ENVIRONMENTAL IMPACT ASSESSMENT PROJECT REPORT FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION IN LARI DISTRICT.

Site GPS coordinates-(1°16'49.35"S 36°39'42.34"E)

SEPTEMBER 2012

FINAL PROJECT REPORT

Environmental Impact Assessment Project Report
CERTIFICATION:

Client: The Kenya Power & Lighting Company Limited

Assignment: To carry out an Environmental Impact Assessment of the proposed Uplands 66/11kV Substation in Lari district.

Project Cost: The project cost is two hundred and twenty four million, two hundred and sixty thousand one hundred and four shillings and seventy cents (KES 224,260,104.70)

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# LIST OF ABBREVIATIONS

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<th>Description</th>
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<tbody>
<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
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<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<tr>
<td>DAO</td>
<td>District Agricultural Officer</td>
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<tr>
<td>DO</td>
<td>District Officer</td>
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<tr>
<td>DC</td>
<td>District Commissioner</td>
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<tr>
<td>EA</td>
<td>Environmental Audit</td>
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<td>SHE</td>
<td>Environment Health and Safety</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ESIA</td>
<td>Environmental &amp; Social Impact Assessment</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<tr>
<td>EMCA</td>
<td>Environmental Management and Coordination Act, 1999</td>
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<td>ESMP</td>
<td>Environment Management Plan</td>
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<tr>
<td>GHGs</td>
<td>Green House Gases</td>
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<td>Ha</td>
<td>Hectare</td>
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<tr>
<td>HVF</td>
<td>Heavy Vehicle Fuel</td>
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<tr>
<td>IDO</td>
<td>Industrial Diesel Oil</td>
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<tr>
<td>KWS</td>
<td>Kenya Wildlife Service</td>
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<tr>
<td>L.R</td>
<td>Land Registration</td>
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<tr>
<td>MOA</td>
<td>Ministry of Agriculture</td>
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<td>MSDS</td>
<td>Material Safety Data Sheet</td>
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<tr>
<td>NEMA</td>
<td>National Environment Management Authority</td>
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<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>NOx</td>
<td>Oxides of Nitrogen</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Health and Safety Act</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate Matter</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>SEM</td>
<td>Sustainable Environmental Management</td>
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<tr>
<td>Sox</td>
<td>Oxides of Sulphur</td>
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<tr>
<td>STD</td>
<td>Sexually Transmitted Diseases</td>
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EXECUTIVE SUMMARY

Introduction
Kenya Power and Lighting Company (KPLC) plans to construct a 66/11kV substation in Shaka village, Gituamba sub location, Gituamba location, Lari division of Lari district. This is geared towards strengthening and expanding the electrical infrastructure in the country. The proposed substation will be constructed on a piece of land owned by the company. The substation will have two 23 MVA transformers to step down power from 66kV to 11kV for distribution. The project site is in Gituamba sub location, Gituamba location. The site is about 1.5km from the Rift valley view point. From the highway the land is about 100 metres away.

Kenya through its Vision 2030 is working towards being a newly industrialized, middle income country providing a high quality of life to all its citizens in a clean and secure environment”. To achieve this vision, several development projects have and will be commissioned to push and sustain economic growth. These projects will increase demand for energy. Consequently, this project is in response to current and future power demand, unreliable supply experienced currently, and technical losses associated with supplying the area with long distance distribution lines. It is expected that any project that is out of character with the surrounding must undergo Environmental and social impact assessment prior to construction. This requirement is enshrined in (EMCA 1999) and the main objective is to identify negative impacts of the project to the environment. The EIA should also propose adequate mitigation measures to address the negative impacts. The report is submitted to National Environmental Management Authority who makes a decision on whether the project should proceed or not.

Objectives of the EIA Study
- Collect baseline socio-economic data of the project area and potential impacts expected from project during construction, implementation, operation and decommissioning;
- Identify and contact stakeholders to seek their views on the proposed project;
- Conduct an Environmental & Social Impact Assessment to identify both positive and negative impacts of the proposed project and propose most appropriate interventions during construction, operation and decommissioning of the project;
- Develop Environmental Management Plan and;
• Develop an Environmental Monitoring Program during construction and operation and present plans to minimize, mitigate, or eliminate negative effects and impacts.

Scope and Criteria of the Environmental Impact Assessment
Every project that is out of character with the surrounding must be subjected to Environmental Impact Assessment. This is undertaken prior to project implementation. This is a requirement by the Government of Kenya that an Environmental Impact Assessment is carried out at the planning stages of any proposed undertaking. The scope of this Environmental Impact Assessment covers:

• The baseline environmental and socio-economic 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.

The scope of assessment covers various activities related to; construction works of the proposed development which includes all works of civil, mechanical, electrical or other nature necessary to construction, commission and decommissioning of the project.

Terms of reference:
• Establish the suitability of the proposed location to construct a substation
• A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
• A description of the technology, procedures and processes to be used, in the implementation of the project.
• A description of materials to be used in the construction and implementation of the project, the products, by-products and wastes to be generated by the project.
• A description of the potentially affected environment.
• A description of environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- To recommend a specific environmentally sound and affordable wastes’ management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- Development of Environmental Management Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable hazardous activities in the cause of the project cycle.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.

**Study Methodology**

In gathering data the study team adopted a participatory approach in order to gather adequate data for the project. This is because data needed was from various persons. This study was carried out through desktop studies and field investigations. To begin with the experts conducted extensive literature review to source information from secondary sources relevant to this project. During the field investigation, reconnaissance survey was conducted to gather information on biophysical and socio-economic aspects of the area and its environs.

EIA team employed various methods in collecting data for the study. Focus group discussion and baraza was used to gather data from the neighbouring community. Among the key activities undertaken during the assessment were:

(i) Review of documents with necessary information on the proposed project, the site plan, schematic diagrams as well as the desired structural design.

(ii) Interviews and consultations with public and stakeholders and the immediate neighboring land users. Questionnaires were administered to obtain their honest opinion regarding the project (samples have been annexed to this report),

(iii) Physical inspections of the proposed site and photography,

(iv) Evaluation of the activities around the site and the environmental setting of the wider area, through review of existing information, literature and physical observations.
The Environmental considerations evaluated for the proposed development include: Ecological considerations (biological diversity, sustainable use of ecological resources and ecosystem maintenance), social considerations (economic impacts, social cohesion or disruption, effects on human health, immigration or emigration, communication and effects on culture and objects of cultural value), Landscape considerations, visual impacts, compatibility with surrounding areas and amenity and land use considerations (water sources, effects of proposed project on surrounding land use potentials and possibility of multiple uses).

**Project Description**

The proposed substation will have two 23 MVA transformers to step down voltage from 66 kV to 11kV. The proposed substation will have one 66kV incoming feeder from Limuru substation. Four 11kV outgoing feeders will be constructed from the new substation to distribute power within the district. Two feeders will go to uplands market, one line will go to Kimende while the fourth one will go towards Gituamba secondary school area. This will be a Turnkey type of project where the contractor will come up with the final designs and construct the substation and associated facilities.

**Project Justification**

Kenya’s economic growth and vision 2030 objectives have caused a rise in current and future demand for power. This calls for urgent responses in expanding the power infrastructure capacity. The proposed project is part of the company’s plan of dealing with the increasing demand for power. The substation project is justifiable in that it will stabilize power supply, improve quality, improve on distribution line security hence cushioning against losses occasioned by power failures and blackouts in Lari and its environs. Consequently, the proposed substation comes hardly in meeting the highlighted challenge in power supply. Other benefits will accrue to the national economy in different aspects.

**Legal and Regulatory Framework**

Kenya has several statutes which touch on environmental matters. Most of these statutes are sector specific covering issues such as occupational health and safety, land use, public health, water quality, soil erosion, wildlife, air quality etc. Previously, environmental management activities were implemented through a variety of instruments such as policy statements, permits and licenses and sectoral laws.
The enactment of the Environmental Management and Coordination Act in 1999 provided for the establishment of an appropriate legal and institutional framework for the management and protection of the environment. Laws of particular concern to this project are:

- The Environment Management and Co-ordination Act, 1999
- Physical Planning Act, 1996
- Local Government Act (Rev. 1998)
- Public Health Act (Cap. 242)
- Energy Act of 2006
- The Standards Act Cap 496
- Land Planning Act (Cap. 303)
- Water Act, 2002
- Penal Code Act (Cap. 63)
- The Wildlife Conservation and Management Act, Cap 376
- The Lakes and Rivers Act Chapter 409 Laws of Kenya:
- The Forestry Services Act, 2005
- Occupational Safety and Health Act, 2007
- Work Injury and Benefits Act, 2007
- Occupiers Liability Act (Cap. 34)
- The Traffic Act Chapter 295 Laws of Kenya
- The Public Roads and Roads of Access Act (Cap 22 Laws of Kenya)
- The Agriculture Act, Cap 318 of 1980 (revised 1986)
- Antiquities and Monuments Act, 1983 (Cap 215)
- The Registration of Titles Act Cap 281
- The Radiation Protection Act (Cap 243 Laws of Kenya)
- The Traffic Act Chapter 295 Laws of Kenya

Public Consultation

During environmental impact assessment, the law requires that public participation be conducted. The role of public participation is to identify potentially affected persons and provide them an opportunity to provide their views and opinions on the project before its implementation. Various stakeholders were engaged by the EIA team so that they could offer their opinions and alternatives that were to be investigated, impacts and any other information that is necessary at project planning level hence facilitating informed decision-making. In complying with the public
participation process (PPP), EIA consultative meetings were organized to engage the stakeholders at various levels.

Potential Environmental and Social Impacts
Through consultations and literature review the following impacts were identified;

**Anticipated Positive Impacts**
- Employment opportunities
- Improved power supply
- Provision of market for supply of building materials
- Boosting of the informal sector
- Improved Security
- Optimal use of land
- Improvement of local and national economy
- Increased protection from possible lightning strikes

**Anticipated Negative Impacts**
- Soil erosion
- Decreased air quality
- Contamination of soil
- Noise and vibration
- Solid waste
- Impacts on Water Quality and Water Resources
- Traffic congestion
- Visual Intrusion and aesthetic impacts
- Accidents as a result of increased traffic
- Damage to roads and transport infrastructure
- Occupational health and safety Impacts
- Impacts on public Health
- Influx of people
- Social vices

**Proposed Mitigation measures**
- Contractor to ensure holding of the construction area
- During construction, any stockpiles of earth should be enclosed /covered /watered during dry or windy conditions to reduce dust emissions;
- Construction trucks removing soil from the site, delivering dusty construction materials to the site should be covered to prevent material dust
- Drivers shall be instructed to drive at low speeds
• The transformer areas shall have oil containment and bund wall to mitigate against accidental oil spill.
• During construction, where water is available, sprinkle the construction area with water to keep dust levels down.
• Dust masks should be provided to all personnel in areas prone to dust emissions throughout the period of construction.
• Drivers of construction vehicles must be supervised so that they do not leave vehicles idling
• No burning of any waste materials on site
• Areas cleared of vegetation at the substation site, and where no substation structures are, shall be rehabilitated by grass to prevent soil erosion. Drainages shall be constructed to control storm water.
• Noise pollution shall be mitigated by ensuring that noisy operations are done during the day only and also by properly maintaining construction machinery.
• HIV/AIDS awareness campaigns shall be carried out for employees and the surrounding members of public.
• Solid wastes generated, shall be carted away as soon as possible for appropriate disposal.
• Occupational safety measures shall be put in place, including provision of suitable and adequate personal protective clothing and equipment to construction employees.
• Scaffolding to be placed to protect the public from dust.
• Danger/Caution warning notices shall be placed appropriately
• Emergency response measures shall be put in place
• Only qualified authorized operational staff shall work at the substation
• The site shall be rehabilitated to its original state as far as is reasonably practical.
• Construction to proceed in the dry season if possible to minimize soil erosion.

Project alternatives
Some of the possible alternatives available and discussed in the report include;
• The ‘Do-nothing’ Option - meaning leaving the area as it is without constructing the substation.
• Alternative structure types and designs- will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements
• Alternative construction materials and technology
• Alternative construction site

Summary of Environmental and Social Management Plan (ESMP)
Based on the assessment, management and monitoring plan has been prepared. This is meant to ensure environmental protection and conservation. The ESMP ensures that the negative environmental impacts are controlled and mitigated effectively. An Environmental and Social Management Plan (ESMP) provides a logical framework within which identified negative environmental and socio-economic impacts can be mitigated and monitored. The ESMP assigns responsibilities of actions to various actors and provides a timeframe for mitigation measures and monitoring can be done. The ESMP outlined addresses potential negative impacts during all project phases.

KPLC management, including Safety, Health and Environment (SHE) department and relevant departments who have interest in the project will be charged with the responsibility of ensuring that overall environmental and social targets are achieved.

During construction, the project manager shall conduct quarterly inspections/audits to ensure that the system for implementation of the ESMP and ESMoP is operating effectively. This EIA therefore requires that the ESMP and ESMoP be integrated into the Design Report with appropriate allocation of funds in the Bills of Quantities. The contract for construction should bear clauses binding the contractor to implement impact mitigation as part of the civil works. The proponent will mount own internal monitoring to ascertain environmental and social sensitivity at all stages of project development.

Conclusion
The EIA points out that the construction and operation of the proposed substation will result in both positive and negative impacts economically, socially and environmentally. An Environmental and Social Management Plan (E&SMP) outline has been developed to ensure sustainability of the project activities from construction through operation to decommissioning.

A monitoring plan has also been developed and highlights some of the environmental performance indicators that should be monitored. Monitoring provides an opportunity to timely respond to any changes and problems in environment.

From the findings of this study, the following conclusions are made:
• The project will be designed, constructed, and operated in accordance with acceptable industry norms and standards.
• The project will generate socio-economic benefits which would not be realized if the project was not implemented.
• Successful implementation of the proposed ESMP will ensure environmental sustainability.

Recommendations
From the assessment, the project’s construction and operation will bring positive socio economic impacts in the project area and Kenya as a whole. However, the project will also bring negative impacts which should be addressed and mitigated against.

The EIA team strongly recommends that a concerted effort be made by the concerned departments in particular, to implement the Environmental Management and Monitoring Plan provided herein. Diligence on the part of the contractor and proper supervision by the proponent is crucial for mitigating the anticipated impacts and ensuring structural strength, safety, and efficient operation of the project. Following the commissioning of the project, annual statutory environmental and safety audits must be carried out.

Having assessed the proposed location, construction management, mitigation and monitoring plan that will be implemented, the EIA team are of the opinion that project is considered important and may be allowed to proceed.
CHAPTER ONE: INTRODUCTION AND PROJECT BRIEF

1.1 Introduction

This chapter gives a brief of the project in terms of background, justification, objectives of the EIA and methodology.

Kenya through its Vision 2030 is working towards being a newly industrialized, middle income country providing a high quality of life to all its citizens in a clean and secure environment”. To achieve this vision, several development projects have and will be commissioned to push and sustain economic growth. These projects will increase demand for energy.

In response to these demand, Kenya Power and Lighting Company plans to construct and commission a 66/11kV substation in Shaka village, Gituamba sub location, Gituamba location, Lari division of Lari district. Such projects are going on throughout the country. This is one of the projects being implemented throughout the country to expand the distribution network.

It is important to note that most development projects come with a cost to the environment with potential to cause environmental damage if measures are not put in place to protect the environment. It is globally accepted that sustainable development is the way to go. For the ecosystem to be sustainable there is need for a balance between human settlement, development projects and the natural ecosystem. This can be achieved through careful planning and the establishment of appropriate management systems. Consequently, the need to plan activities has become an essential component of the development process. A number of planning mechanisms have to be put in place to ensure that minimum damage is caused to the environment.

