



KENYA POWER AND LIGHTING COMPANY LIMITED



Updated Environmental and Social Impact Assessment Report for the Proposed Mombasa-Nairobi 400kv Transmission Line

KPLC1/17ABMSA-NBI400Kv/TL-2

Final Report



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September 2009



ACKNOWLEDGEMENTS

The assessment team wishes to thank KPLC team and field staff who participated in the updating of ESIA by providing necessary assistance and relevant documentation and logistic assistance. We are most grateful to the ESRP Project Leader, Stanley Mutwiri, Mombasa-Nairobi 400kV Transmission line Project Leader, Andolo Ambasi, Deputy Manager Safety, Health and Environment, John Guda, the KPLC Environment/Social specialist, Walter Barongo and Francis Njoroge, the KPLC Senior Wayleave Officer for their assistance and contributions towards the achievement of the stated objectives.

We wish to thank KWS through their Mr. Tom Sipul, KCAA, PAPs, local communities and the provincial administration, graciously provided pertinent data and/or information, documents and actively participated in the many consultative meetings, discussions, and public participation that were carried out during the assessment process. We also wish to thank the AFD for their input.



LIST OF ABBREVIATIONS

AfDB	African Development Bank
AFD	Agence Francaise de Development
AIDS	Acquired Immune Deficiency Syndrome
ASALs	Arid and Semi Arid Lands
EMF	Electro-Magnetic Fields
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental Management Plan
EU	European Union
HIV	Human Immunodeficiency Virus
KPLC	Kenya Power and Lighting Company Limited
KCAA	Kenya Civil Aviation Authority
kV	Kilo volt – 1,000 volts
KWS	Kenya Wildlife Service
MW	Megawatts
NEMA	National Environmental Management Authority
NP	National Park
NNP	Nairobi National Park
OTHL	Overhead Transmission Lines
PAPs	Project Affected Persons
PS	Performance Standards
RAP	Resettlement Action Plan
ROW	Right of Way
WB	World Bank
ILO	International Labour Organization

EXECUTIVE SUMMARY

Background

The Kenya Power and Lighting Company Limited (KPLC) intends to construct a 400 kV electricity transmission line from Rabai in Kilifi District to Nairobi, through the financial assistance provided to the Government of Kenya by Agence Francaise de Development (AFD), European Investment Bank and African Development Bank. The total length of the proposed line is 462 km. The proposed line will have two substations, one at Mariakani in Taita District and the other in Isinya, Kajiado District. As required by law, KPLC contracted *Log Associates* to carry out an update of the Environmental and Social Impact Assessment report drawn earlier, in line with the changing realities on the ground. This report presents the outcome of the ESIA update exercise carried out by the consultant.

Objective

The objective of the assignment was to identify the gaps in the existing ESIA report and update the 2006 and 2007 ESIA project report (Ref. Vol. I and Vol. 2). The output of the update exercise was to conform to the requirements and standards of the AFD, EU and AfDB environmental and social policies, guidelines and assessment procedures in addition to those of National Environment and Management Authority (NEMA).

Methodology

✓ *Review of documents*

The consultant reviewed the 2006 and 2007 (Vol. I and Vol. II) documents to help get an insight into the project and identify any existing gaps in the documents. A review of various policies, regulatory and relevant legal documents was also carried out.

✓ *Participatory methodology*

The consultant adopted a participatory methodology during the study. The consultant carried out extensive field visits between 25 February 2009 and 7 March 2009. During the field visits, several consultative meetings were conducted with KPLC's representatives, the communities, the Kenya Wildlife Service (KWS) and other key stakeholders. Several public consultation meetings were also conducted with the Project Affected Persons (PAPs), provincial administration and the communities in general.

✓ *GPS Coordinates*

The GPS coordinates provided to the consultant by the client guided the consultant in establishing the actual location of the proposed line. The various Angle Points (APs) were identified as accurately as possible using a hand held GPS facility.

Findings

1. Project Phasing

The proposed project was noted to have four overlapping phases of implementation. These are the preparation phase, construction phase, operational phase and the decommissioning phase.

2. Legislative Framework

There exist a number of local legislations and regulations that the project shall have to comply with. The Environmental Management and Coordination Act, 1999 and regulations 2003 provide overall guidelines to project implementation. Together with several other local laws mentioned in Chapter Three of this report, these local legislations shall have to be complied with throughout the project life.

Kenya is also a signatory to several international conventions, protocols and treaties and is therefore bound by the requirements of these conventions and protocols. Some of the relevant global policies include:

- The convention on biodiversity
- Convention on the conservation of migratory species
- The Ramsar Convention on wetlands
- Various World Bank Operational Policies
- United nations Framework Convention on Climate Change

3. Identified Gaps

The existing ESIA report to a great extent documented the necessary general information and provided the required guidelines for implementation of a project of this nature. However, certain gaps exist in the document that makes its application as the overall guiding document for the implementation of the project unfeasible. Some of these gaps are:

a. Proposed Line Route

The consultant found out that the location of the transmission line given in the initial EIA Reports (Vol I and II) was different from the actual line location as indicated through the GPS coordinates provided to the consultant by the client. For example, the existing document indicates that the proposed line passes through Chyulu Hills. The actual line however, avoids this catchment area.

b. Consultation with PAPs

There had been no specific consultations carried out with the actual PAPs during the preparation of the previous ESIA report. Consultations carried out were generally with the communities that lived within the vicinity of the proposed line. Some of these communities lived as far as 40 km from the proposed line route. The consultant, in collaboration with the provincial administration consulted with the specific PAPs along the entire 462 km of the proposed line except for the Kibwezi area, where the residents being illegal squatters did not identify themselves fearing eviction. The consultant however collected general data of these persons from provincial administration.

c. NEMA Approved Terms of Reference

The consultant adopted the Terms of Reference approved by NEMA for the exercise. The Terms of Reference required:

- Description of the EIA process and public involvement in Kenya
- Description of project alternatives
- Description of the landscape
- Impact of project on physical environment
- Impacts on aviation and communication
- Risks of Accidents and safety
- Mitigation Measures
- Environmental Management plan

d. NEMA Comments on the ESIA License

An ESIA license has already been issue by NEMA to the client KPLC subject to the following conditions:

- KPLC shall adhere to routing B (less national parks, more populated areas)
- KPLC shall ensure the erection of appropriate signage in Kiswahili, English and local languages to serve as warning signs around risky places and cable routes. Community sensitization programmes on the same should also be carried out.

- KPLC shall liaise with KWS so that the routing of the power line does not compromise air navigation safety
- Revegetation programme shall be undertaken to restore disturbed vegetation
- KPLC shall ensure that compensation resettlement plan is developed and agreed up with all stakeholders
- Strict adherence to ESMP throughout the project life cycle

The consultant has prepared this update report in strict adherence to the above issues.

e. Issues raised by KWS

The existing report was non-committal on the use of Nairobi National Park (NNP). The consultant and KPLC held extensive discussions with KWS on the use of the park and it has been agreed that KPLC is free to use the NNP as long as KPLC acquired a lease from KWS. Terms of the lease are currently being negotiated between the two parties. However, the consultant has provided indicative estimates of these both in the RAP and the ESMP reports

f. Issues raised by KCAA

The consultant was in agreement with the Terms and Conditions already provided by KCAA with respect to this project and has therefore advised that KPLC complies strictly with the stated conditions

4. Project Impacts and Mitigation Measures

The environmental and social impacts of the project shall be spread through the four project phases. There will be both positive and some minor negative project impacts. The following section briefly describes some of the major impacts and proposed mitigation measures within each of the project phases.

a. Pre-Construction Phase

The first site activities before mobilization of equipment will be final survey required for final design of line and tower foundations. There will be negative impacts on land associated with the construction of camps (temporary loss) and storage of construction materials, and foundations for the towers (permanent loss), especially if such construction is carried out on agriculturally productive land. Expectations of improvement in livelihood among locals should be addressed through public participation. Construction contracts will include environmental monitoring and management procedures and requirements. These must be in place prior to the commencement of any construction activities

b. Construction Phase

This phase of the assignment will have both positive and negative impacts. The positive impacts are employment opportunities offered to the construction workers and any other labourers who will be hired to provide their services during the construction phase. The negative impacts would include wastes generated, sanitation and waste disposal at workers camps, accidents, health and safety, air, dust and noise pollution, vegetation clearance, soil erosion, socio-environmental issues, alteration of drainage, cultural issues, loss of trees, and compaction of soil. There will also be loss of a few social amenities like Schools, Churches and a grave yard.

Whereas most of the above negative impacts are minor and temporary, the loss of a graveyard is likely to be permanent. Discussions with the community however, indicated that they had no opposition to the same as long as the existing graves are not interfered with. The affected school and church will also be relocated on a permanent basis and communities have already identified alternative sites. However, on mitigating the other negative impacts, the contractor shall ensure that all staff had adequate protective clothing and were adequately trained. There will also be need of lease of temporary disposal sites along the proposed route for the disposal of soil, tree twigs, etc from the construction sites. The vegetation cleared from site will also be shared with local communities as firewood. The whole range of mitigation measures are however, outlined in the ESMP.

c. Operational Phase

With the establishment of the Mombasa-Nairobi 400 kV transmission line, Kenya Power and Lighting Company Limited will be able to increase its electric power reliability and provide additional electric power capacity. The proposed project will have minimal negative effects which includes perceived dangers of electrostatic and magnetic force, electrocution, danger to low-flying aircrafts, loss of aesthetic value, Corona sound effect from high voltage lines, vibrations, growth of grass and weeds in the two terminal substations, telecommunication interference and wildlife/birds migration.

d. Decommissioning Phase

The lifespan of the proposed transmission line is expected to be long. At the end of its lifespan, decommissioning of the project will occur. During decommissioning, all transmission line structures and equipment will be dismantled and removed. All areas disturbed by the proposed project shall be restored to pre-project conditions and/or to conditions acceptable to NEMA.

Potential environmental impacts caused during decommissioning are those, which will be mitigated as provided environmental management plan. These include dust and noise to the surrounding environment, fire, oil spills and public safety.

The disposal of materials from the decommissioned Transmission line is not seen as a high-risk matter. Much of the material would be recyclable (steel structures and cabling) or inert (insulators, concrete foundations, etc.). These materials would however, need to be disposed of at a formal waste disposal or recycling centre. There are no hazardous materials associated with the Transmission line itself.

Conclusions

Based on the above, the consultant wishes to document the following conclusions:

- It is unlikely that the Project will have significant adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures in the ESMP for the Project such that the overall benefits from the Project will greatly outweigh the few adverse impacts.
- All the negative impacts will either be moderate or lesser in rating and could be easily mitigated as indicated in the ESMP.
- Generally, the proposed line will result in appreciable benefits to the people in the project area of influence and bring opportunities for development to the country. The main social impact management issues revolve around relocation of people along the transmission line corridor and acquisition of the right of way and way leave of the transmission line.
- Of the two route options, option B, accepted by NEMA, is considered the most cost effective and will cover a lesser portion of the Tsavo East National Park.

Recommendations

From the foregoing, the following recommendations have been made:

1. Compliance with the ESMP

The client shall comply with the requirements of the ESMP throughout the project period.

