KENYA ELECTRICITY TRANSMISSION CO. LTD

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT PROJECT REPORT FOR THE PROPOSED GARSEN 220/132/33 kV SUBSTATIONS IN MINJILA VILLAGE, ITSOWE SUB LOCATION, SHIRIKISHO LOCATION - TANA DELTA DISTRICT.

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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 interprétation of the facts by the Environmental Social & Impact Assessors. It is issued without any préjudice.

EXECUTIVE SUMMARY

Introduction

The Government of Kenya plans to increase access to electricity in Kenya tenfold from the current 4% in the rural areas to about 40% by 2020. To do this, the transmission lines network is being considered for upgrading and with it the communication system required for line protection and management purposes. The Kenya Power and Lighting Company Limited (KPLC) least cost power development plan identified various 132 KV developments for improving the performance of the national grid network to cater for the increasing load growth and meet the objectives of 2030. The Kenya Electricity Transmission Company Limited (KETRACO), which now assumes the full mandate of constructing and managing transmission lines and associated sub stations, is planning to construct a new single circuit 132 kV transmission line between Ol Karia - Bomet Transmission, including establishment of a substation at GARSEN.

The proposed line will serve the greater Tana Delta County and beyond.

The Kenya Government policy on all new projects requires that an Environmental and Social Impact Assessment (ESIA) study be carried out at the project planning phase in order to ensure that significant impacts on the environment are taken into consideration at the construction, operations and decommissioning stages. KPLC on behalf of KETRACO contracted an ESIA for the Rabai – Malindi- Garsen- Lamu 132kV transmission line. The EIA study report has already been licensed by the National Environment Management Authority. However, the ESIA for the substation at GARSEN was not conducted. KETRACO has used its in-house man-power consisting of Electrical and Civil Engineers, Socio-Economists, Land Economists, Surveyors and Environmental Experts to undertake the ESIA for the proposed GARSEN 132/33 kV substation.

In GARSEN, the proposed substation will be located in Minjila village, Itsowe Sub location, Shirikisho Location, Tana Delta District. County Council of Tana River through a letter dated 16th March, 2011 allocated KETRACO the proposed substation land at Minjila, Shirikisho Location (*See the annexed letter for ease of reference*). The area has not surveyed and plots have no land reference numbers.

Project Cost

The estimated cost of the project is approximately **One hundred and seventy million (170,000,000).**

Study Objectives

The principal objective of this assessment was to identify significant potential impacts of the project on environmental and social aspects, and to formulate recommendations to ensure that the proposed project takes into consideration appropriate measures to mitigate any adverse impacts to the environment and people's health through all of its phases (construction, implementation and decommissioning phases).

Scope

The ESIA study was limited to:

- 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.

Study Methodology

The approach to this exercise was structured such as to cover the requirements under the EMCA, 1999 as well as the Environmental Management and Coordination (Impact Assessment and Audit) Regulations 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as decommissioning. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, desktop studies, public consultations with Lead Agencies and members of the community in the project areas, survey, photography, and discussions with key people in KETRACO (the proponent) and KPLC.

The key activities undertaken during the assessment included the following:

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

Policy, Legal and Regulatory Framework

The Environmental Management and Co-ordination Act (EMCA), 1999, is the legislation that governs EIA studies in Kenya. This project falls under the Second Schedule of EMCA, 1999, which list 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. Also discussed are international laws relevant to the proposed projects and good practices as contained in the World Bank Safeguard policies.

Identified Potential Impacts

The following positive and negative impacts are likely to be associated with the proposed project.

Positive Impacts

- Reliable and secure power supply to GARSEN and surrounding areas
- Direct and indirect skilled and non-skilled employment opportunities
- Gains in the local and national economy and increase in revenue.
- Informal sectors benefits
- Development of other Sectors
- Increased security in the area

Negative Impacts

- Noise pollution
- Generation of exhaust emissions
- Dust emissions

- Solid and liquid waste generation
- Oil spill hazards
- Destruction of existing vegetation and habitats
- Avifauna mortality
- Increased demand for material consumption
- Impacts on workers' and community health and safety
- Soil erosion
- Fire outbreaks
- Visual and aesthetic impacts
- Incidences of electrocution
- Perceived dangers of electrostatic and magnetic forces
- Increase in social vices
- Land take – loss of use

Proposed Mitigation Measures

Mitigation of the potential impacts as described in chapter 6, and implementation of the Environmental Management Plan and Environmental Monitoring Plan (chapter 7 and 8) will help to minimize the negative impacts, and enhance the positive outcomes of the project.

Conclusion

An Environmental 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 outline of the activities, associated impacts, and mitigation action plans. 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 Management and Monitoring Plan provided herein. Following the commissioning of the 132/33 kV transmission substation, 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 transmission substation 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 and community members, and Improved security.

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 given that no immitigable negative impacts were encountered and that no community objection was received, the project may be allowed to proceed.

TABLE OF CONTENTS

APPENDINCES

Appendix I: ESIA Team EIA/EA practising licenses/certificates

Appendix II: Sample of filled community questionnaires

LIST OF ABBREVIATIONS

AEZ	Agro Ecological Zone
AGO	Automotive Gas Oil
AIDS	Acquired Immune Deficiency Syndrome
AST	Above Ground Storage Tank
CB	Circuit Breaker
CEO	Chief Executive Officer
CT	Current Transformer
CVT	Constant Voltage Transformer
CO_2	Carbon Dioxide
CO	Carbon Monoxide
DO	District Officer
DOHSS	Directorate of Occupational Health and Safety Services
DC	District Commissioner
EA	Environmental Audit
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMCA	Environmental Management and Coordination Act, 1999
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
ERC	Energy Regulatory Commission
GDC	Geothermal Development Company
GHGs	Green House Gases
GoK	Government of Kenya
HIV	Human immunodeficiency virus
HFO	Heavy Fuel Oil
IPP	Independent Power Producers
KenGen	Kenya Generating Company
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KPLC	Kenya Power and Lighting Company
Kshs.	Kenya Shillings
kV	Kilo Volt
KWH	Kilo Watt Hour
KWS	Kenya Wildlife Service
L.R	Land Registration
mg/kg	Milli grams per kilogram
MoE	Ministry of Energy
MW	Mega Watts
MVA	Mega Volt Amperes
NEMA	National Environment Management Authority
NOx	Oxides of Nitrogen
OSHA	Occupation Safety and Health Act
PM	Particulate Matter
PPE	Personal Protective Equipment
REA	Rural Electrification Authority

SCADA	Supervisory Control and Data Acquisition
SHE	Safety Health and Environment
SOx	Oxides of Sulphur
STD	Sexually Transmitted Diseases
TPH	Total Petroleum Hydrocarbon

CHAPTER 1: INTRODUCTION

1.1 Project Background

The Government of Kenya plans to increase access to electricity in Kenya tenfold from the current 4% in the rural areas to about 40% by 2020. To do this, the transmission lines network is being considered for upgrading and with it the communication system required for line protection and management purposes. The Kenya Power and Lighting Company Limited (KPLC) least cost power development plan identified various 132 KV developments for improving the performance of the national grid network to cater for the increasing load growth and meet the objectives of 2030. The Kenya Electricity Company Limited (KETRACO), which now assumes the full mandate of constructing and managing transmission lines and associated sub stations, is planning to construct a new single circuit 132 kV transmission line between Rabai- Malindi-Garsen-Lamu Transmission, including establishment of a substation at Minjila village, Itsowe Sub location, Shirikisho Location, Tana River County.

The proposed line will serve the greater districts of Tana River County. The proposed substation at Minjila will boost power supply consequently enhancing reliability in Garsen town and surrounding areas.

KETRACO has to supply power reliably to meet the increasing needs and demands of end-users. Therefore, KETRACO has to expand and establish its infrastructure of Transmission Lines and substations on an on-going basis. The substations have to be built while maintaining the balance between satisfying the society's needs for energy and environmental constraints.The purpose of the proposed transmission line and substations is to increase security of electricity supply to the surrounding industries, businesses, homes and social institutions among others.

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

carry out an ESIA for the Rabai – Malindi – Garsen – Lamu 132kV transmission line. The EIA study report has already been licensed by the National Environment Management Authority. However, the ESIA for the substation at GARSEN was not conducted. KETRACO has used its in-house man-power consisting of Electrical and Civil Engineers, Socio-Economists, Land Economists, Surveyors and Environmental Experts to undertake the ESIA for the proposed GARSEN 132/33 kV substation.

This Environmental Impact Assessment has identified both positive and negative impacts of the proposed project to the environment and proposes mitigation measures in the Environmental Management Plan developed to address potential negative impacts, during the construction, operation and decommissioning phases of the project, for overall environmental sustainability.

1.2 Project Location

The proposed substation will be located at Minjila village, Itsowe Sub location, Shirikisho location, Tana Delta District. The proposed site was owned by County Council of Tana River which has since allocated it to KETRACO for the proposed substation following a resolution of the town planning and markets committee on 8th and 9th February, 2011 and adopted by the full council meeting held on 11th February, 2011 (*refer to annexed letter*)

1.3 Study Objectives

The principal objective of this assessment was to identify significant potential impacts of the project on environmental and social aspects, and to formulate recommendations to ensure that the proposed project takes into consideration appropriate measures to mitigate any adverse impacts to the environment and people's health through all of its phases (construction, implementation and decommissioning phases).

The specific objectives of this ESIA were to:

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

- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;
- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
- Prepare an Environmental Impact Assessment Project 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 Terms of Reference (TOR) for the ESIA Process

The following are the TOR for the ESIA process

- Description of the baseline environment (physical, biological, social and cultural)
- Detailed description of the proposed project
- Review Legislative and regulatory framework that relate to the project
- Identify potential environmental impacts that could result from the project
- Carry out public consultation on positive and negative impacts of the project
- Propose mitigation measures against identified environmental and social impacts of the project
- Development of an Environmental Management Plan to mitigate negative impacts
- Development of an Environmental Monitoring Plan
- Environmental and Social Impact Assessment Report

1.5 Scope of the Study

The EIA scope largely covered the following areas:

(1) Baseline Conditions:
- Environmental setting (climate, topography, geology, hydrology, ecology, water resources, sensitive areas etc.),
- Socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.),
- Infrastructural issues (roads, water supplies, drainage systems, power supplies, etc.).

(2) Legal and policy framework:
- Focusing on the relevant national environmental laws, regulations and by-laws and other laws and policies focusing on allied activities relative to the project in question.