Therefore, environmental planning has become a component of other planning processes such as physical planning, economic planning, and development planning to ensure sustainability. Environmental Impact Assessment (EIA) is a planning tool that is mainly used in Kenya. EIAs are undertaken for proposed projects that are likely to have significant adverse impact on the environment. The EIA report identifies both positive and negative impacts of a new project and gives mitigation measures against the negative impacts among other issues. The EIA report is then subjected to a decision of a competent national authority i.e National Environment Management Authority (NEMA)-Kenya. NEMA issues a go ahead for the project once they are satisfied that all negative impacts are identified and can be mitigated.

Kenya’s national access to electricity is estimated at 29%. The government of Kenya, through Vision 2030 aims to raise access to electricity to 40% by year 2020. This increased demand for electrification calls for major expansion in power generation, transmission and distribution infrastructure in the whole country.
Currently, the existing distribution system capacity is constrained particularly during peak hours when system voltages in parts of Nairobi, West Kenya and Mount Kenya drop below acceptable levels, causing occasional load shedding despite the availability of generation capacity. To address these constraints, Kenya Power has identified the need for a number of distribution substation projects across the countries, which are at various stages of development.

Prior to construction of this project the proponent (KPLC) has to undertake an Environmental Impact Assessment (EIA) to ensure that the above project is implemented in an environmentally and socially sustainable manner. Therefore, KPLC engaged the services of environmental experts registered by NEMA to conduct an Environmental Impact Assessment (EIA) for the proposed project. This EIA was conducted in line with the Environmental Management and Coordination Act 1999, and the subsequent Kenya Gazette Supplement No. 56 of 1st June 2003.

1.2 Justification of the Proposed Project
The national energy key stakeholders, who include amongst others, the Ministry of Energy, Kenya Power, Kenya Electricity Transmission Company (KETRACO), Kenya Energy Generating Company (KenGen) and Energy Regulation Commission (ERC) carried out the country’s power-demand projections for the medium term. The results indicated a need for capacity enhancement to satisfy the projected demand.

Further, studies on power load have shown the need for capacity enhancement to ensure stable and quality power supply to meet the increasing power demand. Currently, Kenya’s power grid infrastructure is unable to keep pace with increased demand over the years with demand reaching 7.9% as at 2010/2011 financial year. The area where the substation will be put up has also been experiencing power outages and unreliable power supply.

Uplands 66/11kV substation project is justifiable in that it will stabilize power supply; ensure quality supply, guard against losses due to minimal power failures and blackouts. The division and its environs are supplied with power from Limuru. Additionally, a substation needs to be as close as possible to the area it will serve to minimize on technical losses associated with long distances of distribution. The proposed substation will help in meeting the highlighted challenges in power supply.

There are other benefits that will accrue from the proposed project. To begin with, the economy will benefit both directly and indirectly as better power supply is a key ingredient of economic growth. Supply of quality power will boost and promote small and businesses, there will be incomes to the government coming from Value Added Taxes (VAT) imposed on construction materials and various fees charged by different government institutions. There will be employment opportunities for the locals and other people during construction. Last but not least, the planning and design of the project is well thought out and has taken into consideration all the necessary interventions needed to mitigate
negative impacts on the environment and safeguard safety of workers throughout the project cycle.

1.3 Scope and Objectives of the Study
It is required by the government through its agency (National Environment Management Authority) that all new projects that are out of character with the host environment must be subjected to an Environmental Impact Assessment (EIA) at the planning stages. This is to ensure that potential environmental and social impacts are addressed during the design, construction, operation and decommissioning of the project.

Scope
The overall objective of this assessment was to identify potential environmental and social impacts of the project. Further, it sought to formulate appropriate mitigation measures and recommendations to ensure that the identified negative impacts do not harm the environment through all phases of its implementation. The assessment was carried out in line with EMCA 1999 and the Environmental Impact Assessment and Audit Regulations, 2003. Reference to relevant sectoral legal provisions has been made to ensure compliance with them during all the project phases.

The EIA scope largely covered the following areas:

Baseline Conditions:
- Environmental setting (climate, topography, geology, hydrology, ecology, water resources, sensitive areas, baseline noise levels, air quality and soil quality analysis.
- 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, electricity distribution system, etc.).

Legal and policy framework:
The assessment reviewed relevant national environmental laws, regulations and by-laws and other laws and policies to ensure the project complies.
A participatory approach was adopted for the immediate neighbourhood in discussing project relevant issues such as:
- Nature of project
- Project ownership and acceptability
- Land use aspects
- Social, cultural and economic impacts of the project
- Environmental impacts
- Physical impacts
- Biological impacts
- Legal Compliance.

Specific objectives of the assessment:
The specific objectives of the assessment were;
• To present an outline of the project background,
• Describe the project
• Establish environmental baseline conditions of the project area and review all available information and data related to the project,
• Identify key areas for environmental, health and safety concerns as well as the anticipated impacts associated with the proposed project.
• Establish a comprehensive environmental management plan covering the construction, operation and decommissioning phases of the project,
• Preparation of a comprehensive project report in accordance with the local environmental legislation and submission to NEMA for further instructions and/or approval.

1.4 Terms of Reference (ToR) for the EIA Process

The EIA Experts were tasked with carrying out Environmental Impact Assessment for the proposed 66/11kV substation. The scope covered various activities related to; construction works (civil works), mechanical, electrical or other nature necessary to construct, commission and decommissioning of the project. The output of the assessment is an Environmental Impact Assessment Report which will aid NEMA in making a decision on whether to license the project or not.

The EIA experts were guided by the following terms of reference in conducting the assessment;

• Assess the suitability of the proposed location to construct a 66/11kV substation.
• A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
• A description of the technology, procedures and processes to be used, in the implementation of the project.
• A description of materials to be used in the construction and implementation of the project, the products, by-products and waste to be generated by the project.
• A description of the potentially affected environment.
• A description of environmental effects of the project including the biological, physical, social and cultural impact and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
• Analysis of alternatives including project site, design and technologies.
• Development of an Environmental Management Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
• Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the course of project construction, operation and decommissioning.
• Propose measures to prevent health hazards and to ensure safety in the working environment for the employees and the neighbouring community.
• An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.

1.5 EIA Approach
The experts paid attention to EMCA, 1999 requirements as well as the Environmental Impact Assessment and Audit Regulations, 2003 in. It involved largely an understanding of the project background, the preliminary designs and the implementation plan. The approach and methodology applied enabled collection of quality data needed for the report.

Project screening was the first stage of this assessment. Screening of the project sought to ascertain whether or not this project falls within a category that requires EIA prior to commencement. Other considerations made during this stage included a preliminary assessment of the environmental sensitivity of the proposed project site. Project scoping was the next stage which was done to delineate project issues that required detailed analysis.

1.6 EIA Methodology
Various methods were used in collection data to ensure relevant and adequate data was collected. The methods included;

Desk study/literature review
Available data relevant to the proposed project was gathered. The secondary data included designs, various legislations and regulations and district development plan among others. A critical literature review of the secondary data was done to establish the following:

• Required licenses and permits
• Legislations and institutional framework governing the proposed project
• Nature of the project
• Baseline information of the project area
• Types of waste likely to be generated.

Site assessments
A physical visit to the proposed site was done. This allowed a deeper understanding of the project area and the surrounding environment. It also provided an opportunity to identify potentially affected persons not to mention the affected environment. The site visit allowed for physical assessment of the area through observations.
Data collection procedures
Qualitative methods of data collection were largely employed. Secondary data was obtained through literature reviews. Primary data was obtained through physical observations, interviews, discussions, photography and consultations.

Public Consultations
In conducting EIAs, the experts are expected to widely consult with the public who are within the environs of the project site. It is a requirement by Section 17 of the Environmental (Impact Assessment and Audit) Regulations of 2003, that all EIA assessment undertake Public Consultation (PC) as part of the study. The aim of the PC is to identify all stakeholders in a proposed project such as project beneficiaries and the general public and provide them an opportunity to air their opinions which should be considered during project planning, design, construction, operation and decommissioning phase. Therefore, consultations were carried out in the project area in a bid to inform the public and other interested parties on the proposed project and obtain their views on the same. The consultations also presented an opportunity for the EIA team to educate the public on environmental and safety issues related to the substation.

Public consultations were conducted through; presentations, discussions and administering of questionnaires.

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

Step 1: Project Concepts
The project details, scope, design, implementation were first analyzed.

Step 2: Terms of Reference (ToR)
The terms of Reference were developed guided by EMCA 1999 and The Environmental Impact Assessment/ Audit regulations 2003. Any new developments out of character with their surrounding must have an EIA undertaken; for review, approval and licensing by NEMA.

Step 3: Project Screening
Details about baseline conditions and potential environmental and social impacts were collected through desktop study, consultations, site visits, photography, and inductive methods.

Step 4: Identification of Potential Environmental and Social Impacts
The Potential Environmental impacts were identified, classified and magnitude determined.

Step 5: Impact Assessment and Consultations
The Environmental and Social Impacts were analyzed, assessed and discussed in details involving consultations with the Proponent and other stakeholders.

**Step 6: Formulation of Mitigation measures**
Mitigation measures to ameliorate or minimize the potential Environmental and Socio-economic impacts were formulated for the entire project life.

**Step 7: Development of an Environmental & Social Management and Monitoring Plan:**
An E&SMP for the project life was developed indicating parameters to be monitored, persons responsible, timing and costs involved.

Specific topics 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, including the physical area that may be affected by the project’s activities;
- 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 and Social Management Plan (E&SMP) for the entire project cycle to include 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.
- An Environmental and Social Monitoring Plan (ESMP)

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**Figure 1.1: Summary of EIA procedure**
CHAPTER TWO: DESCRIPTION OF THE PROPOSED PROJECT

2.1 Introduction
This chapter presents a detailed description of the proposed project in terms of the location, nature and the technical aspects. In addition, project activities and materials to be used are discussed.

2.2 Project Location and Land Ownership
The proposed substation will be constructed on a piece of land belonging to the proponent. Administratively, the site is in Shaka village, Gituamba sub location, Gituamba location, Lari division of Lari district. The project site is along Nairobi-Nakuru highway on the left side from Nakuru. The land is about 1.5kms from the Rift valley view point. From the highway the land is about 100 metres away.

The proposed site is owned by Kenya Power and Lighting Company. The land is registered under the proponents name and the (title number) as Lari/Kirenga/191 and measures 1.64 hectares. The title is attached as annex 1. The proponent is in the process of acquiring change of use for the land from agricultural to electrical installation.

2.3 Description of the proposed site
The site is flat and is prone to flooding. The soil is cotton and caution must be taken to lay proper foundations. Additionally storm water drainage must be well constructed. Previously, the land had blue gum trees which had been cut and the tree stumps have budded and there are now short blue gum rafters. The area is a farming zone. The types of crops grown within the area are mainly food crops such as kales, cabbages, carrots, green peas, potatoes, maize, beans and nappier grass for cattle. The tree species around include; blue gum, wattle, gravelia and cedar. There is also a 132kV line passing on the lower side of the plot.
Proposed Uplands 66/11kV substation in Lari District

2.4 Description of the project
Kenya power plans to construct a 66/11 kV substation which will comprise two 23MVA transformers to step down power for distribution within the division and the entire district. This will be a Turnkey type of project where the contractor will come up with the final designs and construct the substation and associated facilities.

The specific objectives of the project include:
- Expanding the distribution network
- Boosting the existing load to stabilize power supply and ensure quality power for the customers not to mention meeting the increasing power demand.
- Designing and constructing of a 66/11 kV substation and associated incoming and outgoing feeders in compliance with electric generation regulatory authorities (ERC, Ministry of energy)
- Ensure sustainability of the project by complying with national laws especially those touching on environment

2.5 Technical aspects of a substation
A sub-station is a vital component of electricity generation, transmission and distribution system. The main role of a substation is to transform voltages from high to low and vice versa, using transformers and other heavy-duty electrical switchgear. The project is a step
Proposed Uplands 66/11kV substation in Lari District

down substation i.e. from 66kV to 11kV. After stepping down, electricity is fed to distribution lines running to specific geographic areas to supply customers.

The proposed project will have the following specifications;

<table>
<thead>
<tr>
<th>Substation</th>
<th>Proposed Uplands Substation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage levels</td>
<td>66/11 kV</td>
</tr>
<tr>
<td></td>
<td>1 X 66 kV Incoming feeder</td>
</tr>
<tr>
<td></td>
<td>4 X 11 kV Outgoing feeders</td>
</tr>
<tr>
<td>Transformer ratings</td>
<td>2 x 23 MVA</td>
</tr>
</tbody>
</table>

As earlier noted, the project is on a “Turnkey” basis where KPLC will float tenders for the design and construction of the specified substation and the associated incoming and outgoing feeders (lines). The winning contractor will provide the substation designs which will be submitted to KPLC for approval. Once the designs are approved, the contractor will be required to construct the substation and hand over the completed substation to KPLC for operation.

The 66kV incoming feeder will come from Limuru substation and will follow the tarmac road. The line will utilize the road reserve. Use of the road reserve ensures minimum disruptions to the social and economic lives of the communities. The line will have concrete poles. These poles are stronger, long lasting hence little maintenance and ensure conservation of the environment compared to wooden poles.

There will be four 11kV outgoing feeders from Uplands substation. These lines will also be constructed on concrete poles for better stability and durability. Two 11kV lines will go to Uplands market, one will proceed to Gituamba area to feed the area with Gituamba secondary while the fourth line will go to Kimende market centre.

Typical Substation Design
The substation designs will also be approved by relevant authorities and will have the following features:

a) Substation yard with: - incoming 1 X 66 kV line, outgoing 4 X 11 kV lines, switch gear, steel structures, protection equipment, 2 X 23 MVA transformers mounted on a concrete plinth, with oil containment pits, an oil separator at the edge point from which drainage channels connect to storm water drainage system, a vehicle drive way & parking bay and cable trenches
b) Control room this is a house with: - control panels’ room, switch gear room, communication room, battery room, office, toilet, pantry and cable trenches
c) Guard house with toilet both secluded from the main substation area
d) Stone perimeter wall with a gate
e) Access road to the substation
The substation will use modern distribution and control equipment. The works shall conform to current best practice in the international Energy industry in all respects.

Figure 2.1: Schematic diagram of the proposed substation

Access
There is already an existing murram feeder road to the substation site. An access road entering to the substation will be constructed from the main road (high way) i.e the murram section to the substation will be upgraded to be permanent. The road will be designed according to KPLC’s standards, taking into account the Ministry of Road’s requirements. The access road will also need to be able to sustain the vehicle load associated specifically with the transportation of the transformer to the site.
Fencing and Security
Safety and security of the proposed project is paramount to its normal and safe operations. Indeed, a substation is a high voltage area with potential health risks if safety regulations and rules are not observed. Consequently, a perimeter stone wall will be constructed to KPLC’s standard to provide a fence that will keep off unauthorized persons and staff from accessing the area. A gate will be fitted at the entrance to the substation which will be locked at all times. The substation will be lit at night, and danger signs will be put to warn the public. A 24 hour guard will also be provided.

2.6 Project Activities
The design and construction of the substation will be undertaken by a contractor selected through a competitive bidding process. Construction will be supervised by KPLC to make sure works are undertaken according to specifications and adherence to safety health and environmental provisions. This is to ensure quality work is achieved.

It is anticipated that the proposed site will undergo alteration during construction to install the two 23MVA transformers and associated structures. The contractor shall be guided by Safety requirements and precautions, established local and international environmental protection regulations alongside the company Safety Health and Environment policy.

