KENYA ELECTRICITY TRANSMISSION CO. LTD

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED KYENI – EMBU 132kV ELECTRICAL TRANSMISSION LINE AND ASSOCIATED SUBSTATIONS IN EMBU EAST AND EMBU WEST DISTRICTS, EASTERN PROVINCE

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CERTIFICATE OF DECLARATION AND DOCUMENT AUTHENTICATION

This document has been prepared in accordance with Environmental (Impact Assessment and Audit) Regulations, 2003 of the Kenya Gazette supplement No. 56 of 13th June 2003, Legal Notice No. 101.

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Do hereby certify that this report was prepared based on the information provided by various stakeholders as well as that collected from other primary and secondary sources and on the best understanding and interpretation of the facts by the Environmental Social & Impact Assessors. It is issued without any préjudice.

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LIST OF ABBREVIATIONS

CSR	Corporate Social Responsibility
DDP	District Development Plan
DEO	District Environment Officer
DO	District Officer
DOHSS	Directorate of Occupational Health and Safety Services
EA	Environmental Audit
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMCA	Environmental Management and Coordination Act, 1999
EMP	Environmental Management Plan
EMoP	Environmental Monitoring Plan
ERC	Energy Regulatory Commission
ESIA	Environmental and Social Impact Assessment
ICT	Information & Communication Technology
IPP	Independent Power Producers
KETRACO	Kenya Electricity Transmission Company Ltd
KFS	Kenya Forest Service
KPLC	Kenya Power and Lighting Company Ltd
kV	Kilo Volt
NEAP	National Environmental Action Plan
NPEP	National Poverty Eradication Plan
NEMA	National Environment Management Authority
OSHA	Occupational Safety & Health Act, 2007
PAPs	Project Affected Persons
PPE	Personal Protective Equipment
PRSP	Poverty Reduction Strategy Paper
PEF	Poverty Eradication Commission
RAP	Resettlement Action Plan
REA	Rural Electrification Authority
REP	Rural Electrification Project
RoW	Right of Way
SHE	Safety, Health and Environment

EXECUTIVE SUMMARY

Introduction

The Kenya Electricity Transmission Company Ltd (KETRACO) proposes to construct a 21kms 132 kV electrical transmission line from Kyeni to Embu. This transmission line is a t-off of the Ishiara 132kV transmission line. The components of the proposed project include:

- A 21km 132Kv electrical transmission line from Kegonge in Kyeni Division to Gatondo in North Lcation of Embu West District.
- A 132/33kV electrical sub-station at Kegonge in Kyeni Division of Embu East District.
- A 132Kv electrical sub-station at Gatondo in Embu West District

The electrical transmission line and electrical sub-station will be constructed, owned, operated and maintained by the Kenya Electricity transmission Company Limited (KETRACO). The Environmental Management and Coordination Act, 1999 section 58 requires that an Environmental Impact Assessment (EIA) study be carried out for certain category of new projects at the project planning stage to ensure that significant impacts are identified. Electrical infrastructures, including electrical transmission lines, electrical substations, electricity generation stations and pump-storage schemes are some of the projects listed under the second schedule of the Environmental Management and Coordination Act (1999) that should undergo an Environmental Impact Assessment.

The ESIA Objectives

The main objective of KETRACO is to construct a 132kV electricity transmission line from the Kyeni sub-station to Embu in order to meet the increasing demand for electricity in Embu East and Embu West Districts and surrounding environment while attaining the objectives of vision 2030. The specific objectives of this project include the following;

- Identify and assess all potential environmental and social impacts of the proposed project;
- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;

- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
- Prepare an Environmental Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.
- Identify and quantify different categories of project affected people (PAPs) who would require some form of assistance, compensation, rehabilitation or relocation.
- Provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project.
- Verify the adherence and compliance of the ADB's Environmental policies.

Scope of the ESIA Study

The Environmental Management and Coordination Act, 1999 requires all new projects, programs or activities to undergo Environmental Impact Assessment at the planning stages and a licence obtained from the National Environment Management Authority. The scope of this Environmental Impact Assessment, therefore, covers:

- The baseline environmental conditions of the area,
- Description of the proposed project,
- Provisions of the relevant environmental laws,
- Public participation
- Identification and discussion of any adverse impacts to the environment anticipated from the proposed project, appropriate mitigation measures, development of an environmental management plan outline.

The scope covered various activities related to; construction works of the proposed development which included ground preparation, construction of the 132/33kV substations and 132Kv electrical transmission line; operation; and decommissioning.

Methodology

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

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

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

- Consultations with the Proponent and regarding the proposed project details, the site planning and implementation plan,
- Desk review of available documentation on t he project,
- Thorough field investigations along the proposed line route, photography, surveys, informal and discussions with people from the immediate neighbourhood.

A participatory rapid assessment method using tools including literature review, questionnaires, observation, geographical positioning system device (GPS), and in-depth interviews as well as public consultative meetings were used as follows:

- Household interviews were conducted along the project corridor
- In-depth interviews were held with district heads of departments and provincial administration.
- Evaluation of the project setting and baseline conditions;
- Consultative Public Participation
- Analysis of the potential impacts of the proposed project on the biophysical and socio cultural/ economic environment;
- Formulation of appropriate mitigation measures and development of an environmental and social management plan, monitoring plan, and guidelines for capacity building in environmental and social management;
- Report writing;
- Submission of ESIA Study Report to NEMA;

The ESIA Team

The ESIA team comprised of Environmentalists, Land Economists, Land Surveyors, Engineers and Socio-Economists.

Policy, Legal and Regulatory Framework

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

Public Consultation

Consultations were also undertaken as part of the ESIA in order to obtain the views of immediate community, interested groups and affected groups within the site's immediate area of influence. The consultation was done with the immediate neighbourhood of the proposed site and involved use of a semi-structured public participation form. In general the project is acceptable and no objections were raised concerning the proposed 132kV electrical transmission line and the two electrical substations.

The ESIA Terms of Reference

The ESIA study terms of reference included:

- Establish the suitability of the proposed route for the proposed electrical transmission line and substations
- A concise description of the national environmental legislative and regulatory framework, baseline information and any other relevant information related to the project.
- A description of the technology, procedures and processes to be used, in the implementation of the project.
- A description of materials to be used in the construction and implementation of the project, the products, by-products and wastes to be generated by the project.
- A description of the potentially affected environment.
- Carry out ambient air quality, noise levels and soil quality baseline measurements.
- A description of environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.

- To recommend a specific environmentally sound and affordable wastes' management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- Development of Environmental Management Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable hazardous activities in the cause of the project cycle.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.
- An economic and social analysis of the project.

Potential Environmental Impacts Evaluation

The study team evaluated the anticipated potential and likely impacts of the project on the bio-physical and the socio-economic environment. The impacts were categorised as positive or negative and their level of effect on the environment were also gauged. In general the study findings indicated that the positive project impacts shall outweigh the negative impacts if the mitigation measures aimed at minimizing or eliminating the negative impacts are implemented. Below is an outline of the anticipated project impacts which have been categorized into either positive or negative. The impacts have further been grouped according to the phase in which they are likely to occur in the project's life cycle namely construction, operation phase and decommissioning phase.

Potential Positive Impacts during Construction

- Creation of employment
- Creation of markets for project development materials
- Increased business opportunities for local traders
- Increased revenue to the Government through tax and duty payment

Potential Negative Impacts during Construction

- Interference with local infrastructure including access routes, power lines, water supply lines among others;
- Increase in fossil fuel consumption;
- Increase in emissions ; for example, noise, Green House Gases (GHG);
- Risks of fossil fuel spills and leaks from project vehicles and equipments;
- Increased exposure to risks and accidents;
- Loss of incomes due to interference with socio-economic activities;
- Loss of properties including land and housing;
- Loss of vegetation including crops, shrubs, trees;
- Relocation and separation of communities;
- Degradation of cultural practices;
- Increase in social vices and infectious disease including HIV/AIDS, STDs; and
- Increase in demand of materials including ballast, gravel among others

Potential Positive Impacts during Operation

- Creation of employment
- Increase in electricity supply
- Development of the project area for example opening of industries, increase in ICT use, use of irrigation among others
- Provision of cleaner sources of energy to the Kenyan market
- Reduced pressure on forests.

Potential Negative Impacts during Operation

- Increased exposure to Electromagnetic fields (EMF)
- Impacts on resident birds
- Risks of fire
- Electromagnetic interference with radio telecommunications systems
- Corona effect/Noise

Potential Negative Impacts during Decommissioning Phase

- Air pollution
- Noise and vibration
- Inappropriate disposal of waste

Potential Mitigation Measures

- Control speed of construction vehicles around the site
- Sensitise construction workers on aerial emissions
- Keep the loose soil and dry materials at the construction site moist at all times
- Delivery vehicles with dry materials to be covered
- Maintain demolition machinery in working order at all times
- Sensitise the workforce and truck drivers on issues on equipment maintenance,
- Supervise demolition traffic
- Undertake demolition only during the daytime for peace of the neighbours
- Workers to wear ear plugs/muffs as part of the PPE gear
- Ensure safe disposal of the waste generated during the decommissioning process
- Everything be done in accordance to the decommissioning audit

Proposed Mitigation Measures

The proponent has committed efforts to ensure that the impacts of the proposed project are maintained within the acceptable standards. The mitigations measures for the anticipated impacts have been analyzed separately as those for socio-economic; EHS and Bio-Physical impacts. The mitigation measures for the Bio-Physical impacts have been further categorized as those related to avian, vegetation and air quality. To ensure sustainability of the project, the proponent proposes to undertake the following mitigation measures:

Socio-Economic Mitigation

- Work within the acquired way leave in order to reduce spill over effects of the project to surrounding community member's property and existing social facilities;
- Work in collaboration with relevant government representative in the project area;
- Reinstall or rehabilitate social infrastructure removed or electrical damages due to the project development;
- Develop appropriate benefits for non-beneficiary community members
- Compensate land and property owners for acquired land and/or measurable disturbance;
- Route the line to traverse less dense areas in order to minimize impacts on property loss, resettlement and destruction of cultural setup;

- Institute developed Resettlement Action Plan (RAP) and communicate project plans in acceptable time frame to all project affected persons and other stakeholders;
- Conduct workshops at community level to facilitate impact monitoring on the environment, socio-economic and socio-cultural aspects;
- Enhance security in project area through community policing in collaboration with local community members;
- Develop Information Education and Communication (IEC) programmes on the projects social impacts and train community members to conduct awareness and training programmes with the help of the project team; and
- Develop programmes to enhance cohesion between project employees and the local communities for example development of sports activities.

Environment, Health and Safety Mitigation

- Employ trained and certified workers to install, maintain and repair electrical equipment;
- Ensure provision and proper use of PPE's to employees
- Ensure proper accident reporting mechanisms are put in place
- Employ trained and qualified machine handlers and drivers;
- Ensure work concerning handling of live wires is conducted by trained workers with strict adherence to safety standards;
- Avoid construction in areas of weak soil structure such as river riparian reserve;
- Ensure restricted access and controls to the electricity transmission lines and substations and enforce way leave requirements for power lines;
- Deactivate and ensure live power transmission lines are properly grounded before maintenance work commences;
- Ensure that structures are tested for integrity prior to commencing work; and
- Implement fall protection programmes that include training in climbing techniques and the use of fall protection measures.

Bio-Physical Mitigation Measures

Avian collision and Electrocution

- Install lines in horizontal circuit as opposed to vertical circuit;
- Maintaining a 1.5 meter spacing between energized components and grounded hardware;

- Install visibility enhancement objects such as marker balls, bird deterrents or diverters; and
- Schedule maintenance activities to avoid nesting sessions.

Vegetation and Soils

- Control soil erosion through timely clearing of excavations from project area; develop erosion control structure and excavate new areas only after finishing work at opened segments among other measures; and
- Develop afforestation programmes in collaboration with the community members.

Air Quality and Aquatic Environment

- Use clean fuels or catalytic converters for project vehicles and equipments dependent on fossil fuels;
- Create awareness among drivers and machine operators on practices aimed at reducing emissions;
- Avoiding clearing in riparian areas and developing on them;
- Avoid using machinery in the vicinity of watercourses;
- Observe manufacturer machinery and equipment guidelines, procedures with regard to noise as well as oil spill prevention and emergency response; and
- Use technological measures during installation to abate against corona effect during operation. Technological measures to implement during construction include; observation of the recommended distance between conductors; use of electrical dampers to reduce vibration among other measures.

Environmental & Social Management Plan and Environmental Monitoring Plan

The ESIA Team have developed an Environmental & Social Management Plan (EMP) and Environmental Monitoring Plan (EMoP) to guide the project team in eliminating or reducing the negative project impacts to acceptable minimum/ standards. The EMP & EMoP is based on good environmental practices of project implementation and safety of the operations. The proposed EMP & EMoP can be improved through continuous monitoring and audits during project implementation. The plan is provided in this report and it identifies the anticipated impacts; proposes measures to be undertaken; states monitoring indicators; states the party to implement the measures or control the indicators; implantation time frame and states the estimated costs likely to be incurred to undertake the measures.

Conclusion & Recommendations

An Environmental & Social Management Plan (EMP) outline has been developed to ensure sustainability of the site activities from construction through operation to decommissioning. The plan provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitorable indicators. Implementation timeframes and responsibilities are defined, and where practicable, the cost estimates for recommended measures are also provided. A monitoring plan has also been developed and highlights some of the environmental performance indicators that should be monitored. Monitoring creates possibilities to call to attention changes and problems in environmental quality. It involves the continuous or periodic review of operational and maintenance activities to determine the effectiveness of recommended mitigation measures.

Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted. It is strongly recommended that a concerted effort is made by the site management in particular, to implement the Environmental & Social Management and Monitoring Plan provided herein. Following the commissioning of the electrical transmission line and two sub-stations, statutory Environmental and Safety Audits must be carried out in compliance with the national legal requirements, and the environmental performance of the site operations should be evaluated against the recommended measures and targets laid out in this report.

It is quite evident from this study that the construction and operation of the proposed electrical transmission line and two substations will bring positive effects in the project area including improved supply of electricity, creation of employment opportunities, gains in the local and national economy, provision of market for supply of building materials, informal sectors benefits, increase in revenue, improvement in the quality of life for the workers, Optimal use of land and improved security. However, although the project will come with various positive impacts, negative impacts will also be experienced hence the need to also look at them.

Considering the proposed location, construction, management, mitigation and monitoring plan that will be put in place, the project is considered important, strategic and beneficial and may be allowed to proceed.

Total Project Cost

The proposed project cost will include lease of land; various operational licenses and permits; professional procurement; construction and miscellaneous overheads. The total cost of the proposed electrical transmission line and two electrical sub-substations will will be **Kshs 500,000,000 (Five hundred million)** to completion. The **0.05% of the total project cost payable to National Environment Management Authority (subject to the upper sealing of one million) will therefore be Kshs 250,000 (Two hundred and fifty thousand)**

CHAPTER ONE: INTRODUCTION

1.1: Background

The Kenya Electricity Transmission Company Limited, the proponent of the proposed 132kV, 21km electrical transmission line intends to construct, own and operate the line plus two associated sub-stations. The overall objective of the project is to reduce the current power blackouts in Embu and the surrounding areas and to meet the increased power demand due to the envisaged expansion of Embu airstrip, growth of Embu town and its environs. The Environmental Management and Coordination Act, 1999 section 58 and second schedule of the same Act requires electrical transmission lines and electrical sub-stations to obtain an Environmental Impact Assessment License from NEMA. The company, pursuant to EMCA, 1999 has tasked a team of NEMA registered ESIA Team to conduct an ESIA Study as per the Terms of Reference that were developed.

1.2: Objectives

The ESIA Study seeks to meet the following objectives:

- To determine the compatibility of the proposed project with the surrounding environment
- To identify and evaluate the significant environmental and social impacts of the proposed project.
- To assess the environmental costs and benefits of the proposed project to the local and national economy.
- To evaluate and select the best project alternative from the various options.
- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;
- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
- Prepare an Environmental & Social Impact Assessment Report compliant to the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003, detailing findings and recommendations.

- Identify and quantify different categories of project affected people (PAPs) who would require some form of assistance, compensation, rehabilitation or relocation.
- Provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project.
- Verify the adherence and compliance of the ADB Environment and social guidelines.
- To incorporate environmental management plans and monitoring mechanisms during implementation and occupation phases of the development.

1.3: Scope of the Study

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the immediate environment as may be affected or may affect the proposed project. Any potential impacts (localized or delocalized) are also evaluated as guided by EMCA 1999 and the Environmental Management and Coordination (Environmental impact assessment and Audit) Regulations, 2003. This report includes an assessment of impacts of the construction, operations and decommissioning of the proposed project site and its environs with reference to the following:

- A review of the policy , legal and administrative framework
- Description of the proposed project.
- Baseline information (bio-physical and socio-economic)
- Assessment of the potential environmental impacts of the proposed project on the biophysical, social-economic, religious and cultural aspect
- To verify compliance with the Environmental Management & Coordination Act, 1999, Occupational Safety & Health Act, 2007 and Energy Regulatory Commission requirements
- Proposition of alternatives
- To identify problems (non-conformity) and recommend measures to improve the existing management system;
- To assess compliance with Company's corporate environmental policy requirements;
- development of mitigation measures and future monitoring plans
- Occupational and environmental health and safety management
- To prepare an Environmental Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

1.4: Project Justification

The power supply in Embu District and the surrounding environs is insufficient and unreliable. Power supply is quite often interrupted and consumers also suffer from voltage fluctuations. It is also not sufficient to satisfy the demand of the larger Embu District. This project is therefore intended to satisfy the demand of electrical power and energy in Embu District and the surrounding environs such as Mwea, Makutano etc.

1.5: Study Methodology

The ESIA study approach was structured such as to cover the requirements under the EMCA, 1999 as well as the Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003. It entailed largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, public consultation (which included discussions with local provincial administrators and the community), photography, as well as discussions with the proponent.
The key activities undertaken during the assessment were as follows:

- Screening
- Scoping
- Desktop study
- Field assessment
- Baseline Data
- Stakeholder consultation
- Report writing

The steps which were followed during the ESIA study are as follows:

Step 1: Screening

Screening is the first step in accordance with EMCA, 1999. In screening we confirmed whether or the project falls within a category that requires an ESIA prior to commencement. Electrical infrastructure, including electrical transmission lines and electrical substations are listed under schedule 2 of EMCA, 1999 among projects requiring an EIA. In addition, other considerations during the screening process included physical site location, environmental sensitivity of the areas surrounding the proposed site, nature of community and social activities in the area.

Step 2: Scoping

Scoping, a result of a preliminary physical assessment of the site and its surroundings, helps to narrow down to the most critical environmental and social issues requiring attention for detailed evaluation. The Scoping process involved discussions with the Proponent at the proposal stage, review of available documents and implementation plans, and a rapid assessment of the site and the surrounding areas. Consultations were also carried out during which time the communities were interviewed to capture their opinion regarding the proposed project. The scoping exercise concluded with a development of the Terms of Reference (TOR) for the assignment which were submitted to the National Environment Management Authority (NEMA) for approval.

Step 3: Desk top Study

Desk top documentation review is a continuous exercise that involves a review of available documents on the project, including approved plans/designs, project plans and designs, environmental legislation and regulations, etc. The review provided an understanding of the terms of reference, environmental and social status, demographic trends, land use practices, development strategies and plans as well as the policy and legal documents.

Step 4: Field Assessment

With the background obtained from preliminary visits, discussions and documentation, the proposed project site was comprehensively evaluated and various lead agencies, provincial administrators and community interviewed. The proposed development was evaluated with a view to establish the physical environment status, social and economic trends. The field assessment was also designed to establish potential positive and negative impacts through interviews, discussions and physical observation.

Step 5: Baseline Data

Baseline information was obtained through physical investigation of the project site areas, desktop studies, public consultations with members of the community in the project areas, survey, photography, and discussions with the project Proponent.This gave the physical description of the project site in terms of position and size, topography, climate and soils.

Step 6: Stakeholder Consultations

Stakeholder consultation is a requirement of Environmental Management and Coordination (Environmental Impact Assessment & Audit) Regulations, 2003. The involvement of the public and the relevant authorities is an integral part of the Environmental Impact Assessment because public input helps to ensure that important social issues are not overlooked. To achieve this the team held structured and comprehensive consultations with Interested and Affected Parties (IAPs) likely to be affected by the project in order to:

- Understand their perceived view of the project; and
- Assess the extent to which their views needed to be taken into account specifically with regard to the implementation of the project.

To that end, the followings steps were carried out:

- A detailed desk top study to establish and describe the environmental and socioeconomic conditions within Embu East and Embu West Districts. This secondary information was mainly obtained from District Development Plans and Poverty Reduction Strategy Papers. Most of these plans were for the years 2002-2008 but in some cases only documents from earlier years were available (e.g. from Embu District). For the new districts such as Embu East and Embu West information from the parental district documents apply;
- Key Informant Interviews and Semi-Structured Interviews were conducted with the District Officers (DO's), Chiefs, Assistant Chiefs, Councillors and Village Elders;
- Open-ended questionnaires were administered to obtain views about the proposed project and its perceived impacts from households along the proposed transmission line. The households were picked at random within three kilometres from the proposed way leave and also on whose homestead the 30 metre way leave would pass. This was done with the help of the area chiefs, assistant chiefs and village elders. For those households which were on the proposed transmission line and not reachable to be interviewed, the Chiefs and Assistant Chiefs gave the team an estimated number of households, names and the villages;
- Public meetings (*barazas*) which were organized by the Chiefs, Assistant chiefs; and village elders;
- Transect walks were also done to confirm the information from the discussions and observations were made on physical and environmental conditions.

Step 7: Report Writing

This report has been jointly compiled by a team of NEMA registered lead EIA/Audit experts. In addition to documentation of the anticipated impacts and appropriate mitigation measures, an Environmental & Social Management and Monitoring Plan have also been developed.

CHAPTER 2: PROJECT DESCRIPTION

2.1: Introduction

The grid is what is often referred to as the electric power transmission system. Redundant paths and lines are provided so that power can be routed from any generation facility to any customer area through a variety of routes, based on the economics of the transmission path and the cost of power. The redundant paths and lines also allow power flow to be rerouted during planned maintenance and outages due to weather or accidents. Electrical power transmission occurs via a system of above the ground power lines and towers located between a power plant and a substation. Transmission networks can cover thousands of kilometres and encompass tens of thousands of towers. For long distance transmission, electricity is usually transmitted at voltages between 110 and 1200 kV. Transmission towers or pylons are utilized to suspend high-voltage overhead power lines. These systems usually transmit three-phase electric power (the common method for transmission of high-voltage lines of over 50 kV) and, therefore, are designed to carry three (or multiples of three) conductors.

2.2 Project Objectives

The proposed project is part of the Proponent's Energy Access Scale-up Program, which has the following objectives:

- Extending the transmission lines and new 132/33kV substations; with the aim of reducing technical losses and improving voltage conditions, thereby coping with additional demand.
- Voltage upgrading to increase supply capacity and reduce system losses;
- Providing alternative electricity supply paths to increase reliability and improve power quality in the regions.

2.3: Project Justification

Currently electricity is accessible to less than 20% of the total population and approximately 5% of rural population. The Government's goal is to accelerate access rate to 20% of rural population by 2010 and to at least 40% by 2020. To achieve this goal, Government has prepared the Energy Scale up Program covering the period 2008 to 2017. This would be approached not only from improvement and expansion of the network, but also on raising the generation to match the demand.

The national economic growth has also been on the upward trend - rising from 1.8% in 2003 to 5.8% in 2005. Significant effects of this growth are notable in agriculture, tourism and construction among others with a corresponding increase in power generation that

rose from 4,852GWh in 2003 (with sales of 3,801GWh) to 5,195GWh in 2004 (sales of 4,090GWh). Maximum energy demand was projected at 5,641GWh in 2006 and 24,957GWh by the year 2026 hence the proposed project.

2.4: Design Considerations

Main criteria when concluding on the adopted conceptual design has been to ensure that the various line components are designed in a safe, cost effective and reliable manner.

2.4.1: Project Components

The proposed project will involve development of a 21 km 132kV electrical transmission line between Kegonge in Kyeni Division and Gatondo in North Mbeti North, Embu West District. To ensure efficient functionality of the proposed line the following components will form part of the project installations; pylons/steel towers, dumpers, conductors, optical fibre, circuit breakers and lightening arrestors. All the project components will be installed using the best electrical engineering practices. The section below discusses on each of the project components in brief.

2.4.1.1 Conductors

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

2.4.1.2: Overhead Earth Wires (OPGW)

According to Ministry of Energy, a single overhead shield wire is recommended for 132 kV lines. The wire would provide a 25 degree shielding angle for the line circuit which is considered satisfactory considering the anisokeraunic level in the region ranging from 120 to 180 thunderstorm days per year.

2.4.1.3: Support Structures

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

due to their short life time and subsequent poor reliability and very high operational and maintenance costs.

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

2.4.1.4: Conductor Configuration

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

2.4.1.5: Foundations

Based on the observation of the ground conditions during the line route surveys conventional pad, chimney foundations and reinforced concrete pad foundations are recommended by the design engineer. On certain sections where poor soils or submerged conditions are identified a raft type design will be required. Hard rock foundations are not foreseen but weathered rock exists which might require heavy excavation equipment and supply of imported backfill for the pad & chimney foundations.

2.4.1.6: Grounding

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

2.4.1.7: Insulator Strings

Composite silicone/polymer long rod insulators are to be used in the insulator strings for the support of the line conductors. Besides being competitive in price their low weight and compact configuration result in lower transport, installation and

maintenance costs. The electromechanical ratings of the insulators to be installed are U70 and U120 according to IEC standard.

2.4.1.8: Circuit Breakers

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

2.4.1.9: Lightning Arresters

Lightning strikes produce high voltages and traveling waves on transmission lines, causing insulator flashovers and interruption of operation. Steel grounded shield conductors at the tops of the towers significantly reduce, but do not eliminate, the probability of direct lightning strikes to phase conductors. The shield wire is designed to protect the power line from lightning.

2.4.1.10: Pylons/Steel towers

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

2.4.1.11: Electrical dampers

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

2.4.12: Substation Design and Layout

Substation Design Services Include: One-Line Diagrams and Construction Drawings, Site Selection & Equipment Layouts, Equipment Procurement, Construction Coordination, Relay, Control & Metering, Protective Systems Coordination, Substation Automation, SCADA Systems Design, Grounding Systems and Final Checkout, Start-up and Testing.

The layout of the substation is very important since there should be a Security of Supply. In an ideal substation all circuits and equipment would be duplicated such that following a fault, or during maintenance, a connection remains available. Practically this is not feasible since the cost of Environmental & Social Impact Assessment Project Report implementing such a design is very high. Methods have been adopted to achieve a compromise between complete security of supply and capital investment.

The proposed substation layout consists essentially the arrangement of a number of switchgear components in an ordered pattern governed by their function and rules of spatial separation. The spatial separation will include; Earth clearance this is the clearance between live parts and earthed structures, walls, screens and ground, Phase clearance this is the clearance between live parts of different phases and Isolating distance this is the clearance between the terminals of an isolator and the connections thereto. The section clearance is the clearance between live parts and the terminals of a work section. The limits of this work section, or maintenance zone, may be the ground or a platform from which the man works.

2.5: Project Activities

2.5.1 Transmission Lines

- The key activities in putting up the transmission line include construction of pylons and stringing of conductors.
- Erection of the lattice structures (pylons) will involve delivery of complete structures, physical assembly at site and laying using cranes. The steel structures will be assembled on site. They will have rivets and will be bolted. Strong aluminium rollers will be used to hoist the structures and in exceptional situation helicopters can be used.
- The foundations of the lattice structures/pylons will be dug manually then casting concrete to be used. The depth will be a minimum of 5m. The depth will be determined after geotechnical study is undertaken.
- Vegetation clearing will be done manually by use of pangas and slashers. Where there are big trees, portable power saw mills (petrol powered) will be used.
- The height of the line will be between 30 - 40 metres this will depend on clearance from Kenya Civil Aviation Authority (KCAA).
- Modes and quantity of transport vehicles employed in the project will be approximately five Lorries and four 4x4 vehicles. Maintenance of these vehicles

will be done through licensed garages found in the project area. There will be no on-site maintenance of vehicles.