2. Annual Environmental Audits

KPLC should undertake an environmental audit (EA) of the projects, as required in NEMA Regulations twelve (12) months after completion to confirm the efficacy and adequacy of the ESMP.

3. Implementation Plan

The consultant recommended that the proposed projects be implemented in compliance with all the relevant legislation and planning requirements of Kenya at all times. In addressing the environmental issues, the contractor and/or KPLC should follow the mitigation guidelines provided under ESMP. This will ensure the safety of operators and the neighbouring communities. It is also recommended that a safety officer should be stationed at every site, during the whole construction phase. The safety officer will make sure that a first aid kit is always available and that all the skilled workers follow the safety rules.

4. Corporate Social Responsibility

Kenya Power and Lighting need to consider supporting the affected communities in afforestation, water provision, provision of social amenities and rural electrification as a corporate social responsibility

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1.0 INTRODUCTION

1.1 Purpose

This Report has been prepared following a request by the Client-*Kenya Power and Lighting Company Limited*, to the consultant *Log Associates*, to update the Environmental and Social Impact Assessment for the 400 kV Mombasa - Nairobi Transmission line.

1.2 Background

The Government of Kenya is expecting to receive funds from Agence Francaise de Development (AFD), European Investment Bank, and African Development Bank, to finance the construction of approximately 462km of 400kV transmission line from Rabai Substation in Mombasa to the proposed Isinya substation to the South East of Nairobi, establishment of substation bays for future installation of the necessary transformers at the two ends of the line and extension of a 24km of 220kV line.

The study conducted conformed to the requirements of the AFD, EU and AfDB environmental and social policies, guidelines and assessment procedures in addition to those of National Environment and Management Authority (NEMA).

1.3 Objectives

The objective of the assignment was to update the 2006 and 2007 ESIA project report (Ref. Vol. I and Vol. 2)

1.4 Scope

The scope of services to be undertaken by the Consultant was to identify the gaps in the ESIA Project Report (Ref. Vol. I and Vol. 2) and updating the study to a full ESIA.

2.0 IDENTIFIED GAPS

Among the services the consultant undertook was to update the ESIA report by identifying the gaps in the Environmental and Social Impact Assessment and addressing them. In updating the ESIA the following gaps were identified;

2.1 Overall proposed line route

The consultant found out that the actual location of the transmission line given in the EIA reports (Vol I and II) was actually not correct. Therefore the consultant used the GPS coordinates to get the exact location of the transmission line. For example the actual list of locations crossed by the proposed line is different as opposed to the one given in the initial ESIA project report Vol II.

2.2 Alternative route of choice

The previous project reports provided two alternatives for the proposed line. The NEMA approves of alternative B as shown in map 1 of this document. This update report is in line with this NEMA approval.

2.3 NEMA approved Terms of References

1. Description of the EIA process and public involvement in Kenya.

The current EIA process in Kenya was reviewed with requirements, standards and specificities according to the Kenya Environmental Management and Coordination Act. This report has been prepared to a level where it can be used for application of all permits necessary for approval of the project from the environmental point of view.

2. Description of project alternatives

An outline of the technical project has been presented in this document which includes the most salient features of the project including the goals and objectives, technical solutions, proposed line routes foreseen situation at the end of the project. It has also outlined the installations and processes considered in the study;

3. Description of the landscape

The landscape along the route has been described using the maps and photographs. The description has also been supported by statistics about the

social and natural conservation conditions along the right of way. Information about the flora and fauna has also been obtained mostly through observations. The project impacts on the flora and fauna has also been covered.

4. Impact on Physical Environment

This study has addressed the issue of visual impact from the suggested transmission line. It has also provided the most appropriate line route. Impacts including erosion and other effects of construction

5. Impacts on aviation and communication

Aircraft navigation and communication may be affected by the project. An assessment of the potential impacts has been performed.

6. Risks of Accidents and safety

The main focus was on the dangers of electrification and other forms of physical accidents to humans and animal life with relation to construction and operation of transmission line

7. Mitigation Measures

For all adverse impacts that could not be avoided by changes in the technical design or location of the installations, measures to reduce the impacts have been proposed.

8. Environmental management plan

An environmental management plan (EMP) has been drafted with the aim of identifying the specific measures required in order to minimize environmental impact. The EMP has addressed the specific findings in this study and drawn up monitoring plans for follow-up.

2.4 Corporate Social Responsibility

Kenya Power and Lighting Company shall consider supporting the affected communities in afforestation, water provision, and rural electrification. To this end, it is proposed that KPLC carries out an afforestation programme as a mitigation measure to cover for probable loss of vegetation that may be experienced during the construction phase. The affected areas, such as within the parks, shall have their aesthetic value restored. The client, KPLC, will work closely with KWS and ICRAF on issues of afforestation (tree species to be planted and where to be planted)

Within the National Parks, any tree cuttings shall be disposed of at the designated temporary sites and left to decompose. However, outside the National Parks tree cuttings shall be left to communities living within the vicinity for use as may be appropriate.

In addition, it was noted that the proposed line crosses certain locations with consistent water problems. As part of its Corporate Social responsibility, it is proposed that KPLC

considers supporting provision of water to these communities by supporting the construction of boreholes, shallow wells and water pans

2.5 Comments by KCAA and KWS

The consultant reviewed the information from KCAA and confirmed that the recommendation as previously given were adequate and shall be adhered to by the client. On the use of the National parks further consultation with KWS resulted into the following;

- The client was free to use the national parks namely; Nairobi National Park, Tsavo West and Tsavo East national park.
- The client shall pay some fees for conservation and lease of Nairobi National Park as specified in the RAP.
- The client will work closely with KWS to develop a memorandum of understanding for this and other future projects.

2.6 Consultation with PAPs

The consultant in collaboration with the provincial administration consulted with the specific PAPs along the entire 462km of the proposed line except for the Kibwezi area, where the residents being illegal and squatters¹ did not identify themselves fearing eviction. The consultant however collected general socio-economic information of these persons from provincial administration.

2.7 Ionizing radiations/Electromagnetic Fields

Electric overhead lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived health effect. The strength of both electric and magnetic fields is a function of the voltage, distance from the conductors to the ground and the lateral distance from the line to the receptor. Many studies published during the last decade on occupational exposure to Electro-Magnetic Fields (EMF) have exhibited a number of inconsistencies and no clear, convincing evidence exists to show that residential exposures to electric and magnetic fields are a threat to human health. However, the EMF decrease very rapidly with distance from source and there should be no potential health risks for people living outside the 30 m wide way leave corridor. The proposed 400 kV line has a wayleave of 60 m which is more than adequate to ensure safety of humans from any perceived effects of EMF radiations.

¹ Information from area chief

3.0 LEGISLATIVE FRAMEWORK

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 which is the core of this project. The Proposed Mombasa-Nairobi 400 kV transmission Lines can also be classified as rural and peri-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.

With 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 been concluded and approved in accordance with these regulators.

3.2 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 the case as was before.

i. 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:

- You are generating 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.

ii. 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

3.3 The Wildlife (Management and Conservation) Act

The Act deals with areas declared as National Parks, under the Act. The Act controls activities within the park, which may lead to the disturbance of animals. Unauthorized entry, residence, burning, damage to objects of scientific interest, introduction of plants and animals and damage to structure are prohibited.

3.4 The Agricultural Act

Legislative control over soil conservation 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.

3.5 Land Acquisition Act

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 landowners whose land is acquired or damaged.

We have in Kenya 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 conveyancing 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 conveyancing 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.

3.5.1 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 registrable under it.

3.5.2 Land Ownership

Absolute or 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 unalienated 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.

3.5.3 KPLC Land Acquisition Procedure

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 wayleaves 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 Defence, 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.

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 60 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.

3.6 The Public Health Act

This Act contains directives regarding regulation of activities that affect human health. There exist provisions within the Act to deal, in a general way, with water, air and noise quality as they pertain to human health. An environmental nuisance is defined, and includes the emission from premises of waste waters, gases, smoke which could be regarded as injurious to health. The owner and/or occupier of premises responsible for such nuisance are liable to prosecution under the Act.

3.7 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.

3.8 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.

3.9 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.

3.10 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:

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

3.11 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.

3.12 The Forests Act 2005

This applies to all forests and woodlands on state, local authority and private land. Except under a licence or permit or a management agreement issued or entered into under this Act, no person shall, in a state, local authority or provisional forest;

- a) Fell, cut, take, burn, injure or remove any forest produce;

- b) Be or remain therein between the hours of 7 p.m. and 6 a.m. unless he is using a recognised road or footpath, or is in occupation of a building authorised by the Director, or is taking part in cultural, scientific or recreational activities;
- c) Erect any building or livestock enclosure, except where the same is allowed for a prescribed fee;
- d) Smoke, where smoking is by notice prohibited, or kindle, carry or throw down any fire, match or other lighted material;
- e) De-pasture or allow any livestock to be therein;
- f) Clear, cultivate or break up land for cultivation or for any other purpose;
- g) Enter any part thereof which may be closed to any person;
- h) Collect any honey or beeswax, or hang on any tree or elsewhere any honey barrel- or other receptacle for the purpose of collecting any honey or beeswax, or enter therein for the purpose of collecting honey and beeswax, or be therein with any equipment designed for the purpose of collecting honey or beeswax;
- i) Construct any road or path;
- j) Set fire to, or assist any person to set fire to, any grass or undergrowth or any forest produce;
- k) Possess, bring or introduce any chain saw or logging tools or equipment;
- l) Damage, alter, shift, remove or interfere in any way whatsoever with any beacon, boundary mark, fence notice or notice board.

3.13 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 licence 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.

3.14 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.

3.15 The 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.

3.16 The 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 effected the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

3.17 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.

3.18 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. 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) Convention on the Conservation of Migratory Species
- e) United Nations Framework Convention on Climate Change
- f) United Nations Convention to Combat Desertification
- g) Important Bird Areas

3.19 International safeguards Policies

Kenya is a signatory to several international agreements. Therefore, apart from adhering to local laws and regulations, the client will need to ensure that the project is implemented in line with the international standards. Some of the key international policies to be complied with include:

- African development bank policy on resettlement
- Relevant world bank safeguard policies on resettlement
 - ❖ Environmental assessment , OP 4.01
 - ❖ Natural Habitats, OP 4.04
 - ❖ Cultural Property, OP 4.11
 - ❖ Indigenous Peoples, OP 4.10
 - ❖ Involuntary Resettlement, OP 4.12

4.0 METHODOLOGY

4.1 Our Approach

To enrich this review and ensure optimal participation of all the stakeholders, a participatory and collaborative approach was adopted. Emphasis was put on consultations between, KPLC, the communities and other stakeholders. The consultant concisely described the project and its geographic, ecological and general layout of facilities. Additional information on size and capacity of pre-construction activities, construction activities, schedule, support, material/facilities and services and operation and maintenance activities were also taken into account. In addition to environmental and social impacts of the project were identified with subsequent mitigation measures.

