KENYA ELECTRICITY TRANSMISSION CO. LTD

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT PROJECT REPORT FOR THE PROPOSED HINDI MJ ROAD – MOKOWE OLD JETTY – LAMU ISLAND'S MNAZI MOJA– MANDA ISLAND 33Kv & 11Kv ELECTRICAL TRANSMISSION LINE AND ASSOCIATED SUBSTATION IN LAMU ISLAND, LAMU COUNTY

Public Consultation Meeting at Matondoni Chief's Camp, Lamu Island

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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.

TABLE OF CONTENTS

LIST OF TABLES

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 17.5kms 33kV & 11kV electrical transmission line from Hindi MJ Road – Mokowe Old Jetty - Lamu Island's Mnazi Moja - Manda Island. This transmission line is an extension of Rabai – Malindi - Garsen – Lamu electrical transmission line which had been licensed by NEMA in accordance with the Environmental Impact Assessment and Audit Regulations, 2003. The components of the proposed project include:

- 13.9km 33kv extension of the Rabai – Malindi – Garsen – Lamu mainland line from Lamu mainland's Hindi MJ Road to Mokowe old Jetty.
- 0.5km 33kV submarine cable from Mokowe old Jetty to Lamu Island
- 2.8km 33kV line from the first tower in the Island at Mnazi Moja to the proposed 33kv/11kV substation at Mnazi Moja, Lamu Island
- 1.5km 11kv submarine cable from Lamu Island's Mnazi Moja substation to Manda Island

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 33kV & 11kV electricity transmission line from the Hindi MJ Road to Mokowe old Jetty, Lamu Island's Mnazi Moja & Manda Island in order to meet the increasing demand for electricity in Lamu County 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 persons (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 Project Report

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 33/11kV substations and 33Kv & 11kV 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 Report. 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 Project 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 33kV & 11kV electrical transmission line and the two electrical substations.

The ESIA Terms of Reference

The ESIA Project 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

- Possibility of connecting more households and institutions to the national grid;
- Negative impacts associated with use of generator to produce electricity will be eliminated
- 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 Lamu 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
- Hampering of sea transport by submarine power cable
- Trapping of fish by submarine power cable

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

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 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 33kV & 11kV 17.5km 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 Lamu town and the surrounding areas and to meet the increased power demand due to the envisaged expansion of Manda Airstrip as well as construction of Lamu Port, growth of Lamu 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 Lamu County 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 Lamu County. This project is therefore intended to satisfy the demand of electrical power and energy in Lamu County.

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 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 Lamu County. This secondary information was mainly obtained from District Development Plans, 2002 - 2008 and Poverty Reduction Strategy Paper (2001 - 2004.
- Key Informant Interviews and Semi-Structured Interviews were conducted with the District Officers (DO's), Chiefs, Assistant Chiefs, 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 17.5KMS km 33kV & 11kV electrical transmission line between Hindi MJ Road - Mokowe Old Jetty – Lamu Island's Mnazi Moja and Manda Island. 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 leveling 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
- 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 Lamu County. The take off point is in MJ Road Hindi Division and terminates at Manda Island in Amu Division.

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: Project Location

The Proposed project will take off at Hindi Substation along MJ Road; it will go through the Hindi-Mokowe Road reserve upto Mokowe old jetty. From Mokowe old jetty, a submarine cable will be anchored at the sea bed using weights to embed it at the sea bed upto Mnazi Moja where there will be a substation. Mnazi Moja and Manda Island will also be connected by a submarine power cable anchored at the sea bed using weights.

The Project will be entirely in Hindi and Amu Divisions of Lamu County. Lamu County is one of the Counties that make up the former Coast Province. The County boarders the Indian Ocean to the south, Tana River County to the Southwest and Garissa County to the North and the Republic of Somalia to the Northeast. It lies between latitudes 1 degree centigrade 40' and 2 degrees centigrade 30' south and longitude 40 degrees centigrade 15' and 50 degrees centigrade 38' east. The county has a land surface area of 6,474.7 square kilometers which includes the mainland and over 6 Islands which form the Lamu Archipelago. The total length of the coastline is 130km while the water mass is 308 square kilometers. The County is divided into seven divisions, 23 locations and 38 sub locations as shown in table 3.1 below:

Table 3.1: Administrative Units and Population

Division	Land Area (sq.kms)	No. of location	No. of sub locations
Amu	102.4	4	6
Hindi	1,804.9	2	4
Mpeketoni	1,360.7	6	10
Witu	1,235.7	2	4
Faza	74.8	4	6
Kizingitini	18.1	3	4
Kiunga	1,570.1	2	38
TOTAL	**6,474.7**	**23**	

Source: Lamu District Development Plan, 2008 – 2012

The County has two constituencies namely Lamu West and Lamu East. Lamu West constituency covers Amu, Hindi, Mpeketoni and Witu Divisions while Lamu East constituency covers Faza, Kizingitini and Kiunga Divisions. The project is in Amu and Hindi Divisions. Lamu County Council with 19 wards is the Local Authority in the County.

3.1.2 Settlement Patterns

Settlement patterns in the County are diverse because they are determined by many factors which include access to economic opportunities in agriculture, livestock keeping, fishing and trade. Other factors include government settlement programmes and security concerns. Witu Division which is predominantly a livestock zone is occupied mainly by the Orma community. Mpeketoni, Hindi and some parts of Witu are settlement scheme areas established in the 1970's and 1980's. These are predominantly agricultural areas and are inhabited by almost all the Kenyan communities. In Hindi and Mpeketoni the Kikuyu community are however the majority. Mpeketoni Division is also home to the Sanye which is one the smallest tribes in Kenya which are normally excluded from mainstream development activities. Amu Division where Lamu town is located harbours almost all Kenyan communities but the majorities are the Bajunis.

In the Island which includes Patte, Kizingitini Ndau and Siyu amongst others, the predominant community are the Bajunis who live in villages. One of the main economic activities in the Islands is fishing, though small scale agriculture is also practiced. Kiunga Division is inhabited by the Boni community and Bajunis. The Bonis are preoccupied with traditional bee keeping while the Bajunis are fishermen. Kiunga which is the main town is popular with many communities due to its location which is on the border with the Republic of Somalia.

There is marked variation in population densities in the district with Kizingitini Division, which is the smallest in the area having the highest density. Other divisions which are densely populated are Amu and Faza Divisions. Kiunga Division is the most sparsely populated having a density of 3 persons per square kilometre.

Major towns in the district are Lamu, Mpeketoni, Witu and Mokowe although there are other trading centers, about 20 spread out in all divisions. Security is another factor influencing the settlement pattern. Amu and Mpeketoni Divisions are highly populated due to adequate security as opposed to divisions such as Witu, Hindi and Kiunga, which

have a history of insecurity problems. These areas are therefore sparsely populated and communities live in small villages.

There is no major migratory pattern in and out of the district but few minor migratory characteristics can be distinguished. During the dry spell, herders from neighbouring counties of Garissa and Tana River migrate to the district in search of pasture and water for their animals. In Lamu town, there is a growing tendency for people to move away from the old town to new unplanned settlements areas. This has resulted in a steady growth of settlements such as Kashmir, Bajuri, Kandahar, Bombay and Gadeni.

3.3: Physiographic and Natural Conditions

3.3.1: Topographic Features

Lamu County is generally flat and lies between zero and 50 meters above sea level which makes some parts of the county become flooded during the rainy seasons; mostly those around Lake Kenyatta in Mpeketoni Division and along Tana River Delta like Chalaluma in Witu Division occasionally become flooded during rainy seasons. Other areas which are near the sea experience floods during the high tides. Other important features in the County are rock outcrops which occur on the Islands of Manda and Kiwayuu and sand dunes which are found mostly in Lamu Island and parts of Mkokoni in Kiunga Division.

The main topographical features include the coastal plains, Island plains, Dodori River plain and the sand dunes while the most common rock formation are residual coral limestone and columns of sand. The coastal plain, though not extending to the coastline creates the best agricultural land in the district. Also to be found in these plains are sand dunes though not many. The island plain is found to the coastal, northern and western parts of the county and has good potential for agricultural development. The Dodori River plain which is in the Dodori national reserve is home to many wildlife species. The sand dunes which are found to the north-eastern and the southern parts of the county rise to a height of about 50metres above sea level and are a source of fresh water in the county.