- Powered equipment expected to be used in the construction include power saw mills, and compressor to break had ground (if required).
- The mode of cooling that will be used in transformers will be transformer mineral oil.
- During the operation phase of the project way leaves will be maintained through manual vegetation clearing. Once the lattice towers are erected and structural integrity established, minimal maintenance is required and a routine Aerial inspection and ground inspection will however be done annually.
- The project will employ unskilled labour, artisans, technicians, drivers and engineers.

2.5.2 Substations

Construction activities will involve the following:

- Construction of the substation access road to the substation
- Removal of vegetation within substation footprint
- Terracing and levelling of the site
- Installation of foundations for infrastructure such as transformers, control room and radio tower
- Construction of bunds and oil holding dams (for emergency holding of transformer oil in the event of a spill) and wall safety walls
- Compaction and filling with gravel of the areas between the foundations
- Creation of formal drainage and storm water control measures
- Delivery and installation of transformers, towers, busbar and associated infrastructure
- Construction of control room and administrative infrastructure
- Redirecting of the 132 kV line from Ishiara to enter and leave Kyeni substation
- Redirecting of the 132 kV line from Kyeni to enter and leave Embu substation
- Connection of the new infrastructure to the proposed 33 kV network
- Construction of perimeter fencing and lighting

2.6: Site Ownership

The proposed transmission line traverses a vast area comprising land owned by various public and private entities. There are a number of land uses along the line route, including sparsely and densely populated settlements along the line route. It is anticipated that the most significant adverse social/socio-economic impact will be the need for compensation and relocation of people affected by the project.

2.7: Project Location

The proposed project is located in Embu East and Embu West Districts. The take off point is in Kegonge, Kyeni Division and terminates at Gatondo in Mbeti North Location of Embu West District.

2.8: Description of the Project's Construction Activities

The main activities during the construction phase will be excavation of materials, installation of steel towers, conductors and their support components.

2.8.1: Seclusion of Project Way leave and Clearing

The acquisition of way leave will be carried out before the implementation of the project commences. Land acquisition will be followed by site preparation which will include bush clearing to pave way for the installations.

2.8.2: Excavation for Foundation Works

The project area is made of different types of soils and varying geological conditions. The excavations will be conducted to create holes for erecting or installing the pylons. After excavation, foundations will be constructed for supporting the pylons. The excavation and construction of the foundations shall involve the use of hand tools like crow bars, mixers, vibrators, trappers etc but in case of rocky areas compressors and drills will be used.

The equipments to be used in project construction will require various forms of energy which will include manpower, charged battery or fossil fuel. The manual equipments to be used in the development project include crow bars, spanners and ropes. Fuel based equipments to be used will include mixer, vibrators, compressors and drills.

The construction of the foundations will involve masonry work and related activities. General masonry and related activities to be undertaken will include concrete mixing, construction of foundations, erection of steel tower and curing of fresh concrete surfaces. These activities shall utilize labour from the neighbourhood to supplement some machinery works such as that by the concrete mixers. Thus creating employment for the local population.

2.8.3: Structural Steel Works and Installations

The project will involve handling steel structures for the towers. The steel components will be purchased as parts from the manufacturer for bolting at the project site to make a complete steel tower/pylon.

2.8.4: Stringing and Tensioning

The conductors will be installed using a trolley to unwind them from the cable holders.

2.8.5: Landscaping

After successful completion of the project construction work, the project contractor should rehabilitate the project sites that had been subjected to clearing by planting indigenous plant species.

2.9: Description of the Project's Operation Activities

2.9.1: Way leave Clearance and General Maintenance

Activities undertaken during the project operations phase are minimal which will include clearing of overgrown vegetation and repairs of any defect that can be detected along the transmission line.

2.9.2: Waste Management

The project proponent will be required to manage the waste generated during the construction, operation and decommissioning phases in accordance with the Environmental Management and Coordination (Waste Management) Regulations, 2006. This can be done by providing facilities for temporary storage or handling of the solid and liquid waste generated during the project cycle.

2.10: Decommissioning Activities

2.10.1: Demolition works

Upon decommissioning, the components of the transmission line and sub-stations will be uninstalled. This will generate a lot of solid waste, which can be reused for other project and construction works or if not reusable, disposed off appropriately by a NEMA licensed waste transporters.

2.10.2: Site Restoration

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

2.11: Analysis of Project Alternatives

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

2.11.1: No Project Alternative

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

- Exploitation of cleaner energy sources will not take place and this will in turn mean continuous destruction of the environment
- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain under utilized.
- Reduced business development due to lack of initiative by regulating authorities to existing opportunities
- Reduced technology advancement in the country and interaction both at local, national and international levels.
- No employment opportunities will be created for thousands of Kenyans who will work in the project area.
- Increased poverty and hence insecurity in Kenya.

From the analysis above, it becomes apparent that the No Project alternative is not the best option to the local people, Kenyans, the government of Kenya and East African region as a whole.

2.11.3: Alternative Technology

2.11.4: Safety

All technological measures concerning safety should be observed during the designed and construction phases of the project in order to reduce anticipated negative impacts during the operation phase. Alternatives to be evaluated with the aim of enhancing safety should include the following:

- Use of double or single circuit- Double circuit lines are known to be safer than single circuit lines but the former is known to be more costly to develop as it requires more conductors. The double circuits are considered safe as they are

visible and chances of not noticing them are low. Since the proposed project is a least cost project, the client aims to develop a single circuit line but it is recommended that project monitoring be conducted to enable gauge the need of enhancing safety in future.

- The height of the proposed line should meet the minimum requirements in order to ensure safety. Adequate tension should be provided to prevent sagging of lines.
- In areas with birds habitats use of horizontal circuits is encouraged in order to reduce incidences of bird's electrocution which is common in areas where parallel lines or vertical circuits are used. The use of double circuit towers will increase the visual impact and cause a greater risk for bird collisions. Other measures to increase visibility in bird areas include use of ball markers, bird deterrents, or diverters.

2.11:5: Corona Effects

Corona effect is induced when conductor are close to each other and when the conductors vibrate due to interaction of EMF. It is recommended that the minimum recommended distance between conductors be observed in order to reduce the humming noise or the corona effect. In addition dumpers should also be installed on the conductors in order to reduce vibration and hence reduce corona effects.

2.11:6: Installation Techniques

Cables can be installed underground or above the ground. Installation of underground cables can be used as an alternative in areas where EMF radiation is likely to affect other activities in the project area. Installation of underground cables reduces or enhances the project impacts. Negative impacts reduced by underground installations include;

- Far less visual electrical damage after installation;
- No physical obstacle to human, animals or birds.
- Minimum interference with land use
- Minimum effect on landscape and visual impact
- Minimum interference on geology and soils
- Minimum interference with water resources

The major positive impact of the underground cables is in the ability to engineer external fields to almost zero and minimal magnetic fields beyond 10 meters from the cable. The main challenge of using underground cable is that during repairs the line will have to be unearthed which leads to several environmental impacts.

It is recommended that the proponent take into consideration the project alternative during the project planning phase in order to ensure sustainable operation of the project. For instance underground cables can be considered when working in areas with large populations of resident birds and even human population.

CHAPTER 3: ENVIRONMENTAL SET-UP OF THE PROPOSED PROJECT AREA

3.1: Geographical Location and Size

The larger Embu District comprises of the newly created Embu East, Embu West and Embu North Districts. The larger Embu District is one of the thirteen districts of Eastern Province. It boarders Mbeere District to the East and South East, Kirinyaga District to the West, Meru South and Tharaka Districts to the North. It lies approximately between latitudes 37'19'' and 37'42'' East and occupies a total area of 708 sq. kms. It is subdivided into five administrative divisions as shown below:

Table 3. 1: Divisions, Locations and Sub-Locations within the larger Embu District

No.	Division	No. of Locations	No. of Sub locations	Area in sq.kms
1.	Manyatta	3	12	208
2.	Runyenyes	3	13	186
3.	Nembure	3	10	111
4.	Kyeni	3	10	139
5.	Central	2	7	64
	TOTAL	14	52	708

Source: Poverty Reduction Strategy Paper, 2001-2002

The proposed project traverses Runyenyes, Kyeni and Central Divisions of Embu East and Embu West Districts.

3. 2: Population and Distribution

According to 1999 Population census, Embu District had a population of 276,011 people growing at an annual rate of 3.1%. Manyatta Division had the highest population followed by Runyenyes, Central, Kyeni and Nembure in that order. There were more females at 141,022 than males at 134,989, giving a sex ratio of 96 men to 100 women.

3.3: Physical Features

Typical highlands, midlands, hills and valleys characterise the landscape of Embu District with attitudes ranging from 1500 to 4500 metres at the foot of Mt. Kenya and covering parts of Manyatta, Kyeni and Runyenyes Divisions. The areas around Embu town and Kyeni Division are low altitudes between 910 and 1525 metres above sea level.

3.4: Climatic Conditions

There are two distinct rainy seasons, the long rains falling between March and June and the short rains from October through December. The annual rainfall average is 1495mm

and temperature range from a minimum of 12 degrees centigrade in July to a maximum of 27.1 degrees centigrade in March.

3.5: Land and Soils

The larger Imbue District has an agro-ecological profile that is typical of the windward side of Mt. Kenya. At the peak of Mt. Kenya, the soils are imperfectly drained; shallow to moderately deep, and dark reddish brown in colour, very friable, acid humid to peaty, loam to clay with rock outcrops and ice in the highest parts with no major economic activity. The upper highlands are so wet and steep that forestry is the best land use. The forest reserve zone is characterised by humid andosols which are well drained, very deep, dark reddish brown to dark brown, clay loam to clay with a thick acid humid top soil. They then gradually evolve into volcanic foot ridges which have soils developed on basic igneous rocks. These soils include ando-humid nitrisols with humid andosols found in parts of Manyatta, Nembure, Runniness and Kyeni Divisions. These are well suited for tea and coffee growing.

In Central Division and lower areas of Nembure, Gruyeres and Kyeni the volcanic foot ridges consist of humid nitrisols with an acid humid top soil. The remaining lower areas of Runyenjes, Central and Kyeni Divisions have ferrasols, soils which are equally well drained and very deep. Generally, in addition to the cultivation of coffee and tea, land use include cultivation of other crops such as maize, beans, yams, pineapples, irish and sweet potatoes and horticultural crops including onions, tomatoes, carrots, cabbages, passion fruits and French beans. The hilly terrain of the District has a profound effect on the soils, resulting in low to moderate fertility levels. The cost of farming has subsequently gone up due to indispensable use of fertilizers. The terrain has also adversely affected the state of the road network. It however favours irrigation, as this can easily be explained by using the gravity system.

Out of the larger Embuôs total area of 708 sq.kms, about 70% is arable land while the remaining 30% is covered by forest. The actual cultivable land is less than 70% considering the amount of land taken up by other uses, such as townships, market centres and public utilities. The average size of farm holding is about 1.2 ha per family. Table 3.1 below shows that there are 8 agro-ecological zones in the District, but this excludes the tropical alpine (TA) at the top of Mt. Kenya, which has no economic activities, and the upper highlands zone, where forestry is the main land use. The Zone include, Lower Highlands (LH), Lower Highlands 1 (LH1), Upper Midlands (UM), Upper Midlands 2 (UM2), Upper Midlands 3 (UM3), Upper Midlands 4 (UM4), Lower Midlands 3 (LM3), and Lower Midland 4 (LM4).

Table 3.2: Agro-ecological Zones and Soil Types in the Project area

Zone	Soil Type	Divisions covered	Altitude
LH, LH1, UM & UM2	Home Andosols & Citric Nitosols	Part of Manyatta, Nembure & Runyenjes	**1770 - 1590**
UM3, UM4, LM3 & LM4	Nitochodic and Orthic Ferrasols	Kyeni, Nembure & Central	1280-1220

Source: Embu District Development Plan, 1997 - 2001

3.6: Economic Activity

The district's main economic mainstay is coffee and tea production. The production levels of the two crops have been declining over the last few years, thus perpetuating poverty situation in the district. This has had trigger effects to the other sectors of the economy, affecting the social and economic well being of the people of the district. This has been reflected for instance in the increasing drop out rates at both primary and secondary levels.

Other crops include Macadamia and cereals such as maize, beans and horticultural crops such as French beans, cabbages, kales, tomatoes, avocados and other fruits.

3.7: Natural Resource Base

The District is well endowed with permanent rivers namely Thuci, Kii, Rupingazi and Ena and therefore relies on surface water resources. The other natural resources are the forests such as Njukini forest and Maranga forest which occupy an area of 2,264 hectares. The District has also an enormous potential for fisheries activities.

3.8: District Poverty Level

Using food indices as the determining factor in assessing poverty levels, 45% of the people in the district may be classified as absolutely poor. This is according to the Welfare Monitoring Surveys of 1994 and 1997. This proportion translates to about 124,000 people in the District and of these about 25% or about 30,000 people are hardcore poor. Programme to reduce poverty in the district will have to target these groups.

The poor in the District are mainly the landless, unemployed, slum dwellers, female headed households and the physically handicapped.

3.9: HIV/AIDS

The HIV/AIDS scourage is a phenomenon that is wrecking havoc in the District and living most families poor (PRSP, 2001-2004). Other than the families loosing their bread winners, cases of orphans and destitution are on the increase. Drugs to treat infection are extremely expensive and are draining the families of their already meagre resources. This pandemic is therefore seen as another major cause of poverty. Though the government has been very instrumental in supporting HIV/AIDS awareness campaigns, there is need to take further and newer measures in the fight against the pandemic especially in terms of support and management of those already infected.

The strategy should be to:

- Avail free HIV testing immediately
- Avail free or cheaper drugs to reduce the suffering and extend the lifespan for those already infected by the virus
- Provide social safety nets for those left behind by HIV/AIDS victims, most of who are breadwinners in their households; and
- Establish bursary funds and feeding programmes for AIDS orphans

3.10: Route Coordinates from Kyeni to Embu

The proposed 132kV transmission line will traverse Embu East and Embu West Districts of Eastern Province of Kenya. Table 3.3 indicates the coordinates delineating the proposed line route.

Table 3.3: Route coordinates from Kyeni to Embu

Points	Easting	Northing
Alt S/S	346209	9953642
AP7	344800	9950350
AP8	340950	9947150
Embu S/S2	333700	9937600

CHAPTER 4: ENVIRONMENTAL LEGISLATIVE AND REGULATORY FRAMEWORK

4.1: Introduction

There are many environmental problems and challenges in Kenya today. Among the cardinal Environmental problems include: loss of biodiversity and habitat, land degradation, land use conflicts, human animal conflicts, water management and environmental pollution. This has been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. There is a growing concern in Kenya and at global level that many forms of development activities do cause adverse effects to the environment.

Development activities have the potential to cause negative impacts to the natural resources upon which the economies are based. Environmental Impact Assessment is a useful tool for protection of the environment from the negative effects of developmental activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. Kenya has over 77 statutes which relate to environmental concerns. Most of the statutes are sector specific, covering issues such as land use, occupational health and safety, water quality, wildlife, public health, soil erosion, air quality among others.

4.2: Environmental Policy Framework

Environmental Impact Assessment (EIA) critically examines the effects of a project on the environment. An EIA identifies both negative and positive impacts of any development activity or project, how it affects people, their property and the environment. EIA also identifies measures to mitigate the negative impacts, while maximizing on the positive ones. EIA is basically a preventive process. It seeks to minimize adverse impacts on the environment and reduces risks. If a proper EIA is carried out, then the safety of the environment can be properly managed at all stages of a project-planning, design, construction, operation, monitoring and evaluation as well as decommissioning. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. The National EIA regulations were issued in accordance with the provisions of Environmental Management and Coordination Act (EMCA) of 1999. The EIA Regulations must be administered, taking into cognizance provisions of EMCA 1999 and other relevant national laws.

4.3: Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environment Management Authority (NEMA), the Kenya Forest Service, Kenya Wildlife Services (KWS) and others.

4.3.1: National Environment Management Authority (NEMA)

The objective and purpose for which NEMA is established is to exercise general supervision and coordinate 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. However, NEMA's mandate is designated to the following committees:

4.3.1.1: Provincial and District Environment Committees

According to EMCA, 1999 No. 8, the Minister by notice in the gazette appoints Provincial and District Environment Committees of the Authority in respect of every province and district respectively. The Provincial and District Environment Committees are responsible for the proper management of the environment within the Province and District in respect of which they are appointed. They are also to perform such additional functions as are prescribed by the Act or as May, from time to time be assigned by the Minister by notice in the gazette. The decisions of these committees are legal and it is an offence not to implement them.

4.3.1.2: Public Complaints Committee

The Committee performs the following functions:

• Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Council.

• Prepare and submit to the Council periodic reports of its activities which shall form part of the

annual report on the state of the environment under section 9 (3) and

• To perform such other functions and excise such powers as May be assigned to it by the Council.

4.3.1.3: National Environment Action Plan Committee

This Committee is responsible for the development of a 5-year Environment Action Plan among other things. The National Environment Action Plan shall:

- Contain an analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.
- Contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.
- Recommend appropriate legal and fiscal incentives that May be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.
- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for the planning and management of the environment and natural resources.
- Identify actual or likely problems as May affect the natural resources and the broader environment context in which they exist.
- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment and strategies for the amelioration of their negative impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.
- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritise areas of environmental research and outline methods of using such research findings.
- Without prejudice to the foregoing, be reviewed and modified from time to time to incorporate emerging knowledge and realities and;
- Be binding on all persons and all government departments, agencies, States Corporation or other organ of government upon adoption by the national assembly.

4.3.1.4: Standards and Enforcement Review Committee

This is a technical Committee responsible for environmental standards formulation methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures.

4.3.1.5: National Environment Tribunal

This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya.

4.3.2: National Environment Council (NEC)

EMCA 1999 No. 8 part III section 4 outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for purposes of EMCA; set national goals and objectives and determines policies and priorities for the protection of the environment and promote co-operation among public departments, local authorities, private sector, non-governmental organisations and such other organisations engaged in environmental protection programmes.

4.4 Kenyan Environmental Legal Framework

Previously, environmental management activities were implemented through a variety of instruments such has policy statements, permits and licences and sectoral laws. There was however need for a stronger enforcement machinery to achieve better standards in environment management. The enactment of the Environmental Management and Coordination Act in 1999 provided for the establishment of an appropriate legal and institutional framework for the management and protection of the environment.

4.4.1: The Environment Management and Co-ordination Act, 1999

The Environmental Management and Coordination Act (EMCA) 1999 is an Act of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. The main objective of the Act is to:

- Provide guidelines for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya;
- Provide a framework legislation for over 77 statutes in Kenya that contain environmental provisions;
- Provide guidelines for environmental impact assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.

The Act empowers the National Environment Management Authority (NEMA) to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies related to the environment.

a) Environmental Impact Assessment and Audit Regulations (2003) Legal Notice No. 101

The Environmental Impact Assessment and Audit Regulations state in Part III Rule No. 6 that an environmental impact assessment study shall be conducted in accordance with the terms of reference developed. Part III Rule 16, takes into account environmental, social, cultural, economic, and legal considerations,
and shall:

- Identify the anticipated environmental impacts of the project and the scale of the impacts;
- Identify and analyse alternatives to the proposed project;
- Proposed mitigation measures to be taken during and after the implementation of the project;
- and
- Develop an environmental management plan with mechanisms for monitoring and evaluating
- the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures

The Proponent has commissioned the environmental impact assessment study in compliance with the EMCA, 1999. The environmental management and monitoring plan laid out in this report shall be adhered to by the Proponent.

b) Environmental Management and Coordination (Water Quality) Regulation 2006

These regulations are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 74, September 2006. The regulation applies to drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. This includes the following:

- Protection of sources of water for domestic use;
- Water for industrial use and effluent discharge;
- Water for agricultural use.

The regulations outline:

- Quality standards for various sources of domestic water;
- Quality monitoring for sources of domestic water;
- Standards for effluent discharge into the environment;
- Monitoring guide for discharge into the environment;
- Standards for effluent discharge into public sewers;
- Monitoring for discharge of treated effluent into the environment.

This Legal Notice on Water Quality provides that anyone who discharges effluent into the environment or public sewer shall be required to apply for Effluent Discharge License. The license for discharge is Ksh. 5,000 while annual license fee for discharge into the environment will be Ksh. 20,000 or Ksh 100,000 depending on the facility. Non compliance with the regulations attracts a fine not exceeding Ksh 500,000 and the polluter pay principle May apply depending on the court ruling.

During construction the proposed line and associated substations, the contractor and KETRACO will refrain from any actions, which may directly or indirectly cause water pollution.

C) Environmental Management and Coordination (Waste Management) Regulation 2006

These regulations are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69, September 2006. These Regulations apply to all categories of waste as provided in the regulations. These include:

- Industrial wastes;
- Hazardous and toxic wastes;
- Pesticides and toxic substances;
- Biomedical wastes
- Radio-active substances.

These Regulations outline requirements for handling, storing, transporting, and treatment/disposal of all waste categories as provided therein. For this project, anticipated waste includes domestic, industrial, hazardous and toxic waste. Wastes contaminated with petroleum product are considered to be hazardous. Treatment of toxic or hazardous waste should be done using the classes of incinerators presented in the third schedule of these regulations. The regulation provides that a waste generator shall use cleaner production methods, segregate waste generated and the waste transporter should be licensed. The notice further states no person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment licence issued by the National Environment Management Authority. Hazardous waste will not be generated from this development. The project proponent will ensure that waste is segregated and a licensed waste transporter is contracted to dispose solid waste during the project cycle.

d) Environmental Management and Coordination (Conservation of Biological Diversity) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84, December 2006. These regulations apply to conservation of biodiversity which includes conservation of threatened species, inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties. Additionally, these links provide for the local enforcement of the International Convention on Biological Diversity (CBD). There is no known rare or endangered species in the project area.

e) Environmental Management and Coordination, (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2010

These regulations are described in Legal Notice No. 19 of the Kenya Gazette Supplement No. 9, February 2010. These regulations include management of wetlands, wetland resources, river banks, lake shores and sea shores. Specific sections have requirements that apply to wetlands in Kenya either in private or public land. These regulations empower the District Environment Committee to coordinate, monitor and advise on all aspects of wetlands resource management within the district. The proponent shall comply with the provisions of the regulations in protecting wetlands, preventing and controlling pollution and siltation in rivers.

f) Environmental Management and Coordination, (Noise and Excessive Vibration Pollution) Regulations 2010

These regulations are described in Legal Notice No. 31 of the Kenya Gazette Supplement No. 21, May 2010. These regulation prohibit any person from making or causing to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. It also prohibits excessive vibration which annoys, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source. Part 11 section 6(1) provides that no person is shall cause noise from any source which exceeds any sound level as set out in the First Schedule of the regulations.

The proponent shall observe policy and regulatory requirements and implement the measures proposed in this document in an effort to comply with the provisions of these regulations.

4.4.2 : Public Health Act (Cap. 242)

This is an Act of Parliament to make provisions for securing and maintaining health. Sections include those dealing with notification of infectious diseases; inspection of infected premises and examination of persons suspected to be suffering from infectious diseases; rules for prevention of diseases; venereal diseases and infection by employees, among others. The proposed project will encourage the movement of people in search of jobs and opportunities, and with this, the risk associated with spread of diseases. Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin. The environmental management plan (EMP) advices the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring,
and estimated cost.

4.4.3: Local Government Act (Rev. 1998)

This Act provides for the establishment of authorities for local government, to define their functions and to provide for matters connected therewith and incidental thereto. In all areas where the project shall be undertaken, the local authorities will require being informed.

Section 160 helps local authorities ensure effective utilization of the sewages systems. Section 170, allows the right to access to private property at all times by local authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs of sewers.

The Act under section 176 gives powers to local authority to regulate sewage and drainage, fix charges for use of sewers and drains and require connecting premises to meet the related costs. According to section 174, any charges so collected shall be deemed to be charges for sanitary services and will be recoverable from the premise owner connected to the facility. Section 264 also requires that all charges due for sewage sanitary and refuse removal shall be recovered jointly and severally from the owner and

occupier of the premises in respect of which the services were rendered. This in part allows for application of the "polluter-pays-principle" Section 163 allows the County Council to prohibit all business, which May be or become a source of danger, discomfort, or annoyance due to their noxious nature through smoke, fumes, dust, noise, or vibrations. Section 165 allows the local authority to refuse to grant or renew any license which is empowered in this act or any other written law on the grounds that the activity does not conform to the requirements of any by-laws in force in the area of such local authority the granting of the license would be contrary to the public interest.

4.4.4: Physical Planning Act, 1996

The Local Authorities are empowered under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore allows for the prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area. Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area May be used.

Section 29 of the physical Planning Act gives county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development. Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid.

The proponent shall secure all mandatory approvals and permits as required by the law.

4.5.5: Land Planning Act (Cap. 303)

Section 9 of the subsidiary legislation (The Development and Use of Land Regulations, 1961) under this Act requires that before the local authorities submit any plans to then Minister for approval, steps should be taken as May be necessary to acquire the owners of any land affected by such plans.

4.4.6: Water Act, 2002

The Act vests the water in the State and gives the provisions for the water management, including irrigation water, pollution, drainage, flood control and abstraction. It is the main legislation governing the use of water especially through permit system.

Part II, section 18, of the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRMA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records May require to be kept by a facility operator and the information thereof furnished to the authority. The proposed site shall include the construction of drainage channels for the Management of waste water. Bund walls and paved surface will be constructed so as to contain oil spills.

4.4.7: Energy Act of 2006

This is an Act of Parliament passed to amend and consolidates the law relating to energy, to provide for the establishment, powers and functions of the Energy Regulatory Commission and the Rural Electrification Authority and for connected purposes. The Energy Act of 2006 replaced the Electric Power Act of 1997 and The Petroleum Act, Cap 116. The Energy Act, amongst other issues, deals with all matters relating to all forms of energy including the generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes.

The Energy Act, 2006, also established the Energy Regulatory Commission (ERC) whose mandate is to regulate all functions and players in the Energy sector. One of the duties of the ERC is to ensure compliance with Environmental, Health and Safety Standards in the Energy Sector, as empowered by Section 98 of the Energy Act, 2006. In this respect, the following environmental issues will be considered before approval is granted:

- The need to protect and manage the environment, and conserve natural resources;
- The ability to operate in a manner designated to protect the health and safety of the project employees; the local and other potentially affected communities.

Licensing and authorisation to generate and transmit electrical power must be supported by an Environmental Impact Assessment Report (EIA) approved by NEMA.

4.4.8: The Standards Act Cap 496

The Act is meant to promote the standardization of the specification of commodities, and code of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. The proponent will ensure that commodities and codes of practice utilized in the project adhere to the provisions of this Act.

4.4.9: Building Code 1968

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and all the wastewater must be discharged into sewers.

4.4.10: Penal Code Act (Cap.63)

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way commit an offence. The Proponent shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation of adverse impacts arising from the project activities.

4.4.11: The Wildlife Conservation and Management Act, Cap 376

The Wildlife (Conservation and Management) Act, Cap 376 of 1976, as amended in 1989, covers matters relating to wildlife in Kenya including protected areas, activities within protected areas, control of hunting, import of wildlife, enforcement and administrative functions of Wildlife authorities. This Act provides for the protection, conservation and management of wildlife in Kenya. The provisions of this Act should be applied in the management of the project.

Part III Section 13 subsection (I) stipulates that any person who not being an officer of Kenya Wildlife Service hunts any animal in a National Park shall be guilty of a forfeiture offence and liable to a fine or imprisonment. Subsection 2 of the Act likewise provides that any person who, without authorisation conveys into a National Park, or being within the area thereof, in possession of, any weapon, ammunition, explosive, trap or poison, shall be guilty of a forfeiture offence. The Act further provides that no person is allowed to use any aircraft, motor vehicle or mechanically propelled vessel in such a manner as to drive, stampede or unduly disturb any protected animal or game animal. Therefore it will be prudent that the construction workforce is conversant with the

provisions of this Act. The proposed project is not located within a conservation/protected area.