4.2 Methodology

4.2.1 Desk Review

The consultant reviewed the following documents as part of this review:

- European Investment Bank/European Union checklists,
- Agence Francaise de Development (AFD) guidelines,
- African Development Bank guidelines,
- World Bank (WB) Environmental Guidelines on Projects and EIA Studies
- Environmental Management and Coordination Act 1999,
- Revised NEMA guidelines
- The Energy Act of 2006
- The Occupational Safety and Health Act, 2007
- Kenya Electricity Grid Code
- The Public Health Act
- The Constitution of Kenya
- The Environmental (Impact Assessment and Audit) Regulations, 2003
- The Occupational Safety and Health Act 2007
- The Water Act 2002
- The Wildlife (Management and Conservation) Act
- The Forests Act 2005
- Government Lands Act, Cap. 280 (revised 1984)
- Chief Authority Act
- Trust Lands Act Cap. 288 of 1962 (revised 1970)
- Local Government Act, Cap. 265 (revised 1986)
- The Land Adjudication Act, Cap. 284 of 1968 (revised 1977)
- Registered Lands Act, Cap. 300 of 1963 (revised 1989)
- Physical Planning Act, Cap. 286
- The Physical Planning Act (Cap 286)

4.2.2 Public Consultation Forum

The consultant organized and convened a public consultation meeting between;

- a) Client- To share the project information in terms of its implementation and predicted impacts.
- b) Communities- To convey the consultation theme
- c) Individuals- Project Affected Persons (PAPs)
- d) Key Stakeholders i.e.
 - KWS
 - Provincial administration

Four public consultation meetings (*barazas*) were held, in areas judged to be affected by the planned power line and sufficiently densely populated. The person contacted was the chief or the assistant chief in the area who facilitated the meeting. In one case, the village elder organized the meeting and in another case, the Kianguni primary school had sports and the parents who were present were mobilized by the deputy head teacher. The meetings had the following agenda:

1. Prayer
2. Introduction of team and issue by local leader
3. Presentation of the proposed project - transmission line Rabai-Nairobi
5. Demonstration of the approximate location of the power line, either by showing computerized maps or by drawing in the sand and giving reference points and distances.
6. Summary of issues to be included in the report.
7. Signing of participant list. Names of illiterate persons were entered by a literate participant.
8. Prayer

At Kimboo village the meeting was organized by the Assistant chief with attendance of over 60 people. The meeting approved the power line, but inquired what benefit it would bring to them. It was explained that there might be some opportunity for casual labour during construction and operation of the line. Clearing is done biannually, completely by local labour.



Figure 4.2: A public consultation meeting in Kimboo village

4.2.3 Observations and Measurements

The assessment team conducted field observations along the proposed lines to obtain further data and consult the stakeholders. We established the location (into more details from the initial site visit) and nature of the surroundings which included existing infrastructure and social set up of the local communities whose normal daily activities would be and/or likely to be affected by the construction of the project.

Estimates of the affected areas around the wayleave were also taken and are provided in detail in the Resettlement Action Plan.

5.0 DESCRIPTION OF THE PROPOSED PROJECT

The baseline environmental information in the project area is summarized under the following thematic areas as follows:

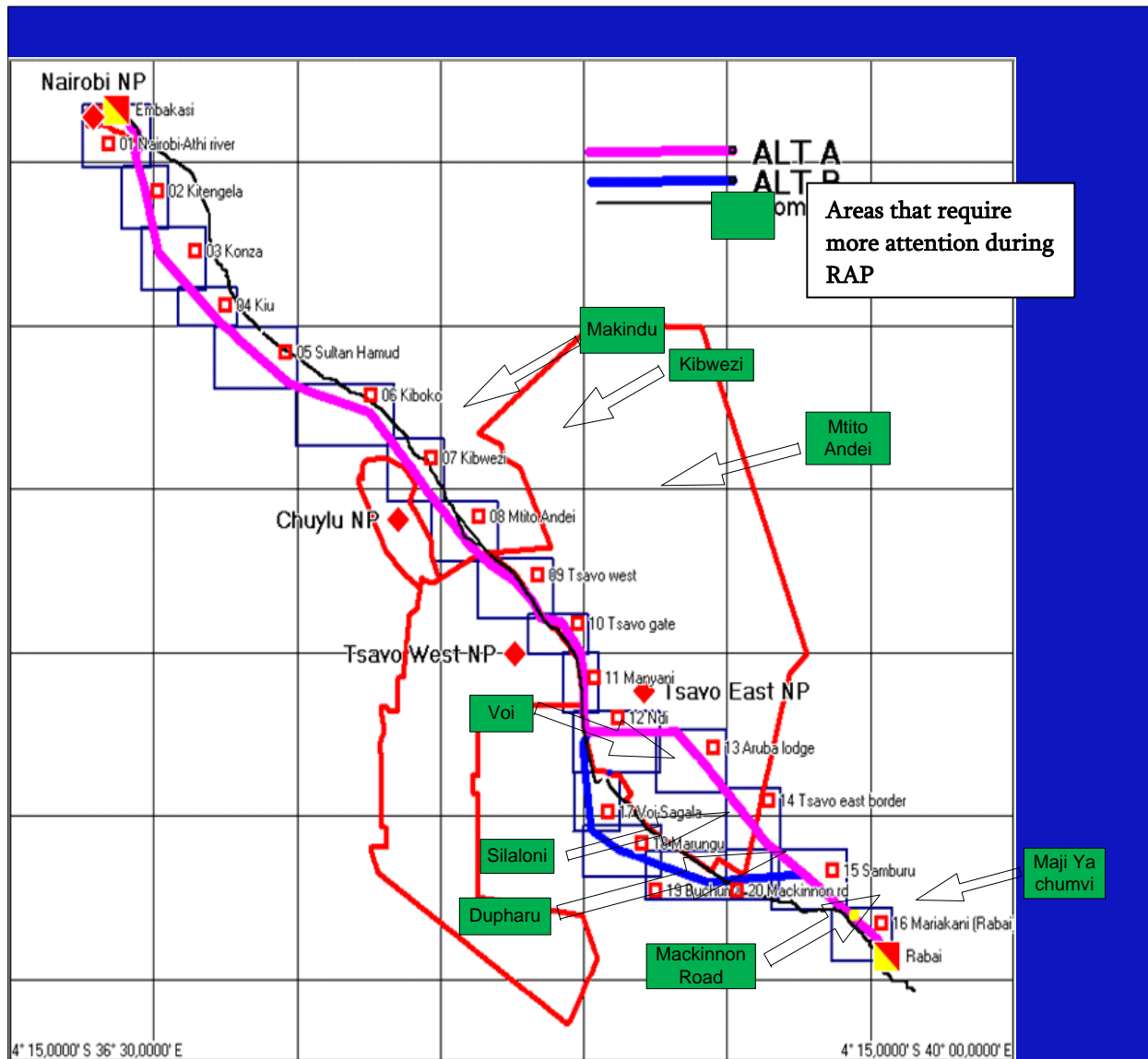


Fig 5.1 Overview of cut-out detailed maps, with sections (blue boxes), numbers and names (red boxes). National park boundaries in red

5.1 Biophysical Environment

5.1.1 Location

The transmission line will start from Rabai substation in Mombasa to the proposed Isinya sub-station to the south East of Nairobi. The Mombasa-Nairobi Transmission line traverses through settled areas, national parks, shrubs and savanna spanning about 462km. The current routing avoids passing through Tsavo East and affects the population living in the perimeter of the National park. Thereafter, the line will follow as much as possible the existing wayleaves between the Tsavo East and West National parks, along the Mombasa-Nairobi alignment. The line will avoid passing through the line of path of aircrafts near Jomo Kenyatta International Airport by using an underground cable for a distance of five kilometres in line with requirements of the Kenya Civil Aviation Authority (KCAA). The line will pass through some populated areas, although to a larger extent, it will pass through Shrubland and savanna grasslands used for ranching and grazing purposes.

Isinya Substation

The proposed substation at Isinya is located at where KPLC has acquired 100 acres of Land from Mr. Kikaya. The proposed substation is about 1km from Kikaya Primary School. The site of the proposed substation is open, flat grassland with short scattered acacia shrubs (Fig.5.2). The site is a grazing area for both domestic animals and wildlife.



Fig.5.2: *Animal grazing within the proposed Isinya substation in Kajiado district*

Settled areas are within a radius of 2km away from the proposed site. The structures bordering the substation include a church and the Isinya which is about 500m away from the proposed substation.



Fig.5.3: *AIC church neighbouring Isinya substation at Kajiado district*

The line passes through the following areas;

1. Nairobi national park

Nairobi national park is an important roosting site for lesser kestrel (vulnerable) on passage, although numbers have declined in recent years. There are 516 species of birds recorded, including 92 of Kenya's Somali-Masai biomes species and 25 of Kenya's African highland species. Other globally threatened species found in the park include Madagascar squacco heron (visitor, not breeding) and red-throated tit (near threatened). A number of regionally threatened species are occasionally or more frequently found in the park, including Common ostrich (common), African darter (scarce visitor), Great egret (regular visitor), Saddle-billed stork (resident, scarce), Ayre's hawk eagle (resident in forest), African crowned eagle (one pair in forest), Martial eagle (home range in park), African finfoot (resident, scarce) and Yellow-billed oxpecker (common).

1. Enkikiri-Emarti-Enkurai Section

The proposed line traverses through Enkikiri, Emarti, and Enkurai sub-locations of Ilmongush location in Kajiado District. From Isinya to Enkikiri Primary school-Emarti-Enkurai (AP1-AP2-AP3), the line runs through open shrub-land and rocky terrain with undulating topography. The area is characterised by short grasses, scattered dwellings and ranch land. This section of the line is occupied by the Masaai ethnic community.



Fig. 5.3: *Undulating topography with shrubs at Emarti in Kajiado district*

In the section between Konza and Kiu, the three alternatives converge in an area called Olperelungu. Most of the land in Olperelungu is savannah, grassland with few trees. The predominant land use is ranching and cattle grazing.

There are few houses or homesteads in the interior. Most of the land is relatively flat, but in the southern portion (south of the railway Konza-Kajiado-Magadi) it is hilly. There are abundant birds, among them weavers nesting in the scarce trees, but most game has disappeared due to poaching.

2. Enkurai-Kima-Nkama Section

The proposed line traverses through Enkurai (AP3), Kima (AP4) sub-locations of Ilmongush and Aroi locations respectively in Kajiado District. The line passes Nkama (AP5, AP6) location in Sultan Hamud after Aroi Location. This section of the line is characterised by hilly terrain with tall acacia trees. There is minimal crop farming especially around Kima and Nkama areas.



Fig. 5.4: *Hilly terrain at Nkama location in kajiado district*

Around Nkama location, the line traces about 1km of county council land of Olkejuado, off Sultan Hamud-Kibini road, characterized by thick forest.



Fig. 5.5: *Thick forest at Olkejuado county council land at Kajiado district*

The Angle point of the proposed line (AP6) is within Nong'aboolo Primary School's compound. The line also divides the school and the school dam.



Fig. 5.6: *Proposed line crossing through Nong'aboolo primary school*

3. Nkama-Poka-Kinyama-Kimboo

From Nkama to Poka, the line runs through open grassland with scattered acacia trees. The terrain is hilly comprising of rocky sections. From the open rangelands south of Sultan Hamud, the alignment leads east towards Kiboko. The vegetation progressively changes from grassland to open forest. The soil here is lava, with rocks strewn in the terrain; it is rather difficult to penetrate. There is wildlife in this area, herbivores as well as carnivores including hyenas and, anecdotally, even lions.