2.6.1 Construction activities
Preliminary assessments indicate that the area is prone to flooding. Construction activities will involve the following:

- Site investigations such as soil samples to determine the nature of foundations to be laid and ensure design and construction are done on a sound engineering basis.
- Holding of the site with iron sheet and a stone perimeter wall will be constructed
- Cutting of the rafters/thin blue gum trees
- Ground breaking and removal of vegetation
- Leveling the ground.
- Storm water drainage construction
- Civil works on site including construction of access road, digging foundations and concrete works
- Compaction and filling with gravel of the areas to form foundations
- Delivery of civil work construction materials, transformer, tools, electrical equipment to project site.
- Construction of bund walls at the base of the transformer to hold oil in case of accidental leakage or spill
- Installation of transformers and erecting of the steel poles to support the incoming and outgoing feeders.
- Post construction clean-up, restoration and landscaping of site
- Ballasting the substation yard
- Connection of power from the incoming 66kV line to the substation
• Connection of power to outgoing 11kV feeders.
• Load testing
• Remedying of defects after functional tests

During construction, the contractor shall observe safety and shall erect warning signs to warn on any potential hazards, ensure proper and efficient use of Personal Protective Equipment (PPE) for all on site and observe safe work procedures.

Vegetation clearance and soil excavation
The proposed site in an agricultural zone. Indeed, one part of the site is cultivated with food crops such as maize and pea. The other part is covered with short blue gum trees that have budded from older stumps. There is also some grass growing underneath the trees called star grass. There is also couch grass growing on areas that are not cultivated. Other crops grown within the vicinity include; kale, cabbage, carrots, green peas, maize and beans. The regenerated blue gum trees will be cut during clearance.

Ground breaking will involve excavation of the top soil to pave way for the construction. Soil excavation process shall be done with utmost care to ensure that the excavated soil is not improperly heaped or carried away by any surface flows to any nearby surface waters causing siltation. The excavated soil will be used to backfill and any remainder shall be disposed appropriately in accordance with the environmental management plan. KPLC safety and environmental policy and other established local environmental protection regulations/standards shall guide the contractor. This will include safety wear at all times and the contractor will appoint a safety officer on site during all construction activities.

Construction Supervision
The proponent will ensure close supervision of the project during construction phase to achieve the following:
• Use of personal protective equipment (such as hand gloves, helmets, safety shoes, ear muffs, overalls and dust coats) by workers at all times.
• Motorized equipment are checked to ensure that they are in good working condition, safe to use and produce minimal noise levels and reduced smoke emission.
• Proper disposal of waste
• Provision of sanitary/toilet facilities for workers
• Provision of first aid kit and firefighting equipment (portable cylinders) which must be placed at strategic positions for access
• Emergency response procedures are in place and all workers are trained in effecting them.
• Any work involving deep excavations, elevated heights and lifting heavy loads, poses a number of risks to personnel. The Contractor shall ensure that personnel are equipped with the correct protective clothing and equipment and are ready to work safely while also safeguarding the environment.

The contractor shall adhere to all requirements set by the proponent and National Environmental Management Authority (NEMA) and any other applicable legislation regarding environmental and social impacts

2.6.2 Operation Phase Activities:
The operation phase of the project will be distribution of power. A substation is a high risk area and no unauthorized person shall be allowed to access the substation. This is in line with company policy to ensure safety of staff and the public. Activities undertaken during operation phase include;
• Periodical maintenance works by authorized staff
• Switching by staff
• Inspections
• Annual environmental and safety audits

2.6.3 Project's Decommissioning Activities
Prior to decommissioning, the proponent shall submit a decommissioning plan to NEMA in good time usually three months. The decommissioning plan shall include a restoration plan. At the decommissioning/demolition phase, the following activities will take place;
• Removal of electrical fittings, bus bars and steel poles/structures
• Removal of transformers and associated switching equipments
• Demolish and carefully handle components that contain oil like the transformer
• Ensure proper handling of the demolished materials alongside an authorized and guided transportation for disposal away from human settlement, water bodies and wildlife conservation area
• Demolish and remove all the concrete works

The proponent shall ensure the site is rehabilitated and restored to its former state through:
• Removal of any soils that may have been impacted by oils or fuels for offsite disposal (away from the project area) remediation.
• Approved and appropriate landscaping methodology.
2.7 Input Materials

It is advised that the construction of the substation should entail quality materials and procedures to ensure quality work, occupational and public safety and environmental sustainability. The following materials will be required for construction:

- Construction materials e.g. sand, cement, natural building stone blocks, hard core, gravel, ballast, timber, nails among others.
- Timber (e.g. doors and frames, fixed furniture, etc.),
- Paints, solvents, white wash, etc.,
- Labour force (of both skilled and unskilled workers).
- Water

Other substation associated facilities

- Two 23 MVA transformers.
- Busbars, switch gears, circuit breakers and capacitors
- Lightning arrestors and steel structures

2.8 Cost of Proposed Project

The estimated cost of installing the substation and associated structures is KES 224,260,104.70.

2.9 Target Group for the EIA Report

This EIA report will be used by different stakeholders that are involved at different phases of the project. The report presents vital information on procedures and plans to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of the project. The information will be useful in planning, implementation, management and maintenance of the substation.

Specifically, the report will be useful to the following stakeholders:

- Interested government ministries and agencies
- The public
- Engineers to be involved in supervision of the construction works.
- Contractors to be engaged in the construction works for the substation;
- Staff that will be involved in the management and operation of the substation.
- Government regulatory agencies such as NEMA and Energy Regulatory Commission (ERC).
CHAPTER THREE: BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction
This chapter provides background information of the district in terms of its administrative units, climate, settlement patterns and the major geographical features. It is worth noting that the project site is in the newly created Lari district. The new district was formerly in Kiambu West district and the baseline information provided is from Kiambu West district development plan. The proposed project will be in Shaka village of Gituamba Location, Lari division of Lari district.

3.2 Location and size
Lari district was one of the divisions in Kiambu West district. The district has an area of 441.4km². The district neighbours Limuru to the south. The district has four divisions namely; Gatamaiyu, Kirenga, Lari and Kijabe.

3.3 Physiographic and Natural Conditions of the project Area
3.3.1 Land and soils
The district is covered by three categories of soils which are high level upland soils, plateau soils and volcanic footbridges soils. These soils are of varying fertility levels with soils from high level uplands which are from volcanic rocks being of high fertility supporting horticulture and forestry. In deed these soils are found in the high lands mostly in Lari division where the project will be located.

3.3.2 Topography
Kiambu West district lies within the altitude 1,500 and 2,550 metres above sea level. It is divided into four broad categories namely upper highland, upper midland, lower highlands and lower midland. Some of the district particularly the upper highland and midland are characterized by steep ranges due to volcanic activities in the Rift valley which passes through the western part of the district.

The upper highland is the main water catchment for Bathi and Gatamaiyu rivers. This area extends from the Aberdare ranges and lies at an altitude 2,550 metres above sea level. It is characterized by highly dissected ranges which are steep and is mainly found in Lari district.

3.3.3 Climate
The district experiences biomodal type of rainfall. The long rains fall between mid March to May and the short rains fall in mid October and November. The annual rainfall varies with altitude, with higher areas receiving as high as 2,000mm and lower areas receiving as low as 600mm. The mean temperature is 26°C with temperatures ranging from 7.1°C in upper highlands to 34°C in the lower midlands of Karai and Kikuyu division. July and August are the months during which the lowest temperatures are experienced whereas January through to March are the hottest months.
3.3.4 Natural resources
Land is the primary resource in the district. The water resource is from two principal sources which are surface and sub surface. Surface water resources is from permanent rivers and springs such as Gatamaiyu, Bathi, Nyamwera, Roromo and Ondiri mainly found in the upper highlands with the rest receiving water from ground water surface. There are swamps such as Ondiri, Nyakumu, Riu, Riu nderi in Kikuyu, Manguo and Roromo in Limuru and Lari in Lari division.

Kiambu West district has forest resources which are natural and manmade and covers about 26,312.9 hectares and mainly found in the upper parts of Lari division. This resource is useful in providing fuel, raw materials for wood products, soil conservation and preservation of water catchment areas.

3.4 Population
The total population of Kiambu West was estimated to be 493,158 at the start of the plan period (2008). The young generation constitutes a high proportion. The population for Lari has been growing over time. At the start of the planning period (2008) the population in Lari was 130,876 and as at July 2012 it was 123,895 which show a decline in population.

3.5 Infrastructure
This sector supports all other sectors and consists of transport, energy, housing, public works and road subsectors. The district has a fair coverage of classified roads with 256kms of bitumen, 255kms gravel surface and 195kms earth surface. The district is well supplied with electricity with 33.7 households connected as at the beginning of the planning period. At the beginning of the planning period kikuyu has 90 km road of bitumen, 80km gravel and 80km earth.

3.6 Trade, Tourism and Industry
The district is predominately agricultural based industries. The district has two milk processing firms that processes the milk produced in the district. The district also has six large tea factories that process and market tea produced in the district. Due to its proximity to Nairobi and the high population both wholesale and retail businesses mostly dealing with households items are thriving. A number of the banking institutions are also found in the district offering the much needed credit for investment.

3.7 Agriculture
The sector comprises agriculture, livestock development, lands, forestry and wildlife and fisheries development sub sectors. The district is basically agricultural with the sector earning the district a lot of income both at the household and institutional levels. The arable land stands at 678.6km² and with the high population; the land is subdivided into small uneconomical units. The sector employs more than 80% of the rural population and therefore contributes greatly to employment in the district. The main food crops grown
are maize, beans, Irish potatoes and vegetables whereas the major cash crops are coffee, tea, pyrethrum, horticultural and flowers.

The main livestock enterprises are dairy, cattle, poultry, pigs and sheep. Production trend for livestock products have been increasing over the last few years. There are local food processing factories such as Farmer’s Choice Ltd, Kenchic Co. Ltd, Githunguri Dairies, Limuru milk processors and Lari dairies.

3.8 Environment, water and sanitation
Kiambu west is served by 6 permanent rivers, 13 water dams and 504 boreholes among other sources. Environmental destruction mostly occurs in the flower farms, tea and coffee factories where they discharge effluents into the environment. Tree felling is rampant thus exposing soil leading to both wind and rain erosion. The dumping site provided by the Limuru municipal council is open and adjacent to residential area therefore exposing the community to danger especially when scavengers descend on the litter making it spill all over. Quarrying is rampant in the district especially in Kikuyu division. These quarries are left open once the resource is depleted. As a result the rain run-off collects in these quarries forming pools that act as breeding place for mosquito and also pose a security risk to the community around.
Map 2: A map showing the Administrative units of Kiambu West District

Figure 3.1 Map showing Lari district
3.9 Socio economic assessment of the potentially affected community

Introduction
This section gives a general description of the area neighboring the proposed site. The site is in an agricultural area. Currently, the proposed site is not tilled and has grass and short blue gum trees that have budded from old tree stumps.

Methodology
Data was collected through observation, discussions and interviews with the respondents/persons living near the proposed site.

Location of the proposed site
The site is along Nairobi-Nakuru highway about 1500m from the famous rift valley view point. The site is located on the left as one goes to Nairobi along the Murram road going to Gituamba secondary school.

Economic activities
People from the area are engaged in different economic activities including; formal employment, farming and businesses. Subsistence arming is mainly practiced and the residents grow kale, cabbages, green peas, carrots, potatoes, maize and beans.

Nature of housing
Most of the residential buildings are made of wood and stone.

Source of water and sanitation
The main source of water within the proposed site is piped water. In fact the pipes pass along the site. There is no water at the substation site and the contractor will either connect water or make hi/her own arrangements during construction.

Land ownership
Land ownership is free hold with most of it owned by individuals. The average land size is about 1 acre.

Sources of energy
The neighbours use different sources of energy mainly paraffin for lighting. The main source of energy for cooking is charcoal, wood and gas. There is demand for electricity. The project comes in handy because demand for electricity in the area continues to increase.
CHAPTER FOUR: RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

4.0 Introduction

There are many environmental problems and challenges in Kenya today. Among the cardinal environmental problems include: loss of biodiversity and habitat, land degradation, land use conflicts, human animal conflicts, water management and environmental pollution. This has been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment.

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economies are based. Environmental Impact Assessment is a useful tool for protection of the environment from the negative effects of developmental activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

Kenya has over 77 statutes which relate to environmental concerns. Most of the statutes are sector specific, covering issues such as land use, occupational health and safety, water quality, wildlife, public health, soil erosion, air quality among others.

4.1 Environmental Policy Framework

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

4.2 Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environment Management Authority (NEMA), the
Forestry Department, Kenya Wildlife Services (KWS) and others. In Kenya, the Environmental Management and Coordination Act (EMCA) of 1999 is the main legislation that deals with EIA studies. In retrospect, the EMCA established various administrative bodies to operationalize EMCA. These include among others:

National Environment Council (NEC) - Is the apex body which among other things is charged with the responsibility of developing the national environmental policy in Kenya and setting annual environmental goals and standards.

The National Environment Management Authority (NEMA) - exercises general supervision and coordination over all matters relating to environment in Kenya.

The Public Complaints Committee (PCC) - investigates environmental complaints against any person, submit their findings/recommendations to NEC.
The objective and purpose for which NEMA was established was to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. However, NEMA’s mandate is designated to the following committees:

### 4.2.2 Provincial and District Environment Committees

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

4.2.3 Public Complaints Committee
The Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Council.
- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and
- To perform such other functions and excise such powers as may be assigned to it by the Council.

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

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

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

4.2.6 National Environment Tribunal
This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya.

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

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

4.3.1 The Environment Management and Co-ordination Act, 1999
The Environmental Management and Coordination Act (EMCA) 1999 is an Act of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

The main objective of the Act is to:
  ▪ Provide guidelines for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya;
  ▪ Provide a framework legislation for over 77 statutes in Kenya that contain environmental provisions;
  ▪ Provide guidelines for Environmental Impact Assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.
The Act empowers the National Environment Management Authority (NEMA) to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies related to the environment.

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 a license as appropriate.

Part VIII section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. Section 73 require that operators of projects which discharges effluent or other pollutants to submit to NEMA accurate information about the quantity and quality of the effluent. Section 74 demands that all effluent generated from point sources be discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities or from the licensee. Finally, section 75 requires that parties operating a sewerage system obtain a discharge license from NEMA to discharge any effluent or pollutant into the environment.

Section 87 Sub-section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a licence. Sections 90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides.

Finally the Environmental Impact Assessment Guidelines require that a study be conducted in accordance with the issues and general guidelines spelt out in the Second and Third schedules of the Environmental Regulations (2003). 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.

Under EMCA 1999 NEMA has developed regulations to establish guidelines for better management of the environment and promote sustainable development. To date, the regulations presented in the following sections have been gazetted.
a) Environmental Impact Assessment and Audit Regulations (2003) Legal Notice No. 101
The Environmental Impact Assessment and Audit Regulations state in Part III Rule No. 6 that an Environmental Impact Assessment study shall be conducted in accordance with the terms of reference developed.

Part III Rule 16, takes into account environmental, social, cultural, economic, and legal considerations, and shall:

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

The Proponent has commissioned the Environmental Impact Assessment study in compliance with the Act. The environmental management and monitoring plan laid out in this report shall be adhered to by the Proponent.