(3) Interactive approach was adopted for the immediate neighbourhood in discussing relevant issues including among others:
- Land use aspects,
- Neighbourhood issues,
- Project acceptability,
- Social, cultural and economic aspects,

(4) Environmental impacts:
- Physical impacts,
- Biological impacts,
- Legal Compliance.

1.6 ESIA Approach and Methodology

The approach to this exercise 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 involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, desktop studies, public consultations with members of

the community in the project areas, survey, photography, and discussions with key people in KETRACO (the proponent) and KPLC.

The key activities undertaken during the assessment included the following:

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

Below is an outline of the basic ESIA steps that were followed during this assessment:

Step 1: Screening

Screening of the project was undertaken to evaluate the need of conducting an EIA and the level of study. Transmission substations are listed under schedule 2 of EMCA, 1999 among projects requiring EIA before commencement. In addition, other considerations taken into account during the screening process included the physical site location, zoning, nature of the immediate neighbourhood, sensitivity of the areas surrounding the site and socio-economic activities in the area, among others.

Step 2: Desk Study

Documentation review was a continuous exercise that involved a study of available documents on the project including the project set-up plans and

architect's statement, land ownership documentation, environmental legislation and regulations, district development plans, location maps, etc.

Step 3: Site Assessment

A site assessment was conducted on 18th August 2010 to establish:

- Land ownership, usage and conflicts;
- Flora, fauna and avifauna found on the site;
- The site landscape;
- Surface water bodies within the neighbourhood of the site and;
- The general environment and its sensitive receptors found within the environs of the site.

Step 4: Public Consultation

Detailed stakeholders consultations for GARSEN Substation study were undertaken from the 20th February to2nd March 2010. These consultations were conducted in the form of:

Key Informant Interviews and household/community interviews.

The following people were consulted:

- Provincial Director of Agriculture
- Provincial Occupational Safety and Health Officer, Eastern province
- District Forest Officer, Kenya Forest Service, Tana Delta District
- Water Resource Management Authority, Rift Valley Catchment area
- Warden , Kenya Wildlife Service, Tana River District
- Physical Planning Officer, Tana River County Council.
- District Youth Officer, GARSEN North District
- District Commissioner, Tana Delta District
- District Development Officer, Tana Delta District
- District Agricultural Officer, Tana Delta District
- District Livestock Development Officer, Tana Delta District
- A public meeting (baraza) attended by area residents.

Step 5: Reporting

Specific issues covered in the project report include but are not limited to:

- Name of the proponent, address and contact person
- Title of the project
- Objectives and scope of the project
- Nature of the project;
- Location of the proposed project,
- Types of activities that will be undertaken during the project construction, operation and decommissioning phases;
- Design of the project;
- Proposed Project budget;
- Materials to be used, products and by-products, including waste to be generated by the project and the method(s) of their disposal;
- Potential environmental impacts of the project;
- Economic and social impacts to the local community and the nation in general;
- Views of the public/potentially affected people about the project; and
- An Environmental Management Plan (EMP) for the entire project cycle including mitigation measures to be taken during and after implementation of the project and an action plan for the prevention and management of foreseeable accidents during the project cycle.

CHAPTER 2: PROJECT DESCRIPTION

2.1 Nature of the Project

The project essentially involves construction of a 132/33kV substation at GARSEN to step down the 132kV incoming power voltage from Olkaria for further distribution to feed the greater districts of GARSEN and beyond.

The substation will be built on a portion of a fifteen (15) acre plot of land in Minjila Village, Itsowe Sub location, Shirikisho location off Garsen – Hola road close to the disused Garsen dispensary.

2.2 Site Ownership

The proposed project site is located off Garsen – Hola road close to Garsen disused dispensary site. The proposed sites are presently classified as agricultural. Among the four alternatives considered, the site at Minjila/…… was found most ideal and the owner has expressed willingness to sell his parcel of land to the Proponent.

2.3 Project Justification

According to the Least Cost Power development Plan 2010 – 2030 the 5 year strategic plan aims at connection over one million customers during the period 2009 – 2014. Towards implementation of this strategy and to reduce losses at transmission and distribution level throughout the country with an aim of enhancing the performance of the national grid network to cater for the increasing load growth, extensive expansion of 400kV system is planned for commissioning between 2010 and 2012.

The proposed transmission line will evacuate hydro power from Rabai and will increase security of electricity supply to Tana River county and surrounding areas. This will in essence boost various sectors including agriculture; tourism; health; education, business (and especially small scale businesses); water and sanitation; security; etc.

2.4 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 Proponent will establish a new 220/132/33kV substation at Garsen equipped with one 220/132/33kV 40 MVA power transformer and one set of 33kV Metal-Clad Type Metal-Enclosed Switchgear. Two 132kV bays will be established to control the Garsen – Lamu and the Garsen-Garissa 132 kV transmission lines. The switchgear in the substations would be conventional outdoor air-insulated switchgear, both for 132 kV and 33 kV. Equipment for control, protection and auxiliary power will be housed in a small control building. 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 which is the clearance between live parts and earthed structures, walls, screens and ground,
- Phase clearance which is the clearance between live parts of different phases and
- Isolating distance which 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 substation works are executed.

2.5 Construction Procedures

All construction activities including ground preparation, earth moving, materials delivery, building, walling, roofing and the installation of amenities (power, water, communication equipment, etc.), fittings (doors, windows, safety provisions, etc.) will be carried out by competent personnel obtained through rigorous tendering procedure to ensure the set quality standards and time lines are met.

2.5.1 Construction activities Outline

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)
- 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, bus bar and associated infrastructure
- Construction of control room and administrative infrastructure
- Redirecting of the 132 kV line from Ol Karia to enter and leave the substation
- Construction of perimeter fencing and lighting

2.5.2 Input Materials

The 132/33 kV GARSEN substation will be constructed using conventional construction materials and construction procedures that are not expected to compromise the safety of the neighbouring communities as well as the general environment. The following inputs will be required for construction:

(i) Raw construction materials e.g. sand, cement, natural building stone blocks, hard core, gravel, concrete among others

(ii) Timber (e.g. doors and frames, fixed furniture, etc.),
(iii) Paints, solvents, white wash, etc.,
(iv) A construction labour force (of both skilled and unskilled workers).

2.6 Project Budget

The estimated cost of the project is approximately **Kshs.170, 000,000 (One seventy million).**

2.7 Target Group for the ESIA Report

The ESIA Report has been prepared for use by different stakeholders to be involved in the construction and operation of the proposed 132/33 kV of the transmission substation. The report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of project activities. The information will be useful in planning, implementation, management and maintenance of the substation.

In this regard, the report is useful to the following stakeholders:

- Funding agencies and donors;
- Relevant government ministries and agencies for policy implementation;
- Affected and Interested persons;
- Planners and Engineers to be involved in preparation of designs and plans for the 132/33kV substations;
- Contractors to be engaged in the construction works for;
- People to be involved in the management and operation of the substation.

2.8 Analysis for Alternatives

One of the functions of the Environmental and Social Impact assessment process is to describe and evaluate various alternatives to the proposed project. Alternatives examined during the study are discussed below;

2.8.1 The "Do Nothing" Option

For this project, the no-development option would mean the proposed substation will not be constructed. The implications of this would be no additional reliability and security of electricity supply to Tana River County and surrounding areas. Given that the community is highly supportive of the project,

the level of impacts associated with the project are low and that there is high probability of mitigation of these negative impacts, the "no-go" option would not be the most viable option in this instance.

2.8.2 Alternative Designs

The cost of building a high voltage electricity step down substation is substantial. Detailed research and development of the design and components form an important part of the process of the substation construction. The current design for the 132/33kV substations at GARSEN is regarded as the most cost effective whilst operationally sound for such a project.

2.8.3 Demand-side Management Option

Demand Side Management (DSM) is a function carried out by the electricity supply utility aimed at encouraging a reduction in the amount of electricity used at peak times. This is achieved by influencing customer usage to improve efficiency and reduce overall demand. These efforts are intended to produce a flat load duration curve to ensure the most efficient use of installed network capacity. By reducing peak demand and shifting load from high load to low load periods, reductions in capital expenditure (for network capacity expansion) and operating costs can be achieved. One of the basic tools is the price differentiation (such as time-of-use tariffs) between peak demand time and low demand time. This option is practiced to a certain extent, but is currently not considered feasible for managing the level of growth forecast for Rift Valley and Nairobi provinces.

2.8.4 Alternative Sites

Four alternative sites have been identified for the project implementation. An assessment of the sites has been done and based on willing ness of owner to sell, the site at Minjila has been considered optimal. The project sites in the order of preference are:

- Minjila/Moricho/320
- Minjila/Moricho/335
- LR No: Minjila/Moricho/326
- Minjila/Moricho/1071
- Minjila/Moricho/327

The Proponent would therefore have to move with speed on land acquisition, design and approvals as they are site specific. In the optimal site (Minjila) no relocation or resettlement of PAPs will be necessary and there are no sensitive ecosystems within or near the site.

2.8.5 Alternative Processes and Materials

Highly refined mineral insulting oils are used to cool transformers and provide electrical insulation between live components. Sulfur hexafluoride (SF_6) may also be used as a gas insulator for electrical switching equipment and in cables, tubular transmission lines and transformers. Polychlorinated Biphenyls (PCB) can be used as a dielectric fluid to provide electrical insulation. SF_6 is a greenhouse gas with a significantly higher Global Warming Potential (GWP) than carbon-dioxide. PCB is a highly toxic substance that is no longer commonly used for electrical insulation. For this project the proponent is advised to use mineral insulating oil for cooling and insulation and to minimize or completely stop the use of SF_6 and PCB.

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

3.1.1: Geographic and physical description.

The proposed substation is to be located at Minjila village, Itsowe sub-location, Shirikisho location in Tana Delta District. The proposed substation land is 15 acres and was formally owned by County Council of Tana River. The Council has since allocated it to KETRACO for the proposed substation. Refer to the annexed letter. It is about 200 metres from the disused Garsen dispensary off Garsen Hola road.

This section provides details of the district profile and background information on the location of the district, the main physical features, settlement patterns and other information critical to the overall development strategy for the next five years.

3.1.2: Position and size of the district.