4.4.12: The Lakes and Rivers Act Chapter 409 Laws of Kenya

This Act provides for protection of rivers, lakes and associated flora and fauna. The provisions of this Act May be applied in the management of the project.

4.4.13: The Forest Act

The forest Act, Cap 385 of 1962(revised 1982, 1992 and 2005) addresses the reservation, protection, management, enforcement and utilization of forests and forest resources on government land. The forest Act is applicable to gazetted forest areas (Forest Reserves) and specifically covers:

- Gazettement, alteration of boundaries and De-Gazettement of Forest Reserves
- Prohibition of activities in Forest Reserves (removal of forest produce, grazing, cultivation,

hunting etc) and on unalienated Government land (removal of trees, collection of honey, lighting of fires) except under license from the Director of Forest Services (Section 8);

- Enforcement of the provisions of the Act, penalties and powers afforded to enforcing officers, among others. The proposed project is not on a forest reserve or near one.

4.4.14 : The Forest Act, 2005

The Act led to the establishment of Kenya Forest Service which is charged with management of forests in consultation with the forest owners. The body enforces the conditions and regulations pertaining to logging, charcoal making and other forest utilisation activities.

To ensure community participation in forest management, the service collaborates with other organizations and communities in the management and conservation of forests and for the utilisation of the biodiversity. Section 43 (1) provides that if mining, quarrying or any other activity carried out in the forest, where the activity concerned is likely to result in forest cover depletion, the person responsible shall undertake compulsory re-vegetation immediately upon the completion of the activity. The proposed project is not on a forest reserve or near one.

4.4.15: Occupational Safety and Health Act, 2007

This is an Act of parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently.

The purpose of the Act is to:

• Secure the safety, health and welfare of persons at work;

• Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work.

The Act provides that before any premises are occupied, or used as a workplace, a certificate of registration must be obtained from the Director of Occupational Safety and Health Services. The Act provides for the health, safety and welfare for employees at workplaces. This shall be considered at the construction, implementation and decommissioning phases of the project. The following are other provisions of the Act.

4.4.15.1: Health

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

4.4.15.2: Safety

Fencing of premises and dangerous parts of other machinery is mandatory. Training and supervision of inexperienced workers, protection of eyes with goggles or effective screens must be provided in certain specified processes. Floors, passages, gangways, stairs, and ladders must be soundly constructed and properly maintained and handrails must be provided for stairs. Special precaution against gassing is laid down for work in confined spaces where persons are liable to overcome by dangerous fumes. Air receivers and fittings must be of sound construction and properly maintained. Adequate and suitable means for extinguishing fire must be provided in addition to adequate means of escape in case of fire must be provided.

4.4.15.3: Welfare

An adequate supply of both quantity and quality of wholesome drinking water must be provided. Maintenance of suitable washing facilities, accommodation for clothing not worn during working hours must be provided. Sitting facilities for all female workers

whose work is done while standing should be provided to enable them take advantage of any opportunity for resting. Every premise shall be provided with maintenance, readily accessible means for extinguishing fire and person trained in the correct use of such means shall be present during all working periods. Regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earning for the employees and if possible within normal working hours. The (OSH) Act provides for development and maintenance of an effective programme of collection, compilation and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illness including disabling during working hours, are adhered.

The Environmental Management Plan (EMP) advices the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost.

4.4.16: Work Injury and Benefits Act, 2007

This Act provides for compensation to employees for work related injuries and disease contracted in the course of their employment and for connected purposes. Key sections of the Act include the obligations of employers; right to compensation; reporting of accidents; compensation; occupational diseases; medical aid etc. In case of any accidents or incidents during the project cycle, this Act will guide the course of action to be taken.

4.4.17: Occupiers Liability Act (Cap. 34)

This Act provides that it's the duty of occupier of the premises owes to his visitors in respect of danger and risk due to the state of the premises or to things omitted or attributes an affliction on his/her health to a toxic materials in the premises.

4.4.18: The Radiation Protection Act (Cap 243 Laws of Kenya)

This is an Act of Parliament to provide for the protection of the public and radiation workers from the dangers arising from the use of devices or material capable of producing ionizing radiation and for connected purposes. Since 1982, Kenya decided to join in the global movement for the use of nuclear energy for peaceful purposes, a movement lead by the International Atomic Energy Agency (IAEA). Most of such uses are in the fields of medicine, agriculture, energy and environmental monitoring. The dangers of injury to the public prompted the adoption of the Radiation Protection Act (Cap 243) in November 1984 to provide according to its citation, protection of the public and radiation workers from the dangers arising from the use of devices or materials capable of producing ionizing radiation and for connected purpose.

The Act prohibits the unauthorized manufacture, production, possession or use, sale, disposal, lease, loan or dealership, import, export of any irradiating device or radioactive material. All authorized buyers, sellers, users, of such device must be properly licensed. The Act is administered by the Chief Radiation Protection Officer assisted by a Radiation Protection Board.
The proposed project won't emit/produce ionizing radiations.

4.4.19: The Traffic Act Chapter 295 Laws of Kenya

This Act consolidates the law relating to traffic on all public roads. Key sections include registration and licensing of vehicles; driving licenses; driving and other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other than motor vehicles and other road users. Many types of equipment and fuel shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the stipulated road regulations. The Act also prohibits encroachment on and damage to roads including land reserved for roads. The project is under the provision of the Act.

4.4.20: The Public Roads and Roads of Access Act (Cap 22 Laws of Kenya)

Section 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent landowners seeking permission to construct the respective roads. The project design concept has left the required road reserves and relevant road widening surrenders. This Act consolidates the law relating to traffic on all public roads. The Act also prohibits encroachment on and electrical damage to roads including land reserved for roads. The proposed facility location complies with the provision of the Act. It is not on road reserves.

4.4.21: The Way leaves Act Cap 292

According to the Way leaves Act cap 292 Section 2, Private land does not include any land sold or leased under any Act dealing with Government lands. Section 3 of the Act states that the Government May carry any sewer, drain or pipeline into, through, over or under any lands whatsoever, but May not in so doing interfere with any existing building. Section 8 further states that any person who, without the consent of the Permanent Secretary to the Ministry responsible for works (which consent shall not be unreasonably withheld), causes any building to be newly erected over any sewer, drain or pipeline the property of the Government shall be guilty of an offence and liable to a fine of one hundred and fifty shillings, and a further fine of sixty shillings for every day during which the offence is continued after written notice in that behalf from the

Permanent Secretary; and the Permanent Secretary May cause any building erected in contravention of this section to be altered, demolished or otherwise dealt with as he may think fit, and May recover any expense incurred by the Government in so doing from the offender. The proposed site is not inhabited hence there will be no compensation.

4.4.22: The Agriculture Act, Cap 318 of 1980 (revised 1986)

This Act has stated objectives to promote and sustain agricultural production, provide for conservation of the soil and its fertility, and stimulate the development of agricultural land in accordance with accepted practices of good land management and good husbandry.

4.4.23: Antiquities and Monuments Act, 1983 (Cap 215)

This Act aims to preserve Kenya's national heritage. Kenya is rich in its antiquities, monuments and cultural and natural sites which are spread all over the country. The National Museums is the custodian of the country's cultural heritage. Through the National Museums many of these sites are protected by law by having them gazette under the Act.

The proposed site has no sites of cultural heritage.

4.4.24: The Registration of Titles Act Cap 281

This Act provides for the transfer of the land by registration of titles. Parts within the Act elaborate. On mechanisms of bringing lands under the Act, and for related purposes. The Act also elaborates on the incorporation of group representatives and the administration of groups.

Section 34 of this Act states that when land is intended to be transferred or any right of way or other easement is intended to be created or transferred, the registered proprietor or, if the proprietor is of unsound mind, the guardian or other person appointed by the court to act on his/her behalf in the matter, shall execute, in original only, a transfer in form F in the First Schedule, which transfer shall, for description of the land intended be dealt with, refer to the grant or certificate of title of the land, or shall give such description as May be sufficient to identify it, and shall contain an accurate statement of the land and easement, or the easement, intended to be transferred or created, and a memorandum of all leases, charges and other encumbrances to which the land May be subject, and of all rights-of-way, easements and privileges intended to be conveyed.

4.4.25 : The Land Titles Act Cap 282

The Land Titles Act Cap 282 section 10 (1) states that there shall be appointed and attached to the Land Registration Court a qualified surveyor who, with such assistants as May be necessary, shall survey land, make a plan or plans thereof and define and mark the boundaries of any areas therein as, when and where directed by the Recorder of Titles, either before, during or after the termination of any question concerning land or any interest connected therewith, and every area so defined and marked shall be further marked with a number of other distinctive symbol to be shown upon the plan or plans for the purposes of complete identification and registration thereof as is herein after prescribed.

4.4.26 : The Land Acquisition Act Chapter 295 Laws of Kenya

The Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. Section 3 states that when the Minister is satisfied on the need for acquisition, notice will be issued through the Kenya Gazette and copies delivered to all the persons affected. Full compensation for any electrical damage resulting from the entry onto land to do things such as survey upon necessary authorisation will be undertaken in accordance with section 5 of the Act. Likewise where land is acquired compulsorily, full compensation shall be paid promptly to all persons affected in accordance to sections 8 and 10 along the following parameters:

- Area of land acquired
- The value of the property in the opinion of the Commissioner of land (after valuation),
- Amount of the compensation payable,
- Market value of the property,
- Electrical damages sustained from the severance of the land parcel from the land,
- Electrical damages to other property in the process of acquiring the said land parcel,
- Consequences of changing residence or place of business by the land owners,
- Electrical damages from diminution of profits of the land acquired.

Part II of the Act allows for the temporary acquisition of the land for utilisation in promotion of the public

good for periods not exceeding 5 years. At the expiry of the period, the Commissioner of Land shall vacate the land and undertake to restore the land to the conditions it was before. Any electrical damages or reduction of value shall be compensated to the landowners.

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4.5: International Environmental Guidelines

Kenya is a signatory to a number of conventions on sustainable development and is a member of various bilateral and multilateral organizations. Some of the relevant International treaties and conventions include:

- Vienna Convention for the Protection of the Ozone Layer. Inter-governmental negotiations for an International agreement to phase out ozone depleting substances concluded in March 1985 with The adoption of this convention to encourage Inter-governmental co-operation on research, systematic observation of the ozone layer, monitoring of CFC production and the exchange of information;
- Montreal Protocol on Substances that Deplete the Ozone layer: Adopted in September 1987 and intended to allow the revision of phase out schedules on the basis of periodic scientific and technological assessment, the Protocol was adjusted to accelerate the phase out schedules and has since been amended to introduce other kinds of control measures and to add new controlled substances to the list;
- The Basel Convention: Sets an ultimate objective of stabilizing greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system;
- Kyoto Protocol: Drawn up in 1997, pursuant to the objectives of the United Nations Framework Convention on Climate Change, in which the developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990;
- Convention on Biological Diversity (CBD, 1992): This Convention entered into force on 29 December 1993, and its objectives are to: conserve biological diversity; use biological diversity in a sustainable fashion and share the benefits of biological diversity fairly and equitably. This Convention governs Kenya's international obligations regarding biological diversity;
- UNESCO Convention for the protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972): This Convention aims to encourage the identification, protection, and preservation of Earth's cultural and natural heritage. It recognizes that nature and culture are complementary and that cultural identity is strongly related to the natural environment in which it develops;
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar) Convention): The Convention was signed in Iran in 1971 and came into force in 1975. It represents the first attempt to establish a legal instrument providing comprehensive protection for a particular type of ecosystem. The Ramsar parties agree to implement their planning so as to promote conservation of the wetlands included in the list. There is no Ramsar site near the proposed site.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):

This convention seeks to control the trade in species of wild animals and plants that are, or May be, threatened with extinction as a result of International trade. CITES is an important line of defence against the threat posed to diversity by invasive species.

• The Africa-Eurasia Migratory Water Bird Agreement (AEWA, 1995): The goal of the agreement is to protect migratory waterfowl by ensuring that they are protected for the entire length of their migratory routes. The list of birds protected under the AEWA Convention covers 235 species of birds.

• African Convention on Conservation of Nature and Natural Resources (1968): This Convention of the African Union is ratified by 40 African countries, including Kenya. The fundamental principle requires contracting states to adopt the measures necessary to ensure conservation, utilization and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people.

Kenya has a duty under these multilateral agreements. The project should adhere to strict guidelines and procedures to ensure the agreements are not violated.

4.6: World Bank /IFC Environment and Social Safeguards Policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for the bank and borrower staffs in the identification, preparation, and implementation of programs and projects. Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local population. The Safeguard Policies aims at improving decision making, to ensure that project options under consideration is sound and sustainable, and that potentially affected people have been properly consulted. Out of the ten (10) World Bank Safeguard Policies described below, only one policy will be triggered by the project.

4.6.1: Environment Assessment (Operational Policy, OP/BP 4.01)

The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies'. The proposed project triggers this policy because although there is justification of the proposed 90MVA 132/60 kV of the transmission substation, there are environmental and social concerns associated with the construction and operation of the proposed project.

4.6.2: Natural Habitats (Operational Policy, OP/BP 4.04)

This policy recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and most native species. The proposed project doesn't trigger this policy because the project won't cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).

4.6.3: Indigenous Peoples (Operational Policy 4.10)

The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples; (ii) ensure that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and (iii) ensure that indigenous peoples receive culturally appropriate and gender and intergenerationally inclusive social and economic benefits. The proposed project doesn't trigger this policy because the proposed site has not cultural sites.

4.6.4: Physical Cultural Resources (Operational Policy 4.11)

The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources May be located in urban or rural settings, and May be above ground, underground, or underwater. The cultural interest May be at the local, provincial or national level, or within the international community. The policy won't be triggered because the proposed project is not located in, or in the vicinity of, recognized cultural heritage sites.

4.6.5: Involuntary Resettlement (Operational Policy, OP/BP 4.12)

The objective of this policy is to:

- avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs;
- assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them;
- encourage community participation in planning and implementing resettlement; and
- provide assistance to affected people regardless of the legality of land tenure.

The policy won't be triggered because the proposed project won't cause physical relocation, loss of land or other assets resulting in:

- relocation or loss of shelter;
- loss of assets or access to assets;
- loss of income sources or means of livelihood.

4.6.6 : Forests (Operational Policy, OP/BP 4.36)

The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank assists borrowers with the establishment of environmentally appropriate, socially beneficial and economically viable forest plantations to help meet growing demands for forest goods and services. This policy is not triggered because no forests exist in the proposed site.

4.6.7: Pest Management (Operational Policy, OP/BP 4.09)

The objective of this policy is to: promote the use of biological or environmental control and reduce reliance on synthetic chemical pesticides; strengthen the capacity of the country's regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. More specifically, the policy aims to (a) Ascertain that pest management activities in Bank-financed operations are based on integrated approaches and seek to reduce reliance on synthetic chemical pesticides (Integrated Pest Management (IPM) in agricultural projects and Integrated Vector Management (IVM) in public health projects. (b) Ensure that health and environmental hazards associated with pest management, especially the use of pesticides are minimized and can be properly managed by the user. (c) As necessary, support policy reform and institutional capacity development to (i) enhance implementation of IPM-based pest

management and (ii) regulate and monitor the distribution and use of pesticides. The policy is not triggered because no procurement of pesticides or pesticide application equipment is envisaged and the project won't lead to substantially increased pesticide use and subsequent increase in health and environmental risk

4.6.8: Safety of electrical transmissions (Operational Policy, OP/BP 4.37)

The objectives of this policy are as follows: For new electrical transmissions, to ensure that experienced and competent professionals design and supervise construction; the borrower adopts and implements electrical transmission safety measures for the electrical transmission and associated works. For existing electrical transmissions, to ensure that any electrical transmission that can influence the performance of the project is identified, an electrical transmission safety assessment is carried out, and necessary additional electrical transmission safety measures and remedial work are implemented. This policy is not triggered because the project doesn't involve construction of a large electrical transmission (15 m or higher) or a high hazard electrical transmission.

4.6.9: Projects in International Waters (Operational Policy, OP/BP 7.50)

The objective of this policy is to ensure that Bank-financed projects affecting international waterways would not affect: (i) relations between the Bank and its borrowers and between states (whether members of the Bank or not); and (ii) the efficient utilization and protection of international waterways. The policy applies to the following types of projects: (a) Hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial and similar projects that involve the use or potential pollution of international waterways; and (b) Detailed design and engineering studies of projects under (a) above, include those carried out by the Bank as executing agency or in any other capacity. This policy is not triggered because there are no International waters in the project site.

4.6.10: Projects in Disputed Areas (Operational Policy, OP/BP 7.60)

The objective of this policy is to ensure that projects in disputed areas are dealt with at the earliest possible stage: (a) so as not to affect relations between the Bank and its member countries; (b) so as not to affect relations between the borrower and neighbouring countries; and (c) so as not to prejudice the position of either the Bank or the countries concerned. This policy won't be triggered because the proposed project won't be in a "disputed area".

4.7: African Development Bank Environment Policy

The environment policy framework is strongly anchored in the concept of sustainable development. This concept has evolved significantly since it was first defined in 1987 by

the Brundtland Commission[1] as "*development that meets the needs of the present without compromising the needs of the future*". Although the principles of sustainability have been globally accepted for decades, their translation into specific environmental management objectives has been fraught with practical and theoretical problems. While subscribing to sustainable development objectives, governments and businesses have shown a preference for concepts that rely on "pollute now, clean later" approaches, and a greater emphasis on financial and economic viability of investment projects.

However, growing evidence of rapid deterioration of the ecological capital and diminishing assimilative capacities of the ecosystems, coupled with the global scale of environmental problems, have now forced planners, governments, institutions and businesses to rethink their development strategies and to accept that the environment and the economy are interdependent. Sustainable development is now increasingly becoming the preferred development paradigm, and there is a better conceptualisation of the environment-growth-social development interaction. In this policy, sustainable development is defined as the acquisition, transformation, distribution, and disposal or resources in a manner capable of sustaining human activities without any reduction in the aggregate natural resource stocks. It also assumes that the ecological regenerative and assimilative capacities of the natural ecosystems will be maintained. This definition stresses the anticipatory nature of sustainable development rather than the reactive responses so predominant.

Underlying the above definition is the notion of environmental thresholds that should not be exceeded. These "carrying capacities" will constitute the constraints within which economic, social and other factors will be optimised. They are inter-linked in time, space and resources, and determined by number of people, the nature and quantity of production and consumption, and the cumulative impact on the environment. More importantly, they are moving goal posts that may be enhanced by technological innovation or severely eroded by natural or human-made calamities.

In adopting the sustainable development concept as an environment policy framework, care has been taken to acknowledge the realities on the ground in Africa. In fact, unlike other continents, African countries entered the 1990s with major political, economic and environmental problems. More than ten years after the Rio Earth Summit, the region still faces a wide range of environmental challenges, and is losing its natural resources at relatively rapid rates in comparison with other regions of the world. Such degradation is

largely the result of poverty, and the poor inevitably become victims to the continued loss of resources on which they depend upon for their survival. But impoverishment is a dynamic process[2], driven by a number of processes, including increasing loss of control over local resources and adverse impacts on livelihood through overexploitation, encroachment by commercial farming practices, erosion, and disempowerment. There is a clear need to establish a strong linkage between natural resource capital enhancement and poverty-reduction strategies that constitute the overarching goal of the Bank's Vision Statement.

However, degradation of the environment is as much a consequence of poverty as it is of population pressure. Rapid population growth can, in fact, push a country beyond its carrying capacity, leading to rapid soil loss and desertification. Associated with the demands of a growing population are those of an increasing livestock population. The clearing of land for cattle ranching and overgrazing by livestock are important contributors to deforestation and land degradation. The policy on environment should, therefore, have to address issues related to population. Coupled with the environmental problems facing Africa is its increasing marginalization by the process of globalization. To be able to share in the benefits and opportunities offered by globalisation, it is accepted that there will be a need to: (i) accelerate the economic growth rates by raising the levels and productivity of investment and attracting larger volumes of international capital; (ii) reorient economic policies, with major policy reforms and greater participation of the private sector; (iii) increase competitiveness of traditional exports, while diversifying them; and (iv) enhance regional integration and strengthen cooperation arrangements. Fortunately, Africa is endowed with a rich resource base consisting, among others, of minerals, oil and gas deposits which can provide a basis for mining and industrial development. Its rich flora and fauna, and wide expanses of natural habitats offer excellent opportunities for tapping into the potential of the global tourism industry, which remains the fastest growing industry in the world. This policy, therefore, takes into accounts the challenges and opportunities facing Africa, and is based on the following key principles that have gained general acceptance as prerequisites to sustainable development and articulated in a number of international agreements[3]:

- A strong and diversified economy shall be recognized as a just means to enhance the capacity for environmental protection; however, all development-related decision-making processes shall integrate economic, social and environmental considerations. Nonetheless, lack of financial resources shall

not constitute an impediment to the promotion of community-based natural resource protection and management.

- Environmental management tools, like environmental assessments, shall systematically be used to ensure that economic activities are environmentally sustainable, and to systematically monitor their environmental performance.
- Community involvement, specifically including women, in natural resource management decisions that affect the most marginalized and vulnerable groups shall be provided for, and the value of traditional knowledge shall be recognized and preserved.
- Transparency, accountability of governance structures and institutions, which are more responsive to the needs and priorities of affected communities in general, and poor people, women, and vulnerable groups in particular, shall be encouraged.
- A coordinated approach to effective environmental interventions in the region shall be pursued by building partnerships with development partners, including other MDBs, bilateral organizations, UN agencies, research institutions and NGOs.

CHAPTER FIVE: STAKEHOLDER CONSULTATION

5.1: Approach to Stakeholder Consultations

Stakeholder consultation was undertaken among people living along the proposed transmission line corridor and area of influence as an integral part of the ESIA study. The aim was to ensure that all stakeholder interests were identified and incorporated in project development, implementation and operation. These meetings enabled interested and affected parties to contribute their concerns (views and opinions on the proposed project) which might have been overlooked during the scoping exercise. Findings of stakeholder analysis were very important in predicting impacts and development of EMP. In case of the proposed development of power transmission lines, public consultations followed several steps as follows: -

5.2: Briefing by the project team

The ESIA team comprised various experts including Environmentalists, Land Surveyors, Land Economists, Socio-Economists, Electrical and Civil Engineers. Briefing commenced after consultations with respective project team members with respect to the various components of the project. During such discussion, the other teams clarified to the ESIA Team (environmentalists) the status of way leave identification and acquisition, project designs and maps on the study area, among other information. The ESIA Team also acquired key contacts of the Provincial administration and other key stakeholders from the project team members who had earlier conducted a reconnaissance visit to the project area.

5.3: Identification of other stakeholders

The proposed transmission line and associated substations typically involves land acquisition land for construction of permanent overhead structures (including substations) traversing close to 20 kilometres on land. Of necessity, numerous people are likely to be affected by the project and are therefore bonafide stakeholders demarcated by the decision to follow the proposed routes of traverse. The Project Affected Persons (PAPs) were identified and mapped as a preparatory activity for a comprehensive RAP of the proposed project.

This study also identified a second category of stakeholders comprised of GoK officers in charge of diverse sectors, which are likely to be impacted by the project. This category was also consulted as key informants on sectoral policy and to advise the ESIA study on mitigation measures to be put in place so as to minimize adverse impacts in respective

sectors. This category also included local policy makers and opinion leaders, local administration, local authorities and civic leaders.

5.4: Modalities for stakeholder consultation

Each category of stakeholders called for a different approach to consultation.

5.4.1: Consultation with Project Affected People

Inventory of PAPs was based on administration of a questionnaire specifically designed for this purpose. The tool was administered on randomly sampled land owners likely to be affected by the project for purposes of capturing their views, opinions and concerns regarding the proposed project. Questionnaires duly filled in by various stakeholders have been annexed to this report.

5.4.2: Consultations with Secondary Stakeholders

Under this category, a cross section of stakeholders were met and these included; civil servants, local government officials and the local residents. Consultations took place in respective offices and in the field where possible. For this category of stakeholders, a semi-structured questionnaire providing for the Institution, name and designation of officer consulted, issues raised and signed feedback was used to guide the discussions. Discussions started with the consultant team explaining the project to the target officer following which, they were asked to identify their environmental concerns on the same. After discussion, the officers were requested to fill and sign the form administered by the consultant in a system that was deemed useful and as a strategy to cut down on paperwork while capturing and documenting for future reference-the signed comments of target informants. A sample of filled key informant questionnaires are attached to this report as appendix IV.

5.4.3: Indirect consultations

Numerous individuals and institutions previously played diverse roles in the formulation and design of the power transmission lines project and though it was not possible to make direct contacts with them, the same was achieved through study and review of outputs left behind in form of reports. Thus, considerable time input was devoted to review of project documents towards preparation of this ESIA report.

5.5: Total stakeholders consulted

Table 5.1 provides a breakdown of the stakeholders consulted. The ESIA Team conducted formal (through questionnaires) and informal (through oral interviews) interviews of selected key informants in the project area. Similarly, another set of questionnaires were administered to community members at household level as part of

stakeholder consultation culminating to barazas held in each of the five locations where the proposed 132 kV transmission line traverses as indicated in table 5.1. A total of 58 household respondents were interviewed as outlined in table 5.2. Minutes of the barazas are attached to this report as appendix II.

Table 5. 3: Breakdown of *Barazas* Held in the Project Area

Location	Date Held	No. of participants
Mbeti North	20th July 2010	47
Kithimu	20th July 2010	39
Kagaari South East	21st July 2010	100
Kagaari South West	21st July 2010	37
Kyeni Central.	22nd July 2010	22
Total		**245**

In total, 327 persons were consulted for this study as indicated in table 5.2.

Table 5. 4: Summary of stakeholders consulted

Category of stakeholder	Office (r) consulted	Number consulted	Station
Provincial Administration	District Commissioners	2	Embu East/Embu West
	District Officers	2	Runyenjes/Central
	Chiefs	5	Mbeti North, Kithimu, Kagaari South East, Kagaari South West, Kyeni Central.
	Assistant Chiefs	3	Itabua, Nthagaiya, Nyagari
Kenya Forest Service	Head Eastern Forest Conservancy	1	Eastern Province, Eastern Province Embu
Ministry of Public Health and sanitation	Senior Provincial Health Administration Officer	1	Eastern Province Embu
	Senior Public Health Officer	1	Embu East, Runyenjes
Ministry of Labour	Provincial Occupational Health and Safety Office	1	Embu
Ministry of Local Government	Town Engineer, Municipal Council of Embu	1	Embu
National Environment Management Authority	District Environment Officer	1	Embu West/East

Category of stakeholder	Office (r) consulted	Number consulted	Station
Ministry of Planning and Vision 2030	District Development Officer	1	Embu West/East/North
Ministry of Livestock development	District livestock Production Officer	1	Embu East, Runyenjes
Ministry of Agriculture	Deputy District Agriculture Officer	1	Embu West, Embu
	Principal Agricultural Officer	1	Embu East, Runyenjes
Kenya Power and Lighting Company Ltd	Marketing Officer,	2	Embu station
Potentially Affected Persons	Household respondents	58	Embu West/East
Potentially Affected Persons	Barazas	245	Embu West/East
Total stakeholders consulted		**327**	

5.6: Outcome of the Stakeholder consultations

5.6.1: General outcomes

Advantages of the project were identified by diverse stakeholders as follows:

i) Project is a manifestation of government commitment to development in the project area
ii) Supply of electricity will unlock economic development in the targeted areas
iii) The locals will be employed in the construction work
iv) People will sell land for proposed sub-stations and thus generate money for investment
v) People will be compensated for lost utility and assets (trees, crops, etc.) within the way leave
vi) Electricity will be available for rural supply
vii) Security enhancement in the area due to enhanced electricity supply resulting in enhanced distribution.
viii) Local power distribution to support and boost growth of Jua kali and other cottage industries.
ix) Electricity supply to hospitals and dispensaries in the project area would enhance delivery of services such as laboratory, surgical, immunization, among others.