Fig. 5.7: A maize farm in Kimboo Village in Makueni District

4. Kaunguni-Utithi-Muthingini-Nthongiini Section

The proposed line traverses through Kaunguni, Utithi, Muthingini, and Nthongiini locations. The line then passes through densely populated areas of Kaunguni, Utithi, Muthingini and Nthongiini locations with many social structures. Arable farming is majorly practised in these areas, and is occupied by kamba ethnic community.

5. Tsavo East national park

The huge area of the park supports a large population of resident species and is also an important stop-over to wintering grounds for Palearctic migrants. Among globally threatened species are Lesser kestrel (vulnerable), Friedmann's lark and Basra reed warbler (Near threatened). The latter is a migrant from the Middle East. Other vulnerable species in Tsavo East national park include African darter, great egret, Saddle-billed stork, White-headed vulture, Martial eagle, African finfoot and Violet wood-hopoe. The proposed line has, however avoided the park.



Fig. 5.8 *View of grassland next to Tsavo east where the proposed line meets the Rabai-Embakasi line*

6. Tsavo west national park

Huge area of the park supports a large population of resident species and is also an important stop-over to wintering grounds for Palaearctic migrants. Among globally threatened species are Corncrake (vulnerable), Friedmann's lark and Basra reed warbler (Near threatened). The latter is a migrant from the Middle East. Ngulia Safari Lodge is a location where many migrating birds have been sighted and ringed (more than 200 000 since 1969). Lake Jike outside the park is an important location for herons. Other vulnerable species in Tsavo west national park include the same species as in Nairobi national park, with the addition of the Blue quail as a rare migrant.



Fig. 5.9: *Giraffes at Tsavo West national park*

7. Mtito Andei

Most of this section is characterized by small-scale agriculture on cleared shrub or woodland. South of Mtito Andei, the power lines pass into Tsavo West national park, where the land cover is characterized by open low shrubland. In this section there is not much wildlife before the national park. At the outskirts of Tsavo west national park intensive crop farming is practiced along the river that borders the park.



Fig. 5.10: *Farming practiced near Tsavo West National Park*

8. Tsavo to Ndi

The line leaves Tsavo west national park and heads northwards towards Kyulu station. This is in order to avoid congestion on the western side of the Mombasa road, where there is already the existing 132 kV line. Furthermore, the new line avoids Tsavo east national park and the Manyani airstrip further south. The land cover is mostly open shrubland. The main line trace shifts east south of Manyani near a small location called Ndi. This is the result of a compromise in order to accommodate as much as possible the request of KWS to avoid the rhino territory further north, nearer to Galana River.

9. Voi - Mariakani

The Sagalla section is majorly sagalla ranch, as its trace turns east south of Sagala mountain and continues south of the Mombassa road. On the western side of Sagala there is some smallholder agriculture, further south east the vegetation is mostly low shrub. At Buchuma, the line crosses the road to the north in order to avoid the densely populated areas near Mariakani to the south to join Kamburu- Rabai line.

10. Mariakani to Rabai

The proposed line joins Rabai - Kiambere line about 7 km away from Mariakani town. All along this section the proposed route follows the existing line between, and consists in a widening of the wayleave of that line of about 20 m. The land cover is characterized as low shrub and tree and shrub savannah. The route continues to follow the existing Kiambere line all the way through the Tsavo East national park, and to Rabai. At Rabai the area is characterized by small-scale farming mainly coconuts and peri-urban type of settlements. This region is mainly inhabited by the Mijikenda community at the Coast.



Fig. 5.11: Coconut trees at Rabai, Kilifi district.

Rabai substation

The Rabai substation is where the line originates in a NW direction. Population is much denser at its environs with undulating terrain.



Fig. 5.12: Rabai substation.

5.1.2 Biodiversity

Vegetation

The predominant type of vegetation in Tsavo national park is open low shrubs, and tree and shrub savannah. Nairobi national park is characterized by tree and shrub savannah. The vegetation progressively changes from grassland to open forest. The crops mainly cultivated along the proposed line are maize, beans, vegetables, peas, and coconut trees.

Fauna

It is expected that most of the large mammals can nowadays be found inside the protected areas. As reported by the local people, the wildlife in the areas between Isinya and Sultan Hamud has been severely reduced due to poaching, while there is still wildlife in the Kitengela game reserve and around Kiboko.



Fig. 5.13: *Ant-hill at paranae village*

The fig.4.13 shows the ant-hill where the proposed line angle point (AP8) is located of which during construction, there will be loss of biodiversity. The birds abundant along the planned power route are hornbills, herons, vultures, eagles and owls. The dominant animals along the route are elephants, zebras, monkeys, *Dik dik*, giraffes, antelopes and bush squirrels.

5.2 Socio-economic Characteristics'

5.2.1 Population and Social Characteristics

The data presented in table 5.1 is the estimate of population affected by the proposed line. The population affected was based on data collected from the field by using data collection tools e.g. questionnaires. The total population and number of households affected is summarized in Table 5.1:

Table 5.1: Summary of population affected by the power line

Province	District	Location	No. of households Affected	Estimated Population Affected
Rift Valley	Kajiado	Isinya	30	210
		Nkama	23	151
		Poka	12	84
		Kima	20	140
		Kenyewa	35	245
Eastern	Makueni	Ilmungush	25	175
		Utithi	60	420
		Nzambani	33	231
		Nthongoni	37	259
		Mtito Andei		Tsavo park
Coast	Taita Taveta	Ikanga	10	70
		Sagalla	24	168
	Kilifi	Rabai	25	175
		Pembe	15	105
		Mariakani	32	224
Kwale	Taru		Church/school	
Total			414	2898

A number of ethnic groups in Kenya reside along the planned power line route. None of them are to be considered as vulnerable ethnic minorities.

Social-Cultural Characteristics: The main ethnic groups in the project area are the Kamba, Taita, Maasai, and Rabai,

Kamba

The Kamba tribe (also called the Akamba) is a Bantu ethnic group who live in the semi-arid Eastern province of Kenya, stretching east from Nairobi, towards the Tsavo and north east to Embu. Kamba people have specialist skills in woodcarving and basketry. They are also involved in other activities such as hunting, farming and pastoralism.

Taita

The Taita people are a Bantu tribe living in the Taita Hills, on the South West of Kenya near the border with Tanzania and the surrounding plains. The Wadawida living on the slopes of this hill practice different forms of agriculture, with the bulk of the food they produce being sold to the residents of Coast Province, especially Mombasa town.

Maasai

Maasai tribe is one of the ethnic tribes of Kenya. Maasai tribe (or Masai) is a unique and popular tribe due to their long preserved culture. Despite education, civilization and western cultural influence, the maasai people, unlike other tribes of Kenya have clung to

their traditions and way of life making them a symbol of Kenyan culture. They practice nomadic pastoralism while others have been absorbed into modern day jobs working in tourism where they perform their culture to visiting tourists.

Rabai

The Rabai is one sub-tribe among the Mijikenda. The Mijikenda tribe is a Kenya coastal Bantu tribe that consists of nine closely related sub-tribes. Agriculture is the main economic activity of the Mijikenda people. Their most important cash crop is the coconut palm, whose products include its oil extracts, palm wine, and the fronds used for roofing and as material for making baskets, mats, brooms and other weaved products.

5.2.2 Economic Characteristics

The majority of the populations affected are;

- Peasant farmers
- Pastoralists
- Small and medium business operators and
- People in informal employment

5.2.3 Public Health

HIV-Aids is a severe health threat in Kenya, and HIV-positive prevalence is very high, at almost 7% of the population of ages 15-55. HIV/AIDS is a big problem and it ranks among the top ten diseases in the project area. During power line construction work, the project employees will interact with the local communities and this can have serious public health impacts. The other common diseases reported in Kenya are respiratory diseases, malaria, skin diseases and diarrheal diseases.

6.0 ENVIRONMENTAL & SOCIAL IMPACTS

6.1 Potential Positive Impacts

Kenya Power and Lighting Company considered and investigated several alternative routes for the development. The proposed route was identified as the best for transmission lines through an analysis of alternatives taking into account constraints on social and natural environment. The proposed route will likely to have the following positive impacts;

6.1.1 Employment Opportunities

Employment opportunities will be offered to the construction workers and any other person who will be hired to provide her/his services during the construction phase.

6.1.2 Additional Power Capacity

With the additional substations and power lines, Kenya Power and Lighting Company Limited will be able to increase its 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.

6.2 Potential Negative Impacts before Commissioning

Power transmission lines characteristically generate impacts such as acquisition and maintenance of the right of way, clearing of vegetation from sites and line corridor; construction of access roads, tower pads, and substations are the most obvious sources of construction-related impacts. The construction phase is the period where most disturbances to the environment will occur. Broadly, key negative impacts of the development are likely to include:

6.2.1 Impacts on Flora and Fauna

It is well known that transmission lines induce physical hazard to birds and climbing animals. Bird strikes and mortality will be of concern in the areas of their high densities and those areas with large birds such as waterfowl colonies and migratory bird species. This is likely to be of concern during the operation stage of the project but can be mitigated by use of reflectory conductor wire types which improve visibility for the birds.

The impact of a transmission line on fauna is limited. Except for birds, most animals are not disturbed by the transmission line. However, the cleared way-leave creates a specific biotope in areas with denser vegetation. This biotope is similar to a natural meadow,

although obviously much longer in extent, that acts as an open grazing area for herbivores, and hence as a hunting ground for carnivores. According to information from KWS and KPLC, elephants have not been shown to have any interest in, or problem with, existing transmission lines, for instance in Tsavo national park. Monkeys, such as baboons, climb the towers, but soon learn to avoid the conductors.

Birds occasionally collide with the transmission lines, and birds nesting in the towers pose a danger both to themselves and to the safe operation of the power line. This is because large nests eventually fill with droppings that can reach the conductors and cause electric shocks or burns. The effect is more severe for birds with long generation times, and for large birds, such as eagles.

Vegetation is affected in the way-leave, in the sense that higher trees and shrubs are cleared, creating an open stretch in woodland and shrub land. The most intense effect is during the construction phase, when in addition to clearing, vehicles and machines move in the way-leave for tower construction and stringing. These impacts will be completely negligible in the case of line construction because only tower/pole holes will be dug.

6.2.2 Impacts on Drainage, Surface Waters and Water Resources

Transmission lines may have both short-term and long-term impacts on water resources. Earthworks might release suspended particles in the water which could have temporary detrimental effect on water organisms. However, the main concern aside from these short-term impacts during construction work is the effect from tower pads and maintenance roads on the hydrological functions of wetlands or water resources which are also of minimal nature.

No water will be used for technological purposes. The OTHL route crosses some few rivers. The towers will be placed so as to leave a protection zone of 15 m when crossing rivers and streams with the span ranging of 10-15 m, and 5 m when crossing any drainage channels. Wastewaters from construction camps will be collected in mobile containers and discharged into approved sewer systems.