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

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

The regulations outline:

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

This Legal Notice on Water Quality provides that anyone who discharges effluent into the environment or public sewer shall be required to apply for Effluent Discharge License. The license for discharge is Ksh 5,000 while annual license fee for discharge into the environment will be Ksh. 20,000 or Ksh 100,000 depending on the facility. Non compliance with the regulations attracts a fine not exceeding Ksh 500,000 and the polluter pay
principle may apply depending on the court ruling. Table 4-1, gives Waste Water Discharge Guidelines from NEMA.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Discharge into public sewers</th>
<th>Discharge into open water bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH</td>
<td>-</td>
<td>6.0 – 9.0</td>
<td>6.0 – 9.0</td>
</tr>
<tr>
<td>BOD (5 days at 20°C) not to exceed</td>
<td>Mg/l</td>
<td>500</td>
<td>20</td>
</tr>
<tr>
<td>COD not to exceed</td>
<td>Mg/l</td>
<td>1000</td>
<td>50</td>
</tr>
<tr>
<td>Total suspended solids not to exceed</td>
<td>Mg/l</td>
<td>500</td>
<td>30</td>
</tr>
<tr>
<td>n-hexane extract not to exceed</td>
<td>Mg/l</td>
<td>Nil</td>
<td>30</td>
</tr>
<tr>
<td>Oils(mineral, animal &amp; vegetable)</td>
<td>Mg/l</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Total phenol not to exceed</td>
<td>Mg/l</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Copper (Cu) not to exceed</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Zinc (Zn) not to exceed</td>
<td>Mg/l</td>
<td>5.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Lead (Pb) not to exceed</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Arsenic (As) not to exceed</td>
<td>Mg/l</td>
<td>0.2</td>
<td>0.002</td>
</tr>
<tr>
<td>Total Mercury (Hg) not to exceed</td>
<td>Mg/l</td>
<td>0.05</td>
<td>0.005</td>
</tr>
<tr>
<td>Alkyl mercury not to exceed</td>
<td>Mg/l</td>
<td>0.01</td>
<td>0.001</td>
</tr>
<tr>
<td>PCB (Polychlorinated biphenyl) not to exceed</td>
<td>Mg/l</td>
<td>Nil</td>
<td>0.003</td>
</tr>
<tr>
<td>Pesticides residues not to exceed</td>
<td>Mg/l</td>
<td>Nil</td>
<td>0.05</td>
</tr>
<tr>
<td>Sulphates not to exceed</td>
<td>Mg/l</td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>Dissolved manganese (Mn)</td>
<td>Mg/l</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>Chromium (total)</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Chloride not to exceed</td>
<td>Mg/l</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Fluoride not to exceed</td>
<td>Mg/l</td>
<td>-</td>
<td>2.0</td>
</tr>
<tr>
<td>Coliform bacteria</td>
<td>-</td>
<td>1000/100ml</td>
<td></td>
</tr>
<tr>
<td>Free ammonia not to exceed</td>
<td>Mg/l</td>
<td>2.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Sulphides (S) not to exceed</td>
<td>Mg/l</td>
<td>2.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Cadmium (Cd) not to exceed</td>
<td>Mg/l</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Cyanide (CN) total not to exceed</td>
<td>Mg/l</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Organic phosphorous not to exceed</td>
<td>Mg/l</td>
<td>30</td>
<td>1.0</td>
</tr>
<tr>
<td>Chromium six (Cr 6) not to exceed</td>
<td>Mg/l</td>
<td>0.5</td>
<td>0.005</td>
</tr>
<tr>
<td>Total dissolved solids not to exceed</td>
<td>Mg/l</td>
<td>3000</td>
<td>1200</td>
</tr>
<tr>
<td>Selenium (Se) not to exceed</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Nickel (Ni) not to exceed</td>
<td>Mg/l</td>
<td>3.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Barium (Ba) not to exceed</td>
<td>Mg/l</td>
<td>10</td>
<td>2.0</td>
</tr>
<tr>
<td>Temperature not to exceed</td>
<td>-</td>
<td>+/- 2° of the ambient</td>
<td>+/- 2° C of ambient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>temperature of the sewer</td>
<td>temperature of the water body</td>
</tr>
<tr>
<td>Oil/ grease</td>
<td>Mg/l</td>
<td>No trace</td>
<td>Nil/ no trace</td>
</tr>
<tr>
<td>Toxic substances</td>
<td>Mg/l</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Odour</td>
<td>-</td>
<td>-</td>
<td>Not objectionable to the nose</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>Not objectionable to the eye</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or not to exceed 5 mg Pt/l</td>
</tr>
<tr>
<td>Colour</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

C) Environmental Management and Coordination (Waste Management) Regulation 2006
These regulations are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69, September 2006. These Regulations apply to all categories of waste as provided in the regulations. These include:

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

These Regulations outline requirements for handling, storing, transporting, and treatment/disposal of all waste categories as provided therein.

The regulation provides that a waste generator shall use cleaner production methods, segregate waste generated and the waste transporter should be licensed. The notice further states no person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment licence issued by the National Environment Management Authority.

**a) Environmental Management and Coordination, (Conservation of Biological Diversity) (BD) Regulations 2006**

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84, December 2006. These regulations apply to conservation of biodiversity which includes conservation of threatened species, inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

Additionally, these links provide for the local enforcement of the International Convention on Biological Diversity (CBD).

*The proposed site has no rich biodiversity and there is no known rare or endangered species in the site.*

**b) Environmental Management and Coordination, (Fossil Fuel Emission Control) Regulations 2006**

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement No. 74, October 2006. These regulations include internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnership to control fossil fuel emissions. The fossil fuels considered are petrol, diesel, fuel oils and kerosene.

*This legislation gives caution to proponent and contractor on careless handling of fuels and possible consequences for failing to observe.*
c) Environmental Management and Coordination, (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009

These regulations are described in Legal Notice No. 19 of the Kenya Gazette Supplement No. 9, February 2009. These regulations include management of wetlands, wetland resources, river banks, lake shores and sea shores. Specific sections have requirements that apply to wetlands in Kenya either in private or public land. These regulations empower the District Environment Committee to co-ordinate, monitor and advise on all aspects of wetland resource management within the district.

d) Environmental Management and Coordination, (Noise and Excessive Vibration Pollution) Regulations 2009

These regulations are described in Legal Notice No. 31 of the Kenya Gazette Supplement No. 21, May 2009. These regulation prohibit any person from making or causing to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. It also prohibits excessive vibration which annoys, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source.

Part 11 section 6(1) provides that no person shall cause noise from any source which exceeds any sound level as set out in the First Schedule of the regulations.

Rules 5 and 6 of the regulations define noise levels for various types of activities that generate noise. The first schedule to the regulations defines permissible noise levels and is reproduced below.

The regulation in addition specifies that a noise license will be required during the construction and operational phase of a project if such equipment that will produce noise during these two phases will be used.

There will be need for the contractor to apply for a noise license from the NEMA during the construction phase of the project.
Table 0-2: Permissible Noise Levels

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sound Level limits(dBA) (leq, 14h)</th>
<th>Noise Rating Level (NR) (leq, 14h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Night</td>
</tr>
<tr>
<td>A.</td>
<td>Silent Zone</td>
<td>40</td>
</tr>
<tr>
<td>B.</td>
<td>Places of Worship</td>
<td>40</td>
</tr>
<tr>
<td>C.</td>
<td>Residential: Indoor</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Outdoor</td>
<td>50</td>
</tr>
<tr>
<td>D.</td>
<td>Mixed residential (with some commercial and places of entertainment)</td>
<td>55</td>
</tr>
<tr>
<td>E.</td>
<td>Commercial</td>
<td>60</td>
</tr>
</tbody>
</table>

This regulation guides on permissible noise levels during construction, operation and decommissioning phases.

4.3.2 Public Health Act (Cap. 242)

This is an Act of Parliament to make provisions for securing and maintaining health. Sections include those dealing with notification of infectious diseases; inspection of infected premises and examination of persons suspected to be suffering from infectious diseases; rules for prevention of diseases; venereal diseases and infection by employees, among others. The proposed project will encourage the movement of people in search of jobs and opportunities, and with this, the risk associated with spread of diseases.

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

The environmental management plan (EMP) advises the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost.

4.3.3 Local Government Act (Rev. 1998)

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

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

The Act under section 176 gives powers to local authority to regulate sewage and drainage, fix charges for use of sewers and drains and require connecting premises to meet the related costs. According to section 174, any charges so collected shall be deemed to be charges for sanitary services and will be recoverable from the premise owner connected to the facility. Section 20 also requires that all charges due for sewage sanitary and refuse removal shall be recovered jointly and severally from the owner and occupier of the premises in respect of which the services were rendered. This in part allows for application of the “polluter-pays-principle”

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

Part XI section 168 provides that every municipal council, town council or urban council may establish and maintain sewerage and drainage works within or without its area of jurisdiction. For purposes of the land required for such development, section 144 states in part “A local authority may, subject to the approval of the Minister, apply to the government or any other authority having power to acquire land required for purposes of any of its functions, to be acquired compulsorily for and on behalf of, and at the expense of the local authority”. The Act, however, does not indicate the repercussions of impacts on landowners.

Section 160 helps local authorities ensure effective utilization of the sewerage systems. It states in part that municipal authorities have powers to establish and maintain sanitary services for the removal and destruction of, or otherwise deal with all kinds of refuse and effluent and where such service is established, compel its use by persons to whom the service is available. However, to protect against illegal connections, section 173 states that any person who, without prior consent in writing from the council, erects a building on: excavate or opens-up: or injures or destroys any sewers, drains or pipes shall be guilty of an offence. Any demolitions and repairs thereof shall be carried out at the expense of the offender.

For maintenance of such sewerage systems, the following relevant clauses have been drawn from section 169 of the Act that reads in part “A municipal council may for purposes of carrying out any drainage or sewerage works------”: 
“--------cause such sewers, drains and pipes to be made, altered, deepened, covered, laid
and maintained either within or without as may be necessary for effectively disposing of
the sewage and draining of its area -------“

“--------carry such sewers, drains and pipes through, across, or under any public road,
street, square or open place laid out for public road, street, square or open space without
paying compensation and after giving 30 days notices in writing to the owner or occupier of
the intention to do so ------“

“--------from time to time alter, enlarge, divert, discontinue, close-up or destroy any
sewers, drains, or pipes under its control ------“

Section 170, allows the right of access to private property at all times by local authorities,
its officers and servants for purposes of inspection, maintenance and alteration or repairs.
In addition, the municipal Council may establish and maintain sewage farms or disposal
works, and dispose of the effluent therefrom, but shall not be liable for any nuisance or
damage as a consequence of proper and ordinary conduct of the sewage farms or disposal
works (section 171). To ensure sustainability in this regard, the local authority is
empowered to make by-laws in respect of all such matters as are necessary or desirable
for the maintenance of health, safety and wellbeing of the inhabitants of its area as
provided for under section 201 of the Act.

To ensure sustainability in this regard, the local authority is empowered to make by-laws
in respect of all such matters as are necessary or desirable for the maintenance of health,
safety and wellbeing of the inhabitants of its area as provided for under section 201 of the
Act.

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 recommendations provided for
mitigation/minimisation/avoidance of adverse impacts arising from the project activities.

4.3.4 Physical Planning Act, 1996

The Local Authorities are empowered under section 29 of the Act to reserve and maintain
all land planned for open spaces, parks, urban forests and green belts. The same section,
therefore allows for the prohibition or control of the use and development of land and
buildings in the interest of proper and orderly development of an area.

Section 24 of the Physical Planning Act gives provision for the development of local
physical development plan for guiding and coordinating development of infrastructure
facilities and services within the area of authority of County, municipal and town council
and for specific control of the use and development of land. The plan shows the manner in
which the land in the area may be used.

Section 29 of the physical Planning Act gives county councils power to prohibit and control
the use of land, building, and subdivision of land, in the interest of proper and orderly
development of its area. The same section also allows them to approve all development
applications and grant development permissions as well as to ensure the proper execution
and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The Environmental Impact Assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to it’s original conditions.

*The Proponent has applied for Development Permission from the local authority and has also commissioned an Environmental Impact Assessment study for approval by NEMA.*

4.3.4 Land Planning Act (Cap. 303)
Section 9 of the subsidiary legislation (The Development and Use of Land Regulations, 1961) under this Act requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to involve the owners of any land affected by such plans.

*The proponent working towards getting clearance as concerns the intended project and existing development plans.*

4.3.5 Water Act, 2002
The Act vests the water in the State and gives the provisions for the water management, including irrigation water, pollution, drainage, flood control and abstraction. It is the main legislation governing the use of water especially through permit system.
Part II, section 18, of the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRMA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the authority.

The Water Act Cap 372 vests the rights of all water to the state, and the power for the control of all body of water with the Minister, the powers is exercised through the Minister and the Director of water resources in consultation with the water catchments boards, it aims at provision of conservation of water and appointment and use of water resources.

Part II Section 18 provides for national monitoring and information systems on water resources. Following on this, Sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand.

Section 20 of the Act requires a permit to be obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an Environmental Impact Assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act.

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water which he is authorised to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law will apply accordingly under the supervision of the Regulatory Board.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including the payment rates for the discharge as may be provided under section 77 of the same Act.

*Construction of access road will ensure leveling and soil erosion prevention measures. All construction, operation and decommissioning phases will take caution to contain oil spills to prevent soil and water pollution.*
4.3.6 Energy Act of 2006

This is an Act of Parliament passed to amend and consolidates the law relating to energy, to provide for the establishment, powers and functions of the Energy Regulatory Commission and the Rural Electrification Authority and for connected purposes.

The Energy Act of 2006 replaced the Electric Power Act of 1997 and The Petroleum Act, Cap 116. The Energy Act, amongst other issues, deals with all matters relating to all forms of energy including the generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes.

The Energy Act, 2006, also established the Energy Regulatory Commission (ERC) whose mandate is to regulate all functions and players in the Energy sector. One of the duties of the ERC is to ensure compliance with Environmental, Health and Safety Standards in the Energy Sector, as empowered by Section 98 of the Energy Act, 2006.

In this respect, the following environmental issues will be considered before approval is granted:

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

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

Part IV Section 80(1) provides that a person shall not conduct a business of importation, refining, exportation, whole sale, retail, storage or transportation of petroleum, except under and in accordance with the terms and conditions of a valid licence.

Part IV Section 90 (1) stipulates that a person intending to construct a pipeline, refinery, bulk storage facility or retail dispensing site shall before commencing such construction, apply in writing to the Energy Regulatory commission for a permit to do so. The application shall: specify the name and address of the proposed owner; be accompanied by three (3) copies of plans and specifications and be accompanied by an Environmental Impact Assessment (EIA) Report.

Part IV section 91(1) stipulates that the Energy Regulatory Commission shall, before issuing a permit under section 90, take into account all relevant factors including the relevant government policies and compliance with Environment Management and Coordination Act, 1999 and in particular EIA report as per Impact Assessment and Audit Regulations 2003, the Physical Planning Act, 1996 and the Local Government Act.

Part iv section 100 (1) provides that it is an offence if a person being the owner or operator of a refinery, pipeline, bulk liquefied Petroleum gas or natural gas facility, service station, filling station or storage depot, fails to institute appropriate environmental, health or safety control measures. The offence if convicted, he/she shall
be liable to a fine not exceeding two million shillings or to a maximum term of imprisonment of two years, or to both.

The proposed project will be required to follow the guidelines set out in this Act.

4.3.7 The Standards Act Cap 496
The Act is meant to promote the standardization of the specification of commodities, and code of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control.

The proponent will ensure that commodities and codes of practice utilized in the project adhere to the provisions of this Act.

All materials and spares used to construct the substation will comply with the Standardized specifications and Certification.