Tana Delta district is one of the districts that constitute Coast Province with a land area of 16,013.4 Km² which accounts for about 20% of the total land area of Coast Province. The district borders Kitui District to the West, Tana Delta District to the North, Ijara and Lamu Districts to the East, Indian Ocean to the Southeast and Malindi District to the South. Tsavo National Park covers about 19% of the Districts total land area. It lies between 2°33' South and 40°32'east.

3.1.3: Administrative and political units.

Tana Delta is divided into three (3) administrative divisions, fifteen (15) locations and thirty four (34) sub locations. Garsen division is the largest with a land area of 14,460.5 Km² followed by Tarasaa and Kipini with land size of 838.2 and 714.7 Km² respectively. Politically, the district is sub-divided into 9 electoral wards and has one constituency known as Garsen. The county council of Tana River is the only local authority serving both Tana Delta and Tana Delta Districts.

Table: Size of Administrative units by divisions.

Division	Land area (sq.kms)	No. of locations	No. of sub locations
Garsen	14,460.50	7	16
Tarasaa	838.20	5	12
Kipini	714.70	3	6
Total	16,013.40	15	34

3.1.4: Settlement patterns

About 93% of the people in Tana Delta reside in rural areas where they carry out crop farming, livestock rearing and fishing activities. Garsen town which is the only urban centre in the district is a home to about 7% of the population.

The settlement patterns in Tana Delta are influenced by various socio-economic activities. Most villages of the farming and fishing communities are found along River Tana and the wetlands. There are about 500 villages.
The district's pastoral communities live in villages called 'Manyattas' which have approximately 150 households and are mainly found on the hinterland in areas around water points and pasture. They often move migrate from the North Eastern Province to the Tana Delta during dry season and move back towards the North during rainy season.

Climatic conditions within and around the district greatly influence migratory patterns of people within, into and out of the district. Between the months of October and May, most of the livestock keepers in the Western hinterlands and neighbouring districts migrate with their livestock to the rich delta in the south eastern part of the district. This is due to dry conditions that are experienced during this period.

In the farming areas, mango harvesting season witnesses immigration of traders into the district for business purposes.

Generally, insecurity has forced most communities in the District to live together for protection. The communities tend to live in places near district, divisional or locational **headquarters where security is guaranteed.**

3.1.5: Physiographic and Natural Conditions

The Tana River Delta traverses the District from Mnazini in the North to the Indian Ocean in the Southeast. As the river traverses, it creates an expansive delta covering about 1,300 Sq Km largely characterised by wetlands and ox-bow lakes.
The delta presents great potential for agricultural development and is also a natural habitat for diverse flora and fauna, forming an ideal ecosystem for promotion of eco-tourism. The delta hosts about 15,000 migratory birds from 69 bird species.

Apart from River Tana, there are several seasonal rivers popularly known as 'lagas' that traverse the district. These rivers flow in a west-east direction from Kitui District hence draining their water into river Tana. The 'lagas' are however major challenges to road network as they cut-off road network during rainy seasons.

The district has a coastline characterized by sandy beaches interrupted by the Tana delta. These features present ideal condition for beach tourism.

3.1.6: Climatic Information

The district receives low, bi-modal and erratic convectional rainfall ranging between 300mm and 900mm. Long rains occur between April and May while short rains occur in October and November. The Inter Tropical Convergence Zone (ITCZ), which influences the wind and non-seasonal air pattern for the Indian Ocean determines the amount of rainfall at the coastline.

The slightly higher levels of rainfall at the coast supports crop production especially around Kipini where cash crops such as cashew nuts, cotton, mangoes, bananas and maize are grown. In addition, it also supports the mangrove forest in Kipini which is a major source of forest products in the district.

The Western hinterland parts of the District experience dry conditions which only support wildlife and nomadic lifestyle. The average annual temperature is 30°C with humid conditions along the coastline.

CHAPTER 4: RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

4.1 Introduction

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

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

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

4.2 NATIONAL POLICY AND LEGAL FRAMEWORK

4.2.1 Policy

Kenya Government's environmental policy aims at integrating environmental aspects into national development plans. The broad objectives of the national environmental policy include:

- Optimal use of natural land and water resources in improving the quality of human environment
- Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations
- Conservation and management of the natural resources of Kenya including air, water, land, flora and fauna
- Promotion of environmental conservation through the sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations
- Meeting national goals and international obligations by conserving bio-diversity, arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth.

4.2.2 Legal Framework

Application of national statutes and regulations on environmental conservation suggest that the Proponent has a legal duty and social responsibility to ensure that the proposed development be implemented without compromising the status of the environment, natural resources, public health and safety. This position enhances the importance of this environmental impact assessment for the proposed site to provide a benchmark for its sustainable operation.

Kenya has approximately 77 statutes that relate to environmental concerns. Environmental management activities were previously implemented through a variety of instruments such as policy statements and sectoral laws as well as through permits and licenses. Most of these statutes are sector-specific, covering issues such as public health, soil erosion, protected areas, endangered species, water rights and water quality, air quality, noise and vibration, cultural, historical, scientific and archaeological sites, land use, resettlement, etc.

Some of the key national laws that govern the management of environmental resources in the country are hereby discussed however it is worth noting that wherever any of the laws contradict each other, the Environmental Management and Co-ordination Act 1999 prevails.

4.2.3 The Environment Management and Co-ordination Act, 1999

Provides for the establishment of appropriate legal and institutional framework for the management of the environment and related matters. Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to partly ensure this is achieved, Part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environmental Management Authority (NEMA), who in turn may issue an EIA license as appropriate. The approval process time frame for Project Reports is 45 days and for full EIA Study is 90 days.

This Project falls within Schedule 2 of EMCA 1999 and therefore requires an EIA. The Proponent has commissioned the environmental and social impact assessment study in compliance with the Act. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA, prior to being issued an EIA license.

4.2.4 The Environmental (Impact Assessment and Audit) Regulations, 2003

The Regulation provides the guidelines that have been established to govern the conduct of environmental assessments and environmental audits in Kenya. The guidelines require that the EIA study be conducted in accordance with the issues and general guidelines spelt out in the Second and Third schedules. These include coverage of the issues on schedule 2 (ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and

their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures.

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

4.2.5 The Occupational Health and Safety Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of 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. The Act has the following functions among others:

- Secures safety and health for people legally in all workplaces by minimization of exposure of workers to hazards (gases, fumes & vapors, energies, dangerous machinery/equipment, temperatures, and biological agents) at their workplaces.
- Prevents employment of children in workplaces where their safety and health is at risk.
- Encourages entrepreneurs to set achievable safety targets for their enterprises.
- Promotes reporting of work-place accidents, dangerous occurrences and ill health with a view to finding out their causes and preventing of similar occurrences in future.
- Promotes creation of a safety culture at workplaces through education and training in occupational safety and health.

Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer

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

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

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

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

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

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

4.2.7 Draft Environmental Management and Coordination (Air Quality) Regulations, 2008

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required stipulated under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits).

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

4.2.8 The 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 water permit system.

Observation of the requirements of the act shall be observed by the Proponent especially during the construction phase.

4.2.9 The Lakes and Rivers Act Chapter 409 Laws of Kenya

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

The proposed project lies in a water deficit area with seasonal streams being the common mode of drainage. The requirements of this Act shall be observed by the Proponent to ensure protection of such water channels and associated flora and fauna.

4.2.10 The Public Health Act (Cap. 242)

The Act Provides for the securing of public health and recognizes the important role of water. It provides for prevention of water pollution by stakeholders, among them Local Authorities (county councils). It states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health.

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

4.2.11 Waste Management Regulations, 2006

The Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

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

4.2.12 Physical Planning Act (Cap286)

The Act provides for the preparation and implementation of physical development plans and for related purposes. It gives provisions 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 Proponent shall secure all mandatory approvals and permits as required by the law.

4.2.13 Occupiers Liability Act (Cap. 34)

Rules of Common Law regulates the duty which an occupier of 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.

The Proponent shall endeavour to ensure that the management of health and safety issues is of high priority during the operational phase of the project.

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4.2.14 Land Acquisition Act (Cap. 295

This 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 damage resulting from the entry onto land to things such as survey upon necessary authorization 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,
- Damages sustained from the severance of the land parcel from the land,
- 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,
- Damages from diminution of profits of the land acquired.

The Proponent shall adhere to the requirements of the Act in the implementation of land acquisition.

4.2.15 The Registered Land Act Chapter 300 Laws of Kenya:

This Act provides for the absolute proprietorship over land (exclusive rights). Such land can be acquired by the state under the Land Acquisition Act in the project area.

The Proponent shall comply with the provisions of the Act in the acquisition of Registered Land.

4.2.16 The Land Adjudication Act Chapter 95 Laws of Kenya

This Act provides for ascertainment of interests prior to land registrations under the Registered Land Act.

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

4.2.17 The Standards Act Cap 496

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

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

4.2.18 The Antiquities and Monuments Act, 1983 Cap 215

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

The proponent shall follow due procedures on case of unearthing any antiquity.

4.2.19 The Civil Aviation Act, Cap 394

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

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

4.2.20 The Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

The Act states that no person shall not engage in any activity that may have an adverse impact on any ecosystem, lead to the introduction of any exotic species, or lead to unsustainable use of natural resources, without an Environmental Impact Assessment License issued by the Authority under the Act.

The Proponent has commissioned this environmental assessment study and seeks to obtain an EIA License from the Authority (NEMA) in compliance with the Act; the

environmental management plan included in this report provides guidelines for the mitigation of potentially adverse impacts on natural resources.

4.2.21 Environmental Management and Coordination (Controlled Substances) Regulation, 2007, Legal Notice No. 73

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. The regulations stipulate that controlled substances must be clearly labelled with among other words, "Controlled Substance-Not ozone friendly'' to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer." Persons handling controlled substances are required to apply for a permit from NEMA.

Proponent will not use controlled substances in the operation of the project. Hazardous materials such as PCB based coolants will not be used in the transformers, capacitors, or other equipment.

4.2.22 Environmental Management and Coordination, Fossil Fuel Emission Control Regulation 2006

This Act deals with internal combustion engines, their emission standards, inspections etc.

The Proponent shall comply with the provisions of this Act. The environmental management plan included in this report provides guidelines on the management of air emissions from the combustion of petroleum products used.

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

This Act applies to all wetlands in Kenya whether occurring in private or public land. It contains provisions for the utilization of wetland resources in a

sustainable manner compatible with the continued presence of wetlands and their hydrological, ecological, social and economic functions and services.

The Proponent shall comply with the provisions of the Act in protecting wetlands, preventing and controlling pollution and siltation in rivers.