There are 4 major catchments areas each with its own characteristics. These are Dodori catchments and coastal zone. Duldul catchments, the Lamu Bay drainage catchments

and the Tana River catchments. The lack of permanent river flow in the county indicates that groundwater storage is not very high. Lake Kenyatta in Mpeketoni Division is the only permanent open water site in the county though it has been known to dry during the exceptionally dry years. The few seasonal streams in the district flow from the west towards the south-eastern part of the county. However, none of these streams reach the Indian Ocean. As a result of rainfall, several swamp sites exist throughout the county with the main ones located in Dodori, Belebele in Hindi, Ziwa la Magarini and Chomo Ndogo – Chomo Kuu along the Hindi – Bargoni road, Luimshi and Kenza on Nairobi ranch and Kitumbini and Ziwa la Gorjji in Witu.

3.3.2: Climatic Conditions

There are no marked variations in temperatures within the county. Temperatures generally range from 23 degrees centigrade to 32 degrees centigrade throughout the county. The hottest months are December to April while the coldest months are May to July. The mean temperature is usually 29 degrees centigrade. The county can therefore be divided into two livelihood zones, namely the rich agricultural and livestock zone in the mainland (mainly settlement schemes) and the fishing and marine zones (the islands) both with varying economic diversities. The zones are also distinct in terms of ecology, infrastructural network and population distribution.

The county has a bimodal pattern of rainfall. The long rains occur from mid April to the end of June, with the highest rainfall occurring in the month of May. The short rains occur in November and December and are generally unreliable. The months of January to March and August to October are usually hot and dry. Due to Ocean influence, the rain pattern is such that its reliability decreases as one move towards the hinterlands. There are therefore 3 major rainfall zones in the county. The arid areas along the northern borders receiving below 540mm of rainfall annually, while the semi-arid areas covering Amu division and the Islands receive between 550mm and 850mm annually. The sub humid zone covering Witu and Mpeketoni Division receive between 850mm and 1,110mm of rainfall annually.

The different physiographic, climatic and other natural conditions categorize the district into four agro-ecological zones namely coconut-cassava zone (CL3), cashew nut-cassava zone (CL4), livestock-millet zone (CL5) and lowland ranching zone (CL6) as shown in table 3.2 below:

Table 3.2: Agro-ecological zones by Division (sq.kms)

Division	L3	L4	L5	L6	TOTAL
Amu	39	533	454	0	1026
Mpeketoni	235	828	246	0	1309
Faza	143	268	122	0	533
Witu	94		**577**	**24**	**1100**
Kiunga	0		**267**	**0**	**1589**
TOTAL	**511**		**1666**	**24**	**5557**

Source: Lamu District Development Plan, 2008 - 2012

3.3.3: Population Profile

The projected population in 2008 is 99,662 and is expected to increase to 105,087 and 109,831 by 2010 and 2012 respectively. The district has a large youthful population with 54,007 persons being below the age of 19 years that is 54%. In terms of gender, 52% of the population is male and 48% of the population is female. The male population stands at 51,480 while the female population is 48,172 giving a male/female sex ratio of 1:1.07. The population is expected to increase to 109,831 of which 56744 will be males and 53,087 female by 2012.

3.4: Environment, Water and Sanitation

The main sources of water in Lamu County are groundwater, surface water, rainfall and desalination of sea water. Ground water sources are the major sources of most of the water supplies in Lamu County. Most areas in the county have saline groundwater or marginalin quality. Surface water sources include the sea, lakes, pans, dams and seasonal rivers.

Rainfall water plays an important role in arid and semi arid areas of the county where rain harvesting structures are used to collect the water for domestic use. Desalination of sea water is mainly done by private individuals and in hotels since the process is costly. The county has 6 major water supplies namely Lamu water supply, Mokowe water supply, Lake Kenyatta water supply, Witu water supply and Hindi Water Supply. In addition to the water supply, the county has 230 shallow wells, 6 water pans, 1 dam, 20 boreholes and 167 djabias.