6.2.3 Landscape and Visual Impacts

The visual impact of the power line is an effect on a socio-cultural level. From the perspective of a tourist seeking pristine natural environments, any infrastructure reminding of industrial society is disturbing. However, from the perspective of rural populations, it may be seen as a sign of development, of hope that things will change for the better. Both these views are present in the development of infrastructure in Africa. Which of them shall prevail depends on political decisions, and on economic reasoning.

The proposed development will also have minimal effects on the landscape. The OHTL route was established so as to meet the co-inhabitation requirements imposed by the natural landscape, objects, buildings, and facilities in the neighborhood, assuring it's framing into the existing landscape and with an impact on as limited land areas as possible.

6.2.4 Electric Power Lines

Electric and Magnetic Fields

Electric overhead lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived health effect. The strength of both electric and magnetic fields is a function of the voltage, distance from the conductors to the ground and the lateral distance from the line to the receptor. Many studies published during the last decade on occupational exposure to Electro-Magnetic Fields (EMF) have exhibited a number of inconsistencies and no clear, convincing evidence exists to show that residential exposures to electric and magnetic fields are a threat to human health. However, the EMF decrease very rapidly with distance from source and there should be no potential health risks for people living outside the 60 m wide way leave corridor.

Vibration

Kenya Power and Lighting Company will install anti-vibrating devices over the entire over head transmission line (OHTL) length to damp vibration caused by the conductors exposed to the dynamic load of wind.

6.2.5 Impacts on Natural Vegetation

To a large extent, the transmission line will pass through shrubland and savanna grasslands used for ranching and grazing purposes. The predominant vegetation forms are shrubland and savannah with scattered trees and shrubs. Most of the woodland is open and with low trees and bushes. While the passage through the border line of the two Tsavo National parks will inevitably take up some land, this will affect similar types of land, and is generally not expected to cause substantial impacts on the flora and fauna. While impact on woody vegetation is going to be permanent, impact on grasses and herbs is mostly transient.

In order to minimize the environmental impact it is recommended that clearing is done manually as much as possible with no burning of the cleared vegetation. In order to reduce the impact of firewood used in the worker's camps it is recommended that wood from the clearings is transported to the camp sites. It is important to reiterate that, vegetation clearance through the Protected Areas will be done with the guidance of KWS staff.

6.2.6 Impact on Biodiversity and Loss of Habitat

The consultant reviewed the Wildlife Act and noted that the proposed development will not cause significant adverse effects on the park that will be affected. The construction activities may cause temporary and limited damage to local flora and fauna. Tree and bush clearance will be limited as most tree/shrubs within the wayleave are less than 12 ft in height, the maximum allowed. The cleared vegetation will be recovered by planting small trees and plants. The OHTL does not interfere with any major bird migration routes. In areas of known bird flight paths, warning spheres will be placed on the OHTL.

6.2.7 Land Excavation, Access Roads Construction and Camp Sites

In order to minimize the need for construction of access roads, the transmission line is located relatively near to existing roads or line corridors. Access roads for heavy equipment that will be used only during the construction phase should be removed after completion of the work. Depots and working camps should be located in such a way that they can either be used for other purposes after the time of construction (i.e. in conjunction with local plans), or be removed without trace.

Erosion may be a problem during construction, especially in areas with thin soil layers. Great care should be exercised when constructing the lines in slopes to avoid loss of soil and low vegetation that protect from erosion.

6.2.8 Noise, Ozone and Corona

During the construction, permissible/acceptable human noise levels can be temporarily exceeded due to the operation of Lorries and equipment in the working zone of the OHTL site. Noise abatement measures will be taken in the zones crossing the residential areas, including adequate work scheduling.

Corona or electrical discharges into the air are produced around high voltage power lines. It is sometimes visible on a humid night or during rainfall and can produce noise and ozone. Both the noise levels and ozone concentrations around power lines have no health consequence and are localized impacts.

6.2.9 Impacts on Aviation and Communication

Aircraft navigation and communication facilities may be affected by the project. A survey was performed by the Kenya Civil Aviation Authority, which proposed changes to the location of the line near Nairobi, and a restriction on the height of towers, which should not exceed 35 m for any of the line. This is due to the many small airstrips along the line, in addition to Jomo Kenyatta International Airport and Wilson Airport in Nairobi.

Furthermore, the conductors shall be marked with visibility markers according to the conditions of the KCAA.

6.2.10 Social Impacts

The project areas immediately outside the Tsavo and Nairobi National Parks are not densely populated. At the Rabai section the population is much denser to the South West, and most of the area is characterized by small-scale farming and peri-urban type of settlements. There will likely be large negative impacts due to; dense population in the route corridor, presence of ranches, farms and related private properties and institutions.

Some of the social structures affected by the project include:

- GreenHill primary school where the power line traverses through playground. The school needs complete relocation since the proposed line traverses the only available playing ground available for the children. The relocation of the school will cause social impact to the community since the community will lack a school in its vicinity. The school should be relocated to a nearby land to minimize social impacts to the community.



Fig 6.1: *GreenHill academy in Taita Taveta district*

- PEFA church: the proposed line traverses right above the church hence complete relocation is recommended. Therefore, since the church members will not be relocated with the church, it will result to depriving the community a place of worship or cause negative social impact. KPLC should consult with church members to ensure proper relocation is done to minimize social impacts to the community.



Fig 6.2: *PEFA church in Taita Taveta district*

- Kaunguni primary school: the proposed line passes through the edge of the playing field hence, depriving the students playing space since it is dangerous for them to play below the lines. KPLC should fence along the line section crossing the field.



Fig.6.3. *Affected Kaunguni primary school play ground in Kibwezi district*

- A.C.K church: the proposed line passes through the grave yard of the church. The members are not in agreement for any form of compensation and needs the grave to remain untouched. KPLC should ensure that no excavation of graves is done during construction.



Fig.6.4 *Affected A.C.K church graveyard in Taita Taveta district*

Other specific social concerns on the project include fragmenting cultivated lands thereby compromising productivity and incomes, loss of crops and fruit trees. Project impacts such as importation of labour into the areas coupled with establishment of workers camp sites and temporary access roads as well as the right of way are likely to bring negative impacts to the areas. While attention will be focused on loss of income due to temporary disturbance to crops or grazing areas, and on health conditions related to the influx of workers from outside the area (HIV/AIDS being the major concern), positive opportunities to Project Affected Persons may be presented in form of temporary employment, as well as through income generated by the sale of food to immigrant workers. The implementation of the Resettlement Action Plan will address all major key concerns relating to social issues.

6.2.11 Cultural Ethical Impacts

The selected route is not expected to cause any damage to historical, archeological and cultural sites. Kenya Power and Lighting will consult widely and monitor the OHTL throughout the works period to ensure no archaeologically valuable areas will be disturbed.

In the event that an archeological resource is discovered during the construction process a Chance Find Procedure will be implemented. A Chance Find Procedure, as described in Performance Standard 8 of IFC, is a process that prevents archeological sites from being disturbed until an assessment by a competent specialist is made and actions consistent with the requirements of PS8 are implemented. It is a project-specific procedure that outlines what will happen if previously unknown physical resources are encountered during project construction or operation. The procedure includes record keeping and expert verification procedures, chain of custody instructions for movable finds, and clear criteria for potential temporary work stoppages that could be required for rapid disposition of issues related to the finds. In accordance with this Procedure, work will

cease on a site where archaeological material is found. The site Environmental Officer will inspect and secure the site, and will then contact Museums of Kenya for advice and arrange for a survey or salvage work as appropriate.

6.2.12 Impact on Agriculture, Settlements and Community facilities

Most of the impact on social life along the transmission line will be during the construction period. The impacts will be both positive and negative. Positive impacts include temporary markets for goods and services, including sources of employment for certain tasks during construction. Some of the recreation requirements of the work force are likely to cause negative impacts. Use of alcohol among the working crew may affect the local population negatively through increased violence and abuse of local women. There will also be an increased risk for spreading of sexually transmitted diseases among them HIV/AIDS in the project area.

6.2.13 Solid Waste

There will be loss of existing under growth during the clearing of the wayleaves in readiness for the stringing work. There will also be solid waste generated from the excavation works. Some of the excavated soil will be reused as backfill while the rest will be disposed of to the designated areas. Solid topsoil wastes from the sites will be the main form of solid waste. Other solid wastes will include metallic pieces, wooden planks, and stone debris. All the wastes will be disposed of according to the legislation guiding the same.

6.2.14 Impact on Ambient Air

The air emissions from construction machinery and traffic will be minor and they will have negligible impact on ambient air quality.

6.2.15 Health Issues

Some of the significant health concerns associated with new projects include shortage of facilities like toilets and catering facilities for construction workers. In this instance the constructor remains the only responsible party to ensure that his or her workers are provided with the required facilities. These facilities could either be put in place before the construction of lines commences or arrangement could be done such that the personnel working along the line could get the facilities from the neighbouring communities.

The control building for equipment and control facility will be supplied with portable water and shall have sanitation and wastewater facility. Periodical investigations and maintenance and remedy of failures and accidents will be performed by specifically trained staff.

6.2.16 Safety Issues

During the construction phase, the work will involve the use of sharp objects, noisy machineries and dusty environment. The constructor will be required to provide his workers with the relevant protective gears like boots, gloves, protective clothing dust masks and earmuffs. These should be provided for in the project budget. The ground will also be made wet to prevent dust. Warning signs will be expected to be displayed next to dangerous points and machines so as to restrict the movement of unauthorised personnel on site during construction and to warn heavy load vehicles that will be at the site against possible danger. All litter and debris will be picked up and disposed in a central disposal site so as to avoid subsequent injuries during and after the construction work is complete. A safety officer will be at the construction site during the construction phase, at all times. The safety officer will make sure a first aid kit is always available and that the skilled workers are aware of the safety rules.

The immediate surrounding will experience an increase in human traffic and noise during ground preparation. In a construction site noise is likely to be produced by the construction machinery excavator and lorries during the civil works. Noise is also most likely to emanate from the regular masonry operations such as stone dressing.

The machine operators and workers who will be in close proximity to the machinery will be required to wear protective gears such as earmuffs during the construction period.

Acute noise damages (Acoustic trauma) occur when the ear is damaged from a single or relatively few exposures of sound at pressure levels of 100-120 dB. Noise damages to the ear can either be temporary or permanent.

There will be significant amounts of dust during the excavation and civil works. A high fence of about 3.0m with a gate should be done first before most of the other civil works to minimize the dust being blown off by the winds especially if construction will be done during dry spells.

Workers must wear safety gears like gumboots, helmets, safety belts (harness), dust masks and approved welding glasses for welders. Other safety precautions are stipulated in the Kenya Safety Code and in the Factory Act.

The power lines may have negative safety impacts on the immediate environment including flora and fauna. However, Kenya Power and Lighting Company will put in place measures towards protecting vegetation and organisms beneath the power lines by constructing the lines within the standard height. In the project design every steel tower and pole will have a danger sign and an anti-climbing barbed wire for the safety purposes. Danger/Hatari cable markers will also be laid along the cable routes

6.2.17 Displacement

The proposed development will displace people within the wayleave, and will be forced to relocate their buildings. KPLC will acquire the wayleaves using the company's policy on land acquisition which is based on mutual agreement with the affected land owners. Kenya Power and Lighting Company will compensate all affected persons adequately, taking into consideration the following for those who may be required to relocate to another different location:

- Compensation for land and assets lost to people developing land for resettlement,
- logistical provision for resettling the people
- Compensate the people in terms of earnings (loss of current earnings)

The consultant however noted that majority of the persons affect by the wayleave will just move their buildings within their own pieces of land without need for relocating to another site altogether.