4.2.29 Penal Code Act (Cap.63)

The Act 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 is dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

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

4.2.30 Energy Act, 2006

The Act prescribes the manner with which licenses shall be obtained for generating, transmitting and distributing electricity. The provisions of this Act apply to every person or body of persons importing, exporting, generating, transmitting, distributing, supplying or using electrical energy; importing, exporting, transporting, refining, storing and selling petroleum or petroleum products; producing, transporting, distributing and supplying of any other form of energy, and to all works or apparatus for any or all of these purposes. The Act establishes an energy commission, which is expected to become the main policy maker and enforcer in the energy sector. This commission among other things shall be responsible for issuing all the different licenses in the energy sector.

4.3 ADMINISTRATIVE FRAMEWORK

4.3.1 The National Environment Council

The National Environmental Council (the Council) is responsible for policy formulation and directions for the purposes of the Act. The Council also sets national goals and objectives, and determines policies and priorities for the protection of the environment.

4.3.2 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is 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 relating to the environment.

4.3.3 The Standards and Enforcement Review Committee

In addition to NEMA, EMCA 1999 provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC). A work plan was set up by SERC to include committees to draw up standards; these include the following:

- Water Quality Regulations
- Waste Management Regulations
- Controlled Substances Regulations
- Conservation of Biological Diversity
- Noise Regulations
- [Draft] Air Pollution Regulations

4.3.4 The Provincial and District Environment Committees

The Provincial and District Environmental Committees also contribute to decentralized environmental management and enable the participation of local communities. These environmental committees consist of the following:

- Representatives from all the ministries;
- Representatives from local authorities within the province/district;

- Two representatives from NGOs involved in environmental management in the
- Province/district;
- A representative of each regional development authority in the province/ district.

4.3.5 The Public Complaints Committee

The Act (EMCA) has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

4.4 INTERNATIONAL ENVIRONMENTAL GUIDELINES

Kenya has ratified or acceded to numerous International treaties and conventions, as described below:

- 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 assessments, 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 concentrations 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 (UN) Framework Convention on Climate Change, in which the developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990.

This EIA is also based on internationally respected procedures recommended by the World Bank, covering environmental guidelines. Reference has been made to the Environmental Assessment Operational Policy (OP) 4.01, and Environmental Assessment Source Book Volume II, which provides the relevant sectoral guidelines as discussed below.

4.5 WORLD BANK'S SAFEGUARD POLICIES

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects. Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations. (World Bank, 1999-2006)

4.5.1 World Bank Safeguard Policy 4.01-Environmental Assessment

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

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

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

The requirements of the policy are similar to those of EMCA which aims to ensure sustainable project implementation. Most of the requirements of this safeguard policy have been responded to in this report by evaluating the impact of the project, its alternatives, existing legislative framework and public consultation.

4.5.2 Bank Safeguard Policy 4.04-Natural Habitats

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

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

The requirements of this policy were observed as much as possible during the EIA study. The consulting team engaged several stakeholders during project impact evaluation and those consulted included the NEMA, WRMA, and KFS

among others. This policy, however, will not be triggered by the proposed project as the project area has no protected forest and wildlife conservation areas.

4.5.3 Bank Safeguard Policy 4.09-Pest Management

This policy promotes the use of ecologically based biological or environmental pest management practices. The policy requires that procured pesticides should meet the WHO recommendations and not be among those on the restricted list of formulated products found in the WHO Classes IA and IB or Class II. This policy is not triggered since routine maintenance of project site will not involve the use of pesticides or agrochemical materials to control vegetation growth. In practice clearance of vegetation growth along way leave is done using mechanical methods especially slashing of grass.

4.5.4 Bank Safeguard Policy 4.12-Involuntary Resettlement

Resettlement due to infrastructure development is not a new phenomenon in Kenya but the government has no Policy Document or Act that aims at ensuring that persons who suffer displacement and resettlement arising from such development activities can be compensated adequately for their losses at replacement costs. The proponent plans to implement the World Bank's Operational Policy 4.12 which has been designed to mitigate against impoverishment risks associated with Involuntary Resettlement and the restoration or improvement of income-earning capacity of the Project Affected People (PAP).

4.5.5 Bank Safeguard Policy 4.20-Indigenous People

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

4.5.6 World Bank Safeguard Policy BP 17.50- Public Disclosure

This BP encourages Public Disclosure (PD) or Involvement as a means of improving the planning and implementation process of projects. This procedure gives governmental agencies responsibility of monitoring and managing the

environmental and social impacts of development projects particularly those impacting on natural resources and local communities. The policy provides information that ensures that effective PD is carried out by project proponents and their representatives. The BP requires that Public Involvement should be integrated with resettlement, compensation and indigenous peoples' studies. Monitoring and grievances address mechanism should also be incorporated in the project plan.

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

CHAPTER FIVE: STAKEHOLDER CONSULTATION

5.1 Introduction

Stakeholder consultation was undertaken among people living in the environs of the proposed transmission substation as an integral part of the ESIA study. The aim was to ensure that all stakeholder interests were identified and incorporated in project development: at planning, implementation and operation phases. 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. Public consultations for the proposed project followed several steps as described below

5.2 Identification of stakeholders

The proposed substation typically involves land acquisition for construction of permanent structures and/or infrastructure including transformers, towers, bus bars, among other infrastructure. Of necessity, land for the location of these permanent structures must be acquired. Communities living within the environs of the proposed site were identified as Project Affected Persons (PAPs), categorized as partially affected groups, while members of families at the specific site will be constituted totally affected group.

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

5.3 Approaches to Stakeholder Consultations

A detailed stakeholder's consultation for this study was undertaken from 16th to 25th May 2011. These consultations were conducted in the form of:

5.3.1 Key Informant oral Interviews:

The following people were consulted:

- Provincial Director of Environment, Coast Province.
- Provincial Occupational Safety and Health Officer, Coast Province.
- Senior Warden, Kenya Wildlife Service, Coast Province.
- Water Resource Management Authority, Sub-Regional Office, Mombasa.
- Provincial Forest Officer, Coast Province.
- Provincial Director of Agriculture, Coast Province.
- Provincial Planning Officer, Coast Province.
- Provincial Public Health Officer, Coast Province.
- District Land Adjudication Officer, Tana Delta.
- District Commissioner, Tana Delta District.

- District Development Officer, Tana Delta.
- District Agricultural Officer, Tana Delta
- District Public Health Officer, Tana Delta.
- District Warden, Kenya Wildlife Service, Tana Delta.
- Chief, Shirikisho Location.
- Assistant Chief, Itsowe sub-location.
- Area residents through a public baraza.

5.3.1 **Open-ended questionnaires:**

Open-ended questionnaires were administered to stakeholders who comprised of GOK officers (key informants) in charge of diverse sectors which are likely to be impacted by the project. In addition, community questionnaires were administered to households and small business enterprises neighboring the site. Concerns, views and opinions from the respondents were received.

5.3.2 Public Baraza:

A public baraza organized by the Area chief was held on 24th May 2011 at Minjila.

5.4: **RESULTS OF THE STAKEHOLDER CONSULTATIONS:**

5.4.1 **MINUTES OF A PUBLIC CONSULTATION BARAZA HELD ON 24TH MAY 2011 AT MINJILA IN GARSEN OVER THE PROPOSED GARSEN 132KV SUB-STATION**

Agenda

1. Preliminaries
2. Introduction of the project
3. Community concerns
4. A.O.B

Objective

To sensitize the community around the identified (4) sites for the proposed substation about the project, the role of the community in general as well as the need to conduct the ESIA as a legal requirement by the government of Kenya.

The meeting began at 11.15 am by a word of prayer from a community volunteer. The area chief welcomed participants to the meeting. He linked the meeting with other consultative meetings held earlier in the area concerning the Rabai-Lamu Transmission line. He thanked KETRACO for up-scaling power supply in the area.

The meeting was conducted in Kiswahili and translated in the local language.

Brief about the project

The community members were taken through the background of KETRACO as a state corporation with a mandate of designing, constructing and maintaining high voltage transmission lines in the country.

A distinction was made between KETRACO and other corporations in the Ministry of Energy namely: KPLC, KENGEN and GDC. While KENGEN

generates power, KETRACO transmits while KPLC distributes to the consumers directly.

The meeting was informed that the purpose of the visit was to consult and sensitize the on the proposed Garsen 132/33Kv sub-station, their role in the process and the need to conduct an Environmental and Social Impact Assessment (ESIA) on the site.

The meeting was also taken through a detailed description of the requirement for the substation in terms of land size and the possible positive and negative impacts. A community member volunteered to describe in local language how a similar sub-station in Kilifi looks like.

Some possible positive impacts highlighted included:

- Improving the existing power lines in the entire Tana Delta District.
- Improved living conditions from new investments
- Opening up the area for industrialization for instance the proposed Lamu port project.
- Increased security

Some of the possible negative impacts included:

- Disintegration of social fabric from increased social interactions.
- De-vegetation which can be mitigated by re-planting of trees
- Dust during construction
- Accidents during construction.

Community concerns and Responses

Some of the concerns raised by community members included:

Q1. How safe is the proposed station to the locals residing in the neighbourhood and the children who may go to fetch firewood from the fields?

A. The lines are directed away from the settlement areas. A way leave is left of a bout 40m wide to act as a buffer. The line only occupies about 10m. The line will also be constructed using pylons that are high enough to pose any danger. A security guard will man the substation round the clock.

Q2. Will the community be sensitized on the dangers of the line and substation?

A. Sensitization has been going on and part of it is the reason for the public baraza. More meetings are planned to thoroughly sensitize the community.

Q3. Transmission lines will be over-head or underground?

A. The lines will be over head transmitted using pylons. However, when the line reaches the sea, under-sea transmission cables would be used to transmit power to Lamu and Manda islands.

Q4. Will the locals be engaged as labourers during construction?

A. A contractor has been awarded the contract and is already on site to do the work. However, an agreement had been reached with the contractor that the locals are given a priority especially for the un-skilled labour.

Q5. Are the locals still free to use the paths that pass below the lines and the farmlands?

A. The lines are constructed high enough to affect anybody passing below. For the farmlands, once a way leave has been acquired, the land use has to be controlled so that only seasonal crops that don't grow tall can be planted on the way leave. Neither trees nor houses should be planted or constructed on the way leave.

Q6. During compensation, those with semi-permanent structures will also be compensated?