Water in the county is managed by various institutions, Lamu water and Sewerage Company which manages Lamu and Mokowe water systems and Lake Kenyatta water

Association where supplies water to Mpeketoni Division. Hindi water Association and Witu uses Association manage water supplies in Hindi and Witu divisions respectively. Other public water sources such as djabias and dams are managed by community committees. The county faces many environmental challenges which are both man-made and natural. Some natural environmental challenges include sea erosion which has led to the construction of sea walls in Lamu town, Faza, Kizingitini and Ndau. Man-made environmental challenges include forest depletion due to illegal logging and expansion of agricultural activities and water pollution. The county is also faced with a challenge of managing its solid and liquid wastes which are increasing in volume as a result of population increase and changes in lifestyles.

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 transporters 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.

Environmental & Social Impact Assessment Project Report

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 14.5 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 government 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. Samples 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 33 kV & 11kV 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.

5.6: Stakeholders Views

Table 5.1: Summary of People Consulted

Name	Comments
Michael M. Gichure Senior Warden Kenya Wildlife Service P.O.Box 82 Lamu ID. No: 4831571	• Reliable electricity supply will enhance tourism in Lamu • This in turn will attract visitors to KWS managed Marine National Reserves and Dodori National Reserve • More tourists will enhance revenue source for Lamu County • Uncontrolled development will result in destruction of habitat for several wildlife species both terrestrial and marine • The electric cable should be encapsulated in a manner that they don't become traps of fish. • Preferably the cables should pass under sea as much as possible • The project is welcome as it will re-vamp development of the Lamu area and stimulate growth • The project is a necessary infrastructure especially in light of the Kenya's Vision 2030 • Airstrip at Hindi and Manda belongs to Kenya Airports Authority • There is no problem as long as the submarine cable is well anchored at the sea bed.
Planner A.O. Eshitera Senior Physical Planner Lamu District Tel: 0721728654	• The project will have no conflict with the physical planning development • The project will displace people on the proposed way leave • This will be mitigated through compulsory acquisition of property where the way leave will pass and compensate affected parties • A good idea, the project should be fast trucked • It will ensure uninterrupted power supply • Noise pollution from the currently used generator will be eliminated
Mr. Stanley M. Mutua District Officer – Hindi Division	• 75% of the occupants of Hindi Division are Kikuyu while 25% are Bajunis • Supports the project

Tel: 0723801432	
John M. Ndichila Works Officer County Council of Lamu ID. No: 11311497	• The high voltage power line will require a way leave which may affect the town planning bearing in mind the narrow streets of Lamu • Improved power lighting at night • It will lead to improved industrialisation • However, they may be incidents of fire outbreaks • Due to increased population, it is necessary • Will improve people's livelihood
Mr. Maisore Ag. District Commissioner Lamu District Tel: 0727248044	• Manda Island is government land • Main basic economy is tourism at 85% followed by fishing at 15% • There are some wild animals in Manda Island • Apart from the Airstrip, there as people staying in Manda Island • Expressed challenges in getting full attendance at public barazas since the time of the study coincided with holy month of Ramadhan • Religion is predominantly intense Islam •
Haji Shibu Deputy District Public Health Officer – Lamu ID. No: 8520465	• Adequate power will lead to proper food storage using refrigerators • Electricity will be used to pump water hence regular supply and improved sanitation • Proper safety measures should be put in place to prevent electrocution • Ensure the community are aware of electric safety and health issues • It will lead to better health and development. • Both formal and informal employment will increase • It will lead to improved infrastructure and reduce cost for health delivery services
Sebastian M. Mutua P.O.Box 9 Mokowe Tel: 0700187675 ID. No: 0769855	• Compensate owners for lost property i.e. trees and crops • Project will benefit saloon and barber shop operators • Operations in hospitals and schools will be made easier with power supply • Light will enhance security at night
Charles Omondi Ministry of Agriculture ID.No: 21824358	• Public institutions will have electricity supply • Supports the project
Mr. Mohamed Omar Ag. Chief, Matondoni	• It will create both formal and informal jobs for the locals