6.3 Potential Impacts after Commissioning

6.3.1 Waste Generated

The expected liquid waste after commissioning might result from leakages of oil from the transformers during its normal operation and in the two terminal substations. However, careful handling can prevent this during refilling and proper maintenance to avoid leakages.

6.3.2 Noise

Overhead transmission lines will produce noise. The noise is characterized by a crackling sound (corona effect). During operation phase, the corona effect around live conductors will generate some noise, which will have limited impact on the health and comfort of people who live in the immediate vicinity (within 100 m) of the OHTL. The effect will be minimal and/or reduced by ensuring the lines are engaged all the time as the noise is as a result of the lines being idle.

6.3.3 Communications Interference

The KPLC overhead power lines are designed to limit corona discharges. The corona noise levels or ozone concentrations have negligible interference on the radio and television signals. Kenya Power and Lighting Company will also incorporate appropriate buffer zones as a further precaution.

7.0 PUBLIC CONSULTATIONS AND PUBLIC DISCLOSURE

Community participation and consultation were undertaken among people living along the proposed transmission line corridor and area of influence as an integral part of the ESIA study. These meetings enabled interested and affected parties to contribute their concerns (views and opinions on the proposed development) which might have been overlooked during the scoping exercise. A synopsis of the views of the project affected people as well as representatives of the Local Councils in the districts through which the project traverses; who will be interviewed during the updating of the ESIA will be presented and incorporated in predicting impacts and the development of the ESMP.

The consultant particularly gave close attention to persons within the proposed wayleave trace. The views of these stakeholders were considered and their names, identification numbers and contacts were taken for future references as required by NEMA.

During the study, the consultant and KPLC further explained to the public and relevant stakeholders that the proposed development would involve construction of 462 km of 400kV transmission line from Mombasa to Nairobi and also answered any questions that the public might sought to know about the project.

Four public consultation meetings (barazas) were held in areas judged to be affected by the planned power line and sufficiently densely populated. The provincial administration facilitated the meetings except for Kianguni primary school where parents attending a sports day were mobilized by the deputy head teacher and the consultants.

The following is the summary of the discussions:

Meeting 1: Meeting at sokoni trading centre in Kimboo village Kiboko in Makueni district location on 03/03/2009 at 15:45 to 14:10 pm.

In attendance: 60 locals and 3 consultants

Summary of the issues raised:

- Local labour should be used in construction and operation
- Find ways to provide power to the local community.
- They were generally not resisting the project.

Meeting 2: Meeting at Itumo centre in Kibwezi district on 04/03/2009 at 12:20 to 1:10pm

In attendance: 23 locals and 1 consultant

Summary of the issues raised:

- They requested to provide labour all the way to Rabai
- Payment of the labour

Meeting 3: Meeting at Kaunguni primary school in Kibwezi district on 05/03/2009 at 12:00 to 12:35pm

In attendance: 14 locals and 2 consultants

Summary of the issues raised:

- The mode of compensation if the school is re-located
- Provision of unskilled labour
- Rural electrification

Meeting 4: Meeting at Mwabila in Kilifi district on 06/03/2009 at 2:00 to 2:20pm

In attendance: 19 locals and 2 consultants

Summary of the issues raised:

- Compensation should relocation and not in cash if fully affected
- Provision of unskilled labour
- Improve the infrastructure e.g. roads
- Water project



Figure.7.1. Consultant describing the proposed line to the community at Kiboko location.

8.0 DECOMMISSIONING

The lifespan of the proposed transmission line is expected to be long. At the end of its lifespan, decommissioning of the project would occur. This is because, as with any project, the facilities, such as towers and cables used in this Project will have a lifetime after which they may no longer be cost effective to continue operation. The specific closure activities during project decommissioning discussed in this section should be viewed as preliminary due to the future nature of these activities. The specific closure activities would be subject to change over time as environmental engineering techniques evolve and become more efficient, and as more definitive information is developed during the life of the project.

During decommissioning, all transmission line structures and equipment would be dismantled and removed. The physical removal of the line and pylons will be the reversal of the construction process. All areas disturbed by the proposed project would be restored to pre-project conditions and/or to conditions acceptable to the NEMA.

At least two years prior to the anticipated cessation of operations, a decommissioning plan for permanent closure of the project would be developed in cooperation with the KPLC and NEMA. This plan would identify specific actions and a schedule for decommissioning of the project, and identify steps and procedures to restore the project area to acceptable conditions. The decommissioning plan would also provide measures to minimize effects to the surface water, groundwater, and other resources during decommissioning, and identify how project materials would be recycled.

There will be a programme of rehabilitation of the land around the pylons (removal of ground anchors, foundations, etc.) and the access routes that will be compatible with the surrounding environment and/or land use. This should be agreed with the landowners and it is likely the landowner would need to sign off the work done.

It is not expected that the servitude rights would automatically be returned to the landowner as part of the decommissioning process. These rights may be retained by KPLC Transmission for later use as appropriate. However, this is considered a separate matter between KPLC Transmission and the landowner, and is not included in this EIA. Nevertheless, it is expected that any reuse of the servitude for transmission would need a separate environmental authorisation, and is thus also outside the scope of this EIA.

The disposal of materials from the decommissioned Transmission line is not seen as a high-risk matter. Much of the material would be recyclable (steel structures and cabling) or inert (insulators, concrete foundations, etc.). These materials would however, need to be disposed of at a formal waste disposal or recycling centre. There are no hazardous materials associated with the Transmission line itself.

When the project moves into the decommissioning stage, negative impacts that may result from decommissioning activities will have to be mitigated. Decommissioning may require outside contractors. The components of negative environmental mitigation that will be addressed include, risk management analysis and emergency response. Implementation and monitoring of environmental, health, and safety issues with regards to legislations outlined in the legislative framework in chapter two of this report and the laws of Kenya will have to be put into consideration.

It will also be necessary for KPLC to undertake comprehensive environmental audits and inspections before and after decommissioning and submit the respective audit reports to NEMA for evaluation and approval.

There are typically requirements such as personal protective equipment, maintaining a safe workplace, fire prevention, safe work practices, etc., as provided in the Kenya Safety Code, Grid Code and the Factories Act, that the contractor must adhere to during decommissioning. Contractors are expected to comply with these requirements as a minimum. Contractor must avail his safety plans for the decommissioning work and this must be reviewed for compliance. The contractor's best safety practices will then be incorporated into the decommissioning plan as appropriate.

The things that the contractor will have to keep abreast include checking of potential hazards and risks, development of a risk register (The risk register is an evergreen document that will be used and be updated on a continuous basis to identify and mitigate risks as they surface), contractor's personnel will be expected to regularly observe work practices and provide positive reinforcement and guidance to fellow employees, work practices that may be considered to place employees or the environment at risk will be identified, evaluated, and modified as necessary to eliminate or substantially reduce the risk.

8.1 Decommissioning Plan

The goal of project decommissioning will be to remove the installed power towers, cables, and line equipment partly or as a whole and return the site to a condition as close to a pre-construction state as feasible. The major activities that will be required for the decommissioning of Mombasa-Nairobi 400kV transmission line are:

1. Tower removal
2. Electrical system removal
3. Re-vegetation

It is noteworthy that the specific requirements and approach for each activity may not be as exactly as it was before commissioning because the technologies and construction techniques available when the project will be decommissioned may have changed. The

disassembly and removal of substation equipment will essentially be the same as its installation, but in reverse order.

Potential environmental impacts caused during decommissioning and those, which will be mitigated as per the provision in the environmental management plan, are dust and noise to the surrounding environment and public safety.

8.2 Transmission Line Removal

During decommissioning, all transmission line structures and equipment would be dismantled and removed, and the project area restored to pre-project conditions or to conditions acceptable to NEMA. After the transmission line is deactivated, the transmission line conductors would be disconnected. The conductors would then be removed from the support poles, the support poles would be taken down, and pole footings would be removed.

The recycling or reuse of materials, such as scrap metal, would depend on the market and existing technology. Roads implemented for the project to access the transmission line would be closed and restored, as directed by the NEMA.

8.3 Structural Foundation Removal

When towers are removed from their foundations, the foundations need to be removed too so as to enable re-vegetation of the land. The concrete and steel in the foundations will be broken-up and removed to appropriate depth. Shallow foundations (like that for buildings) will be removed in their entirety. All concrete and steel debris will be removed from the site.

Site Access Control: The project cannot limit public access to the site to a level lower than it was prior to the start of construction, except in those areas where public safety could be jeopardized.

8.4 Public safety

A safety officer, hired by the contractor, will have the authority or responsibility of keeping all members of the public away from the decommissioning zone, especially if members of the public choose to ignore posting signs or requests for them to keep some distance from the decommissioning zone.

- i. **Dust Impacts:** Temporary and localized impacts from dust would occur from the decommissioning phase as a result of vehicular traffic, and other soil disturbances.

Mitigation: During decommissioning some localized increase in dust levels will be unavoidable. To minimize these levels, the contractor will use water to control dust, and traffic speed will be held to appropriate levels. Disturbed areas will be re-vegetated or otherwise covered as soon as possible following disturbance.

- ii. **Noise Impacts:** Local noise levels will be affected temporarily by decommissioning activities (such as equipment movement), but for the remote nature of the sites no impacts are anticipated to residences or businesses. Impacts during decommissioning are expected to be limited to workers on-site.

Mitigation: All decommissioning will take place during daylight hours. Through communications with the local communities, KPLC and the contractor will be kept informed of any dust or noise complaints. If significant dust or noise complaints are received, dust and noise measurements will be taken along the project boundary or near the complaint sources to ascertain the true dust or noise levels. If the levels are found to be unsatisfactory, alternative mitigation measures will be explored.

8.5 Fire and Oil Spill Prevention:

Fire will be prevented during decommissioning by ensuring that there is adequate availability of fire extinguishers onsite. The personnel undertaking the removal of the equipment will have to be trained on fire fighting and if possible, reasonable fire grills will have to be done to enhance awareness and safety. In case of oil spills, all the equipment and machines that will have the potential of spilling or leaking oil will be checked regularly. If oil spills/leaks are discovered, then capping or any other necessary actions will be taken immediately to prevent the spill/leak from dropping onto the ground. However, careful handling will be done to avoid spilling at all times.

8.6 Manpower

Project decommissioning activities would be similar to project construction activities, and would primarily involve the dismantling and removal of the transmission line. Actual dismantling, removal, and closure activities would be expected to take as long as or less than the construction period thus it will require the same manpower used in construction.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

Based on field work and consultations with Project affected people, locals, the client, KWS, KCAA and provincial administration, it was concluded that:

- It is unlikely that the Project will have significant adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures for the Project such that the overall benefits from the Project will greatly outweigh the few adverse impacts.
- All the negative impacts will either be moderate or lesser in rating and could be easily mitigated.
- Generally, the proposed line will result in appreciable benefits to the people in the project area of influence and bring opportunities for development to the country. The main social impact management issues revolve around relocation of people along the transmission line corridor and acquisition of the right of way and way leave of the transmission line.