A. Compensation will be done as per the valuation report. All structures affected will be compensated on the prevailing market rates. Trees including mango trees will also be compensated on the advice of Kenya Forest Reserve.

Q7. Will we get power installed at the mosque?

A. The mandate of distributing power rests with KPLC. KETRACO only steps it down to required voltage levels.

A.O.B

The chief thanked the members of the community who accepted to attend the meeting. He also KETRACO team for the work they are doing in the community. He gave assurance of maximum cooperation by his office.

There being no other burning questions, the meeting ended at 1.52pm with a word of prayer from a community volunteer.

5.4.2**: OUTCOME OF THE STAKEHOLDER CONSULTATIONS:**

5.5.3: **General outcomes.**

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

- Project is a manifestation of government commitment to development in the project area.
- Electricity supply to hospitals and dispensaries in the project area would enhance delivery of services such as laboratory, surgical, immunization, among others.
- Increased security in the area, due to availability of reliable power supply.
- Introduction of small-scale businesses that depend on power availability, for instance: milling machines, boreholes drilling, mobile charging, juakali industries, and saloons, among others.
- The project would result in general enhancement of the living standards of the residents.
- Improved health and education sector.
- Access to cheap and reliable power supply.
- Rise of both direct and indirect skilled and non-skilled employment opportunities in the area.

Disadvantages of the projects were identified as follows:

- Air and noise pollution during construction.
- Oil spillage during construction.
- Possibility of occurrence of accidents on the site during construction.

- Potential for wild fire that may emanate from the substation.
- Presence of the substation may expose people to accidents and health hazards.
- Land use change will reduce grazing land and food security in the area.
- Incidences of electrocution.
- Increase in social vices due to influx of population in the project area as a result of emergence of new industries as well as general development in the area.

OTHER SPECIFIC CONCERNS

5.5.3: Employment opportunities.

The community expressed fear that local youths may be side lined in securing employment opportunities especially during the construction phase of the proposed substation. "There may arise differences from the contractor opting not to employ locals" the community asserted.

The ESIA team emphasized that locals will be given first priority in employment especially for the un-skilled labour. The ESIA team assured the community that the contractor would be requested to employ the locals.

5.5.4: **Occupational health and safety.**

Some stakeholders especially the community were concerned about the possibility of occurrence of accidents such as electrocution during the construction and operation phase of the proposed project. Moreover, questions were asked about the safety of children fetching firewood and herdsmen who may get into contact with the substation fence.

In view of occupational health and safety concerns, the proponent would ensure health, safety and welfare of workers to prevent accidents in the course of employment.

Compliance with OSHA and WIBA regulations will be prioritized to avoid the possibility of occurrence of accidents during and after construction.

5.5.5: Overall picture from the stakeholder consultations.

Stakeholder consultations results presented a general view that the project is seen as being strategic to stabilising rural power supply which is crucial for sustained economic growth. In order to sustain this overwhelming public support, the project development should proceed simultaneously with resolution of stakeholder concerns.

CHAPTER 6: ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROPOSED 132/333 kV GARSEN SUBSTATION

6.1 Introduction

A summary of the main potential impacts of the proposed project based on stakeholders' views (annex III & IV), site assessment and the team's previous experience in undertaking ESIAs is listed in Table 6.1 below.

Table 6.1: Summary of Potential Impacts

Environmental & Social Impact	Positive/ Negative	Direct/ Indirect	Temporary/ Permanent	Major/ Minor	Occurrence		
					Construction	Operation	Decommissioning
Electricity supply	Positive	Direct	Permanent	Major	x	√	x
Employment opportunities	Positive	Direct	Permanent /Temporary	Major	√	√	√
Gains in the Local and national economy	Positive	Direct	Permanent	Major	√	√	x
Informal sectors benefits	Positive	Direct	Permanent	Major	√	√	x
Development of other sectors such as health, education, construction, industries etc.	Positive	Direct	Permanent	Major	x	√	x
Security	Positive	Direct	Permanent	Major	√	√	x
Noise pollution & increased vibration	Negative	Direct	Permanent	Major	√	x	√
Generation of exhaust emissions	Negative	Direct	Permanent	Minor	√	√	√
Dust emissions	Negative	Direct	Temporary	Minor	√	x	√
Solid and liquid waste generation	Negative	Direct	Permanent	Major	√	√	√
Oil spills hazards	Negative	Direct	Permanent	Minor	√	√	√
Destruction of existing vegetation and	Negative	Direct	Permanent	Minor	√	x	x

Environmental & Social Impact	Positive/ Negative	Direct/ Indirect	Temporary/ Permanent	Major/ Minor	Occurrence		
					Construction	Operation	Decommissioning
habitats							
Disturbance of existing wildlife (fauna) species	Negative	Direct	Permanent	Minor	√	√	√
Avifauna Mortality	Negative	Direct	Permanent	Minor	x	√	x
Increased demand for material consumption	Negative	Direct	Permanent	Major	√	√	x
Impacts on workers' and community health and safety	Negative	Direct	Permanent	Major	√	√	√
Soil erosion	Negative	Direct	Temporary	Minor	√	x	x
Fire outbreaks	Negative	Direct	Temporary	Major	√	√	x
Visual impacts	Negative	Direct	Permanent	Minor	√	x	x
Incidences of electrocution	Negative	Direct	Temporary	Major	x	√	x
Perceived dangers of electrostatic and magnetic force	Negative	Direct	Permanent	Minor	x	√	x
Increase in social vices	Negative	Direct	Permanent /Temporary	Minor	√	√	x
Land take - loss of use	Negative	Direct	Permanent	Minor	√	x	x

6.2 Positive Impacts

The positive impacts associated with the proposed 132/33 kV substation include;

6.2.1 Reliable and Secure Electricity Power Supply

The project will enhance the reliability and security of electricity supply in the region in addition to increasing the region's power supply. This will help meet the increasing demand for power supply and minimize the frequency of power outages.

6.2.2 Employment Opportunities

The construction, operation and decommissioning of the proposed substation will create employment opportunities for both skilled and unskilled personnel. The proponent has committed to ensure that priority is given to the local community.

6.2.3 Gains in the Local and National Economy

Expected gains in the local and national economy from the construction and operation of the proposed project will be in the form of consumption of locally available materials including: timber, glass, metal, and cement among other construction materials; taxes levied from employees; and income from business associated with the project.

6.2.4 Informal Sector Benefits

The project will require supply of large quantities of building materials most of which will be sourced locally. It will also spur the growth of small business enterprises including kiosks to serve construction workers and employees, barbershops, posho mills, cell phone charging, photocopying shops among others.

6.2.5 Development of Other Sectors

Increase in reliability and security of power supply in the region will enhance efficiency and productivity of other sectors including health, education, water supply, agriculture and livestock production, industry, etc.

6.2.6 Security

With increased lighting in the area and presence of guards on the project site the security of the area will be enhanced.

6.3 Negative Impacts

The following negative impacts are also associated with the proposed substation

6.3.1 Noise Pollution

The construction and decommissioning works of the substation will most likely be noisy due to the moving machines (mixers, tippers, drilling etc.) and incoming vehicles to deliver construction materials to site or take away debris.

6.3.2 Generation of Exhaust Emissions

Exhaust emissions are likely to be generated by the motored equipment during the construction and decommissioning phase of the proposed substation. Motor vehicles that will be used to ferry construction materials, take away debris during decommissioning phase or those used for general operation activities (operation phase) will also have impacts on air quality

6.3.3 Dust Emissions

Dust emission is likely to occur during the site clearance, excavation and spreading of the topsoil during construction. They are also likely to occur during the decommissioning phase. Motor vehicles accessing the site may also lead to dust emissions.

6.3.4 Solid and Liquid Waste Generation

It is expected that solid waste will be generated in all phases of the project. The generated waste will include; drums, paper, plastic, cables, metal, transformers, capacitors, drywall, wood, glass, paints, adhesives, sealants, fasteners, wastewater, etc.

6.3.5 Oil Spill Hazards

Motorized machinery on the proposed site may be containing moving parts which will require continuous oiling to minimise the usual corrosion or wear and tear. There is also a potential for oil spills and accidents during oil transportation, storage and operations of the transformers and batteries.

6.3.6 Destruction of Existing Vegetation and Habitats

The proposed site is designated agricultural and presently serves as crop land for both annual (maize, millet) crops and fruit trees.

6.3.7 Avifauna Mortalities

Site assessment revealed presence of various species of avifauna. Avifauna mortalities associated with similar projects have previously been reported.

6.3.8 Increased Demand for Material Consumption

During the life of the project water, energy and construction materials will be used. This will have an impact on the availability of these materials.

6.3.9 Impacts on Workers' and Community Health and Safety

Workers in the substation may be exposed to various risks and hazards including slips and trips, falls, flammable and explosive substance, electrical shocks, dust, noise and vibrations, poor hygiene, fire, bruises and cuts, etc.

6.3.10 Soil Erosion

There are possibilities of soil erosion occurring during the construction of the substation especially during rainy and windy seasons.

6.3.11 Fire Outbreaks

Fire due to electrical faults and flammable substance in the substation is a possible effect of the proposed project. Fires started outside the substation may also spread into the substation.

6.3.12 Visual and Aesthetic Impacts

The physical presence and profile of the proposed project will alter the visual and aesthetic effects of the surrounding area.

6.3.13 Incidences of Electrocution

Since the proposed project will be dealing with electricity, workers and other people who gain access to the substation risk being electrocuted or receiving electric shocks.

6.3.14 Perceived Danger of Electrostatic and Magnetic force

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

6.3.15 Increase in Social Vices

With an increase in the population of the area boosted by the project employees the social set up of the area will be affected. This change may be in the form of loose morality, an increase in school drop-out due to cheap labour, child labour, and increased incidences of HIV/AIDS and other communicable diseases.

6.3.16 Land take – Loss of Use

The project site is currently agricultural but will change to substation. Relocation will not be necessary as the land is expansive thus sparsely populated. Moreover, the Proponent will avoid land that is already settled in acquiring land for the substations. However, on the location where the substation will be sited, local communities, predominantly the Maasai may lose agricultural and grazing land respectively.

6.4 Proposed Mitigation Measures

The following are proposed mitigation measures to avoid, offset or minimize the identified negative impacts.