Disadvantages of the project were identified as follows;-

i) The project will displace people and their property and fail to pay adequate compensation,
ii) Presence of electric lines will expose people to accidents and health hazards
iii) The loss of trees to pave way for way leave and substation construction may exacerbate soil erosion especially in soil erosion prone areas
iv) Fear of transmission lines interfering with communication
v) Increase in social vices due to influx of population in the project area as a result of emergence of new industries as well as general development in the area
vi) Possibility of occurrence of accidents on the sites during construction.

5.6.2: Specific concerns

Way Leave Acquisition

Some stakeholders, more-so those whose properties risk displacement by the project expressed the need for clear mechanisms for way leave acquisition, compensation or resettlement (as may be applicable). The ESIA team confirmed that indeed some people are likely to lose property in order to create a 30 metre way leave for the 132kV power transmission line and construction of associated substations. The team further emphasised that comprehensive consultations spearheaded by the Provincial Administration will be done. Furthermore the compensation which aims at uplifting the affected person to a better economic state will be guided by statutory provisions such as the Agriculture Act (crops) and Forest Act, 2005 (trees).

Concerns over adequacy of compensation for acquired land

Matters pertaining to land acquisition and compensation were a major concern to the local residents, and hence considered to be very critical. The farmers requested that in the event that land acquisition has to be done, then, adequate compensation for land and property that are likely to be taken up by the ROW be adequate. The major concern from the farmers is that if adequate compensation is not granted, then this would leave them poorer against the wishes of poverty eradication. The communities along the ROW also expressed doubts as to whether the compensations will be honoured based on experiences on similar projects some years back where compensation was not paid on time thus occasioning suffering.

There may be a few cases where the current owners are not the registered owners of the land. This may arise from the registered owner dying interstate, and his or her kin take ownership without formally transferring the parcel of land through the laid down legal mechanisms.

Escalation of land related conflicts

The provincial administration observed that the process of land acquisition and compensation is likely to trigger family disputes and recommended that Chiefs, Assistant Chiefs and village elders be involved in identifying bonafide land owners to be negotiated with. Also during signing of way leave consents and compensation, official and authentic documents will be required.

There will also be the need to establish a cut-off date for registration of PAPs so as to avoid speculative land buying as commonly happens in projects entailing land acquisition and compensation.

Questions of power supply along routes of traverse:

Stakeholders (government and community) enquired on the possibility of communities in routes of traverse to tap power supply from the 132kV line and thus benefit locally. This was seen as an incentive to win support for the project.

The ESIA team noted that through the project, electricity will be brought to accessible distance in the project area. Once this happens, KPLC and REA will step in (as defined by their mandate) to distribute power appropriately.

Potential impact on agricultural economies:

Stakeholders in the crop and livestock production sectors were concerned that removal of trees in the right of way will have harmful effects such as loss of shade and shelter belts in semi-arid areas, affect fuel-wood supply, affect yield of mangoes which is an emerging cash crop, affect bee production which is based on availability of trees etc. As well, construction of tower foundations will fix agricultural land and put it out of production thus impacting on food security especially in areas where land sizes are small while construction work during the cropping season can have similar effects through destruction of the standing crop.

On the other hand, stakeholders in this sector also felt that enhanced availability of power would boost value addition in agriculture and the cottage industry. Mangoes are one of the major cash crops in the area; people's livelihoods would improve if their potential as possible avenues for industrialisation would be exploited.

Impact of tree removal on the nesting and breeding patterns of avifauna

It was observed that within the project area, just like other areas with varied ecological characteristics, birds mainly use trees for nesting and breeding in which case, removal of the latter for purposes of the right of way has potential to affect nesting and breeding. The situation is even more desperate where the transmission line clears isolated trees which may be the only nesting ground available in the vicinity.

Modalities for mitigating against tree removal

Stakeholders especially from KFS expressed concern on the loss of on-farm trees and private forests along the transmission line corridor and areas where the substations will be located. This would potentially lead to a tree-less ground along the high voltage power line resulting in soil erosion and loss of raw materials for timber and fuel wood.

KFS staff also observed that Proponent should put in place measures to mitigate tree removal possibly through supporting reforestation programmes to ensure that appropriate balances of standing woody biomass are enhanced rather that eroded by the project.

Employment opportunities

The community expressed fear that local youths may be sidelined in securing employment opportunities especially during the construction phase of the proposed project. "The contractor may come with their own staff and deny our youths job opportunities", the community asserted.

The ESIA team emphasised that locals will be given first priority in employment especially casual employment. As this may lead to unwarranted hostilities, the contractor will be advised to contract locals in the areas where the line will traverse.

Power stability

Some of the stakeholders particularly those within Embu town and its surroundings viewed the project as a relief to the frequent power outages in the area. The unreliable power supply in the town had adversely impacted on income generation and other development activities in the area.

Occupational health and safety

The stakeholder from the Directorate of Occupational Health and Safety Services (DOHSS) was concerned about worker welfare and safety during the construction and operation phase of the proposed project.

The DOHSS recommended that safety and health legislation requirements should be followed during construction and operation phase of the proposed project. Furthermore, the Proponent should ensure health, safety and welfare of workers to prevent accidents in the course of employment.

Corporate Social Responsibility

A key concern of the community was how KETRACO was committed in general development of the area and the role of the project in improving people's livelihoods. Through its CSR programme, KETRACO shall consider supporting the affected communities in development projects including but not limited to afforestation, water provision, among others. With specific reference to the proposed project and the predicted loss of woodlots, it is proposed that KETRACO carries out an afforesation programme as a mitigation measure to cover for the probable loss of vegetation that may be experienced during the construction phase. Towards this, KETRACO endeavours to create harmonious relations and partnerships with host communities and other stakeholders for their mutual benefit.

5.7: Overall picture from the stakeholder consultations

The overall picture emergent from the stakeholder consultations is that the project is seen as being strategic to stabilising rural power supply which is crucial to sustained economic growth. In order to sustain this overwhelming public support, project development should proceed simultaneously with resolution of stakeholder concerns.

CHAPTER 6: POTENTIAL IMPACTS AND MITIGATION MEASURES

6.1: Introduction

The anticipated potential impacts discussed in this chapter are from construction, operation and decommissioning phases. A number of positive and negative anticipated impacts to the environmental and social wellbeing have been identified thus far. Among the broad areas of impacts include the following positive and negative impacts:

Positive Impacts:

- Possibility of connecting more households and institutions to the national grid;
- The major impacts of the transmission line will be reduced poverty and improved living standards within and beyond the district served. These will result from employment creation (direct and indirect) and increased investments especially in value addition processing of primary products.
- Improved incomes and poverty reduction will also occur through provision of opportunities to invest in heavy industries and facilitate direct and indirect employment
- Job creation for both skilled and unskilled labour for vegetation clearing, menial works, drivers and machine operators. The total number of local jobs created by this project as will depend on availability of labour and policies of the contractor and the proponent.
- Employment generation and income opportunities for the contractor, construction staff, and other professional service providers;
- The locals' employment as unskilled labourers during construction of the proposed transmission line; and
- New business opportunities for the local community leading to the establishment of new trade centres and the growth of the existing ones especially where the contractors will establish their camps
- Boost the economy through investment and expansion of businesses and income generation opportunities. This will increase productivity and competition
- Connect more households and institutions with electricity thereby providing household level lightning system. This will in effect create market for electronic goods
- Reduce power problems/outages especially in Embu town and its neighbourhood.
- Improve security in the beneficiary communities through better lighting

- Waste generation; soil erosion and sedimentation; dust emissions; the potential for hazardous materials to contaminate the environment; and occupational health and safety issues during the construction phase; and
- It will boost sectors like education; tourism; health and sanitation; water etc

Negative Impacts

Construction Phase

- Construction Waste Generation
- Soil erosion and sedimentation
- Impact of power transmission lines on migratory fauna
- Aquatic Habitat Alteration
- Risk of Fires
- Air Quality
- Risk of leaks and spills
- Occupational Health and Safety Issues
- Noise and Vibration
- HIV/AIDS
- Terrestrial Habitat alteration and disruption
- Impacts on access roads
- Compensation and Relocation of People Affected by the Project

Operation Phase

- Occupational health and safety
- Electromagnetic Interference with radio telecommunication systems
- Corona effect
- Avian and bat collisions and electrocutions
- Aircraft navigation safety
- Right of Way maintenance

Decommissioning Phase

- Waste generation
- Noise pollution
- Air pollution
- Water pollution
- Traffic accidents

- Occupational health and safety issues

6.2: Impacts during Construction

6.2.2: Construction Waste Generation

Various activities will be carried out during construction phase and involve the demolition, excavation and transport of large amounts of construction materials. It is anticipated that during the materials transportation phase, the implications will be on the transport load of materials and the total transport distance, in the case of using the same transport machine. Generally, the total transport distance will reduce because the transportation of rock blocks could be transported from aggregate manufacturing plant to job site directly especially if located locally. However, waste during the construction period will arise from: spoil during excavation work, deleterious material from aggregate screening; maintenance and repair of machinery; workers domestic waste; as well as waste water. Therefore, the most appropriate options in waste management are: identification of the waste types; segregation into the various categories; and the establishment of suitable mechanisms for collection, storage, transfer, and final disposal.

Solid Waste Mitigation

There will be minimal waste generation as the metal bars will be cut elsewhere and only brought to the site to be fixed with bolts however the following measures will be put in place:

- Domestic solid waste to be stored in refuse bins temporarily before being taken away for proper disposal by NEMA licensed waste transporters;
- Construction solid waste generated by activities that are unsuitable for use should be disposed in areas approved by the local authority/council and NEMA that will be identified before commencement of construction activities.

These areas should be covered with soil and the area later re-vegetated; and

- Concrete, asphalt and other waste aggregate on site should be stored if there is a need for the material to be used as fill, provided that adjacent water bodies, including ground water supplies will not become impaired as a result of doing so.
- There will be pit latrines for construction workers

Liquid Waste Mitigation:

There will be minimal water demand and wastage during construction however the following will be put in place:

- Pit latrines and urinals for construction workers on site
- Waste water from concrete batching and aggregate screening will reused;
- Cement trucks will be washed in designated car wash areas away from the construction site;
- Machinery will be maintained and repaired in designated garages away from the construction site;
- All machinery will be fuelled at designated petrol stations

.

6.2.3: Soil erosion and sedimentation

Construction activities have the potential to loosen soils, particularly on slopes, which can then be washed down into the lower areas (streams and valleys) and soil quality degradation is also likely to occur during construction as a result of disposal of construction materials on the adjacent lands,

Mitigation Measures:

• Excavated earth should be held on locations of the site not susceptible to storm water runoff. The earth removed for external disposal should be deposited carefully on selected sites without the risk of being washed away during heavy rains and where such deposits will not compromise other land use activities in the areas affected; and • Re-vegetation of exposed areas around the site should be carried out rapidly in order to mitigate erosion of soil through surface water runoff and wind erosion

6.2.4: Impact of power transmission lines on migratory fauna

The proposed transmission line May impact bats, birds and terrestrial migratory species as their migration routes could be disrupted due to construction activities. There is no known bird area within the proximity of the transmission line, it is therefore not anticipated that there will be any significant impacts on migratory fauna if any, however the following mitigation measure are recommended:

Mitigation Measures:

• Selection of right of way that avoids sensitive habitats; and
• Use of common corridors to minimize impacts on undisturbed areas

6.2.5: Aquatic Habitat Alteration

The route of the proposed transmission line crosses small streams within the district. This may require the construction of corridors crossing aquatic habitats that may disrupt these watercourses and wetlands as well as require the removal of riparian vegetation. In addition, sediment and erosion from construction activities and storm water runoff may increase turbidity of surface watercourses.

Mitigation Measures:

- Minimizing clearing and disruption to riparian vegetation; and
- Management of construction site activities as per sections 6.2.2 and 6.2.3 of this report.

6.2.6: Risk of Fires

Uncontrolled burning of wastes during construction or operations may cause risk of fire, especially during the dry season especially as the surrounding area is characterized by bushes, trees and grass. During operations, high voltage power may also cause a fire risk in the event of electrical faults with equipment. Bat and bird collisions with power lines may result in power outages and fires. Also, if underlying growth is left unchecked, or slash from routine maintenance is left to accumulate within right of way boundaries, sufficient fuel can accumulate and as such promote bush fires.

Mitigation Measures:

- No uncontrolled burning to be carried out;
- Carrying out controlled burning which adheres to application regulations, fire uppression equipment requirements and monitored by a fire watcher; and
- Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire fighting access.

6.2.7: Air Quality

The following emissions will be expected to result from construction activities. This would in turn lead to poor quality of life as well as upper to lower respiratory infections and silicosis condition:

- Dust from excavations and earth moving vehicles as well as materials delivery);
- Particulate matter from dry materials, more specifically sand, cement, gravel and murram, etc.), and

•Emissions such as smoke, hydrocarbons and nitrogenous gases among others from machinery exhausts

Mitigation Measures

• Personal protective equipment (PPE) such as dust masks must be worn in the immediate vicinity of the operations

• The stockpiles of earth generated during construction works should be suppressed by spraying water or water based mixtures. Spraying should also be carried out on unpaved road accesses regularly and at handling sites for cement;

• Controlling the suspension of dust drilling and blasting by sequential blasting, covering shielding or enclosing the area;

• All machinery and equipment should be maintained in good working order to ensure minimum emissions including carbon monoxide, oxides of Nitrogen and Sulphur, as well as suspended particulate matter;

• Drivers of construction vehicles and delivery trucks should be cautioned to drive slowly near the site to avoid creating dusty conditions;

• Construction trucks removing soils from the site, delivering sand and cement to the site should be covered to minimize dust blowing into the surrounding neighbourhood;

• No burning of any materials whatsoever should be permitted at the site; and

• Drivers of construction vehicles and delivery trucks must be supervised so that they do not leave vehicles idling and limit their speeds so that dust levels are lowered.

6.2.8: Risk of leaks and spills

Petroleum hydrocarbons present both an environmental and fire risk. The storage of petroleum hydrocarbons on site presents a hazard source and the release of hydrocarbons into the environment could result in significant impacts on a variety of receptors. The pathway for pollution is soil or water, and the primary receptors include the sub-soil and groundwater. Other receptors include air (from fuel vapours) and people (through dermal contact, inhalation or ingestion). It is however worth noting that the risks of a major oil spillages occurring are minimal.

Mitigation Measures:

• Regular maintenance of site equipment and machinery should be carried out to ensure any leakages are detected and controlled. The motor vehicles and heavy equipment should be serviced according to manufacturer's requirements to limit the exhaust emissions.

• Investigate the possibility of fitting catalytic converters especially for the heavy equipment to convert harmful substance in the exhaust fumes to less harmful substances;
• Safety procedures for fuel storage and re-fuelling should be well understood and implemented by site staff; and
• Oil residuals including waste oil, lubricants, used filters, should be carefully collected and stored for safe disposal, in order to prevent migration of contaminant hydrocarbons into storm water or groundwater resources.

6.2.9 : Occupational Health and Safety Issues

Potential impacts during construction include: exposure to physical hazards from the use of heavy equipment; trips and fall hazards; and exposure to dust and noise. The uncontrolled proximity to high vehicular traffic during transportation of construction materials and equipment may lead to injuries or fatalities due to traffic accidents. Other injuries or fatalities May result from workers operating equipment without adequate training or with a lack of personal protective equipment or extended exposure to outdoor weather resulting in heat-related lethargy.

Mitigation Measures:

• Ensure all equipment is inspected before use for appropriate safe guards and that the machine operators are trained on machine safety; and
• Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay.

The use of jack hammers for crushing rocks during the construction site may lead to whole body vibrations of the jack hammer operators which are likely causes of impaired functions of the chest, abdominal organs and the musculoskeletal system.

Mitigation Measure:

Avoid the use of jack hammers and employ other form of technology for crushing of rocks Due to the high vehicular traffic expected during the construction phase, it is likely that traffic accidents may become an important factor especially for children from neighbouring communities crossing the roads leading to the project site.

Mitigation Measures:

• Ensure appropriate road safety signage is placed and drivers adhere to the requirements of such signage; and

• Erection of bumps where human and vehicular traffic have high interaction opportunities

During the construction phase, several manual tasks will be carried out by the project workers. Repetitive tasks have the effect of imparting ergonomic disorders especially when they are carried out over long periods of time.

Mitigation Measures:

• Provide adequate manual labour to suffice the tasks; and

• Eliminate repetitive task by semi-automation where possible

6.2.10: Noise and Vibration

There will be noise and vibrations generated during the construction phase but it will be no different from that on any other typical construction site. The noise impact during construction is expected to be negative and short-term. Major sources of noises and vibration will come from: drilling during construction equipment to place charges; blasting to get aggregate; crushing to obtain aggregates and earthmoving machinery, as well as noise from the work force itself.

The major receptors are expected to be the construction workers as well as any immediate neighbouring premises. Excessive vibration forces from blasting of hard granite rocks and the use of vibrators may impair functions of the chest, abdominal organs and musculoskeletal system as well as contribute to fatigue and decrease in concentration. Excessive production of high noise by the blasting of hard granite rocks, rotating turbines, vehicular traffic and machinery operations May result in poor quality of life and potential loss (or reduction) in hearing.

Mitigations Measures:

• Conduct noise measuring to determine levels and extent of harmful noise and provide PPE (hearing protection) to persons who must operate within or visit the identified high noise areas;

• Investigate the possibility of investing in silencers to reduce the quantity of noise produced;

• Create a barrier well beyond the perimeter of the high noise level area to protect the unsuspecting public who May approach the project site;

• Ensure that the works are distant from the settlement areas, and vibration is not expected to have impacts beyond its site boundaries;
• In order to meet noise level requirements, the works will be equipped with standard noise attenuation features. Machines that exceed acceptable noise limits will be equipped with silencers or lagging materials or specially designed acoustic
enclosures; and • Inform local residents of any abnormal noise generating construction activities to minimize disruption to local residents

6.2.11: HIV/AIDS

Today the world has 42 million people living with HIV and the umber is rising in every region of the world. The impact has a devastating effect on individuals and families as well as whole communities. The movement of people exposing them to new situations, meeting new people and experiencing a change of their daily life creates an enhanced risk of acquiring HIV and/or other sexually transmitted diseases (STDs). Even small changes in a normally structured life can cause people to change behaviour and react in different ways than usual.

Also the influx of new people – like construction workers - can affect the number of new cases of HIV, because they often interfere with an otherwise stable situation and at the same time the newcomers themselves are at higher risk. During the construction phase of the project, there May be an increase in the interaction of persons of both genders. This interaction May at times result in sexual relations with potential subsequent increase in HIV/AIDS infection rates.

Mitigation Measures:

The objective of the HIV/AIDS initiatives would be to reduce the risks of exposure to and spread of the HIV virus in the project area. Major targets would be construction workers, institutional communities and the general members of the community, particularly the youth. Recommended measures are as follows:

• Develop appropriate training and awareness materials for information, education and communication (IEC) on HIV/AIDS;
• Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration;
• Develop an intervention strategy compatible with the Electrical transmission construction programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with other stakeholders; and

• Integrate monitoring of HIV/AIDS preventive activities as part of the Electrical transmission constriction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs.

6.2.12: Terrestrial Habitat Alternation and Disruption

Forests and wildlife are critical natural assets for Kenya since the country is endowed with few other natural resources such as minerals. Forests (which comprise slightly less than 3% of the total land) are vital as wildlife habitats and water catchment areas as well as sources of water that support agriculture, the main GDP earner. The construction (and maintenance) of transmission line rights-of-way, could also result in terrestrial habitat alteration and disruption. Specific impacts include loss of wildlife habitat (including for nesting), establishment of non-native plant species and visual/auditory disturbance due to the presence of machinery, construction workers, transmission towers and associated equipment. However, the proposed Kyeni – Embu electrical transmission line does not pass through a forest.

Mitigation Measures:

• Sitting of transmission line and distribution right-of-way, access roads, lines, towers and substations to avoid critical use, through the use of existing utility and transport corridors, as well as existing roads and tracks for access roads, where possible;
• Installation of transmission lines above existing vegetation to avoid land clearing;
• Re-vegetation of disturbed areas with native plant species; and
• Removal of invasive plant species during routine vegetation maintenance.

6.2.13: Impact on Access Roads

Although it is anticipated that the existing accesses are adequate for the transportation of materials, the Contractor must maintain these roads during the construction period.

Mitigation:
• Traffic should abide by the speed limits and by-laws of the area;
• Movement of heavy construction traffic should be planned appropriately.

6.2.14: Compensation and Relocation of People Affected by the Project

The parcels of land acquired will necessitate land acquisition and resettlement include the transmission lines whose width is 30 meters and a length of 21 Kms. In addition, there is need for land acquisition and resettlement to accommodate the two sub-stations. According to field survey, about 159-200 households would be affected by the way leave, with a population of approximately 1200 people. The envisaged crops and trees to be

cleared will include mango trees (indigenous and exotic), cassava, bananas among others. Except in cases where there were large ranches and bush, there were no plantations along the corridor. The crops affected were found on the homesteads hence they were valued together with the land.

Mitigation Measures:

• A resettlement action plan (RAP) has therefore been prepared as part of this assessment and submitted to the Proponent;
• The Proponent will make the respective land acquisition and easements contracts with each land owner before the project can start; and
• Awareness creation to the community on land use alternatives that promote intensive use of their remaining land or is compatible with overhead power cables

6.3 Impacts during Operations and Maintenance

The following potential impacts have been identified during operations and maintenance:

6.3.1: Occupational Health and Safety Issues

The following occupation health and safety impacts have been identified during operations and maintenance:

- Proximity to strong electromagnetic fields such as the immediate power lines from the power generation station May lead to exposure to high electromagnetic fields.
- Electromagnetic field exposure is known to cause alterations in heart rhythm. The resultant effects of the change in heart rhythms are not clearly known but major speculation suggests that it could lead to cardiac problems.
- Strong electromagnetic fields are also known to polarize the blood but the medical effects of these are still not understood.

Mitigation Measures:

• Ensure strict access controls to the electricity power lines; and
• Enforce way leave requirements for power lines.

Uncontrolled access to the high current-carrying wires in the operations phase may lead to accidental electrocution of passer-bys especially in cases where cables have dropped and are still live.

Mitigation Measures:

• Ensure strict access controls to the electricity power lines; and
• Enforce way leave requirements for power lines.

Workers' exposure to occupational hazards from contact with live power lines during construction, maintenance and operation activities.

Mitigation Measures:

• Only allow trained and certified workers to install, maintain and repair electrical equipment;
• Deactivate and ensure live power distribution lines are properly grounded before work commences; and
• Ensure live wire work is conducted by trained workers with strict adherence to safety and standards.

Workers' exposure to occupational hazards when working at elevation during construction and operation

Mitigation Measures:

• Ensure that structures are tested for integrity prior to commencing work; and
• Implementation of a fall protection program that includes training in climbing techniques and the use of fall protection measures

6.3.2: Electromagnetic interference with radio telecommunications systems

The corona of overhead transmission line conductors and high frequency currents of overhead transmission lines may result in the creation of radio noise.

Transmission line rights-of-way and conductor bundles are usually created to ensure radio reception at the outside limits remains normal. However, periods of rain increases the streaming corona on conductors and may affect radio reception in residential areas near transmission lines.

6.3.3: Noise (Humming) and Ozone Emissions

Noise in form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona Ozone, a colourless gas with pungent odour may also be produced. Neither the noise nor ozone produced by power distribution lines (or transformers) carries any known health risks (IFC, 2007) and the acoustic noise produced by transmission lines is greater with high voltage power lines (400-800 kV).

6.3.4: Avian and Bat Collisions and Electrocutions

The combination of the height of the transmission towers, distribution poles and electricity carried by transmission and distribution can pose potentially fatal risks to birds (including raptors) and bats through collision and electrocutions. Birds and bats may be electrocuted by power lines in one of three ways: simultaneously touching an energized wire and a neutral wire; simultaneously touching two live wires; and simultaneously touching an energized wire and any other piece of equipment on a pole or tower that is bonded to earth through a ground wire (IFC, 2007). Avian collisions with power lines can occur in large numbers if located within daily flyways or migration corridors, or if groups are travelling at night or during low light conditions.

Mitigation Measures:

- Maintaining a 1.5 meter spacing between energized components and grounded hardware;
- Covering energized parts and hardware; and
- Installing visibility enhancement objects (marker balls)

6.3.5: Aircraft Navigation Safety

Power transmission lines, if located near an airport or know flight paths (such as the Embu airstrip which has not been in use) can impact air safety directly through collision or indirectly through radar interference.

Mitigation:

- Consultation with regulatory air traffic authorities prior to installation; and
- Adherence to air safety regulations;

6.3.6: Right of Way Maintenance

Regular maintenance of vegetation within the right-of-way must be carried out to avoid disruption to overhead power lines and towers. Regular maintenance May involve the use of mechanical methods (mowing machines) that May disrupt wildlife and their habitats.

Excessive vegetation maintenance May remove unnecessary amounts of vegetation resulting in the continual replacement of succession species and an increased likelihood of the establishment of invasive species.

Mitigation Measures:

- Scheduling maintenance activities to avoid breeding and nesting sessions;

- Avoiding clearing in riparian areas;
- Avoiding use of machinery in the vicinity of watercourses; and
- Observing manufacturer machinery and equipment guidelines, procedures with regard to noise as well as oil spill prevention and emergency response.

CHAPTER 7: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (EMP)

7.1: General

This chapter presents potential impacts and proposed mitigation measures for appropriate action. Some impact mitigation has already been proactively addressed in the design, and legal and regulatory framework, while others would be undertaken through considered incorporation in the implementation of the project and guided by the environmental management plan (EMP) developed in this ESIA report. The EMP provides a general outline of the activities, associated impacts, and mitigation action plans and appropriate monitorable indicators. Implementation timeframes and responsibilities are also defined. It is however recommended that a detailed decommissioning audit be undertaken at the appropriate time.

The responsibility for the integration of the mitigation measures for the proposed development lies with the contractor and proponent. At every stage, the objective would be to ensure that the specified mitigation measures are implemented. There also needs to be long term coordinated efforts that are geared at building partnerships with community groups, non-governmental organizations, business and industries; and facilitating public awareness and provision of educational opportunities for people to learn about conservation and sustainable human development.

7.2: Environmental & Social Management Plan

The scope of this Environmental & Social Management Plan (EMP) document is to give guidelines to all parties involved in construction, maintenance, operation and decommissioning of the transmission line and associated substations in fulfilment of environmental and social requirements. The management plan has a long term objective to ensure that:

- Environmental management conditions and requirements are implemented from the start of the project and post construction period, and
- Precautions against Electrical damage to environment and property and claims arising from damages are compensated expeditiously.