9.2 Recommendations

From the foregoing, the following recommendations have been made:

1. Compliance with the ESMP

The client shall comply with the requirements of the ESMP throughout the project period.

2. Annual Environmental Audits

KPLC should undertake an environmental audit (EA) of the projects, in accordance to NEMA Regulations, twelve (12) months after completion of the project to confirm the efficacy and adequacy of the ESMP. This can be done by seeking the services of Environmental Consultants who should be Lead Agents registered by NEMA. The team should consist of the following experts as a minimum:

- Lead Environmental Consultant (Senior Environmentalist/Team leader)
- Sociologist

In addition to this KPLC should also conduct regular Self Audit of the same.

3. Implementation Plan

The consultant recommended that the proposed projects be implemented in compliance with all the relevant legislation and planning requirements of Kenya at all times. In addressing the environmental issues, the contractor and/or KPLC must follow the mitigation guidelines provided under ESMP. This will ensure the safety of operators and the neighbouring communities. It is also recommended that a safety officer should be stationed at every site, during the whole construction phase. The safety officer will make sure that a first aid kit is always available and that all the skilled workers follow the safety rules.

4. Corporate Social Responsibility

Kenya Power and Lighting need to consider supporting the affected communities in afforestation, water provision, provision of social amenities and rural electrification as a corporate social responsibility. Some of the regions along the proposed line where these amenities would be required include the settlement areas of:

- Makindu
- Kibwezi
- Mtito andei
- Mackinnon Road
- Maji ya Chumvi
- Silaloni
- Duphraru
- Sagalla
- Taita

10.0 APPENDICES

APPENDIX 1: PUBLIC CONSULTATION LIST

Consultancy Services to Update the Environmental and Social Impact Assessment, Developing an Environmental Management Plan and Resettlement Action Plan

Public Participation Form

No	Name	Location	ID No	Address	Tel No
1	ANITA NG'OMBO	UTITHI	1553478	169 KBZ	
2	KINGOLA MURUKU	UTITHI	10275613	169 KBZ	
3	MUNGWOKI MABUKI	UTITHI		169 KBZ	
4	MWIKI MIBUNGI	UTITHI	21261706	62 KBZ	
5	Ketungu MATHA	UTITHI		169 KBZ	
6	Peter Mutia	UTITHI	7064304	169 KBZ	
7	Julian MOKULU	UTITHI	26953339	169 KBZ	
8	Wayua NZEKU	UTITHI	7392120	169 KBZ	
9	Syondau Muli	UTITHI	6274821	169 KBZ	
10	Nzilani Kimuyu	UTITHI	20715655	169 KBZ	
11	Nzeku Kiambo	UTITHI	7392070	169 KBZ	
12	Mwende Kimbu	UTITHI	17280992	169 KBZ	
13	Mukani Masila	UTITHI	13956835	169 KBZ	
14	REGINA KIMINDE	UTITHI	10738992	169 KBZ	

Log Associates, February 2009

[Signature] 4/03/09
 ASSY CHIEF MANGE SUB. LOGATITHI
 P.O. BOX 1 NAIROBI

Consultancy Services to Update the Environmental and Social Impact Assessment, Developing an
Environmental Management Plan and Resettlement Action Plan

Public Participation Form

No	Name	Location	ID No	Address	Tel No
1	Ndala Ndoro	Utithi		169 Tiwano KAE	
2	Benindeka Mubuku	Utithi		169 Kuumo	
3	Anna Kioko	Utithi		169 Kibweza	
4	Hedemba Mubungu	Utithi		169 "	
5	Victoria Kaumbura	Utithi		169 "	
6	Catherine Mubuku	Utithi		" "	
7	Habeca Ndisi	Utithi	7392434	" "	
8	Mareka Ndisi	Utithi	7464455	" "	
9	Joyce Peter	Utithi		" "	
10	Mbeti Mwalolo	Utithi		" "	
11	Argnes Musyoka	Utithi	2359053	" "	
12	Scola Joel	Utithi		" "	
13	Mwikali Ndivo	Utithi		" "	
14	Joseph Mawey	Utithi	5040881	" "	

Log Associates, February 2009

Consultancy Services to Update the Environmental and Social Impact Assessment, Developing an
Environmental Management Plan and Resettlement Action Plan

Public Participation Form

No	Name	Location	ID No	Address	Tel No
1	Mary Muli	USITHI		169 Kibwezi	
2	Grace Ndaro	"	6274636	"	
3	Nolands Muevu	"	7708862		
4	ANNA Mungira	"	21376645	136 Kibwezi	
5	Tabitha Kulemba	"	7892606	136 Kibwezi	
6	Francisco Mhose	"	1452103		
7	Musyimi KALWA	"	7053817		
8	Judy Kii	"		136 Kibwezi	
9	KATI KAMUWA KATE Mungira	"	7724321 13763629		
10	Tabitha Ngarozi	"	7371320		
11	VABET MUMICA	"	13763629		
12	KAMUWA SYUKA Tabitha Ngarozi	"	13763628		
13	ROSALIN HBUKU	"	21261756		
14					

Log Associates, February 2009

Consultancy Services for updating the Environmental and Social Impact Assessment, Development of an Environmental and Social Management Plan and Resettlement Action Plan

Public Participation Form

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MR. C.M.S. Kekayanga			Box 261 Kajiado	0722654870
MR. ROBERT M. NYAMWE	Kiboko	1499486	Box 12 MK4	0726354292
MR. NITHANDA M. KALII	Njauwau	1497228	Box 248 MK4	0724137633
MR. MARTIN MUKII	Njauwau	5334922	Box 95 Mkwinda	0720882904
MR. SIMON MUTHIKA	Njauwau		Box 248 Mkwinda	0720700187
MR. MICHAEL M. MURITHI	Nzambani	13764184	Box 14 Mkwinda	0713879087
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MR. Mwakanda	Mwalegha			
MR. John Mwangura	Kanga Shaps			0728505406

Consultancy Services for updating the Environmental and Social Impact Assessment, Development of an Environmental and Social Management Plan and Resettlement Action Plan

Public Participation Form

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Phyllis MAGANA	MARUNGU	2979583 0720703054	180 VOI	0720703054
BENEFACE MWABUSA	MARUNGU	11313445	295 VOI	0710238396
PASCAL - M. MUKONYA	MARUNGU	10799734	310 VOI - 80250	020-8030575
William TUMBA	TARU	6732163	P.O. TARU	-
Eliza Muri Pascal	Taru (mombasa)	-	Mombasa	0720832663
LEHI NDOO LOKO	SAMBURU	8395825	-	-
STEPHEN M. DALU	SAMBURU KPC 2	-	SAMBURU	0710482468
ALBERT NANTANU OYALE	TARU	6722923	-	-
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KAMANZA - CHINAYA	SAMBURU	10226503	SAMBURU	-
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NZAR WABUKI ZIOGHE	ZIOGHE	-	-	-
KAZUNGEY GIDOK	MARIAKANI	-	-	-
MADISON KATANA	MARIAKANI	-	-	-
KITSHO ZIA GURUK	MARIAKANI	-	-	0733588183

Log Associates, February 2009

Consultancy Services for updating the Environmental and Social Impact Assessment, Development of an Environmental and Social Management Plan and Resettlement Action Plan

Public Participation Form

Name	Location	ID Number	Address	Tel Number
SADIQA MZUNGO	MWAVUMBO	27380616	% 104 MKI.	0723534353
JOHN M. RUWA	"	2193536	% 46 MKI.	—
NTAMVULA LUVI	"	—	% 46 MKI.	—
Mwei Kimani	"	—	—	—
Kabibi Mwei	"	—	—	—
Munaa Muthaka	"	—	—	—
Muthaki Mwei	"	—	—	—
Dennis Chiranga	"	—	—	—
Maria Robert	"	—	% 78 MKI.	—
CHITSAHA MTWANA NYAA				

APPENDIX 2: TERMS OF REFERENCE FOR ESIA REVIEW AND UPDATE

The environmental and social impact study will be based on the studies regarding environmental and social aspects that were previously carried out, and focus on those effects and areas that are likely to have changed significantly since the previous studies. This relates especially to those urban and peri-urban areas that have become more densely populated since earlier studies.

The following is a brief outline of the terms of reference for the review and update of the ESIA study. Essentially it shows the contents of the ESIA report that should be presented as part of the project and should be used for obtaining the environmental permits necessary. Note that the Social Impact Assessment is integrated into the ESIA, and is not presented as a separate study.

2.1 Executive summary

A brief non-technical summary of major findings of the assessment. It should be possible to comprehend also by laymen in the area, and if possible and required, be presented to the stakeholders at various levels.

2.2 Introduction

The ESIA will be carried out as an independent study. It contains desk study aspects as well as field survey components. The ESIA will be founded on in-depth review of previous EIAs carried out for the precursors of the project. Hence, it is expected that a wealth of a data and information regarding the environmental and social conditions is already available which will form a useful foundation for the implementation as part of the present feasibility study.

2.3 Description of the EIA process and public involvement in Kenya

This chapter contains a review of the current EIA process in Kenya with the requirements, standards and specificities according to the Kenya Environmental Management and Coordination Act. An outline will be made of where this process differs from the international standards and a reason for why either international or national standards will be adhered to this project. This report has been prepared to a level where it can be used for application of all permits necessary for approval of the project from the environmental point of view.

2.4 Description of the project and alternatives

An outline of the technical project will be presented in this document. This will include the most salient features of the project including the goals and objectives,

technical solutions, proposed line routes foreseen situation at the end of the project. It will also outline the installations and processes considered in the study including the line route, substation locations, access roads, construction and operation periods.

2.4.1 Alternatives

This report will present alternatives to the project as well as alternatives within the project. Alternatives within the project refer to alternative choices of line route, location of substations, choice of technology and design etc. Regarding alternatives to the project, other ways to reach the proposed objective (if any) will be briefly described.

The baseline alternative is the alternative within the project that is described in the technical feasibility study. It includes the proposed solutions and line route(right of way). The baseline alternative will be based on the findings of the study in order to minimize negative environmental and social impacts. It will be presented in maps, pictures and report test.

2.4 Description of the landscape and environment

The landscape along the route will be described using the maps and photographs. In addition to topographical maps, thematic maps, such as vegetation maps, soil maps will also be presented if available. The description will also be supported by statistics about the social and natural conservation conditions along the right of way. Social condition include population (in the smallest aggregation available) livelihood basis(agriculture, livestock, breeding, forestry).communications etc. Conservation conditions include various forms of natural protection areas,(conservation area, game park, national park) in this case especially the Tsavo National park and Zonal protections of species of flora and fauna.

2.5 Flora and Fauna

Information about flora and fauna will be obtained from the natural protection agencies of Kenya as well as through field observations. However the study will not include specific inventories over large areas but will largely be based on secondary information. Analysis of the project impacts on flora and fauna shall be expected to cover among others effects on

- Habitats of wildlife, including any protected species
- Impact on local wildlife including bird migration effects
- Flora of special conservation interest, including endangered or protected species if any and considering any protected areas or conservation reserves bypassed.