6.4.1 Noise Pollution

Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of site and nearby communities. The contractor will adhere to the EMCA Noise and Excessive Vibration Pollution Control Regulation, 2009 and will be required to implement noise control measures amongst exposed work force and community. This will include provision of hearing protective devices such as ear plugs and ear muffs; avoiding construction or demolition activities during the night, education and awareness programmes and creation of a buffer to propagate against noise pollution among other noise control measures.

6.4.2 Generation of Exhaust Emissions

To mitigate against exhaust emissions, the proponent is advised to sensitise truck drivers and machine operators to switch off engines when not in use; regularly service engines and machine parts to increase their efficiency and reduce generation of exhaust emission; and where feasible use alternative non-fuel construction equipment.

6.4.3 Dust Emissions

The proponent will endeavour to minimize the effect of dust on the surrounding environment resulting from site clearance, excavation, spreading of the topsoil, demolition works and temporary access roads to ensure protection of health and safety of workers and communities. Control measures will include, use of PPE; regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other measures.

6.4.4 Solid and Liquid Waste Generation

To avoid waste generation or to minimize the amount of waste generated, the following measures are recommended; use of an integrated solid waste management system i.e. the 3 R's: Reduction at source, Reuse and Recycle; accurately estimate the dimensions and quantities of materials required; use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time; providing facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage; use of building materials that have minimal or no packaging to avoid the generation of excessive packaging waste; providing waste collection bins at designated points on site; disposing waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws. In addition all drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations; construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a regular basis; and proper procedures for the management of human waste will be put in place in order to prevent outbreak of diseases; place in strategic places signs against littering and dumping of wastes; audits waste generation and develop Waste Reduction Action Plans (WRAP).

6.4.5 Oil Spill Hazards

The proponent will endeavour to prevent petroleum products used in the substation which includes bitumen, oils, lubricants and gasoline from contaminating soils and water resources (ground and surface water). To accomplish this, the proponent will; install oil trapping equipment in areas where there is a likelihood of oil spillage; collect the used oils and re-use, re-sell, or dispose of appropriately using expertise from licenced waste handlers; prepare a written substation response plan and display it on strategic areas and train workers on specific procedures to be followed in the event of a spill; immediately institute clean up measures in case of an oil spill; design the

substation to have spill prevention and detection systems to protect the environment especially where the transformers will be located; design appropriate protection devices against accidental discharge of transformer oil substances; route drains through an oil/water separator; ensure regular inspection and maintenance of the transformers to minimize spillage; ensure that all waste oils from maintenance of transformers and other associated equipment should be segregated and disposed properly by a reputable/registered waste handler in accordance with the waste disposal plan.

6.4.6 Destruction of Existing Vegetation and Habitats

To minimize destruction of existing vegetation and habitats, the proponent will; avoid unnecessary vegetation clearing; ensure proper demarcation and delineation of the project area to be affected by construction works; specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage; with assistance from community, KFS, initiate a tree planting exercise on the un-used 15 acre piece of land; design and implement an appropriate landscaping programme for the substation site; and support community initiatives in tree planting.

6.4.7 Avifauna Mortalities

To minimize bird collisions leading to their mortality, the proponent will undertake wire marking to alert birds of the presence of power lines, allowing them time to avoid collision and will build raptor platforms for bird roosting and nesting

6.4.8 Increased Demand for Material Consumption

To ensure minimal demand for material consumption, the proponent will; harness rainwater and storm-water whenever possible for use in dust prevention and gardening; promote recycling and reuse of water as much as possible; promptly detect and repair water pipe and tank leaks; sensitise construction workers to conserve water by avoiding unnecessary use; ensure taps are not running when not in use; switch off electrical equipment, appliances and lights

when not being used; install occupation sensing lighting at various locations such as storage areas which are not in use all the time; install energy saving fluorescent tubes at all lighting points within the substation instead of bulbs which consume higher electric energy; monitor energy use during the operation of the project and set targets for efficient energy use; sensitise the substation workers to be energy efficient; ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered; ensure that damage or loss of materials at the construction site is kept to a minimum through proper storage and use; encourage material recycling.

6.4.9 Impacts on Workers' and Community Health and Safety

The proponent will implement all necessary measures to ensure health and safety of the substation workers and the general public during construction, operation and decommissioning of the proposed substation as stipulated in the Occupational Safety and Health Act, 2007

6.4.10 Soil Erosion

To reduce soil erosion, the proponent will; apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil; ensure that construction vehicles are restricted to use existing graded roads; ensure that any compacted areas are ripped to reduce run-off; develop and implement a storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.

6.4.11 Fire Outbreaks

To mitigate against fire outbreaks, the proponent will; ensure compliance with fire safety regulations and install all necessary fire safety equipment; conduct regular trainings and fire drills to employees; conduct periodic maintenance to ensure that, there are;- no overloaded electrical systems; no incorrectly installed

wiring; no live naked wires; and fuel store areas are continuously monitored; create fire breaks (ploughed strips) on strategic areas of the 100 acre piece of land to prevent fire spreading to other pasture lands or from pasture lands to the substation; build capacity for community on fire related issues including fighting and vigilance

6.4.12 Visual and Aesthetic Impacts

To reduce impacts on visual and aesthetic values of the area, the project proponent will; undertake extensive public consultation during the planning of the substation; design structures at the site in such a way as to improve the beauty of the surroundings; restore site area through backfilling, landscaping and planting of trees, shrubs and grass on the open spaces to re-introduce visual barriers; design and implement an appropriate landscaping programme.

6.4.13 Incidences of Electrocution

To reduce incidences of electrocution, the proponent will; put in place a maintenance system to ensure physical integrity of substation equipment is maintained; deactivate and properly ground live wires before repair works are performed; ensure that live wire works is conducted by trained personnel; ensure that access to the substation should only be by authorization and trained personnel; erect a perimeter fence to deny unauthorized people access the substation; place warning signs on strategic places; conduct periodic awareness and sensitization campaigns for the neighbouring communities.

6.4.14 Perceived Danger of Electrostatic and Magnetic force

The proponent will conduct education and awareness campaigns to dispel fear among community on the effects of electrostatic and magnetic forces

6.4.15 Increase in Social Vices

To minimize project effects on local social set up, the proponent will; conduct periodic sensitization forums for employees on ethics, morals, general good behaviour and the need for the project to co-exist with the neighbours; offer guidance and counseling on HIV/AIDS and other STDs to employees; provide

condoms to employees; and ensure enforcement of KETRACO's policy on sexual harassment and abuse of office.

6.4.16 Land take – Loss of Use

To allow animal grazing (farm and wildlife), the proponent will only fence the section of the land where the substation sits leaving the rest of the 100 acre piece of land un-fenced.

CHAPTER 7: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Table 7.1: Environmental Management Plan during the construction phase of the proposed 132/33 kV substation at GARSEN

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Minimization of Noise and Vibration				
Noise and vibration	**1.** Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	KETRACO & Contractor	Entire construction period	0
	2. Sensitise construction drivers to avoid running of vehicle engines or hooting	KETRACO & Contractor	Entire construction period	0
	3. Regular servicing of engines and machine parts to reduce noise generation	KETRACO & Contractor	Entire construction period	0
	4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures (containers) to minimize ambient noise levels.	KETRACO & Contractor	Entire construction period	Design cost

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	5. Trees to be planted around the site to provide some buffer against noise propagation	KETRACO & Contractor	Entire construction period	10,000
	6. The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.	KETRACO & Contractor	Entire construction period	0
	7. Provide necessary PPE to workers who may be exposed to high levels of noise and ensure proper and constant use	KETRACO & Contractor	Entire construction period	Ear plugs and ear muff @500 each
	8. All construction equipment and machinery to be used must be tested to verify if they are compliant with Kenya and the internationally acceptable standards of noise.	KETRACO & Contractor	Entire construction period	
2. Abate Air Pollution				
Dust emission	**1.** Ensure strict enforcement of on-site speed limit regulations	KETRACO & Contractor	Entire construction period	0
	2. Avoid excavation works in extremely dry weather			0

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Sprinkle water on graded access routes when necessary to reduce dust generation by construction and vehicles			10,000
	4. Stockpiles of earth should be enclosed / covered / watered during dry or windy conditions to reduce dust emissions			0
	5. PPE to be provided to employees and ensure proper and constant use			Dust coats and dust masks@3000 per employee
Exhaust emission	**1.** Sensitise truck drivers and machine operators to switch off engines when not in use			0
	2. Regular servicing of engines and machine parts to reduce exhaust emission generation			0
	3. Alternative non-fuel construction equipment shall be used where feasible			0
3. Minimize solid and liquid waste generation and ensure efficient waste management during construction				

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Increased solid waste generation	**1.** Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle	KETRACO and Contractor	Entire construction period	0
	2. Accurate estimation of the dimensions and quantities of materials required.			0
	3. Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time			0
	4.Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage			Design cost
	5. Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste			0
	6. Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site			0

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	7. Waste collection bins to be provided at designated points on site			10,000
	8. Dispose waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.			10,000/month
Generation of wastewater	**1.** Provide means for handling sewage generated at the construction site	KETRACO and Contractor	One-off	30,000
	2. Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies		Entire construction period	0
	3. Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated			6,000 - quarterly
4. Minimize Oil Spills				
Oil spills Hazards	**1**. Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of vehicles.	KETRACO and Contractor	Continuous	0
	2. In case of an oil spill, immediate clean up measures will be instituted			

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Storage and liquid impoundment areas for fuels, raw and in-process material solvents, wastes and finished products should be designed with secondary containment to prevent spills and the contamination of soil, ground and surface water		One-off	10,000
	4. A written substation response plan should be prepared and retained on the site and the workers should be trained to follow specific procedures in the event of a spill.		One-off	0
	5. Collected used oils should be re-used, disposed of appropriately by licenced waste handlers, or be sold for reuse to licensed firms		Continuous	5,000 per month
5. Minimize vegetation disturbance at and or around construction site				
Destruction of existing vegetation and habitat	**1.** Avoid unnecessary vegetation clearing	KETRACO and Contractor	Continuous	0

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Ensure proper demarcation and delineation of the project area to be affected by construction works. Of the 15 acres not more than 3 acres should be affected			0
	3. Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.			0
	3. Designate access routes and parking within the site.			0
	4. With Assistant from community, KWS and KFS, initiate a tree planting exercise on the un-used 15 acre piece of land		Entire construction period	50,000
	5. Design and implement an appropriate landscaping programme for the substation site.			20,000
	6.Support community initiatives in tree planting	KETRACO and community	Entire project period	20,000
6. Reduce demand for material consumption and ensure efficiency in material consumption				