The tables below summarise the Environmental Management Plan for this project. They describe the parameters that can be monitored, and suggests how monitoring should be done, how frequently, and who should be responsible for monitoring and action

7.3: Environmental and Social Management Plan (ESMP) Matrix

7.3.1 Design and Construction Phase

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
Terrestrial Habitat Alteration	• Re-vegetation of disturbed areas with native plant species; • Undertake selective clearance by removing tall woody species leaving saplings, for quick regeneration of vegetation along the way-leave	Proponent & Contractor	Re-vegetation of disturbed areas	Routine inspection	Continuous	130,000
Noise and vibration	• Sensitise the workforce and truck drivers on issues of equipment maintenance. Supervise construction traffic, maintain plant and equipment, undertake construction only during the daytime for peace of the neighbours, workers to wear ear plugs, muffs as part of the personal protective gear.	Proponent & Contractor	Not to exceed 84 decibels/40 working hours/per week, sound proofing material	Routine inspection	Continuous	100,000
Aquatic habitat alteration	• Minimizing clearing and disruption to riparian vegetation.	Proponent & Contractor	-Siltation of soil in rivers from construction activities. -Physical water quality	Routine Maintenance	Continuous	Nil
Risk of leaks or spills	• Regular maintenance of site equipment • Investigate the possibility of catalytic converters • Safety procedures for fuel storage and refuelling	Proponent & Contractor	Spot checks by the proponent	Regular inspection	Continuous	110,000

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
	• Dispose of oil residues carefully					
Road safety	• Enforce speed limits for construction vehicles during construction, design a separate vehicle entry different from the common entrance with the residents, streamline traffic flow into and out of the premises, initiate changes in traffic flow in the micro-area upon commissioning, install approximate cautionary signage for motorists entering the premises. • Ensure appropriate road safety signage • Ensure all drivers adhere to the traffic laws and requirements • Erection of bumps where human and vehicular traffic have high interaction opportunities	Proponent & Contractor	Reduced accidents	Number of reported cases, complaints from the residents & inconveniences from visiting motorists	Continuous through out the construction phase	40,000
Power line related avifauna mortalities	• To minimize collision, undertake wire-marking to alert birds to the presence of power line, allowing them time to avoid the collision. • Build raptors platforms on top of pylons for roosting and nesting	Proponent and Contractor	Physical structures	Routine Maintenance Inspection Records	Continuous	180,000
Soil erosion	• Soils excavated for the erection of towers should be used for re-filling and should not be left exposed to wind or water for long periods • The contractor should avoid steep terrain during the transportation of construction material by using alternative routes or use light vehicles where appropriate • Riverine vegetation should be minimally disturbed during the construction phase to reduce soil erosion and safeguard riverbank protection	Proponent and Contractor	Status of ground cover in constructed areas	Re-vegetation	Continuous	90,000

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
	• Re-plant degraded areas with local species common in the area to complement natural vegetation regeneration to improve ground cover.					
Air Pollution (dust, fuel emissions)	• Control speed of construction vehicles • Prohibit idling of vehicles Water should be sprayed during the construction phase on excavated areas • Regular maintenance of plant and equipment. • Provision of dust masks for use when working in dusty conditions	Proponent and Contractor	visible particulate matter in the air Increase in upper respiratory tract ailments Number and status of PPE Vehicle service tags	Respiratory protection devices	Continuous	20,000
Contamination of ground and surface water	• Maintenance of construction vehicles should be carried out in the Contractor's camp and a recognised garage • Proper storage, handling and disposal of oil wastes from machinery, discourage servicing of machinery and vehicles	Proponent & Contractor	Water quality. Nature of surface runoff from the site	Routine inspection	Continuous	30,000
Management of Solid Waste	• Contractor must dispose solid wastes away from the site to an approved disposal site. • Temporary pit latrine for construction workers	Proponent & Contractor	Nil visible solid waste heaps on site	Routine maintenance – Internal cost	Continuous through construction	30,000

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
Risk of fire	• Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire fighting access. • Provision of fire safety system that includes training, fire fighting equipment; regular maintenance of machinery, vehicles and equipment; and no burning activities to be allowed close to or within the site	Proponent & Contractor	Records	Routine maintenance	Continuous	70,000
Electrocution from Live Power Lines	• A maintenance system to ensure physical integrity of structures is maintained • Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines; • Ensuring that live-wire work is conducted by trained staff • Workers should not approach an exposed energized or conductive part even if properly trained unless the worker is : - properly insulated from the energized part with gloves or other approved, insulation; the energized part is properly insulated from the worker and any other conductive object; the worker is properly isolated and insulated from any other conductive object (live-line work).	Supervising Engineer Contractor	Medical Records	Provision of PPE	Continuous	20,000
Working at heights	• Testing structures for integrity prior to undertaking work; • Implementation of a fall protection program that includes training in climbing techniques and use	Supervising Engineer Contractor	Medical Records Test records Training	-Climbing equipment -Initial	Continuous	30,000

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
	of fall protection measures; • Inspection, maintenance, and replacement of fall protection equipment; • Installation of fixtures on tower components to facilitate fall protection systems; • An approved tool bag should be used for raising or lowering tools or materials to workers on structures • Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects.		records	integrity tests -Training of staff		
Spread of Diseases	• Education, guidance and counselling on HIV/AIDS and other STDs – construction staff • Avail condoms to construction staff	Proponent & Contractor	Medical Records	Regular inspection on availability of condoms	Continuous	10,000
Spread of HIV/AIDS	• Review activities of the project to integrate with HIV/AIDS campaigns • Develop appropriate training and awareness materials on HIV/AIDS • Identify other players like CBOs, NGOs etc on HIV/AIDS for enhanced collaboration • Integrate monitoring of HIV/AIDS proactive activities	KETRACO & Proponent	-	-	Continuous	80,000
Land acquisition and Resettlement	Ensure that the displaced persons are: - informed about their options and rights pertaining to resettlement - consulted on, offered choices among, and provided with alternatives;	Contractor & Proponent	Relocation Compensation for loss Compliance	No complaints for lack of compensation	Before commencement of construc	To be covered under RAP

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
	- provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project. - offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; - provided with development assistance in addition to compensation measures;		with OP 4.12		tion	
Visual impact	• Extensive public consultation during the planning of power line and power line right-of-way locations;	Proponent	Complaints	No. of complaints forwarded	Before construction commencement	160,000

7.3.2: Operations and Maintenance Phase

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
Impact on public health as a result of EMF radiation	Evaluate potential exposure to the public	Routine inspection	Ministry of Public Health & Proponent	Continuous	140,000
Terrestrial habitat alteration	• The selective removal of tall-growing tree species and the encouragement of low growing grasses and shrubs in transmission line rights-of-way. • Removal of alien invasive plant species,	Regular inspection	Proponent	Continuous	100,000

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
	• Cultivating native plant species; • Avoiding clearing in riparian areas; • Vegetation management should not eradicate all vegetation				
Avian and bat collisions/electrocutions	• Cover energised parts and hardware • Install visibility enhancement objects • Maintain a 1.5m spacing between energised components and grounded hardware	Routine inspection	Proponent & Contractor	Continuous	110,000
Risk of Fire	• Controlled burning of vegetation in transmission line rights-of-way should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored	Routine inspection	Proponent & Contractor	Continuous	150,000
Exposure to high electromagnetic fields and high current carrying wires	• Ensure controlled access to the electricity power lines • Enforce way leave requirements for power lines	Routine inspection	Proponent & Contractor	Continuous	50,000
RoW	• Schedule maintenance to avoid breeding and nesting seasons • Avoid clearing in riparian areas • Avoid use of machinery in the vicinity of watercourses • Observe manufacturer machinery and equipment guidelines	Routine inspection	Proponent & Contractor	Continuous	130,000
Noise and Vibration	• Consider the possibility of investing in	Routine inspection	Proponent & Contractor	Continuous	80,000

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
	silencers to reduce quantity of noise produced • Create a barrier well beyond the perimeter of the high level noise area and the community				
Waste water	• Avoid unnecessary wastage and spillage of water	Routine inspection	Proponent & Contractor	Continuous	Nil
Electrocution from Live Power Lines	• Workers should not approach an exposed energized or conductive part even if properly trained unless the worker is properly insulated from the energized part with gloves or other approved insulation; the energized part is properly insulated from the worker and any other conductive object; the worker is properly isolated and insulated from any other conductive object (live-line work).	Routine Maintenance Records	Proponent & Contractor	Continuous	70,000
Waste Management & Sanitation	• Solid waste holding bins (segregated into different compartments), engage approved refuse handling agents for the various waste types emanating from the building, carry out an annual waste audit to determine quantities and characterization of wastes and hence mode of disposal, identify hazardous wastes for specialized disposal.	Routine inspection	Proponent & Contractor	Continuous	150,000
Working at heights	• Testing structures for integrity prior to undertaking work; • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; • Inspection, maintenance, and replacement of fall protection equipment; • Installation of fixtures on tower components	Routine Maintenance Inspection Records	Proponent & Contrcator	Continuous	90,000

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
	to facilitate fall protection systems; • An approved tool bag should be used for raising or lowering tools or materials to workers on structures • Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects. • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; • Inspection, maintenance, and replacement of fall protection equipment; • Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects.				
Rights of Way Maintenance	• Provision of appropriate PPE to the workers clearing the way leave (vegetation clearing activities which will involve use of machetes and/or power saws)	Routine Maintenance Inspection Records	Proponent	Continuous	60,000
Cultural diffusion	• Facilitate promotion of cultural preservation	Regular check ups	Proponent	Continuous	120,000

7.3.3 Decommissioning Phase

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Performance indicator	Time Frame	Cost (KSh)

WASTE MANAGEMENT						
Waste management, sanitation and hygiene	• Ensure safe disposal of the waste generated during the decommissioning processes, everything be done in accordance to the decommissioning audit • Engage NEMA licensed waste transporters	Regular inspection	Proponent	Number of reported cases, complaints from the residents	Continuous	
NOISE						
Vehicular	Control of speed	Random checks	Proponent	Number of Public complaints	Continuous	
Compressor	Provision of hearing protection devices	Regular inspection	Proponent	Number of Public complaints	Continuous	
PHYSICAL HAZARDS						
Physical Hazards	adopting ergonomic work flow designs that tend to fit the physical tasks to the workers and not vice-versa while maintaining a balance with expected productivity	Regular inspection and redesign of work flow	Supervising Engineer	Number of ergonomic-related complaints	Continuous	Nil
SOIL EROSION						
Soil erosion	Compact loose soil and apply binding materials	Regular inspection	KETRACO & Contractor	Retention of top soil		20,000
AIR POLLUTION						

Cement Dust	Provide appropriate hand, respiratory and body protective devices	Periodic inventory of personal protective equipment	Supervising Engineer	Number and status of existing PPE	Continuous	100,000
Vehicular	Proper service of project vehicles	Service schedules e.g. every 5,000 km for off-road vehicles and every 3,000 km for truck	Supervising Engineer	Service tags	Continuous	50,000

CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

8.1: Conclusions

The primary objective of this project is to improve energy supply in the Country and there is acceptability and goodwill from the community living in the project area. However, there are significant environmental and social issues associated with the construction and operation of the proposed project. To that end, mitigation measures have been integrated in the components of the environmental management plan (EMP) in this report for consideration in the final design, construction and maintenance of the Electrical transmission.

The EIA and preparation of this Study Report was carried out to fulfil legal requirements, as outlined in the Environmental Management and Co-ordination Act (1999), and the Environmental (Impact Assessment and Audit) Regulations (2003).

Recommendations for corrective measures for the potentially significant and/or adverse environmental impacts and safety risks have been provided as an integral part of this EIA report. Rigorous implementation of the Environmental Management and Monitoring Plan will facilitate the mitigation and/or prevention of potentially adverse environmental impacts.

Diligence on the part of the Contractor and proper supervision by the Proponent will be crucial for ensuring success of the EMP and for ensuring that the recommended measures are implemented throughout the design, construction and operational phases in order to avert any negative impacts

8.2 Recommendations

The benefits related with this project, mainly the security of energy supply in the Country, supersede the negative impacts and hence the justification for the raising. To that end, recommendations for corrective measures for the potentially significant and/or adverse environmental impacts, and safety risks, have been provided as an integral part of this EIA study report.

Considering the proposed location, construction, management, mitigation and monitoring plan that will be put in place and the importance of this Electrical transmission, the development of this project is considered strategic and beneficial and should therefore be allowed to proceed.

A summary of the recommendations for the prevention and mitigation of potentially adverse environmental and socio-economic impacts are stated below:

- Ensure the sentiments expressed by the community under this report are integrated in the implemented plan of the project, especially where aspects of social interest are concerned;
- Institute effective communication, education and awareness towards the project beneficiaries for enhanced acceptability and social harmony;
- Ensure proper design and construction methods in relation to borrow pits, roads and excavations during construction;
- The Proponent should rehabilitate all sites that are May be used for construction activities such as camps, sites for storage materials and any paths, tracks that may be established during the construction phase;
- The Proponent should ensure the selection of right of way that avoids sensitive habitats;
- Use of common corridors to minimize impacts on undisturbed areas;
- Minimal clearing and disruption to riparian vegetation;
- No uncontrolled burning to be carried out;
- Regular maintenance of site equipment and machinery to detect and control leaks;
- The transmission lines should be installed above existing vegetation to avoid land clearing;
- Any disturbed areas should be re-vegetated with native plant species;
- Movement of heavy construction traffic should be planned appropriately;
- Provide PPE for workers and safety warnings for the public during construction;
- Ensure strict access controls to the electricity power lines once operational;
- Enforce way leave requirements for the power lines;
- Only allow trained and certified workers to install, maintain and repair electrical equipment;
- Ensure that structures are tested for integrity prior to commencing work;
- The Proponent should make the respective land acquisition and easements contacts with reach land owner before the project can start; and
- Consultations should be held with regulatory air traffic authorities prior to installation.

REFERENCES

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The World bank Safeguard Policies

Registrar of International Treaties and other Agreements in Environment (UNEP 1999)

APPENDICES

Appendix I

Terms of Reference

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED KYENI – EMBU 132kV TRANSMISSION LINE AND ASSOCIATED SUBSTATIONS IN EMBU EAST AND EMBU WEST DISTRICTS, EASTERN PROVINCE, KENYA

TERMS OF REFERENCE

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Signature ----------

Date: 28/07/2010

PROPONENT'S REPRESENTETIVE

NAME: Eng. (Dr.) John Mativo (Head of Technical Services)

FOR: Managing Director & CEO

KENYA ELECTRICITY TRANSMISSION COMPANY LIMITED

Signature----------

Date---------- 28/7/2010

TERMS OF REFERENCE

Introduction

Kenya Electricity Transmission Co. Ltd (KETRACO) intends to construct, own and operate a 132kV transmission line from Kyeni to Embu with two associated substations at Kyeni and Embu. Pursuant to Section 58 of Environmental Management and Coordination Act, 1999; the proponent (KETRACO) intends to conduct an Environmental & Social Impact Assessment study for the proposed project.

Scope

The ESIA will be carried out in compliance with the Environmental Management & Coordination Act, 1999, Environmental Management and Coordination (Impact Assessment & Audit) Regulations, June 2003, World Bank's Environmental and Social Considerations policies and other relevant laws, regulations and guidelines. The scope of the study to be undertaken by the lead EIA/Audit Experts shall include but not limited to the following:

Literature Review

The lead EIA/Audit experts are required to undertake desktop study analysis on the available literature on electricity transmission lines and substations as well as any other relevant project materials for the proposed project.

Baseline Environment

The experts shall collect, collate and present baseline information on the environmental characteristics of the existing situation in the transmission route and the site for the substations. The description will include:

- **Biological Environment:** Flora and fauna types and diversity, endangered species, sensitive habitats etc
- **Social & Cultural Environment:** Present and projected i.e. population, land use, planned development activities, community structure, employment and labour market, sources and distribution of income, cultural properties etc
- **Physical Environment:** Topography, meteorology, landforms, air quality, geology, hydrology, soils, climate etc

Description of the Proposed Project

The experts are to concisely describe the proposed project, its geographic location, ecological, general layout of facilities including maps.

Legislative and Regulatory Framework

The lead EIA/Audit experts shall identify and describe all pertinent regulations and standards governing the environmental quality, solid and liquid waste management,

health and safety, protection of sensitive areas, land use control at the national and local levels and ecological and socio-economic issues as well as compliance issues.

Potential Environmental Impacts

The lead EIA/Audit experts shall analyse and describe all significant changes expected due to the proposed project. These would encompass environmental ecological and social impacts, both positive and negative, as a result of interaction between the proposed project and the environment that are likely to bring about changes in the baseline environmental and social conditions. The lead EIA/Audit experts shall differentiate between short, medium and long term impacts. During the analysis, the lead EIA/Audit experts shall consider both biophysical and socio-economic characteristics of the difference target groups along the transmission lines and proposed substation sites; forms of social organization and co-operation, physical and social infrastructure; change in economic activities, development resources; vegetation clearance; mechanical disturbance; removal of structures; relocation and resettlement; effects on flora and fauna; air quality; improved access; accident rates and aesthetic change.

Occupational Safety and Health

The lead EIA/Audit experts shall analyse and describe all occupational safety and health concerns likely to arise as a result of construction, operation and decommissioning of the proposed facility. The experts shall make recommendations on corrective and remedial measures to be implemented under the environmental management plan. The experts will include emergency preparedness plans for the project.

Public Participation

The lead EIA/Audit experts shall carry out a social due diligence which will involve a description of the social, economic and cultural status of the project area. The experts to organize forums for public participation to enable interested and affected

parties to present their concerns and opinions regarding the proposed project. The views of the public will be solicited and incorporated in the ESIA final report.

Potential Mitigation Measures

The lead EIA/Audit experts shall formulate feasible mitigation measures for the negative impacts that could result from the proposed project.

Environmental Management Plan

The lead EIA/Audit experts shall develop a comprehensive Environmental Management Plan (EMP). The plan should recommend a set of mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of adverse environmental impacts and minimize socio-economic benefits. The lead EIA/Audit expert shall provide for the proposed measures as well as their institutional and financial support.

Environmental Monitoring Plan

The lead EIA/Audit experts will be required to give specific descriptions, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, and definition of thresholds that will signal the need for corrective actions as well as deliver monitoring and reporting procedures. The experts will provide time frames and implementation mechanisms, staffing requirements and cost outlays.

Environmental & Social Impact Assessment Report

The main output shall be an Environmental & Social Impact Assessment Report. The report shall be report shall be in accordance with Environmental Management & Coordination (Impact Assessment & Audit) Regulations, 2003.

The ESIA will specifically include but not limited to the following:

- **Executive summary:** This shall include a concise description of the proposed project; environmental setting, highlight of key findings and recommended mitigation and monitoring procedures
- **Baseline information:** Location and extent; Soils and Geology; Water Resources; Climatic Conditions; Flora and Fauna; The Socio-Economic Environment; Ethnic Groupings, Population Structure and House hold Data; Infrastructure and Utility Services; Cultural Beliefs and Folklore; Institutions
- **A concise description of the national environmental legislative and regulatory framework:** This shall include a detailed description of the existing legislation,

regulation and policy governing solid and liquid waste management, air emissions, environmental quality, health and safety among others. The level of compliance to the applicable laws and corporate environment, safety and health policy shall be discussed.

- **The objectives of the project:** To determine the compatibility of the proposed facility and evaluate the local environmental condition; to identify and evaluate the significant environmental impacts of the proposed projects; to assess the environmental costs and benefits of the proposed project to the local and national economy; to evaluate and select the best project alternative from the various
- Options; and to incorporate environmental management plans and monitoring mechanisms during implementation and occupation phases of the development.
- **Methodology:** A description of the methodology used by the experts to carry out the study.
- **The technology and processes** to be used, in the implementation of the project;
- The materials to be used in the construction and implementation of the project;
- The products, by products and waste generated by the project;
- the environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative irreversible, short-term and long-term effects anticipated;
- alternative technologies and processes available and reasons for preferring the chosen technology and processes;
- Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies.
- an environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
- provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;
- the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
- An economic analysis of the project;

- An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and such other matters as the Authority may require.
- Public consultation: Provide a summary of steps taken to consult local interested parties, lead agencies, with key concerns of each party included
- Impact mitigation measures and Environmental Management Plan: This shall include proposals of feasible mitigation measures, adequate EMP and the cost of impact mitigation
- Major conclusions and recommendations
- References: All sources of information shall be clearly documented with clear names and proper locations under references
- Appendices

Appendix II

ESIA Team EIA/EA Practising Licences/Certificates

FORM 5

(r. 14(4))

Application Reference No:.....951.....
Registration No:.....1501.....
FOR OFFICIAL USE

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT

CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT EXPERT

This is to certify Ms.....MR. DAVID MATARA MOINDI.....
of.....P. O. BOX 65611 – 00607, NAIROBI.....(Address)
has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environment Management and Coordination Act and is authorized to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type).....LEAD EXPERT.....
.....

Dated this .....7TH.....day .....APRIL.....of 20.08.....

Signature.....

(Seal)

Director General
The National Environmental Management Authority

UPK (L)

FORM 5 (r. 14(4))

Application Reference No: 1242
Registration: 1889
FOR OFFICIAL USE

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT
CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT EXPERT

This is to certify M/s THINGURI THOMAS MWANGI

of P.O. BOX 65861 KAMITI NAIROBI (Address)

has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environmental Management and Coordination Act and is authorised to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type) LEAD EXPERT

Dated this 22ND Day APRIL of 20 09

Signature

(Seal)

Director General
The National Environment Management Authority

FORM 7 (r.15(2))

Application Reference No: 627
Licence No: 0260
FOR OFFICIAL USE

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT PRACTICING LICENCE

M/S CALEB MATHEWS OKOTH MANGO (individual or firm) of

Address P. O. BOX 492-00200
NAIROBI

is licenced to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) LEAD

in accordance with the provisions of the Environmental Management and Coordination Act.

Dated this 5TH Day MAY of 20 10

Signature

(Seal)

for Director General
The National Environment Management Authority

Conditions of Licence
This licence expires on 31st December, 20 10

FORM 5

(r. 14(4))

Application Reference No:....626.....
Registration No:....0748.....
FOR OFFICIAL USE

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT

CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT EXPERT

This is to certify Ms.....**MILDRED AKINYI OGENDO**.....

of.....**P. O. BOX 28976-00200, NAIROBI**.....(Address)

has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environment Management and Coordination Act and is authorized to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type).....LEAD EXPERT.....

.....

Dated this ...28TH.....day ...JUNE.....of 20..05.....

Signature.....

(Seal)

Director General
The National Environmental Management Authority

UPK (L)

Appendix III

Minutes of Public Consultation meetings/*barazas*

Meeting 1: Held on 20th July 2010 at Gatondo Coffee Factory, Mbeti North Location, Itabua sub-location

Members present: 38 locals, area Chief and Assistant Chief and 8 members of ESIA team (see attached list)

Agenda

- Introduction of the members present
- Introduction of the project
- The community's view of the project (opinions and concerns)
- Way forward and recommendations

The ESIA team introduced the Proponent and overall aim of the proposed project. The objectives of the meeting were later spelt out by both the Chief and re-emphasised by the ESIA team.

The key issues that were raised included;

- The residents of Mbeti North location generally appreciated and expressed a "no option" to the proposed project
- During compensation exercise they would like the Area Chief to be fully involved as he knows everyone in the area and the legal owners of the land in order to avoid cases of land grabbers and land conflicts.
- The community was concerned about the mode of compensation for trees and crops
- The residents urged the proposed project to distribute power to the immediate community since they have experienced lack of power for a long time.
- They raised the issue of transparency in terms of compensation and employment opportunities when the project begins and insisted that it should be the locals who should be considered when it comes to working on the sites.
- What other benefits does the community stand to gain besides access to electricity
- The community identified some of the positive impacts of the proposed project as;
- Emergence of *Jua kali* industries to the youth.
- Employment opportunities to the locals especially the youth and women.
- A boost of security within the area after the electricity distribution.

There were some negative impacts that were raised too. They included;

- Accidents on the sites during construction.
- Destruction of trees, permanent crops and other subsistence crops along the proposed project.
- Loss of land and relocation

Way forward and recommendations

- Compensation for trees will be done in accordance with the KFS and Ministry of Agriculture cost guidelines
- The provincial administration will be fully involved in compensation especially in identifying the *bonafide* asset owners
- The Proponent through their CSR programme may consider funding other development projects in the project area
- In the event of loss of land, the Proponent prefers land to land (resettlement) as opposed to cash compensation

Meeting 2: Held on 20th July 2010 at Kithegi Primary School, Kithimu Location, Kithegi sub-location

Members present: 37 locals, area Chief and Assistant Chief and 8 members of ESIA team (see attached list)

The ESIA team introduced the Proponent and overall aim of the proposed project. The objectives of the meeting were later spelt out by both the Chief and re-emphasised by the ESIA team.

Community issues and views of the proposed project

- The community of Kithimu location was positive regarding the proposed project and termed it as a development in the area, especially after the power distribution is completed since it would lead to economic boost in the area and the country in general due to increase in development projects.
- In addition they promised public participation during the process especially where information was needed to ensure faster delivery of services.
- The community sought clarification on do's and don'ts within the 30 metre way leave
- What factors are taken into consideration when compensating trees and crops?

- How long does compensation take?

The community envisaged some positive impacts emanating from the proposed project as;

- Local power distribution to support Jua Kali industries and other small cottage industries.
- Employment opportunities for the locals especially during construction.
- Enhancement of education in the area since schools around would engage pupils and students have extra time for preps.

However, some negative impacts were also raised, such as;

- Scaling down of farm sizes.
- Homestead relocation leading to disruptions of livelihoods.
- Cultural differences especially to the displaced persons since one will have to adapt to the new environment and start all over again.
- Interference with communication (the corona effect)

Way Forward and recommendations

- The community recommended that due to lack of financial management skills for the Project Affected Persons, there was need for the proposed project to make a follow-up and build homes for them or even monitor that homes are built.

- The ESIA team clarifies that for safety reasons housings and/or dwellings and vegetation beyond 12feet is allowed within the 30 metre trace. However, other uses such as crop farming and grazing can safely be practiced within the transmission corridor.

- Grading of trees is done resulting in their classification as young, medium and mature and guidance from the KFS is sought during the entire process.

- Corona effect only affects communication gadgets directly underlying the transmission line. There is interference with communication outside the centre line of the transmission line.

Meeting 3: Held on 21st July 2010 at Gichera Cattle Dip, Kagaari South East Location, Kichinga sub-location

Members present: 98 locals, area Assistant Chief and 8 members of ESIA team (see attached list)

The ESIA team introduced the Proponent and overall aim of the proposed project. The objectives of the meeting were later spelt out by both the Chief and re-emphasised by the ESIA team.

Community issues and views of the proposed project

The community of Kagaari South East location welcomed the proposed project wholly and said it would be of great importance in the area especially to sectors such as health, education, security, agriculture, water supply, among others. They had high expectations from the proposed project which would have great impacts on the following:

- Street lighting to enhance security in the area.
- Power distribution to schools to enhance the current poor reading cultures locally by introducing new mechanisms like computers machines and also to prolong reading hours especially to the day school students.
- To the hospitals and dispensaries around to enhance delivery of services such as laboratory services, surgical services among others.
- The community wondered whether the proposed project would also involve connection of power to homesteads.
- The community sought clarification on the mode of compensation for trees
- The community sought clarification on the way forward if the transmission line occupies over 75% of individual holdings (land)

Some of the positive impacts identified by the community included;

- Job opportunities for the youth and wanted the locals to be part and parcel of the project in terms of the unskilled labour.
- Local markets establishment leading to economic boost of the region.

The community identified some of the negative impacts of the proposed project as:

- Displacement of persons
- Increase in social vice due to influx population as a result of emergence of new industries as well as development in the area among others.

Way Forward and recommendations

- Compensation for trees will be done in accordance with the KFS guidelines depending on age and size.

- The proposed project involves construction of high voltage (132kV) power lines from Kyeni to Embu. Power will be evacuated from a sub-station in Kyeni from which KPLC and REA will distribute power to individuals and government institutions and/or public utilities respectively. Distribution of power is not within the mandate of the Proponent.

- The ESIA team clarified that any land with over 75% annexation will be out rightly acquired by the Proponent but the owner will continue using the said land for allowed activities such as crop farming and grazing.

Meeting 4: Held on 21st July 2010 at Kathugu Market, Kagaari South West Location, Nthagaiya sub-location

Members present: 33 locals, area Assistant Chief and 8 members of ESIA team (see attached list)

The ESIA team introduced the Proponent and overall aim of the proposed project. The objectives of the meeting were later spelt out by both the Chief and re-emphasised by the ESIA team.

Community issues and views of the proposed project

Some of the key issues and concerns raised were as follows:

- The community requested for mass education of human safety measures, incase of occurrence of tampering with electricity and also the fire fighting equipment be made available locally at the Chief's camp.
- Time frame of the project was also raised in order to prepare the community psychologically before the initiation of construction/resettlement
- The community insisted that land valuation, tree and house compensation should be done properly and according to the current economy.
- The community requested the government to give enough time to the persons to be resettlement even after they are compensated in order to build new homes as well as adopt new environs.
- The community however cited other benefits expected from the project such as;
- Improvement of mass media communication especially use of batteries that do not last long, migrate from black and white televisions to coloured ones.
- Security enhancement in the area.
- Shortening of traveling distances and costs in search for basics like, phone charging.
- Power distribution to schools to enhance the current poor reading cultures locally by introducing new mechanisms like computers machines and also to prolong reading hours especially to the day school students.

