in Flourspar

Consultant doing Public participation

Expert assessing the proposed transmission line

Wheat field along the transmission line

Manyatta to be displaced by the Transmission line

Mathenge species along the transmission line

Honourable Kaparo being interviewed

Ol pajeta conservancy

River Mutara

Base station along Nanyuki-Rumuruti

Marmanet forest in Kabarnet

Structure on the wayleave

GPS gadget used during the assessment

House to be affected by the transmission line

Existing 220KV Turkwel to Lessos

vi. Samples of Filled questionnaires