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Increased Water Demand	**1.** Harness rainwater and storm-water whenever possible for use in dust prevention, gardening and other site specific uses	KETRACO & Contractor	Entire construction period	5,000
	2. Install water conserving taps that turn-off automatically when water is not being used			40% more than price of ordinary taps
	3. Promote recycling and reuse of water as much as possible			0
	4. Promptly detect and repair water pipe and tank leaks			1,000 per month
	5. Sensitise construction workers to conserve water by avoiding unnecessary use.			0
	6. Ensure taps are not running when not in use			0
Increased energy consumption	**1.**Ensure electrical equipment, appliances and lights are switched off when not being used	KETRACO and Contractor	Entire construction period	0
	2. Install energy saving bulbs/tubes at all lighting points instead of incandescent bulbs which consume higher electric energy			5,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Plan well for transportation of materials to ensure that fossil fuels (diesel, transformer oil, petrol) are not consumed in excessive amounts			0
	4. Monitor energy use during construction and set targets for reduction of energy use.			0
Demand of Raw material	**1**. Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.	KETRACO & Contractor	Entire construction period	0
	2. Ensure that damage or loss of materials at the construction site is kept to a minimum through proper storage and use.			
	3. Encourage material recycling			
7. Minimize occupational health and safety risks				
Impacts on workers' and community health and safety	**1**. Ensure strict compliance with the Occupational Safety and Health Act (OSHA) 2007	KETRACO, DOHSS and Contractor	Entire construction period	100,000
	2. Prohibit access by unauthorized personnel into the construction site			0

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Train all employees and regularly sensitize them on safe working procedures			100,000
	4. Periodic community sensitization of the dangers posed by the project		Quarterly during the entire construction period	50,000
	5. Place warning signs where necessary		Whenever necessary	10,000
	6. Provide necessary PPEs to workers		Continuous	10,000
	7. Erect a perimeter fence to enclose the substation		One-time off	Design cost
8. Reduce soil erosion and storm-water runoff				
Soil erosion and storm-water runoff	**1.** Surface runoff and roof water shall be harvested and stored in tanks so that it can be used for cleaning purposes.	KETRACO and Contractor	Entire construction period	10,000
	2. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.		First quarter	

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.			
	4. Ensure that construction vehicles are restricted to use existing graded roads		Entire construction period	
	5. Ensure that any compacted areas are ripped to reduce run-off.			
	8. Roof catchments will be used to collect the storm water for some substation uses			40,000
	9. Construction of water pans to collect storm water for substation use, tree planting and landscaping.			5,000 per unit
9. Fire outbreaks				
Fire safety	**1**. Conduct a fire risk assessment	KETRACO, DOHSS and Contractor	First quarter	0
	2.Ensure compliance with fire safety regulations and install all necessary fire safety equipment		Entire construction period	50,000
	3.Conduct regular trainings and fire drills for employees			10,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	4. Periodic maintenance to ensure that, there are;- no overloaded electrical systems; no incorrectly installed wiring; no live naked wires; and fuel store areas are continuously monitored			0
	5. Create fire breaks (ploughed strips) on strategic areas of the 100 acre piece of land to prevent fire spreading to other pasture lands or from pasture lands to the substation.	KETRACO	Continuous	50,000
	6. Build capacity for community on fire related issues including fighting and vigilance	KETRACO and community	Continuous	5,000 per session
10. Visual and aesthetic impacts				
Visual and aesthetic impacts	**1.**Extensive public consultation during the planning of the substation	KETRACO and community	Planning phase	5,000
	2. Structures at the site should be designed in such a way that they will improve the beauty of the surroundings.			

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Restore site area through backfilling, landscaping and planting of trees, shrubs and grass on the open spaces to re-introduce visual barriers,		Continuous	10,000
	4. Design and implement an appropriate landscaping programme		Quarter one	20,000
11. Increase in social vices				
Increase in social vices including HIV/AIDS	**1**. Periodic sensitization forums for employees on ethics, morals; general good behaviour and the need for the project to co-exist with the neighbours	Contractor	Entire construction period	0
	2. Guidance and counselling on HIV/AIDS and other STDs to employees	KETRACO and contractor		10,000
	3. Provision of condoms			10,000
	4. Contractor to have a strong policy on sexual harassment and abuse of office guided by proponent's policy on the same	Contractor	Quarter one	0
12. Land take – loss of use				

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Loss of use of land	**1**. Only fence the section of the land where the substation sits leaving the rest of the 100 acre piece of land un-fenced to allow animal (farm and wildlife) grazing	KETRACO	Continuous	0

Table 7.2: Environmental management Plan for the operation phase of the proposed 132/33 kV substation

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Abate Air Pollution				
Generation of exhaust emission	**1.** Vehicle idling time shall be minimised	KETRACO	Entire implementation time	0
	2. Regular servicing of engines and machine parts to reduce exhaust emission generation			
2. Minimization of solid and liquid waste generation and ensuring more efficient waste management				
Solid waste generation	**1.** Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle	KETRACO	Continuous	0
	2. Provide solid waste handling facilities such as rubbish bags and skips		One-off	20,000
	3. Ensure that wastes generated at the substation are efficiently managed through recycling, reuse and proper disposal procedures.		Continuous	0
	4. A private licensed company to be			

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	contracted to collect and dispose solid waste on regular intervals			30,000 /year
	5. Place in strategic places signs against littering and dumping of wastes			5,000 /year
	6. Audits on waste generation and development of Waste Reduction Action Plans (WRAP)			To be determined
Liquid waste generation	**1.** Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	KETRACO	Continuous	20,000 / annum
	2. Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated			
	3. Audits on liquid waste generation and development of liquid Waste Reduction Action Plans			
Release of sewage into the environment	**1.** Provide adequate and safe means of handling sewage generated at the substation	KETRACO	One-off	40,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Conduct regular inspections for sewage pipe blockages or damages and fix appropriately			0
	3. Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated		Continuous	0
3. Minimize Oil Spills				
Oil spills Hazards	**1**. Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of vehicles	KETRACO	Continuous	0
	2. In case of an oil spill, immediate clean up measures will be instituted			
	3. The substation should be designed with spill prevention and detection systems to protect the environment especially where the transformers will be located.		One-off	Part of construction cost

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	4. Design appropriate protection devices against accidental discharge of transformer oil substances.			
	5. The substation design should provide adequate storage areas for the transformer oil			
	6. Drains should be routed through an oil/water separator		One-off	Part of construction cost
	7. Frequent inspection and maintenance of the transformers should be done to minimize spilling		Continuous	0
	8. A written substation response plan should be prepared and retained on the site and the workers should be trained to follow specific procedures in the event of a spill.		One-off	0
	9. The substation operator should ensure the proper containment or collection and disposal for the waste oil or used oil		Continuous	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	10. All waste oils from maintenance of transformers and other associated equipment should be segregated and disposed properly by a reputable/registered waste handler in accordance with the waste disposal plan			20,000/year
	11. Storage and liquid impoundment areas for fuels, raw and in-process material solvents, wastes and finished products should be designed with secondary containment to prevent spills and the contamination of soil, ground and surface water		One-off	Project construction cost
4. Avifauna mortality				
Substation related avifauna mortalities	**1.** To minimize collisions, undertake wire marking to alert birds to the presence of power lines, allowing them time to avoid the collision	KETRACO	One-off	Part of construction cost
	2. Build raptors platforms for bird roosting and nesting			
5. Reduce demand for material consumption and ensure efficiency in material consumption				
High water demand	**1.** Prompt detection and repair of water pipe and tank leaks	KETRACO	Continuous	30,000/year

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Substation workers to be sensitized on water conservation techniques.			10,000/year
	3. Ensure taps are not running when not in use			0
	4. Install water conserving taps that turn-off when water is not being used		One-off	30,000
	5. Install a discharge meter at water outlets to determine and monitor total water usage		One-off	10,000
	6. Harness rainwater and storm-water whenever possible for use in the substation		Continuous	0
	7. Create water conservation awareness		Continuous	10,000/year
High demand for energy	**1.** Switch off electrical equipment, appliances and lights when not being used	KETRACO	Continuous	0
	2. Install occupation sensing lighting at various locations such as storage areas which are not in use all the time		One-off	20,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Install energy saving fluorescent tubes at all lighting points within the substation instead of bulbs which consume higher electric energy		One-off	10,000
	4. Monitor energy use during the operation of the project and set targets for efficient energy use		Continuous	2,000/month
	5. Sensitise the substation workers to be energy efficient			0
6. Minimize occupational health and safety risks				
Impacts on workers' and community health and safety	Implement all necessary measures to ensure health and safety of the substation workers and the general public during operation of the proposed substation as stipulated in the Occupational Safety and Health Act, 2007	KETRACO	Continuous	5,000/month
7. Fire outbreaks				
	1.Ensure compliance with fire safety regulations and install all necessary fire safety equipment	KETRACO DOHSS and Community	Continuous	0
	2.Conduct regular trainings and fire drills for employees			20,000/year

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Periodic maintenance to ensure that, there are;- no overloaded electrical systems; no incorrectly installed wiring; no live naked wires; and fuel store areas are continuously monitored			0
	5. Create fire breaks (ploughed strips) on strategic areas of the 100 acre piece of land to prevent fire spreading to other pasture lands or from pasture lands to the substation.			10,000 /annum
	6. Build capacity for community on fire related issues including fighting and vigilance			20,000 / annum
8. Minimize Electrocution Incidents				
Electrocution from live power lines or electric equipment	**1.** Put in place a maintenance system to ensure physical integrity of substation equipment is maintained	KETRACO	Planning stage	0
	2. Deactivating and properly grounding live wires before repair works are performed		Continuous	
	3. Ensure that live wire works is conducted by trained personnel			

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	4. Access to the substation should only be by authorization and trained personnel.			
	5. Erect a perimeter fence to deny unauthorized people access the substation		During construction	0
	6. Clear warning signs to be placed on strategic places			10,000/year
	7. Personnel should not approach an exposed energized or conductive part unless the personnel is ;-properly insulated from the energized part with gloves or other approved insulation; the energized part is properly insulated from the personnel and other conductive objects; the personnel is properly isolated and insulated from any other conductive object		Continuous	0
	8. Conduct periodic awareness and sensitization campaigns for the neighbouring communities			10,000/year
9. Electrostatic and magnetic forces				