However, the expected benefits listed above, some negative impacts were raised. They included:

- Soil erosion due to destruction of vegetation.
- Population influx leading to rise in spread of diseases like airborne as well as HIV.

Way Forward and recommendations

- The ESIA team clarified that enough and timely notice will be issued prior to commencement of resettlement and construction respectively. The entire process, the team further clarified, takes approximately six months after signing of consents by PAPs.
- Compensation for trees and crops will be done in accordance with the KFS and Ministry of Agriculture guidelines

Meeting 5: Held on 22nd July 2010 at DO'S Office Camp, Kyeni Central location, Nyagari sub-location.

Members present: 14 locals, Area Assistant Chief and 8 members of ESIA team (see attached list).

The ESIA team introduced the Proponent and overall aim of the proposed project. The objectives of the meeting were later spelt out by both the Chief and re-emphasised by the ESIA team.

Community issues and views of the proposed project

- The members of Kyeni Central location where the proposed substation is envisaged welcomed the project and said it would bring much awaited development in the area.
- The community was therefore ready to assist where needed in order to help in the fast delivery of the services.
- The community expressed the need to consider locals in employment opportunities especially during the construction phase of the proposed project

The community viewed the proposed project positively with regard to:

- Increase in social interactions especially the resettlement group. Thus leading to intermarriages.
- Access to cheap power.
- General enhancement of the living standards of the residents.
- Gains in the local and national economy leading to increase in revenue.
- Reliable and secure power supply.

- Less eye-sight problems because of good lighting.

However, they cited a few negative impacts of the proposed project. They included:

- Incidences of electrocution.
- Increase in social vices due to influx in population.
- Land use change will potentially impede food security in the area.
- Landlessness due to loss of land

Way Forward and recommendations

- The Proponent prefers land to land (resettlement) as opposed cash compensation. The provincial administration will advise on the most appropriate mode of compensation on a case to case basis.
- Locals will be given top priority in casual employment. The Proponent will advise the contractor accordingly over the same.

Appendix IV

Sample of filled community questionnaires

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct a 20km 132 kV electricity transmission line from Kyeni to Embu.

To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) conducting an Environmental and Social Impact Assessment (ESIA) for the electricity transmission line.

Participation of interested and affected parties in the environmental impact assessment (EIA) is a requirement under Environmental Management and Coordination Act, 1999. As an identified stakeholder, you are requested to document your views, opinions and concerns regarding the proposed project.

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

1. Respondent Details

Name.....JACINTA.....KALUTI.....
Address.....1905 - 60100.....
Phone contact.....0724423909.....
Location/sublocation.....Kyeni Central.....
Date.....22/7/2010.....

Occupation....Environmental Health Expert.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....The Project will mean improved health. Electricity is crucial in.....
...Provision of basic health services in health centres and hospitals. Provision of water.
.....and food.....

Education.....
.....The provision of electricity will mean that schools in the neighbourhood.....
.....have access to electricity, thus will in the long term uplift education in the area.

Employment.....Opportunities will be available and especially unskilled labour.....
.....through casuals who will be involved in setting up of posts, clearance of.....
.....the ground etc.....
Business/income.....The project is a plus to local food venders. Procurement.....
.....of transmission cables and other accessories will mean business to supplier of the.....
.....same materials.....
Security.....
.....Security will be improved because of lighting. In addition, many businesses.....
.....will rise up in the area hence improved security.....
Culture.....
.....
.....
...
Beauty.....Lighting in the Project area will enhance the beauty of the.....
.....area.....
.....
...
Others.....
.....
.....

3. **Negative impacts**

What negative impacts do you think will result from the proposed project in terms of?

Resettlement.....To give way for the construction of this Project, People who.....
.....are settled near the Project site may be displaced.....
.....
Health.....
.....Construction of the transmission Project will mean more pollution in the.....
.....area in waste water discharge, solid waste all of which will impact on health if not managed.....
Education.....
.....
.....
Employment.....It will mean no job for those who use other Power Source.....
.....
.....
Business/income.....Residents and business owners will have to chip into.....
.....their Pockets to cater for electricity expenses.....
.....

Heritage.....
.....
Security....More businesses and perhaps unplanned developments will stem due to the construction of this Project. This will mean increase in the level of crimes.....
Safety.....
.....Any construction is a leeway to accidents and more so provision of electricity. Improper use can subject users to electric shock.....
Culture.....
.....Many developments have led to erosion of cultures and thus is not an exception.....
...
Soil
erosion....Highly Pouble if the site to which the transmission line is to be constructed is clay.....
.....
Loss of vegetation and
habitats.....Clearance of vegetation to erect the transmission lines will lead to loss of vegetation, animals and soil organisms.....
.....
Solid waste.....There will be alot of solid waste discharged from material for construction, cartons, papers.....
.....
Liquid waste ...Workers in the site will Produce this waste. Waste water will also be discharged through construction works.....
.....
Air pollution
...Smoke(exhaust from vehicles as the site ferrying construction materials. Dust also from construction works.....
.....
Noise pollution.....From vehicles.....
.....
Water quality (surface and
underground).....Will be affected if both solid and liquid waste are not properly managed.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
.....(i) Look for ways of compensating those resettled.....
.....(ii) Plant vegetation in the areas around the site which are disturbed to check erosion
.....(iii) Proper waste management.....
.....(iv) Work to be done during the day to avoid disturbance at night.....

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project

.....
.....Its a welcome Project, our lives will highly improve.....
.....
.....
.....

Signature.....Date.22/7/2010.....ID number.....23690051.....

(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct a 20km 132 kV electricity transmission line from Kyeni to Embu.

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Participation of interested and affected parties in the environmental impact assessment (EIA) is a requirement under Environmental Management and Coordination Act, 1999. As an identified stakeholder, you are requested to document your views, opinions and concerns regarding the proposed project.

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

1. Respondent Details

Name.....Peterson Kariuki Njagi.....
Address.....151...Runyenjes.....Embu.....
Phone contact.....0726385972.....
Location/sublocation.....Kagaari.....
Date.....21/02/2010.....

Occupation.....Business.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....
.....Due...to...this...project...some...people...will...initiate.....
.....Hospitals...eg....Dispensary...that...and...That...transmission
will enable the owners of the hospital to operate using
Microscope

11

Education... School children will be able to do
... their home work
... people will be to use computers

Employment... Some people will be able to initiate
... welding work

Business/income... In people who have radio will
... will be able to use electricity

Security... In Security some bar will put the
... electric bulb and that will minimize theft

Culture... there was

Beauty... Some people will start their small
... business eg Salon
... The place will be well secured

Others... many business will be learning
... smoothly due to electricity

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement...
... there will be disturbances due to
... cutting of trees and demolition of houses but compensation will have
Health... Due to dust from use of electric saw small
... it can cause danger especially in small children

Education...

Employment... Due to electronic people will will
... be using electric in computer and that people
... will not have come jobs

Business/income...
... Business will be learning
... smoothly and income will be good

Heritage..... N/A .....

Security..... N/A .....

Safety..... Can Kill People .....
..... Can be managed .....

Culture.....

Soil erosion.....
..... NO .....

Loss of vegetation and habitats.....
..... There will be effect, but we will be .....
..... compensated .....

Solid waste.....
..... N/A .....

Liquid waste .....
..... N/A .....

Air pollution
..... yes .....

Noise pollution..... yes .....

Water quality (surface and underground).....
..... N/A .....

4. What are your suggestions on the concerns you have mentioned in number 3. above
..... That will not affect anything .....
..... Because we are compensated on the land .....
..... development matters .....

3

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project

.....
The project is all good
.....
.....
.....

Signature.....Date.21/07/2010...ID number..22977614....

(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct a 20km 132 kV electricity transmission line from Kyeni to Embu.

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Participation of interested and affected parties in the environmental impact assessment (EIA) is a requirement under Environmental Management and Coordination Act, 1999. As an identified stakeholder, you are requested to document your views, opinions and concerns regarding the proposed project.

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

1. Respondent Details

Name.....Elisha Ntanja.....
Address.....ISI RUNJENJES.....
Phone contact.....0724467502.....
Location/sublocation.....Gichera Sublocation / Kagaari South East Location
Date.....21/7/010.....

Occupation.....Shopkeeper.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....Improved health facilities will be a prominent issue.....
.....to our nearest Health Centres eg. Lab equipments.....
.....

Education: In our rural schools we will receive for instance computer equipment's. This will enable our students to catch up with those of urban areas.

Employment: People will open business eg. battery chargers, Barbers also welding.

Business/income: Improved business due to addition of income for instance on the side of battery charging.

Security: Security will be tight due to security lights.

Culture: Improved car we will get for chaff cutters, electric iron etc.

Beauty: Environment will be good coz people will improve many things eg. good houses to compete for the power from project.

Others:

3. **Negative impacts**

What negative impacts do you think will result from the proposed project in terms of?

Resettlement: No negative impact

Health: If sb tries to interfere with the wire shock is a prevalent issue & it may cause health problems

Education: No impact -ve.

Employment: No -ve impact.

Business/income: No -ve impact.

Heritage.....
.....
Security.....
.....
.....
Safety.....
.....If an electric wire breaks it can cause great.....
.....destruction in many ways as known.....
Culture.....
.....
.....
...
Soil
erosion.....No -ve Impact.....
.....
.....
Loss of vegetation and
habitats.....
.....
.....
Solid waste.....Damage to human body through piercing by.....
.....these solid wastes.....
.....
Liquid waste .....
.....
.....
Air pollution
.....Burning of waste that will harm our eyes.....
.....
.....
Noise pollution.....Through the machines working in the business.....
.....
Water quality (surface and
underground).....
.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
.....
.....
.....
.....

3

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project

.....
This project will make we be able to carry out many things towards the development of this area. So we appreciate this project greatly and we have alot of hope and we will support it maximumly.

Signature.....Date.....21/7/2010.....ID number.....23587619

(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

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This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

1. Respondent Details

Name.....MERCY.....MUTHONI.....MBARE.....
Address.....151.....DUMENGES.....
Phone contact.....0715.099...358.....
Location/sublocation....KAGANDI.....SOUTH EAST.....CHIEFS.....
Date.....

Occupation.....FARMER.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....
.....Health.....Centres....eg....Laboratories.....
.....

Education....Computer....facilities.....
.....
.....Studying....of....students....at....home.....

Employment.....
.....Welding....Saloon.....Ninyozi....etc.....
.....
Business/income.....
.....Less....it....will....be....economical.....
.....
Security.....
.....& Security....in....shops,....health....Centres.....
.....Schools.....
Culture.....The....work....will.....
.....be....easier....eg....ironing....mattress....mending.....
.....
...
Beauty.....
.....There....will....be....Saloons,....Ninyozi.....
.....etc.....
...
Others.....Laboratories....in....Heath....Centres.....
.....Schools.....
.....

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement.....
.....
.....
Health.....
.....
.....
Education.....
.....
.....
Employment.....The....will....be....less....employment....of....Boys.....
.....Computers....will....be.....
.....
Business/income.....
.....
.....

Heritage.....
.....
Security.....There is no disadvantage of securing.....
.....
.....
Safety.....
.....It may cause accident.....
.....To the house.....
Culture.....
.....
.....
...
Soil
erosion.....
.....NO effect.....
.....
Loss of vegetation and
habitats.....Loss of trees.....
.....
.....
Solid waste.....The will be no effect.....
.....
.....
Liquid waste .....
.....
.....
Air pollution
.....
.....
.....
Noise pollution.....
.....The will be noises.....
Water quality (surface and
underground).....The fe is no side.....
.....effects.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
.....
.....
.....
.....

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project
.....There will be maende ro.....
.....in the area. The will be.....
.....employments with eg hearth centres.....
.....Schools.....
..Conclusion.....The work will be easier.....

Signature ~~Mercy~~.....Date 21/7/2010 ID number 13338691
(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct a 20km 132 kV electricity transmission line from Kyeni to Embu.

To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) conducting an Environmental and Social Impact Assessment (ESIA) for the electricity transmission line.

Participation of interested and affected parties in the environmental impact assessment (EIA) is a requirement under Environmental Management and Coordination Act, 1999. As an identified stakeholder, you are requested to document your views, opinions and concerns regarding the proposed project.

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

1. Respondent Details

Name.....Peter Mwaura Mbugua.....
Address.....34 Kyeni.....
Phone contact.....0710363091.....
Location/sublocation.....Kyeni.....
Date.....22/9/10.....

Occupation.....farmer.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....
.....Construction of High Pavement there are.....
.....for the big hospital.....

Education: Recruitment of our Children for the demand of re-allocating of many Wayleaves.

Employment: More jobs will emerge due to So much rural ele drivation

Business/income: for Highly Powered Installation Jobs like 3 Phase line, Shall held

Security: Due to Some More Re-located and Installed electricity, rural areas Shall have More light at night

Culture: Due to Some More Media transmission, through TV. Radio DSTV. in rural area, People Shall change a Kind of learning frown educative programmes.

Beauty: Construction of Beauty therapy in rural areas Shall change a kind of learning in line

Others: MP's' and Other Prominent Members in Society, may build a Small industry since More Jobs in our areas

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement: To rebuilt the house, Plant Permant Crops like Coffee to the area you have gone May take too long to start acquiring the cash as before.

Health: To adapt the area you have been resettled may result to ~~many~~ So Much disturbance. like Malaria, Pheumonia

Education: Viewing of Programmes in media may result to a Kind of negative impact eg wrong love/Romantics

Employment: Too much cash repayment for the Compensation may result to of Lure of too much multitude to work to their homes.

Business/income:

Heritage......re settlement of many may result to brotherhood to brotherhood enmity due to some share

Security......Too much of darkness at night in rural area due to some lights at night, may result to theft/break-ins

Safety......

Culture......Viewing of [illegible] ... in rural areas may lead to [illegible] damaged mind to little children

Soil erosion......Cutting down of trees to the allocated area may lead to soil erosion

Loss of vegetation and habitats......Cash crops trees damaged may lead to loss of jobs in the nearer area

Solid waste......Rebuilding of houses may take too long for the recoverage.

Liquid waste ......

Air pollution ......

Noise pollution......

Water quality (surface and underground)......

4. What are your suggestions on the concerns you have mentioned in number 3. above

......

3

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project
.....
.....
.....
.....
.....

Signature.....Date.....ID number..... 22177221

(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

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1. Respondent Details

Name.....JOSEPH NGARE THATHI.....
Address.....Box 67 RUNYENJES.....
Phone contact.....0725271942 / 0710246037.....
Location/sublocation...KAGAARI SOUTH / NTHAGAIYA.....
Date.....21/07/2010.....
Occupation.....FARMER / FORMER MILITARY OFFICER

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....
.....Transmission of electricity to the proposed
.....Rural Health Centre / project.....

Education: Use of Computers in the rural School

Employment: To the youth, in the dispensary, church.

Business/income: Improved market, eg Wedding, information from Media, etc.

Security: Lighting at homes, roads

Culture: ~~Beauty~~ Information from media and education.

Beauty: Cleanness from Cleaners, Salons.

Others: Nutrition, Livestock keeping eg poultry.

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement: Adaptability to the climate.

Health: Diseases like Cancer, electric shock/ death.

Education: N/

Employment: N/

Business/income: N/

Heritage..... Nil .....
.....
Security.....
..... Nil .....
.....
Safety.....
..... Electric Shock .....
.....
Culture.....
..... Nil .....
.....
...
Soil
erosion..... Nil .....
.....
.....
Loss of vegetation and
habitats..... Reduced rainfall due to loss of .....
..... trees .....
Solid waste..... Nil .....
.....
.....
Liquid waste ..... Nil .....
.....
.....
Air pollution Diseases due to pollution .....
.....
.....
Noise pollution..... Loss of hearing, Sight .....
.....
Water quality (surface and
underground)..... Nil .....
.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
..... Education on electric risks, plant trees .....
.....
.....

3

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project
.....Reduction on cost of electricity.....
.....
.....
.....

Signature.....Date.21/7/10.....ID number.....11420807

(Please provide these details for the purpose of authentication)

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

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1. Respondent Details

Name.....NATALY WAITHIRA MUNENG.....
Address.....P.O BOX 943 EMBU.....
Phone contact.....0713-126779.....NORTH.....
Location/sublocation.....ITABUA/MBETI LOCATION.....
Date.....20-7-2010.....

Occupation.....ACCOUNTANT/FARMER.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....(1) Will promote health to families.....
.....(2) Boost income generating activities.....
.....(3) Enrich beneficiaries.....

Education..... ✓ .....
.....
.....

Employment..... ✓ .....
.....
.....

Business/income..... ✓ .....
.....
.....

Security..... ✓ .....
.....
.....

Culture..... ✓ .....
.....
.....
...

Beauty..... ✓ .....
.....
.....
...

Others..... ✓ ✓ .....
.....
.....

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement..... Families relocated .....
..... will be displaced from friends .....
..... and contact .....

Health.....
.....
.....

Education..... Misuse of TVS and photography .....
.....
.....

Employment..... N/A .....
.....
.....

Business/income..... N/A .....
.....
.....

Heritage..... N/A .....
.....
Security..... N/A .....
.....
.....
Safety..... N/A .....
.....
.....
Culture..... N/A .....
.....
.....
...
Soil
erosion..... N/A .....
.....
.....
Loss of vegetation and
habitats..... N/A .....
.....
.....
Solid waste..... N/A .....
.....
.....
Liquid waste ..... N/A .....
.....
.....
Air pollution
..... N/A .....
.....
.....
Noise pollution..... N/A .....
.....
Water quality (surface and
underground)..... N/A .....
.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
.....
..... In my opinion there will be .....
.....
..... no side effects .....

5. Please feel free to add any other concerns or advice relating to the proposed project

The quicker you bring the line the better as members will be able to approach KPLC & Co. Ltd

Signature [signature] Date 28/7/2010 ID number 3560644

(Please provide these details for the purpose of authentication)

4

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

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1. Respondent Details

Name. JOSEPH MBOGO GATUMU
Address.....
Phone contact.....0723997895.....
Location/sublocation.....KITHIMU...../.....KITHEGU.....
Date.....20/7/2010.....

Occupation.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health.....
.....It will facilitate transmission of electricity supply.....
...to.....and.....health.....institution.....

Education
Our Education institutions will benefit from it.

Employment
it will help employ our local people and help them financialy

Business/income
The moment we get electricity we will open up business facilities especialy machine users

Security
We will be able to get light which and insecurity is always in dark nesr

Culture
The moment infrastructure comes near we change even Cultureally.

Beauty
Beauty comes automaticaly whenever there is light

Others
we are happy to see those big development in our area

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement
one might fill unfotortable in his/her new resettled area.

Health
if accident comes it might affect our health

Education
Non

Employment
Non

Business/income
there might have competition in our business areas.

Heritage.....
.....
Security.....Non.....
.....
.....
Safety.....
.....Non.....
.....
Culture.....
.....Non.....
.....
...
Soil
erosion.....Non.....
.....
.....
Loss of vegetation and
habitats.....
.....people might have loss on flat side.....
.....
Solid waste.....Purchas.....or.....left overs.....after.....
.....construction.....
.....
Liquid waste .....Non.....
.....
.....
Air pollution
.....Non.....
.....
.....
Noise pollution.....It ~~has~~ will affect as especialy.....
.....at night.....
Water quality (surface and
underground).....
.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
....Make.....necessary.....measures.....to.....avoid.....
....Negative.....activities.....mentioned.....in.....No! 3.....above
.....
.....

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project
.....
.....I can help identify many places
.....in Kathimba & Kitheu avoid.....
.....
.....

Signature.....Date 20/7/2010.....ID number. 20622419.....
(Please provide these details for the purpose of authentication)

4

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

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1. Respondent Details

Name...Joanne Nyambura.....
Address.....
Phone contact.....0720565426.....
Location/sublocation...Itabua.....
Date..20/07/2010.....

Occupation.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health..Electric machines/equipment can be used in health institutions when there is power for example sterilizers. This will avail more health services to the people therefore improving health in general.

Education: Use of Technology like computers that rely on electricity will improve education. Have study hours for students/pupils — lighting at night.

Employment: Small industries will crop-up needing workers thereby creating more employment opportunities.

Business/income: Use of power for small industries like hair salons thereby increasing/creating an income.

Security: Lighting will open up the area therefore the place will be more secure. Electric security equipment/gadgets will be used if power is here thereby improving security in general.

Culture: Some changes will be expected for example those who associate some phenomena with darkness then this will stop if use darkness will be experienced.

Beauty: Will improve if there is power, people will be able to make themselves up using machines that rely on power.

Others:

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement: Conflict in families, some would not like the change and will try to resist resulting in conflict.

Health: I don't know — I don't think there is any.

Education: I don't know — I don't think there is any.

Employment: I don't think there is any.

Business/income: None.

Heritage..... Now .....

Security.. Fraudsters will be enabled because they can use electric gadgets to do more fraud .....

Safety..... Now .....

Culture... Now .....

Soil erosion... it might occur because trees will be cut down all along the electricity corridor .....

Loss of vegetation and habitats. Yes it will occur along the proposed corridor as the farmers are expected to uproot crops & trees .....

Solid waste..... I don't know .....

Liquid waste .... I don't know .....

Air pollution ..... I can't think of any .....

Noise pollution... During construction but I don't think it will be alot .....

Water quality (surface and underground)..... I am not sure electricity has an effect on this .....

4. What are your suggestions on the concerns you have mentioned in number 3. above

How community sensitization & mobilization using the existing structures for example women groups putting in mind women are more cooperative and willing to change .....

.....
.....

5. Please feel free to add any other concerns or advice relating to the proposed project
All the best, be ready to answer more questions and
even assistance from the community.
.....
.....
.....

Signature.....Date. 20/07/2010 ID number. 20215511

(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132N KV LINE

PUBLIC CONSULTATION FORMS (COMMUNITY MEMBERS QUESTIONNAIRE)

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1. Respondent Details

Name...ANNE C MBOGO MITHIGA.....
Address.....BOX 462 EMBU.....
Phone contact.....0723387097.....
Location/sublocation.....KITHIMU LOCATION KITHEGI SUBLOCATION.....
Date.....25/7/2010.....

Occupation.....TEACHER.....

2. Positive Impacts

What positive impacts do you foresee from the proposed transmission line in terms of?
Health...Supply of power to our Health.....
.....Clinic.....
.....

Education...Supply of power to nearby schools.........

Employment......Skilled and unskilled manpower
......will be provided.........

Business/income......Welding, Battery charging
......and business hours will be increased
......in our area.........

Security.........Security lights will be installed
......in homes and market centres.........

Culture.....There will cultural diversity
......Modern culture & our traditional
......cultural.........

Beauty.....Lighted environment is beautiful.
.........Beauty of our area will be enhanced.

Others.........
.........The land value will appreciate.

3. Negative impacts

What negative impacts do you think will result from the proposed project in terms of?

Resettlement......It will be very stressful to
......migrate relocate to new home.........

Health....../

Education....../

Employment....../

Business/income......

2

Heritage...-

Security...-

Safety...The Pylons Many Collapse and Fall Down

Culture...

Soil erosion...

Loss of vegetation and habitats...- No Forestry in the practised along the way leave.

Solid waste...-

Liquid waste ...-

Air pollution ...-

Noise pollution...The Cuttes produce noise

Water quality (surface and underground)...-

4. What are your suggestions on the concerns you have mentioned in number 3. above

They are not significant

……………………………………………………………………………………………………
……………………………………………………………………………………………………

5. Please feel free to add any other concerns or advice relating to the proposed project
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………

Signature…M. Mtg…………Date…20/7/2010…ID 6057372
number…6057372………
(Please provide these details for the purpose of authentication)

4

Appendix V

Filled key informants questionnaires

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct 20km 1323Kv electricity transmission line from Kyeni to Embu. To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) is conducting an Environmental and Social Impact Assessment (ESIA) for the proposed project.

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Lead Agency: KENYA FOREST SERVICE

Name: Samuel Gitonga Ithure

Designation: Head of Eastern Forest Conservancy

1

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.

The Cutting down of on-farm trees and and private forests and compensation to the owners

2. In your opinion, what benefits does your institution stand to reap from the proposed project

The Corporate Social Responsibility of KETRACO for Environmental Sustainability

3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?

- Tree-less ground along the high Voltage powerline. Possibility of erosion
loss of raw-materials for timber and
fuelwood.

4. What would you propose as measures to mitigate against the above impacts?

Support tree planting in adjacent areas

5. What is your general opinion of the proposed project?

It is a developmental project which is
long term.

6. I/We approve the proposed project (reasons) It is necessary to have power for development.
With support to ~~~~ tree planting
in areas adjacent to the project the overall
effect will be reduced.

7. I/We do not approve the project (reasons) N/A

.....
.....
.....
.....

Signature.....Date....19/7/10.....ID number....23028607

(Please provide these details for the purpose of authentication)

3

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

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Lead Agency:.....

Name:.....DANIEL MBOGO OBUDO.....

.....

Designation :.....DISTRICT OFFICER I EMBU WEST DISTRICT.....

1

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.
   NO.

2. In your opinion, what benefits does your institution stand to reap from the proposed project. The High power Grid will enable the power to reach the deep-rural areas where the project will cover. Also, the frequent power-black outs will be a thing of the past.

3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?
   → An upsurge in the Land-related conflicts on ownership claims where the Pylons will pass due to compensation.

4. What would you propose as measures to mitigate against the above impacts? An elaborate land-dispute mechanism be put in place; involve relevant departments public sensitization also required.

5. What is your general opinion of the proposed project?
   The project is worthy and timely as it will help address the current power problems experienced.

6. I/We approve the proposed project (reasons) I approve; The project will boost the growth of the District- conform to the Environmental Impact Assessment guidelines.

7. I/We do not approve the project (reasons) NA.

.....
.....
.....
.....

Signature.....Date.....22/7/2010.....ID number.....11133522.....

(Please provide these details for the purpose of authentication)

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

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Lead Agency:..... Min. of Agricultural .....

Name:..... Henry Ngatia Muraya .....

Designation :..... Principal Agricultural Officer .....

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.
   ..... No .....
   .....
   .....
   .....
2. In your opinion, what benefits does your institution stand to reap from the proposed project. Small agro-processing cottage industries will have readily available power which is reliable.
   .....
   .....
3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?
   ..... ~~Higher income per household~~ Better Credit for farmers
   ..... None
   .....
   .....
4. What would you propose as measures to mitigate against the above impacts? N/A
   .....
   .....
   .....
5. What is your general opinion of the proposed project?
   ..... Okay due to above reasons (2.)
   .....
   .....
   .....
6. ~~I~~/We approve the proposed project (reasons) reliable Power and few chances of outage - Cheaper Power than the current rates
   .....
   .....
   .....
7. I/We do not approve the project (reasons) N/A

.....
.....
.....
.....

Signature.....Date...16/07/10...ID number.....7236561

(Please provide these details for the purpose of authentication)

3

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

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Lead Agency:..... Ministry of Agriculture .....

Name:..... James Mudawa .....

Designation :..... D/DAO .....

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.
   No
2. In your opinion, what benefits does your institution stand to reap from the proposed project
   - Stepping up Power that hopefully will reduce Power rationing
3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?
   - Disruption of farming activities as Power Posts (grids) will be on farmlands.
   - Soil earthing process - it might cause horizon inversion leading to reduced soil fertility.
4. What would you propose as measures to mitigate against the above impacts?
   - Use Public Ways - like roads etc
5. What is your general opinion of the proposed project?
   It will be a good project to us as an organization and also to the community we serve
6. I/We approve the proposed project (reasons)
   → Power amounts envisaged to increase
   → Hopefully lower Cost of Consumption.
7. I/We do not approve the project (reasons).....

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Signature.....Date.19/7/2010.....ID number.....10970279.....

(Please provide these details for the purpose of authentication)

3

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct 20km 1323Kv electricity transmission line from Kyeni to Embu. To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) is conducting an Environmental and Social Impact Assessment (ESIA) for the proposed project.