2.6 Impact on Physical Environment

2.6.1 Landscape and visual amenity

The erection of pylons may be perceived as having an impact on the visual landscape. The study shall therefore address the issue of visual impact from the suggested transmission line. The section will provide input for selecting the most appropriate line route from the point of visual impact as well as the suggestion of less offensive structures pylon tower design in certain sensitive areas e.g. the Tsavo National park

2.6.2 Erosion and soils

This aspect is expected to address potential impact on physical environment including erosion and other effects of construction activities such as extraction of construction material and erosion that may result and generation and disposal of waste and surplus material

2.6.3 Impact of electrical and magnetic fields

The current scientific position on electric and magnetic fields will be outline as well as the implications for the local population and activities with respect to risks, safety zones etc.

2.7 Socio-economic study

The potential influence of the project on social conditions will be studied in areas where significant changes have occurred since the previous EIA report. The basis for the socio – economic assessment is availability of data and statistics regarding population, income, communication, livelihood e.tc. the base line data will be enhanced by key interviews in target communities. The result of the socio economic analysis will form the data base for the re settlement management.

2.8 Resettlement and compensation

Social disruption arising from planned (resettlement) and spontaneous migration of population to the project area and effects on health and security will be addressed in a Resettlement Action plan (RAP).

2.9 Impacts on aviation and communication

Aircraft navigation and communication facilities may be affected by the project. An assessment of any potential impact on aviation and communication (TV, radar, etc) will therefore be performed, but as part of the technical study.

2.10.Risks of Accidents and safety

In this regard focus shall be on dangers of electrification and other forms of physical accidents to humans and animal life with relation to the construction and operation of the transmission line. The study will primarily address risks to third parties while account for workplace risks and issues will be treated in the technical feasibility study.

2.11.Mitigation measures

For all adverse impacts that cannot be avoided by changes in the technical design or location of the installations measures to reduce the impact or to mitigate the effect of the impact will be proposed.

2.12.Environmental management plan

An environmental management plan (EMP) will be drafted, with the aim to identify the specific measures required in order to minimize environmental impact. The EMP will address the specific findings in this study, and draw up monitoring plans for the follow-up of its implementation. The EMP will include identification of needed capacity for monitoring as well as proposal of suitable organization for monitoring and capacity enhancement measures within that organization.

2.13.Related Studies

The study will be based on review of previous studies performed for the construction of a HV transmission line between Nairobi and Mombasa especially the EIA Study by Electricite de France in 1994 and the 1998 update of this report (by Mott Ewbank Preece) but also relevant parts of other reports e.g. Electricite de France 1992 and 1993, Kartson and Finne 1993, RPS International 1995, Power Engineers 2003 BKS Acres 2005.

It is envisaged that the review and update of the existing environmental impact assessment shall be implemented in close coordination with the implementation of the technical feasibility study.

2.14.Reporting

The report shall be presented as an independent document, developed to the level and standards required or obtaining all environmental permits and approvals for the project to take place.

APPENDIX 3: TERMS OF REFERENCE FOR ENVIRONMENTAL AUDIT

Conducting of the Environmental Audit will ensure KPLC is compliant with Environmental Management and Coordination Act, 1999 (Part VII) and the Environmental (Impact Assessment & Audit) Regulations, 2003-Part V. the bidder will be expected to carry out an Environmental Audit and prepare an Environmental Audit report for submission to NEMA pursuant to section 68 of EMCA, 1999 and in accordance with the environmental impact assessment and audit regulations of 2003.

Objectives

An Environmental audit is a systematic, documented, periodic and objective process in assessing an organization's activities and services in relation to:

1. Assessing compliance with relevant statutory and internal requirements
2. Facilitating management control of environmental practices
3. Promoting good environmental management
4. Maintaining credibility with the public
5. Raising staff awareness and enforcing commitment to departmental environmental policy
6. Exploring improvement opportunities
7. Developing an Environmental Management and mitigation plan complete with mechanisms for monitoring and evaluating compliance including cost of mitigation measures and time frame for implementing the measures.

Scope

The scope of services to be undertaken by the Consultant shall include the following:

Task 1: Detailed Description: The Consultant is to concisely describe the project, its geographic, ecological, general layout including maps at appropriate scale where necessary.

Task 2: Description of the baseline environment: The Consultant is required to collect, collate and present baseline information on the environmental characteristics of the existing situation along the transmission line and the two terminal sub-stations. This description involves;

- a) *Physical environment* (topography, geology climate and meteorology, air quality, hydrology etc.,
- b) *Biological environment* (i.e., flora types and diversity, endangered species, sensitive habitats etc.
- c) *Social and cultural environment*, including present and projected, where appropriate (i.e., population, land use, planned development activities, community

structure, employment and labour market, sources and distribution of income, cultural properties.

Task 3: Legislative and Regulatory Framework: The Consultant shall identify and describe the pertinent regulations and standards governing the environmental quality, health and safety, protection of sensitive areas, land use control at the national and local levels and ecological and socio-economic issues.

Task 4: Determination of impacts of the transmission line and the two terminal substations: The Consultant will analyse and describe all significant changes brought about by the project. These would encompass environmental, ecological and social impacts, both positive and negative, as a result of each facility intervention that are likely to bring about changes in the baseline environmental and social conditions discussed in Task 2. The Consultant will make a prioritization of all concerns identified and differentiate between short, medium and long-term impacts. A detailed outline and discussion of specific conditions that might affect the environment which are unique to the type of project being audited should be provided.

Task 5: Occupational health and safety concerns: The Consultant will analyse and describe all occupational health and safety concerns brought about by the operations of the substations and the line. The Consultant will make recommendations on corrective and remedial measures to be implemented under the environmental management plan.

Task 6: Development of management plan to mitigate negative impacts: The Consultant will develop a comprehensive environmental management plan. The plan should recommend a set of mitigation, monitoring and institutional measures to eliminate, minimise or reduce to acceptable levels of adverse environmental impacts and/or maximise socio-economic benefits. The Consultant should provide cost outlays for the proposed measures as well as their institutional and financial support.

Task 7 Development of monitoring plan: The Consultant is required to give a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, definition of thresholds that will signal the need for corrective actions as well as deliver monitoring and reporting procedures. The Consultant should provide a time frame and implementation mechanism, staffing requirements and cost outlays.

Task 8: Environmental Audit Report: The main output will be an Environmental Audit Report. The report shall be in the English Language and has to be clear and concise. The report should be in a format acceptable to NEMA. The Consultant shall present the report to NEMA for approval in the required number of copies.

Format for Environmental Audit report

1. **Executive Summary:** - Brief description of Key finding/impacts and consultant's findings/recommendations/lessons learnt)
2. **Description of the Project:** - Rationale, genesis, constraints/opportunities, accomplishments, problems, way forward for project implementation and approach
3. **Audit purpose and Methodology:** - Types and sources of evidence and methodologies employed to complete the environmental audit
4. **Findings:** - Presentation of findings with supporting evidence as regards issues in the audit and other pertinent matters that should arise during the course of audit
5. **Recommendations:** - Presentation and synthesis of pertinent recommendations from project participants/stakeholders as they regard ongoing planning, management and implementation of the project, and matters of long-term sustainability and impact
6. **Lessons Learnt:** - Description and documentation of lessons learned from the project to date. Consideration will be given to internal project aspects, i.e. planning, design, management and implementation and external factors such as policy contexts, other country/regional/global factors that have been constraining or supportive
7. List of documents reviewed, organizations and persons contacted, workshops held, and workshop briefs/proceedings

APPENDIX 4: COPY OF NEMA LICENSE

Application Reference No. EIA/310Registration No. **0002149**

For official use

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT ENVIRONMENTAL IMPACT ASSESSMENT LICENCE

is to certify that the Project Report/Environmental Impact Assessment Study Report received from
...KENYA POWER & LIGHTING COMPANY LIMITED..... (Name
of individual/firm) P.O. BOX 30099-00100, NAIROBI. (Address)
submitted to the National Environment Management Authority in accordance with the Environmental Impact
Assessment & Audit Regulations regardingPROPOSED MOMBASA - NAIROBI TRANSMISSION
.....LINE 330 KV & 330/220/132 KV SUBSTATION IN NAIROBI.....
(title of project) whose objective is to carry onCONSTRUCTION OF A TRANSMISSION LINE.....
TO TRANSPORT POWER FROM COAST TO NAIROBI.....

..... (briefly describe purpose) located
atFROM BABAI TO ISINYA AND EXTENSION TO EMBAKASI AND DANDORA.....
..... (locality and district)

has been reviewed and a licence is hereby issued for implementation of the project, subject to attached
conditions.

Dated this..... 11TH day SEPT of 20..08

Signature..... .....

(SEAL)

Director General
The National Environment Management Authority

CONDITIONS OF LICENCE

1. This licence is valid for a period of 24 MONTHS (time within which the project should commence) from the date hereof.
2. The Director-General shall be notified of any transfer/variation/surrender of this licence.

3. The proponent shall adhere to routing alternative B (less national parks, more populated areas).
4. The proponent shall ensure the erection of appropriate signage in Kiswahili, English and local languages to serve as warning signs around risky places and cable routes. The proponent shall further carry out community sensitization programmes on the same.
5. The proponent shall ensure that the power line is restricted within the way leave width to avoid vegetation disturbance/clearing. Revegetation programme should be undertaken to restore disturbed vegetation.
6. The proponent shall before commencing construction, liaise with Kenya Wildlife Services so that routing of the power line does not adversely affect wildlife especially when it passes through the Tsavo East National Park.
7. The proponent shall before commencing constructions, liaise with Kenya Civil Aviation Authority to ensure that the proposed routing of the power line does not compromise air navigation safety.
8. The proponent shall ensure that compensation and resettlement plan is developed and agreed up with all the stakeholders in cases where impacts of power line rerouting causes property demolition and or homestead relocation.
9. The proponent shall ensure strict adherence to the Environmental Management Plan developed throughout the project cycle.
10. The proponent shall collaborate with the EIA Expert(s) and the contractor(s) to ensure that proposed mitigation measures are adhered to during the construction phase and where necessary appropriate mending-up activities undertaken and a report of the same submitted to NEMA. Emphasis must be given to control of dust, noise, vibrations, occupational hazards and provision of sanitary accommodation to construction workforce.
11. The proponent shall comply with the relevant principal laws, by-laws and guidelines issued for development of such a project within the jurisdiction of Ministry of Energy, Ministry of Lands, Ministry of Roads and Public Works, Kenya Wildlife Services Energy Regulatory commission and other relevant Authorities.
12. The proponent shall ensure that during the construction phase, the operations adhere to Legal Notice No. 40, The Factories (Building, Operations and Work of Engineering Construction) Rules, 1984.
13. The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as restricting transmission line to common corridors/way leave, adhering to recommended standards height of the power line, installation of anti-climb and defectors to ensure wildlife and bird safety are designed, constructed and employed simultaneously with the proposed project.
14. The proponent shall ensure that records on conditions of licences/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.
15. The proponent shall submit an Environmental Audit Report in the first year of occupation/operation/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.
16. The proponent shall comply with NEMA's improvement orders throughout the project cycle.



APPENDIX 5: FIELD PHOTOGRAPHS