Tel: 0728566057 ID.No: 13018133	• It will enhance security • Supports the project
Khalifa S. Ali Asst. Chief, Mokowe ID.No: 10390726 Tel: 0729751927	• It will improve the standard of living in the area • It will create job opportunities to the local community • It will benefit the business community
Mohammed Bwanamkuu Imam Mokowe Jamia Mosque P.O.Box 25 Mokowe ID. No: 10390535 Tel: 0725585477	• With electricity, Schools will be able to acquire and use computers • Electricity will be a substitute to use of paraffin and fuel wood • Use of CCTV's for security will be possible • Students will be able to comfortably attend night studies using the electric light • It will enhance the aesthetic value of the area
Yusuf Bile Mohamed – Unemployed P.O.Box 16 Mokowe Tel: 0716021273 ID.No: 22782940	• It will lead to decreased crime, improvement in health sector, education facilities and more job opportunities • Noise pollution during construction • There will be soil erosion during construction • Supports the project
Juma Banga Muoi – Farmer P.O.Box 60 Mokowe Tel: 0715577615 ID.No: 0307592	• There should be compensation for lost vegetation • The project should start immediately
Richards Kassy Okech Ondeng Businessman Manda Island ID.No: 2586183	• It will generate development in the area • Supports the project
Lulai Hussein Hassan – House Wife P.O.Box 25 Mokowe ID.No: 13536600	• People will be displaced especially those who do not have title deeds • Possibility of people being electrocuted • Security will be improved and more jobs created • Dust emissions will cause air pollution • Noise pollution from machines used during construction • With proper mitigation measures, the project should proceed
Evans Ogot Manda Island ID. No: 23408760	• It will spur the jua kali sector • Supports the project • Will use electricity to charge the machines he has
Adelo Otieno Businessman Manda Island ID.No: 20195489	• The nearby primary school has computers but cant use them due to lack of electricity • With electricity, the computers will be used • Need the project to spur development

	• It will enhance security • KETRACO staff should always be on the ground to respond to any eventuality and respond to the locals concerns
Joseph Ndung'u Community Health Worker ID. No: 20908828	• Do not expect any negative impacts • Supports the project for development purposes and uplifting of local economy
Christopher Wachira & Joseph Ayugi Quarry Excavators – Manda Island Tel: 0716802042/0712575395	• The local dispensary and primary school will benefit from the power supply • It create employment and spur businesses • The affected land owners should be compensated
Mohammed Abdalla Bakari Carpenter – Matondoni P.O.Box 111 Lamu Tel: 0728589123 ID.No: 13536337	• It will be possible to operate a mortuary with reliable power supply • It will be possible to store/preserve fish • It will be possible to have beach lights • Security will be enhanced
Hadija Bakar Business lady –Matondoni P.O.Box 111 Lamu ID.No: 10391912	• It will be possible to store medicine in freezers • Will be used in laboratory by students • Will enhance fish storage • Will light the area and enhance security • Supports the project
George Randiki – Peasant farmer – Manda Island ID.No: 22629902	• It will help attain vision 2030 • Will support jua kali sector i.e. welding • Manda Airstrip and primary school will benefit
Bernard Otieno Oduor Tel: 0710735990 ID. No.21157371	• Will help attain vision 2030 • Schools, hospitals, airstrip and private sector will benefit • Will enhance local economy and create jobs for the youth i.e. saloons, barber shops etc
Maryam Swaleh Business lady – Matondoni P.O.Box 111 Lamu Tel: 0711593094 ID.NO; 0165429	• Help jell in preserving medicine in freezers • Students will be able to use power in the laboratories • It will create employment opportunities • It will enhance the area's aesthetic value • Will be used to power television sets • The project should be fast trucked
Fatma Ali House Wife – Matondoni P.O.Box 74 Lamu ID No: 234422	• Devegetation will cause soil erosion • Fast truck the project • Will enhance security & create more jobs • Will have no negative impact on local culture
Hudaa Molid Housewife - Matondoni P.O.Box 111 Lamu Tel: 0718195997	• There can be electric fire outbreaks • People will be displaced • Street lights will enhance security • Will be used in hospital freezers to preserve