Participation of interested and affected parties in the environmental impact assessment (EIA) is a requirement under Environmental Management and Coordination Act, 1999. As an identified key informant, you are requested to document your views, opinions and concerns regarding the proposed project.

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

Lead Agency: LIVESTOCK PRODUCTION DEPARTMENT

Name: DAVID MURAMBI

Designation: DLPO

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.
   ...No...
2. In your opinion, what benefits does your institution stand to reap from the proposed project...Reduced power blackouts...
3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?
   ...None...
4. What would you propose as measures to mitigate against the above impacts?...N/A...
5. What is your general opinion of the proposed project?...
   ...It is a timely project...
6. I/We approve the proposed project (reasons)...power blackouts are/will be expected to reduce possibly the cost of producing livestock products many go down.
7. I/We do not approve the project (reasons)...N/A...

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Signature.....Date.16-07-10.ID number.....10899226.

(Please provide these details for the purpose of authentication)

3

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

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Lead Agency: DISTRICT DEVELOPMENT OFFICE

Name: ANNE N. MUTHAMIA

Designation: DISTRICT DEVELOPMENT OFFICER

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.
   BEING A COORDINATING OFFICE (DEVELOPMENT ACTIVITIES), WE CAN ONLY RECEIVE COMPLAINTS FROM DIRECT AFFECTED STAKEHOLDERS LIKE THOSE WITHIN THE PROJECT LINE MAY EXPECT SOME COMPENSATIONS.
2. In your opinion, what benefits does your institution stand to reap from the proposed project - INCREASED POWER SUPPLY - ASSURED TO USE MY OFFICE EQUIPMENTS THROUGHOUT (COMPUTER, PHOTOCOPIER ETC) - WILL ENHANCE MY PRODUCTIVITY.
3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?
   I FORSEE POSITIVE IMPACT WHERE BLACK OUTS WILL BE A THING OF THE PAST. ALSO INCREASED ECONOMIC GROWTH IN TERMS OF MORE INVESTMENT AND WEALTH CREATION FOR THE DISTRICT
4. What would you propose as measures to mitigate against the above impacts? THE ONLY REQUIREMENT IS TO SENSITIZE ARE STAKEHOLDERS AND MEET THEIR NEEDS
5. What is your general opinion of the proposed project? A MAJOR REQUIREMENT TO ACHIEVE THE VISION 2030. ALL SECTORS IN ONE WAY OR THE OTHER ARE INDEPENDENT ON THE DEVELOPMENT OF ELECTRICITY FACILITY.
6. I/We approve the proposed project (reasons) I APPROVE THE PROJECT BECAUSE THAT IS THE WAY TO GO - DEVELOPMENT.
7. I/We do not approve the project (reasons) ✓

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Signature.....Date.....ID number.....

(Please provide these details for the purpose of authentication)

3

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct 20km 1323Kv electricity transmission line from Kyeni to Embu. To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) is conducting an Environmental and Social Impact Assessment (ESIA) for the proposed project.

Participation of interested and affected parties in the environmental impact assessment (EIA) is a requirement under Environmental Management and Coordination Act, 1999. As an identified key informant, you are requested to document your views, opinions and concerns regarding the proposed project.

This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

Lead Agency: MUNICIPAL COUNCIL OF EMBU

Name: ISAAC MOGOI

Designation: TOWN ENGINEER

1

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.

   NO

2. In your opinion, what benefits does your institution stand to reap from the proposed project.....
   UNINTERRUPTED POWER SUPPLY.

3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?

   NONE

4. What would you propose as measures to mitigate against the above impacts?.....
   N/A

5. What is your general opinion of the proposed project?.....IT IS A TIMELY PROJECT AS IT WILL INCREASE THE AMOUNT OF ELECTRICITY AVAILABLE FOR USE TO EMBU PEOPLE.

✓ 6. I/We approve the proposed project (reasons).....IT IS APPROPRIATE FOR EMBU AT LARGE.

7. I/We do not approve the project (reasons).....N/A.....

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Signature.....Date.19.07.10.....ID number.....9772768.....

(Please provide these details for the purpose of authentication)

3

Kivandi to Act. 20.7.2010

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct 20km 1323Kv electricity transmission line from Kyeni to Embu. To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) is conducting an Environmental and Social Impact Assessment (ESIA) for the proposed project.

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Lead Agency: MINISTRY OF PUBLIC HEALTH & SANITATION - RUNYENJES HEALTH OFFICE

Name: J. USIFU M. C. KIWANA

Designation: SENIOR PUBLIC HEALTH OFFICER

Heritage..... Nil .....
.....
Security.....
..... Nil .....
.....
Safety.....
..... Electric Shock .....
.....
Culture.....
..... Nil .....
.....
...
Soil
erosion..... Nil .....
.....
.....
Loss of vegetation and
habitats..... Reduced rainfall due to loss of .....
..... trees .....
Solid waste..... Nil .....
.....
.....
Liquid waste ..... Nil .....
.....
.....
Air pollution Diseases due to pollution .....
.....
.....
Noise pollution..... Loss of hearing, sight .....
Water quality (surface and
underground)..... Nil .....
.....
.....

4. What are your suggestions on the concerns you have mentioned in number 3. above
..... Education on electric risks, plant trees .....
.....
.....

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.....

5. Please feel free to add any other concerns or advice relating to the proposed project

.....Reduction on cost of electricity.....
.....
.....
.....

Signature.....Date.21/7/10.....ID number.....11420807

(Please provide these details for the purpose of authentication)

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

The Kenya Electricity Transmission Company Ltd (KETRACO) intends to construct 20km 1323Kv electricity transmission line from Kyeni to Embu. To ensure that the project is implemented in an environmentally and socially sound manner, the Proponent (KETRACO) is conducting an Environmental and Social Impact Assessment (ESIA) for the proposed project.

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This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

Lead Agency: Provincial Medical Office.....

Name: Samuel W. Kagwa.....

Designation: Senior Health Admin. Officer.....

1

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.

None.

2. In your opinion, what benefits does your institution stand to reap from the proposed project.

The low power voltage experienced at PCEA Embu will be a thing of the past.

3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?

I don't think there will be any.

4. What would you propose as measures to mitigate against the above impacts?

N/A

5. What is your general opinion of the proposed project?

It is a well thought of project and I hope this project will solve the power failures or fluctuations experienced in Embu.

6. I/We approve the proposed project (reasons) It will end the power blackouts if implemented well.

7. I/We do not approve the project (reasons).....

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Provincial Medical Officer
Eastern Province
P. O. Box 273 - EMBU
Tel: (068) 31883/31081

Signature.....Date.....19/7/10.....ID number.....5086705.

(Please provide these details for the purpose of authentication)

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

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This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

Lead Agency:..PROVINCIAL ADMINISTRATION.....

Name:.....D.C. EMBU EAST.....

.....

Designation :.....

1

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.

YES. If the community will not be informed in time e.g Signing of consents to allow use of private land.

2. In your opinion, what benefits does your institution stand to reap from the proposed project

Development in the district.

3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?

NIL
The Jua Kali sector & positive Youth e.g Vinyozi

4. What would you propose as measures to mitigate against the above impacts?

✓

5. What is your general opinion of the proposed project?

It is a good idea.

6. I/We approve the proposed project (reasons)

It will bring development & Create jobs.

7. I/We do not approve the project (reasons) ✓

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Signature.....Date..20/07/10..ID number.....12745256.....

DISTRICT COMMISSIONER EMBU EAST

(Please provide these details for the purpose of authentication)

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PROPOSED KYENI – EMBU 20KM 132/33 KV ELECTRICITY TRANSMISSION LINE

PUBLIC CONSULTATION FORMS (KEY INFORMANTS QUESTIONNAIRE)

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This questionnaire acts as a guide for the respondent to provide relevant information on the proposed project. All the information obtained shall be used entirely for the proposed study and shall be treated confidentially. We appreciate your cooperation and thanks for your willingness to participate in this exercise.

Lead Agency: PROVINCIAL OCCUPATIONAL HEALTH & SAFETY OFFICE.

Name: CHARLES THEURI

Designation: OCCUPATIONAL HEALTH & SAFETY OFFICER

1. Do you perceive any conflicts (issues) that could emerge between your institution and the proposed project? If yes, give details.
   Yes. When the company fails to ensure the safety, health and welfare of persons at work and any other person who may be affected during construction of the line.
2. In your opinion, what benefits does your institution stand to reap from the proposed project. There will be extra supply of electricity to Embu town after the construction of the line thus enough power supply to our institution.
3. What are the possible impacts from the proposed project that are likely to adversely affect your institution?
   1) Extra work in enforcing occupational safety and health legislation during construction of the line.
   2) Processing work injury benefits to workers injured.
   3) The company failing to ensure health, safety and welfare of persons at work.
4. What would you propose as measures to mitigate against the above impacts? 1) Safety and health legislations requirements should be followed during construction of the line.
   2) The construction company should ensure health, safety and welfare of workers to prevent accidents in the course of employement.
5. What is your general opinion of the proposed project? Good
   The proposed project will impact positively to the area. The area will develop since there will be electric energy enough to sustain development in the area.
6. I/We approve the proposed project (reasons) The proposed project will impact positively to the area by enhancing economic development in the area.
   It will also create employment.
7. I/We do not approve the project (reasons).....

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Signature.....Date..22/04/2010.....ID number...22578343.....

(Please provide these details for the purpose of authentication)

3

Appendix VI

Public *Baraza* attendance sheets

22/07/2010

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

KYENI CENTRAL LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI - EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	JOSHUA NDUE NJERU	ASST. CHIEF	0720753524	3657128	
2.	EZEKIEL NJERU	B/MAN	0721671330	16040402	
3.	GERALD KINYUA KARUINGO	EDUCATIONIST	0720119749	0716571	
4.	GERALD NYAGA BERNARD	FARMER	0716622323	3736768	
5.	ALFRED NJIRU	FARMER	0720104135	1863347	
6.	JOHN MSUE	FARMER	0710144665	11673435	
7.	PETER MURITHI MBUGU	FARMER	0710363091	22198221	
8.	JOHNSTONE NJIRU	FARMER	0713845476	—	
9.	Angela Kamenju	Farmer	0720152001	3736795	
10.	IGNATIUS KIBERA	FARMER	0721437892	23664409	
11.	Evanson Njeru	farmer	0712429224	3656443	
12.	Samuel Njeru Mbui	Farmer		3657981	Njeru
13.	Cousam Murithi Mati	Bussiner	0729269493	13263086	
14.	Dorothy Muthoni Nduiga	Farmer	0727432171	0267472	
15.	GEOFREY MUNYI	FARMER	0722364426	3656587.	GEOFREY
16.					
17.					
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22/07/2010

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

KYENI CENTRAL LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	DAVID MOINDI	ENV. EXPERT	0720926524	11555665	
2.	JACKLINE KIMARY.	SOCIO-ECONOMIST.	0726346980.	24028892.	
3.	STEVEN MUINZHU	"	0721-795422	11623270	
4.	JOHNSON MUTHOKA	VALUER	0722752394	10094186	
5.	JILLO MADRAS	LAND SURVEYOR	0728315386	10950237	
6.	Mildred Ogendo	SOCIOECONOMIST	0720402458	10218617	
7.	CALEB MANGO	ENV. EXPERT	0721565359	11049130	
8.					
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KETRACO

KITHIMU LOCATION

20/07/2010

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU WEST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	SAMUEL NJUKI GERISHON	ADM. (CHIEF)	0724907598	0437845	
2.	ALBERT NJIRU KYAGA	ASST. CHIEF	0716850857	9097599	
3.	SAMUEL MWANIKI NJUE	FARMER	0726229243	23322780	
4.	JOSEPH MBOGO GATUMU	FARMER	0723997895	20629419	
5.	DAVID MURITHI CIKUNGU	FARMER	-	11211512	
6.	FRANCIS NJERU NJIRU	"	0715002114	5096683	
7.	EPHANTUS NJOKA KIVUNGA	"	N/A	N/A	
8.	BENJAMIN MWANIKI WAGURA	"	0710123910	13261509	
9.	NJOKA KYAGA NJEGE	"	0712016795	0264536	
10.	BENSON NDUNGA MWANIKI	"	0725551660	8600382	
11.	PATRICK KIVUTI NYAGA	"	0700918134	0883175	
12.	VINCESIO NYAGA NDUNGA	"	0717039021	—	
13.	SALECIO MWANIKI MUDANGU	"	0714751579	35114849	
14.	ZAKAYO KATHURI CIKUNGU	"	0726922126	16077658	
15.	IDERI NAFANO	"	"	3738149	IDERI
16.	HAISON NJERU KAMAMBIO	POSTAR	0722553904	35220320	
17.	JAMES MWANIKI KAMUNDAMBURA	"	0723784929	24896124	
18.	LABAN NYAGA WACHIRA	"	0721962332	11022958	
19.	JAMES NDUGO NJERU	"	0720608873	02672141	
20.	KIGETHA NJERU NJOROGE	"	N/A	—	KIGETHA

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

KITHIMU LOCATION 20/07/2010

LIST OF MEMBERS PRESENT(EMBU WEST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	FRANCIS MURIUKI NGARI	"	0729746706	13339303	[signature]
2.	JOHN MUNYI NYAGA	"	0725961399	11672890	[signature]
3.	ALVAN NJUE GATUMU	FARMER	0726 613807	11353848	[signature]
4.	JOSHUA NJUE JEREMIA	"	0714165891	9679176	J.M [signature]
5.	Moses [illegible]	"	07233354660	21133284	[signature]
6.	FRANCIS MURITHI THIRIKWA	"	0721777599	07002140	[signature]
7.	MARTIN NYENJE Kongo	"	0722776408	3306012	[signature]
8.	ANGEL MBOGO NTHIGA	FARMER	0723 387 077	6057322	[signature]
9.	MACMILLAN MWANIKI NJIRI	"	0726103766	—	[signature]
10.	LUCY WAITHERA MURITHI	"	0718728116	—	[signature]
11.	KELLEN NDUTA NGAITHI	"	—	0303352	NDUTA
12.	ESTHER MUTHONI GACHANJA	"	—	3128827	muthoni
13.	JUDITH GICHUKU IRERI	"	—	—	Gicuku
14.	ZEVEDINA MUTHANJE NYAGA	"	—	3685936	+ X X
15.	TERESIA NJAMBI NJUGUNA	"	0720194571	3512614	TERESIA
16.	RUTHIMBA NJUKI	"	—	3684189	X X X
17.	MIKE MUGO MBOGO	FARMER	0725536027	9819542	[signature]
18.	STEVE MUNZYU	"	0721-795422	11683270	[signature]
19.	DAVID MOINDI	ENV. EXPERT	0720 936524	11555665	[signature]
20.					

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

21/07/2010

KAGAARI SOUTH EAST LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	SARA Wanja	FARMER	0726401182	11420253	Wanja
2.	MERCY Wanja	FARMER	0728016026		Mercy Wanja
3.	Rose Mariga	FARMER			Rose
4.	Eucepia Njura	FARMER			Eucepia
5.	JANE Gicuku MARIGU	FARMER	0720754619		
6.	LEWIS NYAGA	FARMER	0716691145	22590993	
7.	MIRRIAM MBERE	FARMER			
8.	GRACE GITIRI	FARMER	0727694199		
9.	ISAIA MUGENDI.	FARMER			
10.	APIJA KAGIRO.	FARMER			
11.	AGATHA WAROJH	FARMER			
12.	LEADYS GICUKU	FARMER			
13.	GLADYS WARUE	FARMER	0722433753	0721907	
14.	ATHANASIA MUTHONI	FARMER			
15.	NAOMI GICUKU	FARMER			
16.	RUCIRA WERUMA	FARMER			
17.	Bondy Mangu	FARMER	0734846043		
18.	Teresia Warue	FARMER			
19.	ESTER WAWIRA				Wawira
20.					

21/07/2010

KAGAARI SOUTH EAST LOCATION

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU WEST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	NANCY UGO	Farmer	0714559911		
2.	SILAS WAWERU	"	0729987165	07158921	
3.	ROBERT RUHA	"	0700252510	1306707	
4.	FRANCIS NYAGA	"		1307023	
5.	JOSHUA KARIUK				JOSHUA K.
6.	SAMWEL NDWIGA	"	0716828936	1305796	
7.	IRERI NAMAN	"	0715569490		
8.	DICKSON GAITA	"			
9.	SILAS MBOGO	"	0717680496		
10.	JOSEPH IRERI	"	0710645869		
11.	SIMON NYAGA	"	0713232297	11425320	SIMON
12.	SAMMY NJUE	"	0718739471	1304433	
13.	LUCY MUTHONI	"	0710648483		LUCY
14.	CATHERINE KINA	"	0715329036		
15.	FIDES MURUGI	"	0715435445		
16.	NANCY GICHUKI	"			NANCY
17.	SUSAN MUTHONI	"	0715409416		
18.	JUDYTH IGANDA	"	07	14676261	
19.	FENINA WARUE	"			Fina
20.	ALICE WANJA	EVANGELIST	0720151896	11022313	Wanja

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

21/07/2010

KAGAARI SOUTH EAST LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	JAPHAT KAUMBUTHU	Farmer	0713274745	3306552	JAPHAT
2.	RICHARD K IRERI	Farmer	0724365370	8302839	
3.	Simon njeru Tawela	farmer		13046833	
4.	William ireri Joel	"	0714912086	35146648	Mr. W Joel
5.	peter m'ithambo	"			Njeru
6.	Samuel waithaka	"	0711656431		
7.	Daniel Kamunyu	"	0724740333		Kamunyu
8.	Jesse njue Tawela	"	0715174163	3710197	
9.	Samuel njeru ngondi	"			NJERU
10.	samuel njiru Kingee	"			
11.	Elisha ndwiga K	"	0712017399 ~~1307679~~	1307679	
12.	Enos mbago	"			
13.	Sammy njue Kamunyu	"			
14.	Josephat njuga	"			Ndiga
15.	Mathew nyaga	"			
16.	Peterson Kamuti	"	0726389712	23971814	
17.	Josphine gicuku	"			
18.	Lydys wanjovi	"			

19.	Juleter wawire	"			
20.	Dickson ngari	"			

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KENYA ELECTRICITY TRANSMISSION CO. LTD.

21/07/2010

KAGAARI SOUTH EAST LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	PAULINE WARIIMI	FARMER	0713628920		
2.	JANE GICUKU	FARMER	0713669215	1304953	JGA
3.	JOHN NJUKI	FARMER	07	11022287	John
4.	LAWRENCE NJIRU	FARMER	0721894419	4684671	
5.	RUBEN NJERI	FARMER	0715421096	9818593	RUBEN
6.	EPHANTUS NJIRU	FARMER	-		E. Njiru
7.	DICKSON NJUE	FARMER	0713744586	0720325	D. Njue
8.	NAOMI WEWETI	FARMER	0715099358	"	NW
9.	MERCY MUTHONI	FARMER	0715099358	13338691	
10.	JOHN NJERU NYAGA	FARMER	"	"	John
11.	LEAH'S RWAMBA	FARMER	0726032570	8600065	Leah's
12.	PHYLIS GIKIRI	FARMER	"	"	
13.	VENANZIA NJURA	FARMER	"	"	V.N
14.	TERESIA WANJIRU NYAGA	FARMER	0725351894		
15.	ANNA IGANJI	FARMER	"	"	
16.	Lincoln Muchira	FARMER	0713770354	23483519	
17.	MAGRET NJERI	FARMER			
18.	MIRRIM GIKIRI	FARMER		071838	MR

19.	ROSEMARY NJOKI	FARMER					
20.	FIDES WANJA	FARMER	0718778035		0720838		
21	JOHNSON MUCHIRA	VALUER	0722752394	100 9418 6			

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KENYA ELECTRICITY TRANSMISSION CO. LTD.

21/07/2010

KAGAARI SOUTH EAST LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	JOSPHAT THAITHI	CARPENTER	0723768045		
2.	BRAMWEL NYAGA	CARPENTER	0725470911	13062240	
3.	MARY KINA	FARMER			
4.	JOYCE WANJA	FARMER	0729801677	13337977	
5.	JOYCE MUSAU	FARMER	0710787695	07721561 07107876	
6.	LUCY MURINGO	"			
7.	DIONISIA IGANDU	"	0729371650	1306578	
8.	TRYPHOSAR WAMBUI	"	0722995868		
9.	TRYPHOSAR NJERI	"	0718352792	3304325	
10.	JOSEPH NJUKI	"	0724304958	1304320	J.N. Ngerichi
11.	JAPHET NTHIGA	"		16115336	
12.	JULIANO KARIUKI	"	0714351755		NJIRU
13.	BENSON GICOVI	"	0728400548		
14.	JOHN NGERU NGARU	"	0714586190	12879850	
15.	JOHN NJAGI MUTHANGARI	"	0713323544	1305105	
16.	ABEL NGIGI M.	"	0713323544	1305105	
17.	MICHAEL NTHATHI	"		3668475	
18.	JANE WANJA				

19.	AGAPIOS NJUE	Farmer	0722275948	[illegible]	[illegible]	
20.	PETER KARIUKI	"		12947?	IVC	

21/07/2010

KAGAARI SOUTH WEST LOCATION

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU ~~WEST~~ EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	DORIS . K. NJAGI	Farmer	0729553681	0265552	
2.	ANN MUTHONI	"	0723098121	075409	
3.	ROSALINE RWAMBA	"	0726765976	0372540	
4.	IRERI MUGAI	"		1295973	
5.	LUCY MUTHONI	"			
6.	ROBERT KIGORO	"			KIGORO MWITHA
7.	ALICE WAMBUI	"			A. Wambui
8.	JUSTER NJERI	"		23035559	
9.	JOHN INGIRI KAGAI	"	0728253077	7679422	
10.	MARY NJOKI	"			Mary
11.	KAUNDESIA KAARI	"			
12.	DAVES NSUE	"	0711397599		
13.	JOSEPH NGARE	"	0710246037	11420807	
14.	JOHN KARIUKI	"		21725873	
15.	SHARAH THARA	"			Thara
16.	CHRISTINE SAMMY	"	0738709168	11420193	
17.	WILLI NAMU	"	0720066802	13477454	
18.	SALESIO NGARI	"	0711172624		Salesio
19.					
20.					

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KENYA ELECTRICITY TRANSMISSION CO. LTD.

21/07/10

KAGAARI SOUTH WEST LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU EAST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	MATHAH NJIRU NJERU	FARMER	0726336099	13046/9	
2.	EUGENIA MURIUKI KARIUKI	"	0725589400	1858934	
3.	STANLEY M' KWIGWA	"			
4.	KITHAKA NDWATI	"	0710931620		
5.	N.DWIGGA NTHAKANIO		0725780067	13028988	
6.	JAMES NTHIGA	"		5772181	
7.	JUSTINE NDWIGA NJAGI	"	0724644088	10629767	
8.	BERNARD MURITHI	"	0727211997	11220354	
9.	PAUL NYAGA CHIOMBA	"			
10.	FRANCIS NJIRU KAGAI	"	0724867824	10059857	
11.	Beatrice Muiyi	"			Beatrice muiyi
12.	JOSHUA NTHIGA	"	0717662463	7662463	
13.	JOLANA MUGO	"			J. MUGO
14.	LYDIA MUTHONI	"	0711691759	11673319	MUTHONI
15.	JERUSA CIERUNJI	"			Cierunji
16.	JASON MUNENE	TEACHER	0725522780	0721550	
17.	JOHNSON MUTHOKA	VALUER	0722752394	10094186	
18.	Jillo Madras	SURVEYOR	0728315386	10950237	

PTO

19.	Mildred Ogendo-Omede	Socio Economist	0720402458	10218617	[signature]
20.					

20/07/2010

KETRACO

MBETI NORTH LOCATION

KENYA ELECTRICITY TRANSMISSION CO. LTD.

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU WEST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	JACOB KAMONGO	ASST. CHIEF	0724725447	8311865	
2.	ELPHAS KINYUA	PUBLIC HEALTH	0720845772	0615410	
3.	JOANNE NYAMBURA	PROJECT COORD.	0720865426	20215511	
4.	PAUL M. MJOKA	CHIEF	0721589270	3370905	
5.	JAMES R.S. KIIRU	FARMER	0725538369	0814445	
6.	FRANCIS M.KAMUNYU	FARMER	0210324746	1300025	
7.	KARIUKI SAMUEL	FARMER	0710898983	3521468	
8.	Stanley Mugo	FARMER		1300855	
9.	Naftaly Wachira	Farmer	0713-126729	3560644	
10.	James R. Maina	FARMER	0726948787	3477282	
11.	JOHN NJUE MUHO	FARMER	0728626141	4949365	
12.	JOSEPH M. MAINA	ASST. CHIEF	0727397436	13248975	
13.	CPL ERASTUS MUIRURI	AD CPL	0721310704	3400723	
14.	STEVE MUMZYU	SOCIO-ECONOMIST	0721-795420	11623270	
15.	DAVID MOINDI	ENV. EXPERT	0720-936524	11555665	
16.	JILLO MADAKA	LAND SURVEYOR	0728314386	10950237	
17.	JOHNSON MUTHOKA	LAND ECONOMIST	0722752394	10094186	
18.	KIMARU JACKLINE	SOCIO-ECONOMIST.	0726346930	24038872.	

19.	Mildred O. Omanda	Socio-Economist	0722402458	10218617			
20.	Eliud Moki	Land Surveyor	0722 786525	5334518			

20/07/2010

KETRACO

KENYA ELECTRICITY TRANSMISSION CO. LTD.

MBETI NORTH LOCATION

PUBLIC CONSULTATION MEETING FOR THE PROPOSED KYENI – EMBU 20KM 132 kV LINE

LIST OF MEMBERS PRESENT(EMBU WEST)

No.	Name	Designation	Telephone	ID. No.	Signature
1.	IKAN MURITHI NTHIGAH	PHOTOGRAPHER	0720969579	13336240	
2.	SAMUEL NJAGI NGOROI	MANAGER	0723592615	5773242	
3.	NICASIO NJERU KAMAU	CHW.	0735226801	3710130	
4.	PATRICIA W. MBOGO	CHW	0723167456	3521323	
5.	CATHRINE KARU NJERU	CHW	0729228456	9047154	
6.	JANE NJERI WAMBUGU		0721-289877	91187336	
7.	EDITH RUGURU		0727176267	16685037	
8.	PAULINE MUTHONI ALWAN		0726 062 786	27260017	
9.	JEANET CICUKU				
10.	JUDITH WAMBUI I	CHW	0713587273	23602147	
11.	STEPHEN MURIITHI		0726166881	13358308	
12.	NYAGAH TIMOTHY			8138257	
13.	MARION WAKUTHII		0712072501		
14.	C.G.S Mugo		0724542350		
15.	Mary Muthoni Salim		9820763	9820763	
16.					
17.					
18.					
19.					
20.					