4.3.8 Penal Code Act (Cap.63)
Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighborhood or those passing along public way, commits 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/minimisation/avoidance of adverse impacts arising from the project activities.

4.3.9 The Wildlife Conservation and Management Act, Cap 376

This Act provides for the protection, conservation and management of wildlife in Kenya. The provisions of this Act should be applied in the management of the project.

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

The proposed project is not located within a conservation/protected area and this act will not be triggered by the project at the stages.

4.3.10 The Lakes and Rivers Act Chapter 409 Laws of Kenya:
This Act provides for protection of rivers, lakes and associated flora and fauna. The provisions of this Act may be applied in the management of the project.

4.3.11 The Forestry Services Act, 2005
The Act led to the establishment of Kenya Forest Service which is charged with management of forests in consultation with the forest owners. The body enforces the conditions and regulations pertaining to logging, charcoal making and other forest utilization activities.
To ensure community participation in forest management, the service collaborates with other organizations and communities in the management and conservation of forests and for the utilization of the biodiversity.
Section 43 (1) provides that if mining, quarrying or any other activity carried out in the forest, where the activity concerned is likely to result in forest cover depletion, the person responsible shall undertake compulsory re-vegetation immediately upon the completion of the activity.

The proposed project does not traverse any gazetted forest nor any conservation area hence the Act will not be triggered but the proponent will adhere to recommendations in the EMP in regards to vegetation clearance in the private farms and the provisions of this act will be observed where applicable.

4.3.12 Occupational Safety and Health Act, 2007
This is an Act of parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently.

The purpose of the Act is to:
- Secure the safety, health and welfare of persons at work;
- Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work.

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

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

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

4.3.15 Welfare
An adequate supply of both quantity and quality of wholesome drinking water must be provided. Maintenance of suitable washing facilities, accommodation for clothing not worn during working hours must be provided. Sitting facilities for all female workers whose work is done while standing should be provided to enable them take advantage of any opportunity for resting.

Every premise shall be provided with maintenance, readily accessible means for extinguishing fire and person trained in the correct use of such means shall be present during all working periods.

Regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earning for the employees and if possible within normal working hours.

The (OSH) Act provides for development and maintenance of an effective programme of collection, compilation and analysis of occupational safety. This will ensure that health
statistics, which shall cover injuries and illness including disabling during working hours, are adhered.

The environmental management plan (EMP) advises the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost.

4.3.16 Work Injury and Benefits Act, 2007
This Act provides for compensation to employees for work related injuries and disease contracted in the course of their employment and for connected purposes. Key sections of the Act include the obligations of employers; right to compensation; reporting of accidents; compensation; occupational diseases; medical aid etc. In case of any accidents or incidents during the project cycle, this Act will guide the course of action to be taken.

4.3.17 Occupiers Liability Act (Cap. 34)
This Act provides that it’s the duty of occupier of the premises owes to his visitors in respect of danger and risk due to the state of the premises or to things omitted or attributes an affliction on his/her health to a toxic materials in the premises.

4.3.18 The Radiation Protection Act (Cap 243 Laws of Kenya)
This is an Act of Parliament to provide for the protection of the public and radiation workers from the dangers arising from the use of devices or material capable of producing ionizing radiation and for connected purposes.

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

The Act prohibits the unauthorized manufacture, production, possession or use, sale, disposal, lease, loan or dealership, import, export of any irradiating device or radioactive material. All authorized buyers, sellers, users, of such device must be properly licensed. The Act is administered by the Chief Radiation Protection Officer assisted by a Radiation Protection Board.

The proposed project won’t emit/produce ionizing radiations.

4.3.19 The Traffic Act Chapter 295 Laws of Kenya
This Act consolidates the law relating to traffic on all public roads. Key sections include registration and licensing of vehicles; driving licenses; driving and other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other
than motor vehicles and other road users. Many types of equipment and fuel shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the stipulated road regulations.

The Act also prohibits encroachment on and damage to roads including land reserved for roads. *The project will observe the provisions of the Act.*

**4.3.20 The Public Roads and Roads of Access Act (Cap 22 Laws of Kenya)**

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

The project design concept has left the required road reserves and relevant road widening surrenders. This Act consolidates the law relating to traffic on all public roads. The Act also prohibits encroachment on and damage to roads including land reserved for roads.

*The proposed facility location complies with the provision of the Act.*

**4.3.21 The Way leaves Act Cap 292**

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

*The proposed substation will not trigger the act. No compensation will arise because the land has been purchased through open tender on willing seller willing buyer basis hence all aspects of the act have been adequately addressed.*

**4.3.22 The Agriculture Act, Cap 318 of 1980 (revised 1986)**

This Act has stated objectives to promote and sustain agricultural production, provide for conservation of the soil and its fertility, and stimulate the development of agricultural land in accordance with accepted practices of good land management and good husbandry.
The proposed project will not trigger the Act. Any aspects which may affect farms, recommendations to mitigate the impacts have been adequately addressed in the ESMP.

4.3.23 Antiquities and Monuments Act, 1983 (Cap 215)
This Act aims to preserve Kenya's national heritage. Kenya is rich in its antiquities, monuments and cultural and natural sites which are spread all over the country. The National Museums is the custodian of the country’s cultural heritage. Through the National Museums many of these sites are protected by law by having them gazette under the Act.

The Act will not be triggered because there are no known monuments, cultural and natural sites along the proposed project area.

4.3.24 The Registration of Titles Act Cap 281
This Act provides for the transfer of the land by registration of tittles. Parts within the Act elaborate on mechanisms of bringing lands under the Act, and for related purposes. The Act also elaborates on the incorporation of group representatives and the administration of groups.

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

The Act will be applicable because the Proponent has already purchased land from the owner on willing seller willing buyer basis. The land title has already been transferred to Kenya Power.

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

4.3.26 The Land Acquisition Act Chapter 295 Laws of Kenya

The Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. Section 3 states that when the Minister is satisfied on the need for acquisition, notice will be issued through the Kenya Gazette and copies delivered to all the persons affected. Full compensation for any damage resulting from the entry onto land, to do 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:

(i) Area of land acquired
(ii) The value of the property in the opinion of the Commissioner of land (after valuation),
(iii) Amount of the compensation payable,
(iv) Market value of the property,
(v) Damages sustained from the severance of the land parcel from the land,
(vi) Damages to other property in the process of acquiring the said land parcel,
(vii) Consequences of changing residence or place of business by the land owners,
(viii) Damages from diminution of profits of the land acquired.

Part II of the Act allows for the temporary acquisition of the land for utilisation in promotion of the public good for periods not exceeding 5 years. At the expiry of the period, the Commissioner of Land shall vacate the land and undertake to restore the land to the conditions it was before. Any damages or reduction of value shall be compensated to the landowners.

4.3.27 The Civil Aviation Act Cap 394

Under this act, the Kenya Civil Aviation Authority (KCAA) has to authorize and approve the height of Transmission lines and masts when they are on or proximal to flight Paths so as to ensure the safety of flying aircraft.

Under Section 9 of this act, notwithstanding the provisions of any written law, or terms of any deed, grant, lease, or license concerning the use and occupation of land, the minister may, where he considers it to be necessary in the interests of air navigation, by order published in the Gazzette, prohibit the erection within a declared area of any structure above height specified in the order.

Failure to adhere to the provisions of this act, one commits an offence and upon conviction shall be liable to a fine not exceeding two million shillings or to imprisonment for a term not exceeding three years or to both.
4.4 World Bank /IFC Environment and Social Safeguards Policies

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

The Safeguard Policies aims at improving decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted.

4.4.1 Environment Assessment (Operational Policy, OP/BP 4.01)

The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is considered to be the umbrella policy for the Bank’s environmental ‘safeguard policies’.

The proposed project triggers this policy because although there is justification of the proposed substation, there are environmental and social concerns associated with the construction and operation of the proposed project.

4.4.2 Natural Habitats (Operational Policy, OP/BP 4.04)

This policy recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and most native species.

The proposed project doesn't trigger this policy because the project won’t cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project). The area is private owned land. The substation will pose insignificant environmental impacts.

4.4.3 Indigenous Peoples (Operational Policy 4.10)

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

The policy is not triggered for this sub-project as there are no Indigenous Peoples (defined in the Project Appraisal Document for KEEP as the Sengwer, Ogiek, Waata, and Boni peoples) that are affected in the project area.

4.4.4 Physical Cultural Resources (Operational Policy 4.11)
The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, “physical cultural resources” are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community.

The policy will not be triggered because the proposed project is not in the vicinity of, any recognized cultural heritage, archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance sites.

4.4.5 Involuntary Resettlement (Operational Policy, OP/BP 4.12)
The objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; (iii) encourage community participation in planning and implementing resettlement; and (iv) provide assistance to affected people regardless of the legality of land tenure.

The policy will not be triggered because no household will have to be relocated since the substation will not be constructed close to any community houses, businesses or any industrial establishments within the locality.

4.4.6 Forests (Operational Policy, OP/BP 4.36)
The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank assists borrowers with the establishment of environmentally appropriate, socially beneficial and economically viable forest plantations to help meet growing demands for forest goods and services.
This policy will be not be triggered because proposed route does not pass next any gazette forest or any National Park (Forest).

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

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

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

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

*Kenya has a duty under these multilateral agreements. The project should adhere to strict guidelines and procedures to ensure the agreements are not violated.*
CHAPTER FIVE: PUBLIC AND STAKEHOLDERS CONSULTATION

5.1 Introduction
This chapter discusses stakeholders’ engagement commonly referred to as consultations by the EIA team/experts. EMCA, 1999 and EIA/EA Regulations 2003 require the experts conducting environmental impact assessment to undertake public consultation.

5.2 Objective of Public and Stakeholders Consultation
The overall objective of consultation in the EIA process is to provide an opportunity to share information about the proposed project and receive feedback from the stakeholders and the public.

The objectives of public participation are to identify potentially affected persons and stakeholders and explain to them the project. Further, stakeholder engagement allows them an opportunity to provide input/opinions and comment on the project during the EIA process. It also provides a forum for creating awareness to the public and other parties on positive and negative impacts of the proposed project. The opinions received including alternatives to the project and any other inputs/advice at this planning level facilitates informed decision-making. In complying with the public participation process (PPP) for the EIA consultations were done at various levels.

5.3 Sources of Information
The main sources of information for the public participation are different stakeholders and the public. Stakeholders are persons with an interest in the project such as project beneficiaries, government ministries and the general public. Public consultation was done at different levels in a bid to engage the different stakeholders appropriately. These consultations were undertaken with the help of the provincial administration.

5.4 Key government ministries/Departmental heads consultations
Stakeholder engagement began at the district commissioner’s office in Lari. The EIA team explained the project to the D.C. the team went ahead and explained the same to the District development officer, education officer, youth fund officer and forester.

5.5 Local community and Stakeholder Consultation
Consultations done at the community level involved liaising with the provincial administration (chief) to organize a public baraza for persons living in the sub location in which the proposed site lies. During the baraza the EIA team explained the need for the project, EIA, positive impacts, negative impacts and mitigation measures for the negative impacts among others. Further, the public were engaged in a discussion by the EIA team through question and answer session. A pre-designed questionnaire was also used to gather individual opinions and suggestions.
5.6 Comments and Responses from the consultations

During consultations the scope of activities associated with the project were presented by EIA experts to the stakeholders and the public. The concerned were then asked to make suggestions, comments and ask questions in regard to the project. All comments received on the consultation were incorporated into the final impact assessment Report.

Some of comments received from the public regarding the proposed project are listed below;

**Anticipated Positive Impacts**
- Employment opportunities
- Reduced blackouts
- Enhancement of security through security light
- Connection to three phase
- 24 hour supply of electricity
- Our children can have extended time for study

**Negative Issues**
- Vehicles coming to site may create a nuisance
- Noise during construction
- Dust pollution
- Exposure to electrocution
- Fires
- New people coming to the area
- Possibility of sexually transmitted diseases
- Unwanted pregnancy
- Cutting of trees

The following suggestions were raised during stakeholders’ consultation meetings:
- KPLC should ensure community is protected from exploitative contractors
- Unskilled and semi-skilled jobs must be given to the local people.
- Control dust levels
- Give the women the trees (rafters) to use as firewood that will be cut from the proposed site.
- The proponent should put up security lights
- Put danger signs to warn the public to keep off.

The consultation process gave a go ahead to the proposed project provided the negative impacts will be mitigated.
CHAPTER SIX: IDENTIFICATION AND ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

6.0 Introduction
This Section identifies and discusses both negative and positive impacts associated with the proposed construction of 2*23MVA 66 /11 kV Substation. The impacts are identified across the three phases namely: Construction Phase, Operational Phase and Decommissioning Phase.

Environmental impacts may result from the activities that are undertaken during the construction, operation and decommissioning of the substation and associated power-lines.

6.1 Impact Identification and Assessment
Several environmental impacts (positive and negative) associated with the proposed project were identified through public participation process and through the use of experts’ judgment method. The following section highlights the impacts anticipated throughout the lifecycle of the proposed project. The associated impact assessment tables for each impact will be categorized according to project phases, prior to and post mitigation. Effects of activities are categorized as negative impact or positive impact.

The summary of the main potential impacts of the proposed project are listed in Table below and have been analyzed into different categories based on stakeholder’s views and perceptions as well as the consultant’s previous experience in undertaking EIA of similar nature. The project impacts are classified as positive or negative. However the study goes further to categorize the impacts in terms of direct or indirect, temporary or permanent, major or minor.

Table 6-1: Summary of Project Potential Impacts

<table>
<thead>
<tr>
<th>Environmental &amp; Social Impact</th>
<th>Positive/ Negative</th>
<th>Direct/ Indirect</th>
<th>Temporary/ Permanent</th>
<th>Major/ Minor</th>
<th>Occurrence</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Opportunities</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent/ Temporary</td>
<td>Major</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Gains in the Local and National Economy</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Provision of Market for Supply of Building Materials</td>
<td>Positive</td>
<td>Direct</td>
<td>Temporary</td>
<td>Major</td>
<td>✓</td>
<td>x</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Informal Sectors Benefits</td>
<td>Positive</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td>✓</td>
<td>x</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Environmental Benefits</td>
<td>Positive</td>
<td>Indirect</td>
<td>Permanent</td>
<td>Minor</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Noise pollution &amp; increased vibration</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Environmental &amp; Social Impact</td>
<td>Positive/Negative</td>
<td>Direct/Indirect</td>
<td>Temporary/Permanent</td>
<td>Major/Minor</td>
<td>Occurrence</td>
<td>Construction</td>
<td>Operation</td>
<td>Decommissioning</td>
</tr>
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</tr>
<tr>
<td>Generation of Exhaust Emissions</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Dust Emissions</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td>√</td>
<td>√</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Disposal of Excavated Soil</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td>√</td>
<td>√</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Increased water demand</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>x</td>
</tr>
<tr>
<td>Workers accidents and hazards</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Energy (Transformer oil) Consumption</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>x</td>
<td>√</td>
<td>x</td>
<td>X</td>
</tr>
<tr>
<td>Extraction and Use of Building Materials</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td>√</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Solid Waste Generation</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Liquid Waste Generation</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Possible Exposure of Workers to Diseases</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Increased Storm Water Runoff from New Impervious Areas</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Soil Erosion</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td>√</td>
<td>x</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Oil Spills Hazards</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Destruction of existing vegetation</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
<td>√</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Fire Outbreaks</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Major</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Quality electricity supply</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>x</td>
<td>√</td>
<td>x</td>
<td>X</td>
</tr>
<tr>
<td>Increased Population around the project area</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent/Temporary</td>
<td>Minor</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Visual Impacts</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

### 6.1.1 Positive Impacts during Construction Phase

The positive impacts associated with the proposed 66/11 kV substation during construction phase are as discussed below;

**Employment Opportunities**

With the construction of 66/11 kV substation there will be employment opportunities especially for casual workers from the local community. Creation of employment opportunities has both economic and social benefit. In the economic benefit, abundant unskilled labour will be used in economic production while socially these young and
energetic otherwise poor people will be engaged in productive employment other than remaining idle. Employees with diverse skills are expected to work on the site during the construction period.