	medicine • Will be used in cold storage facilities, cybercafés, video shows hence enhanced income
Rukia Hussein P.O.Box 111 Lamu Tel: 0717370939 ID. NO: 28207823	• People wont spent more time travelling several kilometres looking for well equipped hospitals • Students will get quality education by using computers • Locals will be employed in the project • Locals will save money used in paraffin and wood fuel • Blow driers will be used in saloons • People will be displaced • Children may be electrocuted • Noise pollution from machines used • Loss of vegetation will cause erosion
Muhsin Hussein Baishe Nursing officer - Matondoni P.O.Box 111 – 80500 Lamu Tel: 0716777391 ID.No: 9352755	• No negative impacts anticipated • Will improve telecommunications • Fish will be preserved in freezers • Drug storage in refrigerators will be possible • Street lighting will enhance security
Mohammed Bakari Haji Fisherman – Matondoni P.O.Box 74 Lamu ID.No: 10391390	• Trees will be destroyed and should be replaced • Good storage of medicine • More work for locals will be created • Project good for development and security
Evans Akello Opondo Tel:0719594089 ID. No:28498192	• Health will improve due to easy communication • There will be a reduction in crime rate due to the employment that will be created • Employment creation • Improvement in the education
Joseph Ojing Tel:0700778704	• There will be improved health • Children will have enough time to concentrate in their education • Improved employment opportunities for the people living around this area • There will also be improved security
Ali Gure P.O. BOX 10-Mokoine Tel:0710454954 ID.No:13536802	• Improved Health • More work for locals will be created • Many trees will be cut and they should be replaced • Improved security in the area due to street lighting • There will be development in the area
Simon Mwalimu Farmer and Youth	• Health services will be improved • Education standards will improve since students

P.O. Box 22-Mokowe Tel: 0727697944 ID.No:27931679	will be reading even at night • Employment will be improved since people will be using power available • Small businesses will be put in place hence more income will be generated • Security will be improved since there will be security lights on the streets • People will not have to travel for long looking for saloons • People will be vacated for the electricity lines to be put in place hence many will remain landless • Increased pollution due to the smoke released from the power stations • Risk of people getting shocked by electricity • Power generators will lead to noise pollution
Yunus Ahmed Businessman **Tel:0716368505**	• More equipment will be found in the health sector • Better performance in education as students will be studying using electricity • Creation of jobs • Improved income due to more hours of working • Improved security • May lead to conflicts as some may be protesting against loss of their land • Health risk associated with noise and air pollution • Environmental degradation • Fall in agricultural production • May lead to deforestation
Richard Asser Maneno Farmer and Herdsman P.O. Box 41 Mokowe Tel: 0711761412 ID. No: 0650121	• Health services will improve • Schools will benefit from the project as they will be supplied with electricity • Employment opportunities will be increased in the area • Improved security due to street lighting • Saloons and barbershops will be many hence people will not have to walk long distances inn search of them • There will be loss of vegetation cover • Increased pollution will also lead to poor health standards
William Kariuki Muiruri Farmer	• Community health will be made better due to development in health centres

P.O. Box 245 Lamu Tel: 0720244677 ID. No:2128370	• Schools will have enough light for students to use in their studying and programmes • Improvement in life due to availability of electricity • Power supply will create multiple products hence development in the community • Result in more saloons and barbershops hence improved body care • Improved security due to the lighting system • Improve businesses due to long hours of operation
Stephen Ikua District Commissioner – Lamu	• Questioned why too much time wasted on environmental matters derailing development • Education is skewed to favour boys at 60% while only 40% girls attend school • Cultural practises still predominant, girls are married off as early as 12 years of age

5.7 <u>Stakeholders Concerns</u>

5.7.1: <u>Mokowe</u>

- Locals have never benefited from power being generated at Lamu town by KenGen
- They have unemployed youths and would appreciate if they can be employed in the project
- They wondered if they will be compensated in the event that the power line passes through somebody's piece of land
- Assistant Chief of Kilimani –Mokowe wondered whether his sub location will benefit since the line will not pass there
- The locals wondered why the substation will be put at Hindi and not Mokowe, they want it at Mokowe
- They wondered why the line will pass through Mokowe old jetty and not the new jetty
- They wondered how people without title deeds will be compensated since nobody in the area has no title deed
- The locals wanted to know the project duration and when it will be commissioned