Appendix VII

Map showing location of proposed project

Appendix VIII

Kenya Civil Aviation Authority Clearance

Flag this message

Fw: Re: proposed 132 kv Ishiara-Kieni-Embu tx line terminating near Embu airstrip

Tuesday, August 3, 2010 6:19 AM
From:
This sender is DomainKeys verified
"ELIUD MOKI" <eliudmoki@yahoo.com>
Add sender to Contacts
To:
"D Moindi" <dmoindi2005@yahoo.com>
Message contains attachments
1 File (136KB)

- Proposed Embu Sub Station.jpg

--- On **Wed, 6/30/10, ELIUD MOKI <*eliudmoki@yahoo.com*>** wrote:

From: ELIUD MOKI <eliudmoki@yahoo.com>
Subject: Re: proposed 132 kv Ishiara-Kieni-Embu tx line terminating near Embu airstrip
To: pmmunyao@kcaa.or.ke
Date: Wednesday, June 30, 2010, 12:14 AM

--- On **Wed, 6/16/10, pmmunyao@kcaa.or.ke <*pmmunyao@kcaa.or.ke*>** wrote:

From: pmmunyao@kcaa.or.ke <pmmunyao@kcaa.or.ke>
Subject: proposed 132 kv Ishiara-Kieni-Embu tx line terminating near Embu airstrip
To: concisevs@yahoo.com, eliudmoki@yahoo.com
Cc: lkangogo@kcaa.or.ke
Date: Wednesday, June 16, 2010, 12:32 AM

Jambo,
The inspection carried out yesterday 15/6/2010 refers.
Kindly find advice on the precise location bounded by the red marked area.
Please note that the area we had nominated is different from the one indicated in this attachment as the topo chart has not placed the airstrip correctly. You can check for the possible area beyond the point where we picked the coordinates. The blue line is approxiamte routing of the proposed powerline.
Brgs,
Munyao

Jambo,
I agree with you that the area we picked (ie N 9938325 E 332639) is different from the one in the diagram. It appears that the dip in the topo may not be the dip we found on the ground which misled us.
The area you have chosen is actually within the area we had requested for which is N 9937600 E 333700 (lat -0.5644 long 37.50564). This site is shown in the attachment with this message.
In essence we have in mind the same area.
Please grant us clearance to go ahead with the site in the attachment. There is some urgency that has come up.
God Bless You. Thanks
Eliud Moki

Flag this message

Fw: proposed 132 kv Ishiara-Kieni-Embu tx line terminating near Embu airstrip

Tuesday, August 3, 2010 6:18 AM
From:
This sender is DomainKeys verified
"ELIUD MOKI" <eliudmoki@yahoo.com>
Add sender to Contacts
To:
"D Moindi" <dmoindi2005@yahoo.com>
Message contains attachments
1 File (162KB)

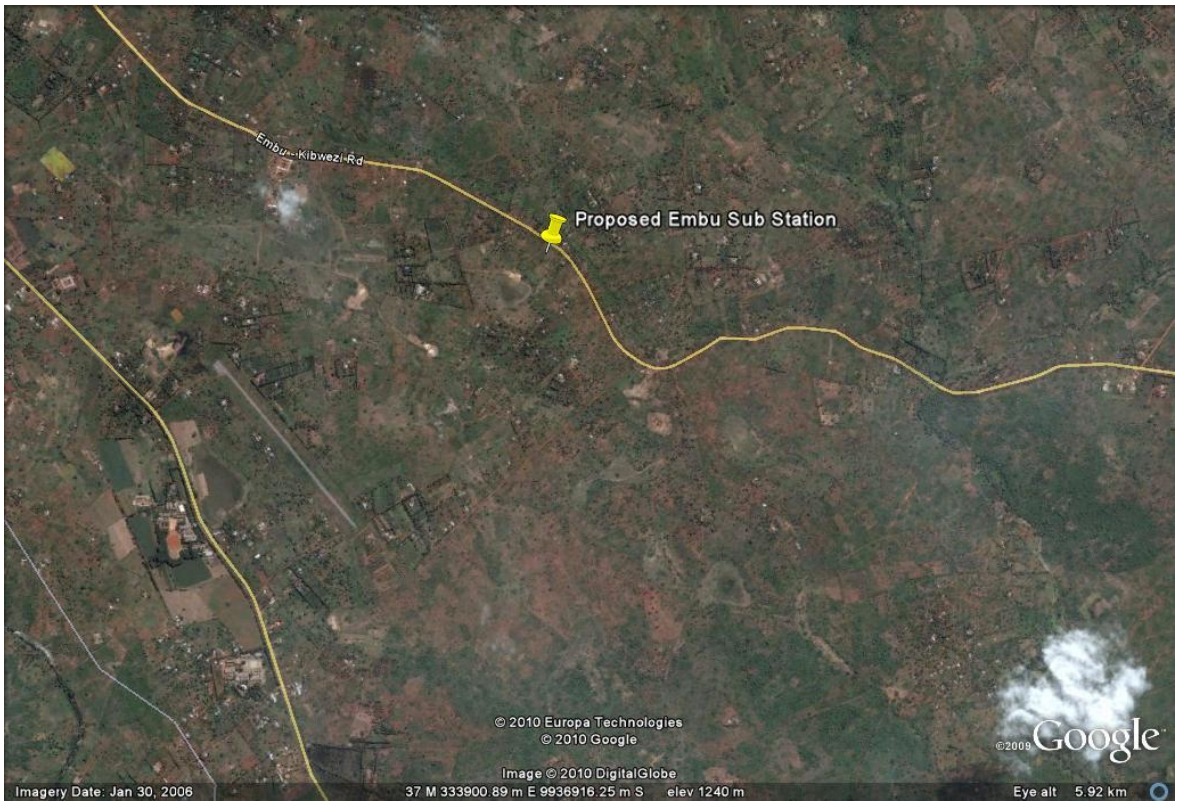
- kefraco ishiara kieni embu terminating point.jpg

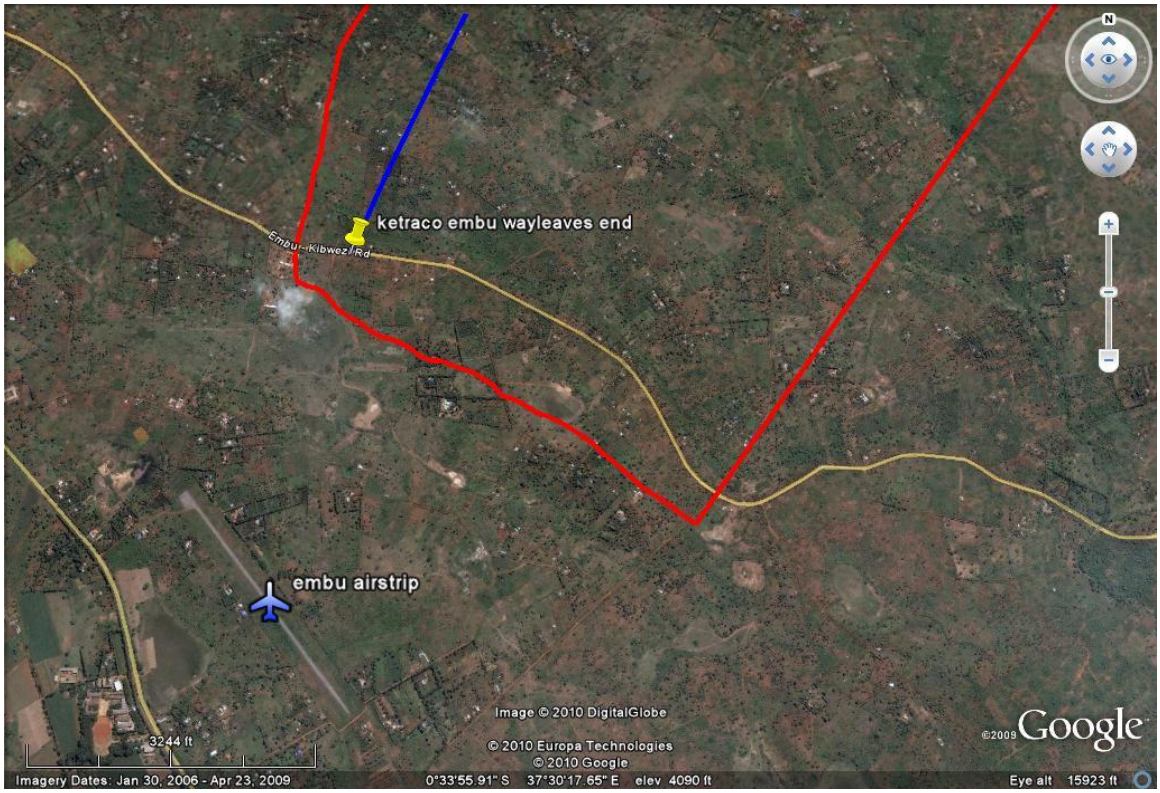
--- On **Wed, 6/16/10, peter ole munya <*pmmunyao2010@gmail.com*>** wrote:

From: peter ole munya <pmmunyao2010@gmail.com>
Subject: proposed 132 kv Ishiara-Kieni-Embu tx line terminating near Embu airstrip
To: concisevs@yahoo.com, eliudmoki@yahoo.com
Date: Wednesday, June 16, 2010, 1:30 AM

---------- Original Message ----------
Subject: proposed 132 kv Ishiara-Kieni-Embu tx line terminating near Embu airstrip
From: pmmunyao@kcaa.or.ke
Date: Wed, June 16, 2010 10:32 am
To: concisevs@yahoo.com
eliudmoki@yahoo.com
Cc: lkangogo@kcaa.or.ke

Jambo,
The inspection carried out yesterday 15/6/2010 refers.
Kindly find advice on the precise location bounded by the red marked area.
Please note that the area we had nominated is different from the one indicated in this attachment as the topo chart has not placed the airstrip correctly. You can check for the possible area beyond the point where we picked the coordinates. The blue line is approxiamte routing of the proposed powerline.
Brgs,
Munyao


Embu - Kibwezi Rd
Proposed Embu Sub Station
© 2010 Europa Technologies
© 2010 Google
Image © 2010 DigitalGlobe
©2009 Google
Imagery Date: Jan 30, 2006
37 M 333900.89 m E 9936916.25 m S elev 1240 m
Eye alt 5.92 km


ketraco embu wayleaves end
Embu - Kibwezi Rd
embu airstrip
Image © 2010 DigitalGlobe
© 2010 Europa Technologies
© 2010 Google
©2009 Google
3244 ft
Imagery Dates: Jan 30, 2006 - Apr 23, 2009
0°33'55.91" S 37°30'17.65" E elev 4090 ft
Eye alt 15923 ft

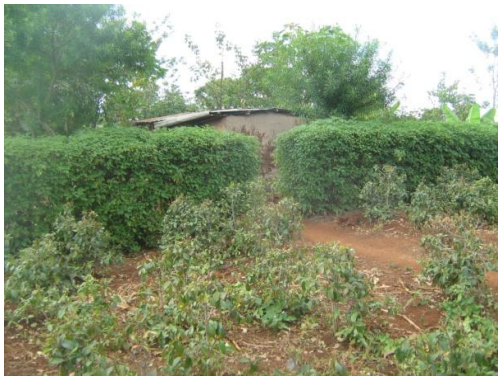
Appendix IX
Site photographs

A view of the proposed site for substation at Embu with maize fields

A view of the proposed site for substation at Kyeni. The site is virgin land covered by grass.

The ESIA team mapping the line route

A view of a structure at AP7 proposed for relocation



A view of a structure at AP 8 proposed for relocation

A view of *Grevillea robusta* and *Cupressus spp* to be cleared for the way leave at Kithimu Location

A view of *Grevillea robusta* and *Mangifera indica* to be cleared for the way leave near Githunguthia Market

The ESIA team conducting household interviews

A view of a public *Baraza* at Gatondo Coffee Factory, Mbeti North Location

A view of a public Baraza at Kithegi Primary School, Kithimu Location

A view of a public Baraza at Gichera Cattle dip, Kagaari South East Location

A view of a public at Kathugu Church grounds, Kagaari South West Location

A view of a public Baraza at District Officer, Runyenjes grounds, Kyeni Central Location

A view of point where proposed line will intersect the Embu – Ishiara road (341756E; 9947817N)

A view of structure at Mbeti North Location near proposed substation proposed for relocation

A view of structure at Kithimu Location proposed for relocation

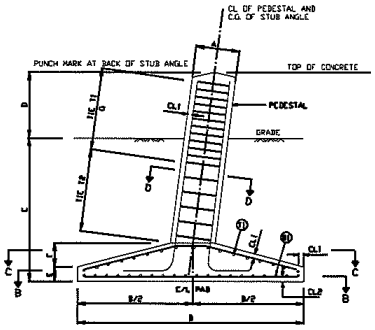
A view of Ngeniari Primary school located South East of AP8 (340950E; 9947219N). The school will not be relocated.

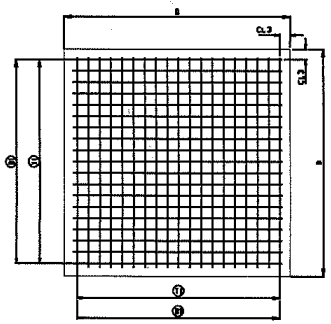
A view of Embu Airstrip located (332104E;993739N) East of proposed Embu substation

Appendix X

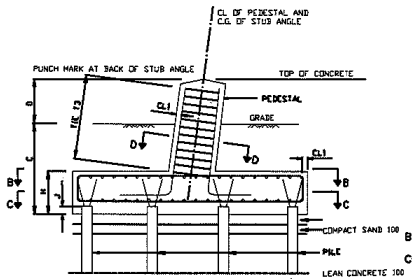
Project Designs layouts and drawings

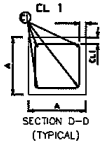
PAD FOUNDATION



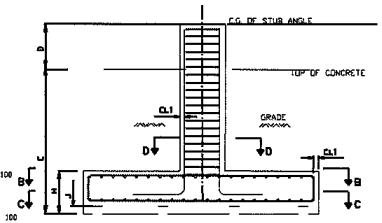


PILE FOUNDATION

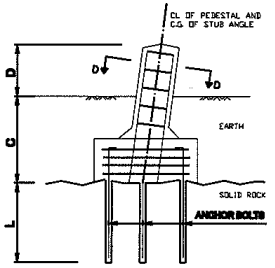


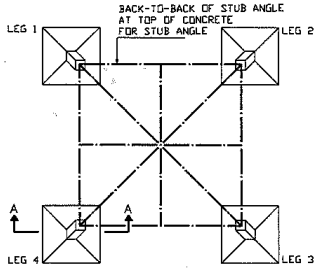


POLE FOUNDATION



ROCK FOUNDATION





FOUNDATION PLAN

Notes:

1. Dimensions shown for foundation outlines are indicative only. The tenderer is required to to indicate his proposed dimensions supported by his calculations.
2. All dimensions are in millimetres unless otherwise noted.
3. Only one type of foundation shall be used at a tower location
4. Special holes for tower grounding shall be provided.

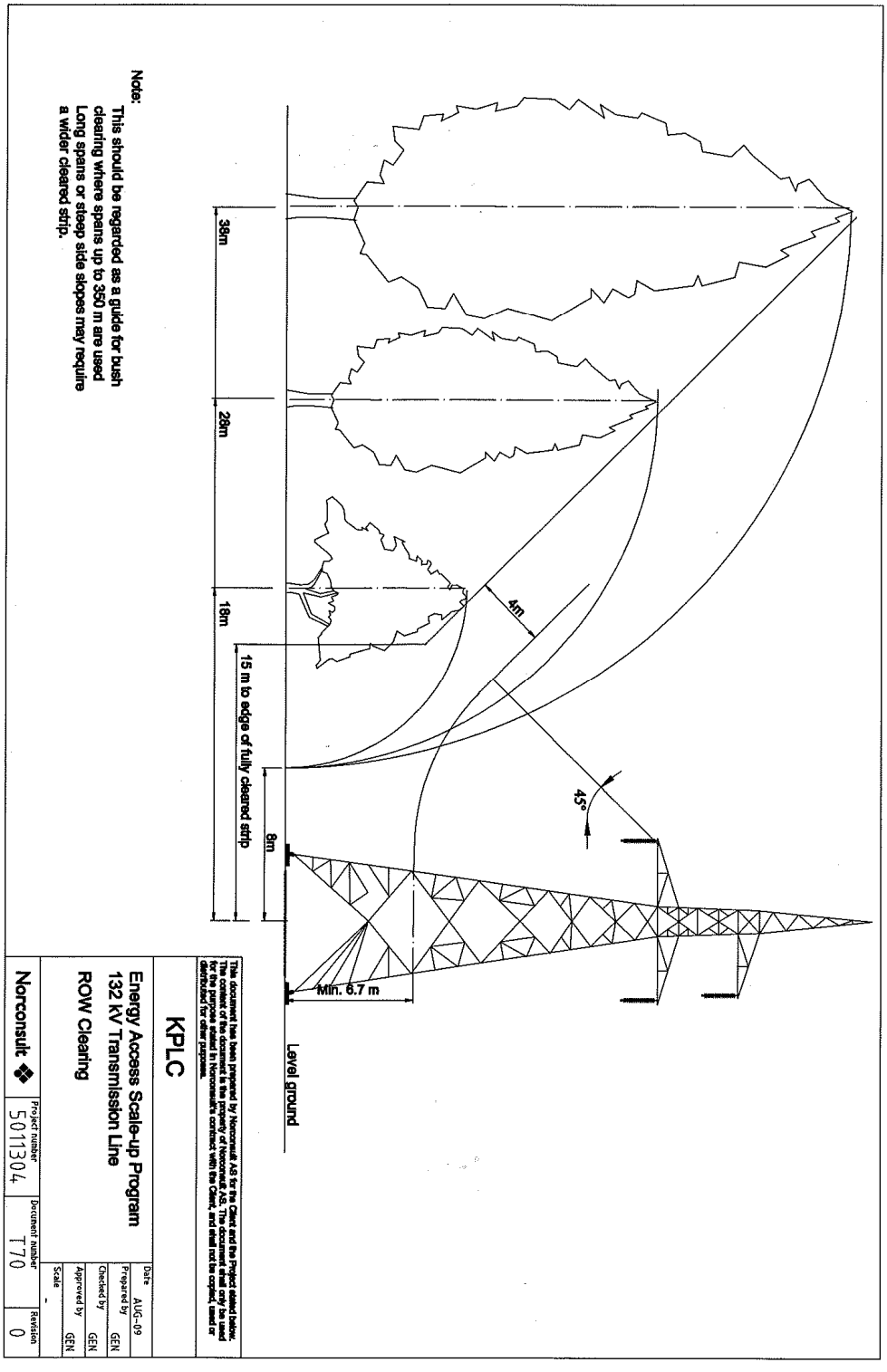
KPLC

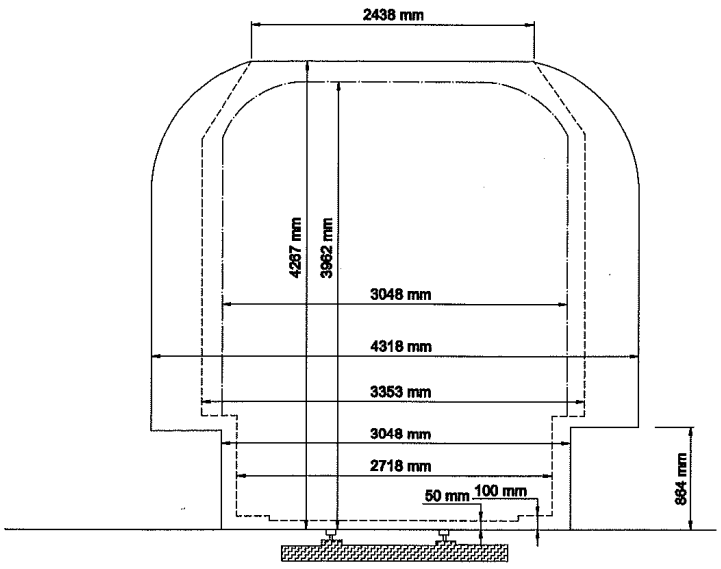
Energy Access Scale-up Program
132 kV Transmission Line

Foundation Types
Conceptual Design Drawing

Date	Prepared by	Checked by	Approved by	Scale
AUG2009	GEN	GEN	GEN	-

Norconsult	Project number	Document number	Revision
	5011304	T15	0


38m
28m
18m
15 m to edge of fully cleared strip
8m
4m
45°
Min. 6.7 m
Level ground
Note:
This should be regarded as a guide for bush clearing where spans up to 350 m are used
Long spans or steep side slopes may require a wider cleared strip.
This document has been prepared by Norconsult AS for the Client and the Project stated below. The content of the document is the property of Norconsult AS. The document shall only be used for the purpose stated in Norconsult's contract with the Client, and shall not be copied, used or distributed for other purposes.
KPLC
Energy Access Scale-up Program
132 KV Transmission Line
ROW Clearing
Norconsult
Project number
5011304
Document number
T70
Revision
0
Date
AUG-09
Prepared by
GEN
Checked by
GEN
Approved by
GEN
Scale
-



Standard loading gauge

Special loading gauge

KPLC

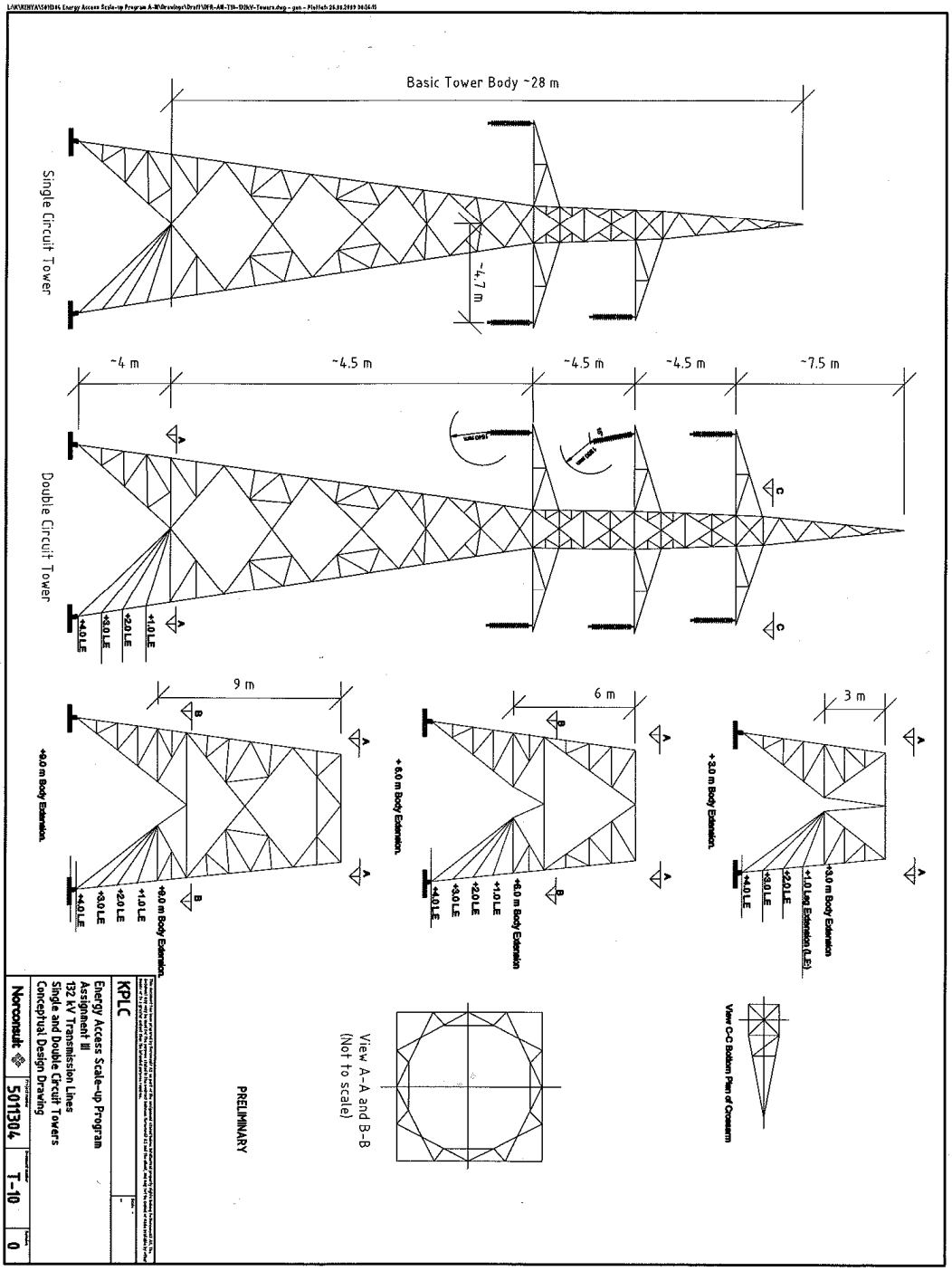
Energy Access Scale-up Program
132 kV Transmission Line

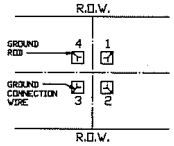
Rail Load Gauge Profile

Date	AUG-09
Prepared by	GEN
Checked by	GEN
Approved by	GEN
Scale	-

Norconsult

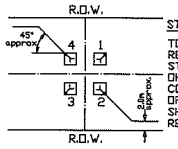
Project number	Document number	Revision
5011304	T90	0


Basic Tower Body ~28 m
Single Circuit Tower
~4.7 m
~4 m
~4.5 m
~4.5 m
~4.5 m
~7.5 m
Double Circuit Tower
+4.0 LE
+3.0 LE
+2.0 LE
+1.0 LE
9 m
+8.0 m Body Extension
6 m
+6.0 m Body Extension
3 m
+3.0 m Body Extension
+1.0 Leg Extension (LE)
View C-C Bottom Plan of Crossarm
View A-A and B-B
(Not to scale)
PRELIMINARY
KPLC
Energy Access Scale-up Program
Assignment III
132 kV Transmission Lines
Single and Double Circuit Towers
Conceptual Design Drawing
Norconsult
5011304
T-10
0



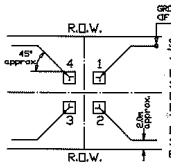
STEP 1

INSTALL FOUR GROUND RODS AS SHOWN. MEASURE GROUND RESISTANCE AND RECORD. (SEE GROUND ROD INSTALLATION BELOW)



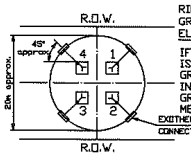
STEP 2

TO BE USED IF THE GROUND RESISTANCE MEASURED IN STEP 1 IS GREATER THAN 20 OHMS .INSTALL TWO RADIAL COUNTERPOISES TO DIAGONALLY OPPOSITE FOUNDATIONS AS SHOWN. MEASURE GROUND RESISTANCE AND RECORD.

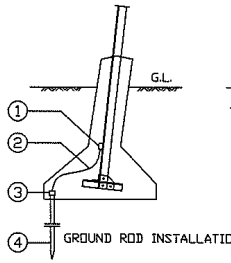


STEP 3

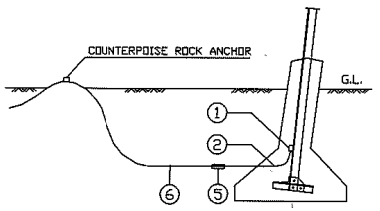
TO BE USED IF THE GROUND RESISTANCE MEASURED IN STEP 2 IS GREATER THAN 10 OHMS .INSTALL TWO ADDITIONAL RADIAL COUNTERPOISES TO THE REMAINING DIAGONALLY OPPOSITE FOUNDATIONS AS SHOWN. MEASURE GROUND RESISTANCE AND RECORD.



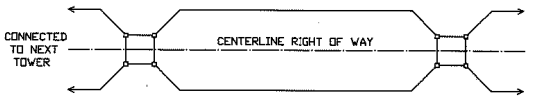
IF THE EARTH RESISTIVITY IS HIGH AND THE SOIL IS GRAVEL, SAND OR STONES. INSTALL RING-SHAPED GROUNDING ELECTRODE. MEASURE GROUND RESISTANCE.



GROUND ROD INSTALLATION



COUNTERPOISE AND EARTHING RING INSTALLATION



CONTINUOUS COUNTERPOISE

ITEM	DESCRIPTION	TOTAL QUANTITY			
		STEP 1	STEP 2	STEP 3	RING-SHAPED GROUNDING ELECTRODE
1	Copper alloy ground connector	4	2	2	4
2	No. 4 AWG. annealed copper ground connection wire	2.4m	1.2m	1.2m	
3	Copper alloy double saddle ground rod clamp	4			
4	Molten-welded or copper bonded (electro-deposited)	4			
	or copper-clad steel ground rod				
5	Heavy-duty exothermic or compression type connector		2	2	5
6	No. 2 AWG. solid copper-clad steel wire, 30% conductivity		30m	30m	90m

KPLC

Energy Access Scale-up Program
132 kV Transmission Line

Tower Grounding
Conceptual Design Drawing

Date	AUGUST-09
Prepared by	GEN
Checked by	GEN
Approved by	GEN
Scale	-

Norconsult

Project number	Document number	Revision
5011304	T18	0