**Gains in the Local and National Economy**

There will be gains in the local and national economy as a result of the construction of the proposed substation, through consumption of locally available materials including: timber, glasses, metals, and cement among other construction materials. The consumption of these materials in addition to fuel oil and others will attract taxes including Value Added Tax (VAT) which will be payable to the government. The cost of the materials will be payable directly to the producers.

**Provision of Market for Supply of Building Materials**

The project will require supply of large quantities of building materials most of which will be sourced locally from the surrounding areas especially Naivasha and Kimende towns. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

**Informal Sectors Benefits**

During construction phase of proposed Uplands 2*23MVA 66/11 kV substation; the informal sectors are temporarily likely to benefit from the operations. This will involve kiosk operators who will be selling food to the construction workers on site. This will finally promote Jua Kali entrepreneurs in the area during the operation period.

**Environmental Benefits**

The proposed uplands 66/11 kV substation has a potential for contributing to the good of the environment of the area. Quality supply of power will be enhanced hence reduction in reliance on other sources of energy that have impacts on the forest cover and greenhouse.

**6.1.2 Negative Impacts during Construction Phase**

**Noise pollution**

The construction works of the proposed Uplands 66/11 kV substation is most likely to produce noise due to operation of the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials to site. The construction workers who will be working in the site will generate some noise as they are communicating to one another.

**Generation of Exhaust Emissions**

Exhaust emissions are likely to be generated by the construction equipment during the construction phase. Motor vehicles that will be used to ferry construction materials will cause air quality impact by emitting pollutants through exhaust emissions.

**Dust Emissions**

Particulate matter pollution is likely to occur during the site clearance, excavation and spreading of the topsoil during construction stage.
**Increased water demand**
During the construction phase of the proposed substation, both the construction workers and works will be using water that will cause additional demand in addition to the existing demands. Water will be mostly used in mixing concrete for construction works and for wetting surfaces or cleaning completed structures. It will also be used by the construction workers to wash themselves and even drink.

**Workers accidents and hazards during construction**
During construction of the proposed substation, it is expected that construction workers especially non-skilled casuals are likely to have accidental injuries and hazards. Because of these intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from hand tools. Falling objects and construction equipment cuts from sharp objects.

**Solid Waste Generation**
During construction of the proposed substation, there will be generation of solid waste. These wastes include papers used for packing cement, plastics, metal scraps and timber remains among others. Dumping of these wastes around the proposed project site will interfere with the aesthetic status of the area.

**Possible Exposure of Workers to Diseases**
Workers are likely to be exposed to diseases from building materials during the construction phase of the proposed substation. It is therefore recommended that before the construction phase of the proposed substation commences, there is need for the construction materials to be well inspected according to the occupational health and safety standards and worker encouraged to use personal protective equipments.

**Increased Storm Water Runoff from New Impervious Areas**
Construction of the proposed substation buildings, pavements and its associated structures within the proposed project site will lead to additional runoff through creation of impervious areas and compaction of soils. Impervious areas and compacted soils generally have higher runoff coefficients than natural area, and increased flood peaks are a common occurrence in developed areas.

**Soil Erosion**
There are possibilities of soil erosion occurring during the construction of the proposed substation especially during rainy and windy seasons. The impact will however be minimal as there area to be disturbed for the proposed development is small.
Oil Spills Hazards
The construction machines on the proposed site may be containing moving parts which will require continuous oiling to minimise the usual corrosion or wear and tear. This will contaminate the soil. Likewise, moving vehicles on site may require oil change.

Destruction of existing vegetation
The construction process of the proposed substation buildings and other associated facilities and structures will involve clearing of the existing vegetation cover (mainly grass) and some small Eucalyptus trees which have regenerated.

Surface and ground water Hydrology and Water Quality Degradation
Changes in surface hydrology alter the flow of water through the landscape. Construction of impervious surfaces such as transformers sites, cabling trenches, parking lots, walking pavements, roads and buildings might increase the volume and rate of runoff, resulting in habitat destruction, increased pollutant loads, and flooding. Contaminated soil or ground water in the path of the project could be disturbed by excavation resulting in a potential transfer of the contamination to surface waters. Oil spills during construction could introduce contaminants into subsurface which may end-up into ground water.

Fire Outbreaks
Due to various construction activities at the proposed substation project, fire outbreaks can occur. Handling of inflammable products increases fire risks like the transformer oil. The impact will be direct, temporary and major.

6.1.3 Positive Impacts during Operation Phase
Like construction phase, there are positive impacts associated with the proposed substation during operation phase. These positive impacts are discussed below.

Quality electricity supply
The existing distribution system capacity in Lari District and its environment has been constrained during the peak hours when system voltage do drop below acceptable levels, occasioning load shedding despite availability of generation capacity. This could be sorted by establishing and constructing new high voltage line that will be stepped down at the proposed Uplands substation so as to enhance quality electricity supply in Lari District and its environments.

Employment Opportunities
Employment opportunities are one of the long-term major positive impacts of the proposed substation. This will occur during the operation and maintenance of the proposed substation. These will involve security personnel that will be employed to look after the proposed substation. Other sources kinds of employment include electrical engineers, civil engineers, mechanical engineers, drivers among others.
Increase in Revenue
There will be positive gain for the revenue system arising from the step down and distribution of the electricity power from the proposed substation to Government, the suppliers and KPLC. This will in turn be supplied to various customers who will be paying taxes to the Government.

Improved Security
With the establishment of the proposed substation, the level of security will be improved around the project area. This is as a result of more security lights and security personnel being employed to guard the proposed substation. The project site will also be well fenced. Hence if the level of security is increased, the residents will feel more secure than before.

6.1.4 Negative Impacts during Operation Phase
The following are the negative impacts that are associated with the proposed substation during the operation phase.

Solid Waste Generation
The proposed substation is expected to generate some amounts of solid waste during its operation phase. The bulk of the solid waste generated during the operation of the project will consist of drums, paper, plastic, cables, metal, transformers and capacitors. Such wastes can be injurious to the environment. Some of these waste materials especially the plastic, cables, metals, polythene among others are not biodegradable hence may cause long-term injurious effects to the environment.

Liquid Waste Generation
Since the substation transformers will be using oil for cooling purposes of the transformers for the purpose of stepping down and distributing power, transformer oil and other effluents will be generated. Likewise waste oil will be generated through transformer leakages. The liquid waste to be generated will be hazardous hence may cause long-term injurious effects to the environment.

Increased oil Consumption
The proposed substation shall consume large amount of transformer oil in the process of stepping down electric power. Since transformer oil fuel is produced mainly through nonrenewable resources, this will have adverse impacts on these non-renewable resources base and their sustainability.

Increased Population around the project area
With the construction and operation of the proposed substation it will lead to the establishment of food kiosks and shops within the proposed project area whereby the workers of the proposed substation will be eating from hence it will have some negative environmental impacts.
Increased water demand
The operation activities during the operation phase of the proposed substation will involve the use of large quantities of water for substation cleaning, drinking, washing and toilet flushing. These will increase strain water resources in the area.

Increased Pressure on Infrastructure
The proposed substation will have a potential of increasing pressure on existing infrastructure such as roads and water among others. This would be due to increased use of volumes on water, human and vehicle traffic in the project area.

Water Pollution
During the operation phase of the proposed substation, if the sites for dumping solid wastes are not well taken care of, they may cause contamination of ground water sources. There is need therefore for the project proponent to put in place an efficient waste management scheme that will prevent the accumulation of uncontrolled waste, as well as an efficient collection system and off-site disposal.

Oil Spills Hazards
Potential oil spills and accidents during oil transportation, storage and operations of the transformers and batteries of the proposed substation may occur. In the case of oil spill the relatively lighter, more volatile, mobile, and water soluble compounds in transformer oil will tend to evaporate fairly quickly into the atmosphere or migrate to groundwater. When exposed to oxygen and sunlight, most of these compounds will tend to break down relatively quickly. Accidental oil spills can occur due to leakage from the transformers. Poor maintenance of transformers can also lead to oil spills.

Fire Outbreaks
Due to handling of flammable substances at the proposed substation project, fire outbreaks can occur. Handling of inflammable products increases fire risks.

Visual Impacts
The substation might present unwanted visual impacts, both by its physical presence and profile against the surrounding area, and by visual impacts its associated structures that may also have adversely impact the visual quality of the area.

6.1.5 Positive Impacts during Decommissioning Phase
The following positive impacts are associated with the proposed substation during the decommissioning phase:

Site Rehabilitation
Upon decommissioning of the proposed substation rehabilitation of the project site will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation which will lead to restoration of the visual quality of the area.

Employment Opportunities
For faster and timely demolition to take place, several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed substation.

6.1.6 Negative Impacts during Decommissioning Phase
The following three negative impacts discussed below are associated with the proposed substation during its decommissioning phase.

Noise and Vibration
The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed substation.

Solid Waste Generation
Demolition of the proposed substation and other related infrastructure will result in generation of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

Generation of Dust
Some dust will be generated during demolition works of the proposed substation. This will affect demolition staff as well as the neighbours.
CHAPTER SEVEN: MITIGATION MEASURES AND MONITORING PROGRAMMES

7.0 Introduction
This section highlights the mitigation measures for the expected negative impacts of the proposed 23MVA 66/11 kV substation. The potential impacts and the possible mitigation measures have herein been analyzed under three categories: Construction, Operational and Decommissioning.

7.1 Mitigation of Construction Related Negative Impacts
The following measures can be considered as mitigation measures of the negative impacts associated with the proposed substation during construction phase.

7.1.1 Minimization of Noise and Vibration
The project proponent of the proposed substation should put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimise the impact of temporary construction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Co-ordinate with relevant agencies regarding all construction.
- Limit vehicles to a minimum idling time and observe a common-sense approach to vehicle use, and encourage drivers to switch off vehicle engines whenever possible.

Compliance with the recently issued Noise and Vibration Regulations of 2009 is expected at all phases of the project.

7.1.2 Control of generation of Exhaust Emissions
In order to control exhaust emissions that are likely to occur during the construction of the proposed substation, the following measures shall be implemented during construction.

- Vehicle idling time shall be minimized
- Alternatively fuelled construction equipment shall be used where feasible
- Equipment shall be properly tuned and maintained

This will also be achieved through proper planning of transportation of materials to be used during construction of the project to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.

7.1.3 Dust Emissions and Air quality
Controlling dust emissions that is likely to take place during construction phase of the proposed substation is useful in minimizing nuisance conditions. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (NOx, CO2, SOx, transformer oil and diesel related PM10) that would occur in the exhaust from heavy equipment are also included.
The project proponent is committed to implementing measures that shall reduce air quality impacts associated with construction.

- During construction, any stockpiles of earth should be enclosed / covered / watered during dry or windy conditions to reduce dust emissions;
- Construction trucks removing soil from the site, delivering sand and cement to the site should be covered to prevent material dust into the surrounding areas;
- All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction.
- Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Drivers of vehicles used during construction will be under strict instructions to minimize unnecessary trips and minimize idling of engines.
- During construction, where water is available, sprinkle the construction area with water to keep dust levels down.
- Masks should be provided to all personnel in areas prone to dust emissions throughout the period of construction.
- Drivers of construction vehicles must be supervised so that they do not leave vehicles idling, and they limit their speeds so that dust levels are lowered.
- Maintain all machinery and equipment in good working order to ensure minimum emissions including carbon monoxide, NOx, SOx and suspended particulate matter;

7.1.4 Excavated Soil during Construction
The excavated soil during the construction of the proposed substation will not be disposed. It is recommended that part of the topsoil excavated from the proposed construction site be re-spread in areas to be landscaped to enhance plant health.

7.1.5 Minimization of increased Water Demand
The proponent of the proposed substation shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use.

7.1.6 Minimization of Worker accidents and hazards during Construction phase
To reduce the workers accidents and hazards during the construction phase of the proposed substation, the contractor and proponent are expected to adhere to the provisions of the Occupational Safety and Health Act, 2007 and its subsidiary legislation. It is the responsibility of the project proponent and contractor to provide a safe and healthy environment for construction workers as outlined in the EMP. The proposed substation Response and Evacuation Plan must be in place in addition to safety education and training shall be provided to the employees.

7.1.7 Reduction of Energy Consumption
The project proponent and contractor shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off
electrical equipment or appliances when they are not being used. In addition, proper planning of transportation of materials will ensure that fossil fuels (transformer oil, diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the proponent shall monitor energy use during construction and set targets for reduction of energy use.

7.1.8 Reduction of Impacts at Extraction Sites and Efficient Use of Raw Materials

The proponent of the proposed substation will source building materials such as sand, ballast and hard core from registered quarry and sand mining firms whose projects have undergone satisfactory Environmental Impact Assessment/Audit and received NEMA approval. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated.

To reduce the negative impacts on availability and sustainability of the materials, the proponent will only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the proponent will ensure that wastage, damage or loss (through run-off, wind, etc) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

In addition to the above measures, the proponent shall consider reuse of building materials and use of recycled building materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.

7.1.9 Minimization of Solid Waste during Construction Phase

It is recommended that demolition and construction waste be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed off. In addition, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community groups, institutions and individual residents or home owners.

The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted for and to ensure that the amount of construction materials left on site after construction is kept minimal. It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Additional recommendations for minimization of solid waste include:-
i. 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
ii. Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
iii. Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials
iv. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
v. Use of construction materials containing recycled content when possible and in accordance with accepted standards.
vi. Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided.

7.1.10 Possible exposure of workers to diseases
Possible exposure of workers to diseases from building materials at construction site shall be mitigated by compliance with occupational health and safety standards.

7.1.11 Minimization of Storm Water Run-off and Soil Erosion
The proponent of the proposed substation will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include terracing and levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off. Increased runoff from paved grounds and expansive roofs causing extreme flooding and overflows of drainage systems shall be mitigated. Surface runoff and roof water shall be harvested and stored in underground reservoir for reuse. 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 structures will be designed.

Excavations at the site will be restricted to the sections of the substation. Excavated earth will be held away from trenches and on locations of the site not susceptible to surface runoff of storm water. The earth removed for external disposal will require to be deposited on sites without the risk of being washed down during rains and where it will not compromise other land use activities in those areas. Caution will be required during construction at times of heavy rains. Re-vegetate exposed areas around the site so as to mitigate erosion of soil by storm water runoff.

7.1.12 Controlling Oil Spills during Construction Phase
The proponent of the proposed substation will control the dangers of oil spills during construction by maintaining the machinery in specific areas designed for this purpose.

7.1.13 Minimization of Vegetation Disturbance
Clearance of part of the vegetation (mainly grass and re-generated eucalyptus) at the proposed substation site to pave way for construction will be inevitable. However, the project
proponent will ensure proper demarcation of the project area to be affected by the construction works to ensure that any disturbance to flora is restricted to the actual project area and avoid spillover effects to the neighbouring areas. Another important measure aimed at reducing disturbance of vegetation in the proposed project area will be preservation of individual trees within the site. In addition, the proponent will be involved in re-vegetation of some of the disturbed areas planting ornamental trees and proper landscaping.