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Perceived danger of Electrostatic and Magnetic force	**1.** Conduct education and awareness campaigns to dispel fear among community on the effects of electrostatic and magnetic forces	KETRACO	Continuous	20,000 / annum
10. Increase in social vices				
Increase in social vices including HIV/AIDS	**1**. Periodic sensitization forums for employees on ethics, morals; general good behaviour and the need for the project to co-exist with the neighbours	KETRACO	Continuous	30,000/year
	2. Guidance and counselling on HIV/AIDS and other STDs to employees			
	3. Provision of condoms			
	4. enforcement of KETRACO's policy on sexual harassment and abuse of office			

Table 7.3: Environmental Management Plan for the decommissioning phase of the proposed 132/33 kV substation

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Reduction of Noise and vibrations				
Increase noise and vibration	**1.** Install portable barriers to shield compressors and other small stationary equipment where necessary.	KETRACO and Contractor	Continuous	To be determined
	2. Demolish mainly during the day. The time that most of the neighbours are out working.			
	3. Provide appropriate PPE to workers			
	4. Co-ordinate with relevant agencies and neighbouring communities regarding all substation demolition activities			
2.Abatement of air pollution				
Generation of dust	**1.** Watering all active demolition areas as and when necessary to lay dust.		Continuous	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.	KETRACO and Contractor		
	3. Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at demolition sites.		One-off	10,000
	4. Provide appropriate PPE to all workers		Continuous	Dust coats and dust masks@3000 per employee
Generation of exhaust emission	**1.** Vehicle idling time shall be minimised	KETRACO and Contractor	Continuous	0
	2. Regular servicing of engines and machine parts to reduce exhaust emission generation			
3. Waste management				

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Demolition waste	**1.** Use of an integrated solid waste management system i.e. through a hierarchy of options: 1.Source reduction 2.Reusing 3. Recycling 4.Incineration 5. Sanitary land filling.	KETRACO and Contractor	Continuous	0
	2. All machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible or they be taken to a licensed waste disposal site	KETRACO and Contractor	One-off	0
	8. Dispose waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.	KETRACO and Contractor	Continuous	Cost borne by the contractor
4. Oil spills				
Oil spills Hazards	**1**. Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of construction facility and vehicles.	KETRACO and Contractor	Continuous	0
	2. In case of an oil spill, immediate clean up measures will be instituted			

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Close surveillance of the fuel and cooling oil store			
5. Impacts on workers' and community health and safety				
Health and Safety for workers' and community members	**1**. Ensure strict compliance with the Occupational Safety and Health Act (OSHA) 2007	KETRACO DOHSS and Contractor	Continuous	To be determined
	2. Prohibit access by unauthorized personnel into the demolition site			
	3. Place warning signs where necessary			
6. Rehabilitation of project site				
Vegetation disturbance	**1.** Implement an appropriate re-vegetation programme to restore the site to its original status	KETRACO and community	One-off	100,000
	2. Consider use of indigenous plant species in re-vegetation			
	3. Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development.			

CHAPTER 8: ENVIRONMENTAL MONITORING PLAN (EMoP)

Table 8.1: Environmental Monitoring Plan for the proposed 132/33 kV substations at GARSEN

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
1. Noise and vibration impacts	Daily observation; monthly noise level analysis		Daily observation; monthly noise level analysis	Noise level analysis; quarterly reports on log of vehicle and machine servicing; trees planted; number of (noise) licences given; PPE provided; and sensitization meetings held	KETRACO and Contractor
2. Impacts on air pollution	Daily dust observation; monthly air quality analysis	Monthly air quality analysis	Daily dust observation; monthly air quality analysis	Daily dust observation; quarterly air sampling and lab analysis; quarterly reports on PPE provided; log of vehicle and machine servicing; sensitization meetings held; frequency of sprinkling water	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
3. Solid and liquid waste generation	Monthly	Monthly	Monthly	Reports on waste management plans developed; amounts of waste generated; facility provided for handling and storage of waste; methods employed for waste disposal; training meetings held, Waste water quality analysis; Reports on liquid waste management plans developed; number of inspections held to identify leaking or blocked pipes	KETRACO and Contractor
4. Oil spills	Daily	Monthly	Daily	Reports of oil trapping equipment installed; number of oil spill incidents and corrective measures taken	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
5. Destruction of existing vegetation and habitats	Daily			Reports on site zoning program; community initiatives held on tree planting; landscaping programme on re-vegetation implemented	KETRACO and Contractor
6. Avifauna mortalities		Quarterly		Reports on wire marking and raptor platforms build; incidents of bird strikes	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
7. Demand for material consumption	Monthly	Monthly		Quarterly reports on water use audit; amount of water harnessed from rain or any other source outside of the regular water supply at the site; number of sensitization meetings held; water conservation storage erected; conservation water taps installed, Reports of raw material audits; sources of the raw materials; damaged material, Reports on energy audits held; number of installed energy conservation bulbs; reduction of amount of fuel used	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
8. Health and Safety issues	Daily	Monthly	Daily	Quarterly reports on health and safety plans; SHE training programs; records of any incident, accident; investigation and corrective actions; PPE provided; progress of perimeter wall construction; warnings posted;	KETRACO and Contractor
9. Soil erosion	Daily			Reports on storm water management and soil erosion control plans developed; amounts of run-off and roof water harvested; water harvesting and storage facilities installed	KETRACO and Contractor
10. Fire outbreaks	Monthly	Monthly		Reports on fire risk assessment held; compliance with OSHA 2007; trainings held;	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
11. Visual and aesthetic impacts	Quarterly			Reports on public consultation held; landscaping programme designed and implemented	KETRACO and Contractor
12. Electrocution incidences		Quarterly		Reports on maintenance system developed; electrocution accidents occurrence and corrective measures taken; visitors and employees access to the substation log; progress on construction of the perimeter wall; warning signs posted; sensitization workshops held	KETRACO and Contractor
13. Perceived danger of Electrostatic and Magnetic force		Quarterly		Reports on education and awareness campaigns held	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
14. Increase in social vices	Monthly	Monthly		Reports on sensitization forums held; sessions held on guidance and counselling on HIV/AIDS and other STDs; number of condoms issued	KETRACO and Contractor
15. Rehabilitation of project site			Monthly	Reports on re-vegetation programme developed and implemented; number and species of trees planted	KETRACO and Contractor

CHAPTER 9: RECOMMENDATIONS AND CONCLUSION

9.1 Introduction

An Environmental 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, and mitigation action plans. 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 Management and Monitoring Plan provided herein. Following the commissioning of the 132/33 kV transmission substation, 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 transmission substation 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 and community members, and Improved security.

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 given that no immitigable negative impacts were encountered and that no community objection was received, the project may be allowed to proceed.

9.2 Recommendations

Following the impact analysis presented in the previous sections, the following recommendations were made

- The proposed project to be implemented in compliance with the relevant legislation and planning requirements
- The proponent to ensure implementation of the mitigation measures provided in the EMP
- The proponent to monitor implementation of the EMP using the developed EMoP
- The proponent to conduct annual Environmental Audits and submit to NEMA
- NEMA to consider, approve and grant an Environmental Impact Assessment License to the proponent

9.3 Conclusion

From the foregoing, it is noted that;

- no immitigable negative impacts were encountered
- No objection from the community was received
- Identified potential negative impacts can be mitigated
- Benefits to the community, region, and the country at large are immense

The ESIA team, therefore, recommends to NEMA to consider, approve and grant an Environmental Impact Assessment License to the proponent and the proponent to implement the project with strict adherence to the proposed EMP

REFERENCES

Kenya Gazette Supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government Printer, Nairobi

Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. Government printer, Nairobi

Kenya gazette supplement number Environmental Management and Coordination (Emissions Control) Regulations, 2006 Government printer, Nairobi

Kenya gazette supplement Environmental Management and Coordination (Water Quality) Regulations, 2006

Kenya gazette supplement Environmental Management and Coordination (Waste Management) Regulations, 2006

Kenya gazette supplement Environmental Management and Coordination (Excessive Noise and Vibration Control) Regulations, 2009

Kenya gazette supplement, Special Issue 51, Legal Notice number 19; Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009 Government printer, Nairobi

Kenya Gazette Supplement Acts Building Code 2000 Government Printer, Nairobi

Kenya Gazette Supplement Acts Land Planning Act (Cap. 303) Government Printer, Nairobi

Kenya Gazette Supplement Acts Local Authority Act (Cap. 265) Government Printer

Kenya Gazette Supplement Acts Penal Code Act (Cap. 63) Government Printer, Nairobi

Kenya Gazette Supplement Acts Physical Planning Act, 1999 Government printer, Nairobi

Kenya Gazette supplement Acts Public Health Act (Cap. 242) government printer, Nairobi.

The World Bank Safeguard Policies

APPENDICES

Appendix I

ESIA Team EIA/EA Practising Licences/Certificates

FORM 5

(r. 14(4))

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

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT

CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT EXPERT

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

Dated this .....7TH.....day ....APRIL....of 20..08....

Signature.....

(Seal)

Director General
The National Environmental Management Authority

UPK (L)

FORM 5 (r. 14(4))

Application Reference No: 1242
Registration: 1889
FOR OFFICIAL USE

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

This is to certify M/s THINGURI THOMAS MWANGI
of P.O. BOX 65861 KAMJTI NAIROBI (Address)
has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environmental Management and Coordination Act and is authorised to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type) LEAD EXPERT

Dated this 22ND Day APRIL of 20 09

Signature

(Seal)

Director General
The National Environment Management Authority

FORM 7 (r.15(2))

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

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

M/S CALEB MATHEWS OKOTH MANGO (individual or firm) of
Address P. O. BOX 492-00200
NAIROBI

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

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

Dated this 5TH Day MAY of 20 10

Signature

(Seal)

for Director General
The National Environment Management Authority

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

FORM 5

(r. 14(4))

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

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT

CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT EXPERT

This is to certify Ms.....**MILDRED AKINYI OGENDO**.....
of.....**P. O. BOX 28976-00200, NAIROBI**.....(Address)
has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environment Management and Coordination Act and is authorized to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type).....LEAD EXPERT.....
.....

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

Signature.....

(Seal)

Director General
The National Environmental Management Authority

UPK(L)

Appendix II

Sample of filled community questionnaires

Appendix III

Filled key informants questionnaires

Appendix IV

Public *Baraza* attendance sheets

Appendix V

County Council of Tana River Land Allocation Letter