<u>5.7.2: Manda</u>

- Community members asked why we could not undertake the whole process up to distribution because they think it will be expensive if KPLC is left to handle distribution
- Locals said they accept the project and hope it will benefit them as soon as possible; especially in the school which has computers but has no power
- One member of the community questioned why the construction of the line was given to a Chinese firm and not a local firm?
- Locals wondered how they will communicate with the Chinese during construction stage

- Locals wondered how youths of the area will benefit from the project by way of unskilled labour
- One of the locals questioned if he implementation of the said project is within the new constitution
- Locals also questioned the effect of the underground cables on fishing
- Locals took the opportunity to request the local administration to ensure land allocation and settlement issues are handled amicably

5.7.3: Matondoni/ Mnazi Mmoja

- Locals welcomed the project and expressed hope that the project will lead to electricity distribution in the houses
- Locals asked how the project will affect them directly especially taking into account the many proposals they have written to KPLC requesting for connection
- Local community informed the meeting that they had earmarked a portion of the CDF funds for connection of electricity thus the project will fasten the process
- They have unemployed youths and would appreciate if they can be employed in the project
- They wondered if they will be compensated in the event that the power line passes through somebody's piece of land

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 Lamu 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

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
- Submarine cable tampering with sea transport
- Submarine cable trapping fish

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 suppression 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 Hindi MJ Road – Mokowe Old Jetty – Lamu Island's Mnazi Moja – Manda Island 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.

6.3 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 known flight paths 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 substation 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
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

Potential Impact	Proposed Mitigation	Responsibility for Monitoring	Monitoring Indicator	Monitoring Means	Time Frame	Cost (Ksh)
Fish trapping	• Anchor the submarine cable at the sea bed	Proponent & contractor	Complaints	No. of complaints forwarded	Through out the project cycle	500,000
Hampering transportation	• Anchor the submarine cable at the sea bed	Proponent & Contractor	Complaints	No. of complaints forwarded	No. of complaints forwarded	Ditto

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, • Cultivating native plant species; • Avoiding clearing in riparian areas; • Vegetation management should not eradicate all vegetation	Regular inspection	Proponent	Continuous	100,000

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
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 silencers to reduce quantity of noise produced • Create a barrier well beyond the perimeter of the high level noise area and the community	Routine inspection	Proponent & Contractor	Continuous	80,000
Waste water	• Avoid unnecessary wastage and spillage of water	Routine inspection	Proponent & Contractor	Continuous	Nil

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
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 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	Routine Maintenance Inspection Records	Proponent & Contractor	Continuous	90,000

Potential Impact/Aspect	Proposed Mitigation	Monitoring Means	Responsibility for Monitoring	Time Frame	Cost (KSh)
	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	• Ensure safe disposal of the waste generated during the decommissioning processes,	Regular inspection	Proponent	Number of reported cases,	Contin uous	

hygiene	everything be done in accordance to the decommissioning audit • Engage NEMA licensed waste transporters			complaints from the residents		
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	Supervising Engineer	Number and status of existing	Continuous	100,000

		protective equipment		PPE		
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.

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The World Bank Safeguard Policies

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APPENDICES

Appendix I

ESIA Team EIA/EA Practising Licenses/Certificates

Appendix II

Sample of filled community questionnaires

Appendix III

Filled key informants questionnaires

Appendix IV

Public *Baraza* attendance sheets

Appendix V

Maps showing location of proposed project

Appendix VI

Site photographs

Plate 1: KETRACO Socio-Economist & Environmentalist at Mnazi Moja, proposed substation site

Plate 2: Chief, Manda Island addressing the public consulation meeting

Plate 3: ESIA Team in a KPLC motor boat crossing the sea from Lamu town to Manda Island

Plate 4: Chief Matondoni, addressing the public consultation meeting

Plate 5: Mzee Kassy Okech Ondeng addressing the Manda Public Consultation meeting

Plate 6: KETRACO land surveyor at the entrance of Manda Airstrip

Plate 7: Environmentalist and Chief boarding a motor bike at Manda jetty

Plate 8: A view of Lamu Town from the Ocean