7.2 Mitigation of Operation Phase Negative Impacts
The negative impacts of the proposed substation will be mitigated as discussed below.

7.2.1 Ensuring Efficient Solid Waste Management
The project proponent of the proposed substation will be responsible for efficient management of solid waste generated by the project during its operation. In this regard, the proponent will provide waste handling facilities such as labeled waste bins and skips for temporarily holding solid waste generated at the site.

The proponent will put in place an integrated solid waste management system and give priority to reduction at source of the materials. This option will demand a solid waste management awareness programme in the management and the operator employees. Solid wastes shall be disposed off in a manner that is acceptable to NEMA and Environmental Regulations.

7.2.2 Ensuring efficient liquid Waste Management
The transformer oil should be re-used in the substation or other related sites and the unusable one should be disposed by a NEMA approved contractor. The substation should be well paved to prevent spilled oil from reaching the sub-surface. It is proposed that a bundwall and oil holding dam be constructed to contain transformer oil in case of accidental leakage.

7.2.3 Ensure Efficient Energy Consumption
To ensure efficient energy consumption during the operation phase of the proposed substation, the proponent plans to install an energy-efficient lighting system at the project site. This will contribute immensely to energy saving during the operational phase of the project. In addition, the substation operators will be sensitized to ensure energy efficiency in their daily operations.

7.2.4 Ensure Efficient Water Use
The proponent of the proposed substation will install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff. Rain water harvesting will be highly recommended.

7.2.5 Oil Spills
To prevent oil spills and environmental contamination, the substation and transformers should be designed with spill prevention and detection systems to protect the
environment. With spill prevention and protection measures there should no adverse effects to the ground and surface water and soil.

All the transformers should have secondary containment with sufficient volume to contain any spill from them in the containment structure. The containment area should have a means of removing accumulated water. The containment area should have a means of removing accumulated water. A retention area should be designed that surrounds the fuel storage tanks.

The substation operators should provide containers for the storage of chemical and lubricating products. Drains should be routed through a site/water separator. A spill and substation response plan would be developed and put in place prior to commencement of construction.

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 oil leakages and spills. The project proponent will orientate the workers on site on their specific EHS policies to prevent incidents and accidents of oil spill.

A floating boom should be used to contain spillage during refilling and unrefilling oil to transformers procedures. Frequent inspection and maintenance of transformer can minimize leakages.

The waste oil or used oil from maintenance of the transformers for proper disposal. In the Environmental Management Plan (EMP), disposal of used oil will be the responsibility of the project operator. The proponent will identify a reputable company to handle disposal of oil and oil filters.

7.2.6 Visual Impacts
The visual negative impacts can be mitigated through landscaping the area with trees to screen the project stacks, poles, cables and transformers by the project proponent of the proposed substation.

7.2.7 Minimization of Sewage Release
The project proponent of the proposed substation will ensure that there are adequate means for handling the sewage generated at the proposed substation. It will also be important to ensure that toilets are kept clean and properly maintained.

7.2.8 Fire Suppression
The site must contain fire fighting equipments of recommended standards and in key strategic points all over the proposed project site of the proposed substation. Fire pumps, Hydrants, Sprinkler/water spray systems, Hose houses, Dry chemical systems, Carbon dioxide systems, Detection/alarm systems, Portable fire extinguishers among others. A fire evacuation plan must be posted in various points of the construction site including procedures to take when a fire is reported. All workers must be trained on fire management and fire drills undertaken regularly.
7.2.9 Workers Health and Safety

All workers entering the proposed substation must be equipped with appropriate and adequate PPEs, including ear muffs, safety footwear, overalls, gloves, dust masks, among others. The PPE should be those meeting the international standards of PPE. Personal protection gear must be provided and its use made compulsory to all. The entire workforce of the substation should be trained in the use of protective gear, handling of chemical products and acid storage cells, electric safety equipment, procedures for entering enclosed areas, fire protection and prevention, substation response and care procedures. Training given to the employees should be backed by regular on-site training in safety measures. ‘Restricted ENTRY’ signs such as “HATARI” should be installed to keep away unauthorized persons from access to restricted areas. Machines and Equipments must be operated only by qualified staff and a site supervisor should be on site at all times to ensure adherence. The project operator must develop a Workplace Health and Safety Policy Manual for which all the workers should be conversant and comply with. The project operator should appoint a responsible person from the management team to be in charge of workplace Safety, Health and Environmental issues. The operator should develop a substation Response Plan for handling any emergencies arising thereof during the project implementation phase.

7.2.10 Hazardous waste

The amount of hazardous waste created will be very low and possibly originate from maintenance sources. The waste would primarily consist of transformer oil and their containers, used rags and spent clean-up solvents. The used oil should be stored in a place with a drip collection mechanism before they are collected by the disposal agent for proper disposal. The substation operator should ensure that the used oil and its containers are properly disposed off in an environmental sound way. The mitigation measure is to provide training to site operation and maintenance staff to proper handle and dispose of the hazardous wastes using acceptable methods. Hazardous wastes on the site shall be clearly marked out and the entire workforce trained to recognize the danger signs and familiarize themselves with procedures to be followed before entering hazardous areas.

7.2.11 Noise and Vibration

Noise and vibration are expected during the operation phase of the project. Mitigation is through installation of generator muffling materials and with inbuilt sound and vibration absorption materials. The project operator will be expected to comply with the recent EMCA (Noise and Vibration) Regulations of 2009 during the operation phase of the project. All equipments and machinery installed must be tested to verify if they are compliant with Kenya and the World Bank acceptable standards of noise. Tested noise levels should be recorded as baseline and used for future monitoring.

Noise emitting equipment should comply with the applicable Kenya and World Bank noise standards and should be properly maintained. All workers in the project site must be equipped with the necessary and required Personal Protective Equipment (PPE) prescribed by the Directorate of Occupational Safety and Health of the Ministry of Labour like PPE.
7.3 Mitigation of Decommissioning Phase Impacts

Just as in the case during the construction and operation phase, the negative impacts of the decommissioning phase of the proposed substation can be mitigated as follows.

7.3.1 Minimization of Noise and Vibration

Significant impacts on the acoustic environment will be mitigated by the project proponent of the proposed substation shall put in place several measures that will mitigate noise pollution arising during the decommissioning phase. The following noise-suppression techniques will be employed to minimize the impact of temporary destruction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Co-ordinate with relevant agencies regarding all substation construction activities in the residential areas.
- Install sound barriers for pile driving activity.
- Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
- Demolish mainly during the day. The time that most of the neighbours are out working.

7.3.2 Efficient Solid Waste Management

Solid waste resulting from demolition or dismantling works associated with the proposed substation during decommissioning phase will be managed as follows:

- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of demolition waste generated during decommissioning phase.
- Provision of facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements.
- Use of materials that have minimal packaging to avoid the generation of excessive packaging waste.
- Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided.

7.3.3 Reduction of Dust Concentration

High levels of dust concentration resulting from demolition or dismantling works will be minimized as follows:

- Watering all active demolition areas as and when necessary to lay dust.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at demolition sites.
7.3.4 Site Rehabilitation after Decommissioning

The project operator shall, on decommissioning of the project, restore the site to its original status as far as practicable and plant trees at the site.
CHAPTER EIGHT: ANALYSIS OF PROJECT ALTERNATIVES

8.1 Consideration of Project Alternatives
This chapter describes and examines the various alternatives available for the project. The following alternatives were identified and investigated during EIA study. This section discusses the various alternatives considered to date for the proposed substation development project, including the “no-go / do nothing” alternative, alternative construction materials and technology, the alternative substation site, alternative sources of energy and power-line corridor routes identified during the Scoping Phase of the EIA.

8.2 Alternative Structure Types and Designs
The cost of a proposed substation project such as this is substantial, resulting in detailed research and development being put into the design of the components of the substation construction. The current design for the 66/11kV substations and its components is regarded as the most cost effective whilst operationally sound for such a project. Overhead incoming and outgoing feeders’ power lines have been determined to be the most feasible option for the following reasons:
- Underground cabling will incur significantly higher installation and maintenance costs given the length of the power line;
- Overhead lines are far quicker and easier to repair should faults occur; and
- Relative to overhead lines, underground cables requires a larger area to be disturbed during construction and maintenance operations.

8.3 Analysis of Alternative Construction Materials and processes
The proposed substation will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that guarantees efficient use of locally available materials will be encouraged to ensure reliability in supply with minimum power loss and good design to allow efficient distribution of power in the area.

The support structures in a substation can be wooden or steel. Because of its durability and strength, steel is the best choice and all support structures will be steel. Perimeter fence can be a reinforced wire mesh fixed to support structures that can be wooden, concrete or steel. Alternatively a stone perimeter wall can be constructed and this is the option of choice since it is more durable, offer better protection and requires less maintenance.

The process material that are consumed by the proposed project area, transformer oil for cooling the transformer and water for substation cleaning purposes are critical elements. There is no alternative for transformer oil for transformer cooling and for substation cleaning water. So the task was to assess alternative water and transformer oil sources for the project.
The transformer oil helps cool the transformer, because it provides part of the electrical insulation between internal live parts, transformer oil must remain stable at high temperatures for an extended period. To improve cooling of large power transformers, the oil-filled tank may have external radiators through which the oil circulates by natural convection. Very large or high-power transformers (with capacities of thousands of KVA) may also have cooling fans, oil pumps, and even oil-to-water heat exchangers. Large, high voltage transformers undergo prolonged drying processes, using electrical self-heating, the application of a vacuum, or both to ensure that the transformer is completely free of water vapor before the cooling oil is introduced. This helps prevent corona formation and subsequent electrical breakdown under load. Oil filled transformers with a conservator (an oil tank above the transformer) tend to be equipped with Buchholz relays. These are safety devices that detect the build up of gases (such as acetylene) inside the transformer (a side effect of corona or an electric arc in the windings) and switch off the transformer. Transformers without conservators are usually equipped with sudden pressure relays, which perform a similar function as the Buchholz relay.

8.4 Alternative Sources of Energy
During the EIA study; alternative sources of energy other than relying on the KPLC’s National Grid were analyzed. Some of the possible options included relying on small diesel generators at household / individual level. This would lead to increased noise and emission of green house gases. Other sources of energy include Biogas and Biofuel which have not yet been fully explored towards electricity generation. Other alternatives would include use of firewood to generate energy at individual levels. It is worth noting that most of these alternatives are not sustainable and some have adverse environmental impacts like desertification and increased concentration of green house gases in the atmosphere. Other alternatives would be Generating solar power which is not yet adequately explored for commercial purposes in Kenya. Solar Power is green energy with minimal maintenance costs but it is capital intensive. Many people still opt to being connected to the National power grid for domestic and commercial power supply.

8.5 The ‘Do-nothing’ Option
The existing substation and power-line networks supplying the Kiambu County and its environs are highly constrained in terms of capacity and are unable to supply additional electrification load growth in the area. It is therefore imperative for KPLC to establish a new 66/11kV substation in the area to cater for existing and projected electrification load. Should the proposed development not be undertaken, the risk for electrical faults and associated power outages, which are currently occurring in the area on a relatively frequent basis, will increase significantly. In addition, the ability to supply new customers would be severely limited in that it is anticipated that the demand for electricity in the study area will soon exceed the capacity of KPLC’s existing electrical system. This will consequently have a significant negative impact on existing and proposed new developments in the area. The no project option will have the forgone costs and benefits including
• The targeted consumers will forgo improved electricity supply
• Generation of employment opportunities through expansion of business activities that would have been spurred by availability of electric power will not occur
• The country won’t meet its energy requirement
• The objectives of the right issue, as well as the Governments efforts towards achieving Vision 2030 will not be realized.

It is thereby concluded that the ‘do-nothing’ option is not a viable or acceptable option, and should therefore be discounted.

8.6 Alternative Substation Site

The identification of potential substation site for the proposed substation involved change of use as the site belonged to the proponent. In selecting the site for a substation site visits and preliminary site investigations and consultation with various experts was done.

The suitability of potential substation sites identified by the proponent during the initial site visits was assessed in terms of various suitability criteria and technical restrictions stipulated by Kenya power, as outlined below:

• Size - potential sites need to be sufficient for the average size of a substation and associated incoming and outgoing power lines.
• Public acceptability - public acceptance criteria relate to such issues as the possible adverse impact on public health, quality of life, local land use, project beneficiaries and property values. This was assessed through public consultations and the project was accepted by the neighbours.
• Hydrology - consideration is given to the proximity of potential sites to adjacent water courses and wetlands where there may be potential impacts in terms of erosion and siltation of water courses, as well as implications associated with storm-water control at the substation;
• Flora and fauna - potential sites need to be assessed in terms of their ecological value at both a macro and micro scale i.e. within the site and the environment surrounding the site. Both a fauna and floral investigation may be required, with particular emphasis on ensuring the protection of endemic and red data species and their habitat, should they be present. An identified site that has a high ecological value may be excluded from the list of potential sites;
• Topography - consideration is given to the topography of potential sites whereby flat or gently sloping topography is preferred. An ideal gradient for the natural ground is 1:100. A gentle slope facilitates surface drainage and movement of vehicles and people on-site during construction. A steep slope requires costly leveling (cut and fill) for the construction of the substation. In addition, a steep slope inhibits movement, makes vehicle access problematic and increases the potential for environmental impacts during construction as well as operation e.g. steeper slopes have higher surface water flow rates and therefore higher erosive potential;
Proposed Uplands 66/11kV substation in Lari District

- Geology and soils - consideration is given to the soil type present within the potential site whereby stable soil and founding conditions are preferable. Less stable soils, i.e. shallow, dispersive soils and soils with poor drainage present an erosion hazard if not managed correctly, and also require the installment of additional, costly foundation infrastructure;

- Visibility - highly visible sites i.e. on a ridge / elevated terrain are considered less favorable in that they have a high visual impact on the surrounding landscape. Sites that are hidden or out of sight e.g. behind a hill, may be considered more suitable;

- Access - it is preferable that potential sites are located in close proximity to existing provincial roads so as to avoid the need for construction of new access roads of considerable length. Access is also important particularly as it relates to the transportation of the substation transformer to the site, which weighs approximately 38 tons and requires the use of a low-bed vehicle. As such, long access routes with sharp bends are to be avoided and the site should not be located in an area that has excessively steep inclines or declines that could hinder access, particularly during periods of heavy rainfall;

- Distance to site - it is important that the site be located strategically within the receiving area’s electrical load centre;

- Adjacent land use - adjacent land use has implications for access and required clearances for the power lines extending into the substation, i.e. it is important that the land surrounding the substation is relatively clear of obstructions which might otherwise inhibit / obstruct the path of the power lines in and out of the substation. Current and future development planning of adjacent land use should therefore also be considered; and

Based on the above-mentioned suitability criteria and technical restrictions, Kenya power has identified one potential site for the location of the proposed substation because the site belongs to the proponent. Relocation option to a different site is an option available for the project implementation. The project proponent can look for alternative land to accommodate the scale and size of the project. However, this will be a costly venture, which takes long without a guarantee that the land would be available. It is recommendable that the proponent be allowed to install the project at the already existing site.
CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

9.0 Environmental Management Plan

Environmental and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental and socio-economic impacts can be mitigated and monitored. In addition, the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. ESMP is a vital output of an Environmental Impact Assessment as it provides a checklist for project monitoring and evaluation. The ESMP outlined below addresses the identified potential negative impacts and mitigation measures of the proposed substation during construction, operational and decommissioning phases, based on the Chapter of Environmental Impacts and Mitigation Measures of the expected Negative Impacts.

This section presents the environmental and social management plan (ESMP) for the proposed project. The ESMP specifies the mitigation and management measures which the Proponent will undertake and shows how the Project will mobilize organizational capacity and resources to implement these measures. The ESMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of the following project phases: design, construction, operation and decommissioning.

9.1 Significance of an EMP

Environmental Management Plan (EMP) for development projects provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition the EMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. EMP is a vital output of an Environmental Impact Assessment as it provides a checklist for project monitoring and evaluation.

9.2 Construction phase EMP

Environmental Management Plan for the construction phase is as shown below
Table 9.1: Environmental Management Plan during CONSTRUCTION PHASE of the proposed substation

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Minimize extraction site impacts and ensure efficient use of raw materials in construction</td>
<td>1. Source building materials from local suppliers who use environmentally friendly processes in their operations.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2. Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4. Use at least 5%-10% recycled refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td>Demand of Raw material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Minimize vegetation disturbance at and or around construction site</td>
<td>1. Ensure proper demarcation and delineation of the project area to be affected by construction works.</td>
<td>Contractor, Resident Project Manager</td>
<td>1 month</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>2. Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.</td>
<td>Civil Engineer and Resident Project Manager</td>
<td>1 month</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>3. Designate access routes and parking within the site.</td>
<td>Civil Engineer and Resident Project Manager</td>
<td>1 month</td>
<td>5,000</td>
</tr>
<tr>
<td>Vegetation disturbance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>Proposed Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Introduction of vegetation (trees, shrubs and grass) on open spaces and around the project site and their maintenance.</td>
<td>Architect &amp; Landscape specialist</td>
<td>Monthly to Annually</td>
<td>12,000</td>
</tr>
<tr>
<td>5. Design and implement an appropriate landscaping programme to help in re-vegetation of part of the project area after construction.</td>
<td>Architect &amp; Landscape specialist</td>
<td>2 months</td>
<td>15,000</td>
</tr>
</tbody>
</table>

### 3. Reduce storm-water, runoff and soil erosion

**Increased storm water, runoff and soil erosion**

<table>
<thead>
<tr>
<th>Proposed Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Surface runoff and roof water shall be harvested and stored in tanks so that it can be used for cleaning purposes.</td>
<td>The Civil Engineer, Mechanical Engineer and Resident Project Manager</td>
<td>2 months</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>The Civil Engineer, Mechanical Engineer and Resident Project Manager</td>
<td>1 month</td>
<td>10,000</td>
</tr>
<tr>
<td>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.</td>
<td>The Civil Engineer, Mechanical Engineer and Resident Project Manager</td>
<td>1 months</td>
<td></td>
</tr>
<tr>
<td>4. Ensure that construction vehicles are restricted to use existing graded roads</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td></td>
</tr>
<tr>
<td>5. Ensure that any compacted areas are ripped to reduce run-off.</td>
<td>Contractor</td>
<td>2 months</td>
<td></td>
</tr>
<tr>
<td>6. Site excavation works to be planned such that a section is completed and rehabilitated before another section begins.</td>
<td>Resident Project Manager</td>
<td>Throughout construction period</td>
<td>5,000 per unit</td>
</tr>
<tr>
<td>Expected Negative Impacts</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Time Frame</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------</td>
<td>-------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>7. Interconnected open drains will be provided on site.</td>
<td>Civil Engineer</td>
<td>Throughout construction period</td>
<td>5,000 per unit</td>
</tr>
<tr>
<td>8. Roof catchments will be used to collect the storm water for some substation uses.</td>
<td>Civil Engineer</td>
<td>Throughout construction period</td>
<td></td>
</tr>
<tr>
<td>9. Construction of water storage tanks to collect storm water for substation uses.</td>
<td>Civil Engineer</td>
<td>Throughout construction period</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Minimize solid waste generation and ensure efficient solid waste management during construction

<table>
<thead>
<tr>
<th>Increased solid waste generation</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Through accurate estimation of the dimensions and quantities of materials required.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4. Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td>5. Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6. Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site</td>
<td>Resident Project Manager, Mechanical Engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>No.</th>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Dispose waste more responsibly by contracting a registered waste handler who will dispose the wastes at designated sites or landfills only.</td>
<td>Resident Project Manager, Mechanical Engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>10,000 /month</td>
</tr>
<tr>
<td>8</td>
<td>Waste collection bins to be provided at designated points on site</td>
<td>Resident Project Manager, Mechanical Engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>40,000</td>
</tr>
</tbody>
</table>

### 5. Air Pollution

#### Dust emission

<table>
<thead>
<tr>
<th>No.</th>
<th>Dust emission</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ensure strict enforcement of on-site speed limit regulations</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>5,000</td>
</tr>
<tr>
<td>2</td>
<td>Avoid excavation works in extremely dry weathers</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>30,000 per month</td>
</tr>
<tr>
<td>4</td>
<td>Personal Protective equipment to be provided to employees and worn</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Exhaust emission

<table>
<thead>
<tr>
<th>No.</th>
<th>Exhaust emission</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vehicle idling time shall be minimized</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly maintained</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Sensitize truck drivers to avoid unnecessary running engines of stationary vehicles and to switch off engines whenever possible</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

### 7. Minimization of Noise and Vibration
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise and vibration</td>
<td>1. Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Rountine site operation</td>
</tr>
<tr>
<td></td>
<td>2. Sensitize construction drivers to avoid running of vehicle engines or hooting</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>Routine site operation</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that construction machinery are kept in good condition to reduce noise generation</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td>4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures (containers) to minimize ambient noise levels.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Trees to be planted around the site to provide some buffer against noise propagation</td>
<td>Resident Project Manager &amp; all site foreman</td>
<td>Throughout construction period</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>6. The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.</td>
<td>Resident Project Manager &amp; all site foreman</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
</tbody>
</table>

### Minimization of Energy Consumption

#### Increased energy consumption

<table>
<thead>
<tr>
<th></th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Ensure electrical equipment, appliances and lights are switched off when not being used</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2. Install energy saving bulbs/tubes at all lighting points instead of incandescent bulbs which consume higher electric energy</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>3. Plan well for transportation of materials to ensure that fossil fuels (diesel, transformer oil, petrol) are not consumed in excessive amounts</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>10,000</td>
</tr>
</tbody>
</table>
### Expected Negative Impacts

#### Recommended Mitigation Measures

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Monitor energy use during construction and set targets for reduction of energy use.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>5,000</td>
<td></td>
</tr>
</tbody>
</table>

### 9. Minimize water consumption and ensure more efficient and safe water use

**Increased Water Demand**

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water to be brought in from the Limuru Water Company or Gituamba water.</td>
<td>Mechanical Engineer and Resident Project Manager</td>
<td>Throughout construction period</td>
<td>5,000 per unit</td>
<td></td>
</tr>
<tr>
<td>2. Harness rainwater for office &amp; gardening</td>
<td>Mechanical Engineer and Resident Project Manager</td>
<td>Throughout construction period</td>
<td>5,000 per unit</td>
<td></td>
</tr>
<tr>
<td>3. Install water conserving taps that turn-off automatically when water is not being used</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>40% more than price of ordinary taps</td>
<td></td>
</tr>
<tr>
<td>5. Promote recycling and reuse of water as much as possible</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>6. Install a discharge meter at water outlets to determine and monitor total water usage</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>7. Promptly detect and repair of water pipe and tank leaks</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>1,000 per month</td>
<td></td>
</tr>
<tr>
<td>8. Ensure taps are not running when not in use</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Throughout construction period</td>
<td>1,000</td>
<td></td>
</tr>
</tbody>
</table>

### 10. Minimize release of liquid effluent

**Generation of wastewater**

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide means for handling sewage generated at the construction site</td>
<td>Mechanical Engineer &amp; Resident Project Manager</td>
<td>One-off</td>
<td>30,000</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Mechanical Engineer &amp; Resident Project Manager</td>
<td>Throughout construction period</td>
<td>2,000/month</td>
<td></td>
</tr>
</tbody>
</table>
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated</td>
<td>Mechanical Engineer &amp; Resident Project Manager</td>
<td>Throughout construction period</td>
<td>2,000/month</td>
<td></td>
</tr>
</tbody>
</table>

### 11. Minimize occupational health and safety risks

<table>
<thead>
<tr>
<th>Statutory Requirements</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure compliance with The OSHA (Building Operations and Works of Engineering Construction Rules), L.N. 40 of 1984</td>
<td>Contractor</td>
<td>During the construction period</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Worksite Safety and Health Hazards to employees</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure compliance with the Occupational Safety and Health Act (OSHA) 2007 provisions e.g. employees to be provided with appropriate PPE</td>
<td>Developer</td>
<td>One-off</td>
<td>5,000</td>
<td></td>
</tr>
</tbody>
</table>

### 12. Minimize Oil Spills

<table>
<thead>
<tr>
<th>Oil spills Hazards</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install oil trapping equipments in areas when there a likelihood of oil spillage such during the maintenance of construction facility. Soil in such an area will be well protected from contamination</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>50,000</td>
<td></td>
</tr>
</tbody>
</table>
9.3 Operational Phase EMP
The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of proposed substation, are outlined in this section.

Table 9-2 below indicates the operational phase EMP.
### Table 9-1: Environmental management/monitoring Plan for the OPERATIONAL PHASE of the proposed substation

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid waste generation</td>
<td>2. Provide solid waste handling facilities such as rubbish bags and skips</td>
<td>Resident Project Manager</td>
<td>One-off</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that solid wastes generated at the substation are regularly disposed of appropriately at authorised disposal sites</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>15,000/month</td>
</tr>
<tr>
<td></td>
<td>4. Ensure that wastes generated at the substation are efficiently managed through recycling, reuse and proper disposal procedures.</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5. A private company to be contracted to collect and dispose solid waste on regular intervals</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>30,000 per month</td>
</tr>
<tr>
<td></td>
<td>6. Install site smokeless incinerator</td>
<td>Resident Project Manager and contractor</td>
<td>During design and construction</td>
<td>To be determined</td>
</tr>
<tr>
<td>2. Ensuring Efficient Liquid waste management</td>
<td>1. Paving of substation surface to reduce spilled liquid waste from reaching sub-surface</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>During Construction</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td></td>
<td>2. Install sludge treatment unit on site</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>During construction</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td></td>
<td>3. Install oil interceptor on site to separate oil and water</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>During construction</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td>3. Minimise risks of sewage release into environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected Negative Impacts</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Time Frame</td>
<td>Cost (Ksh)</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Release of sewage into the environment</td>
<td>1. Provide adequate and safe means of handling sewage generated at the substation</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>One-off</td>
<td>40,000</td>
</tr>
<tr>
<td></td>
<td>2. Conduct regular inspections for sewage pipe blockages or damages and fix appropriately</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>Continuous</td>
<td>500 per inspection</td>
</tr>
<tr>
<td></td>
<td>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</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>Continuous</td>
<td>500/parameter</td>
</tr>
<tr>
<td>4. Minimize energy consumption</td>
<td>1. Switch off electrical equipment, appliances and lights when not being used</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2. Install occupation sensing lighting at various locations such as storage areas which are not in use all the time</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>10-40 % higher than ordinary lighting</td>
</tr>
<tr>
<td></td>
<td>3. Install energy saving fluorescent tubes at all lighting points within the substation instead of bulbs which consume higher electric energy</td>
<td>Resident Project Manager &amp; Occupants</td>
<td>One-off</td>
<td>10-40% higher than ordinary lighting</td>
</tr>
<tr>
<td></td>
<td>4. Monitor energy use during the operation of the project and set targets for efficient energy use</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>2,000/month</td>
</tr>
<tr>
<td></td>
<td>5. Sensitize the substation workers to use energy efficiently</td>
<td>Resident Project Manager</td>
<td>Continuous</td>
<td>500/month</td>
</tr>
<tr>
<td>5. Minimize water consumption and ensure more efficient and safe water use</td>
<td>1. Promptly detect and repair of water pipe and tank leaks</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>Continuous</td>
<td>2,000/month</td>
</tr>
<tr>
<td>Expected Negative Impacts</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Time Frame</td>
<td>Cost (Ksh)</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------</td>
<td>-------------------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>2. Substation workers to be sensitized on water conservation techniques.</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>Continuous</td>
<td>500/month</td>
</tr>
<tr>
<td></td>
<td>3. Ensure taps are not running when not in use</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>Continuous</td>
<td>500/month</td>
</tr>
<tr>
<td></td>
<td>4. Install water conserving taps that turn-off when water is not being used</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>One-off</td>
<td>40% more than ordinary taps</td>
</tr>
<tr>
<td></td>
<td>5. Install a discharge meter at water outlets to determine and monitor total water usage</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>One-off</td>
<td>2,500</td>
</tr>
<tr>
<td></td>
<td>6. Create water conservation awareness</td>
<td>Resident Project Manager &amp; Mechanical Engineer</td>
<td>Continuous</td>
<td>2,500</td>
</tr>
</tbody>
</table>

6. Minimization of health and safety impacts

| Increased health and safety impacts | Implement all necessary measures to ensure health and safety of the substation workers and the general public during operation of the proposed 2*23MVA 66/11 kV substation as stipulated in the Occupational Safety and Health Act, 2007 | Resident Project Manager, Mechanical Engineer, & Developer | Continuous | 5,000 per month |

7. Ensure the general safety and security of the proposed 2*23MVA 66/11 kV substation and surrounding areas

| Increased general safety and security impacts | Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. | Security Officer, Resident Project Manager & Police | Continuous | 8,000/month |

8 Increased Pressure on Infrastructure

<table>
<thead>
<tr>
<th>Increased Pressure on Infrastructure</th>
<th>1. Coordinate with other planning goals and objectives for region</th>
<th>Architect, Project Manager, and the Developer</th>
<th>Continuous</th>
<th>40,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Upgrade existing infrastructure and services, if and where feasible.</td>
<td>Architect, Project Manager and the Developer</td>
<td>Continuous</td>
<td></td>
</tr>
</tbody>
</table>
### 9. Air Pollution

1. Suitable wet suppression techniques need to be utilized in all exposed areas  
   - **Responsible**: Site Safety Officer  
   - **Duration**: Continuous  
   - **Cost**: 20,000

2. Enforce low speed limits for vehicles moving within the site  
   - **Responsible**: Site Safety Officer  
   - **Duration**: Continuous

3. Ensure that the site is located away from such pollution sources  
   - **Responsible**: Site Safety Officer  
   - **Duration**: Continuous

4. Use of transformer oil should have be sulphur free for the purpose of cooling the transformers  
   - **Responsible**: Residents project manager  
   - **Duration**: Continuous  
   - **Cost**: 5,000 per month

### 10. Minimization of fire risks

1. Installation of fire fighting equipments  
   - **Responsible**: Substation manager and contractors  
   - **Duration**: In design and Continuous  
   - **Cost**: 100,000PA

2. Development of fire evaluation plan  
   - **Responsible**: Substation manager and contractors  
   - **Duration**: In design and Continuous

3. Training of all staff in fire management  
   - **Responsible**: Substation manager and contractors  
   - **Duration**: In design and Continuous

### 12. Worksite Safety and Health Hazards to employees

- Ensure compliance with the Occupational Safety and Health Act (OSHA) 2007 provisions e.g. employees to be provided with appropriate PPE  
  - **Responsible**: Developer  
  - **Duration**: One-off  
  - **Cost**: 5,000
9.4 Decommissioning Phase EMP

In addition to the mitigation measures provided in the above two tables, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the proposed substation have been implemented and there is need for phasing out. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the proposed substation project are outlined in the below.
**Table 9.3: Environmental management/monitoring Plan for the DECOMMISSIONING PHASE of the proposed 2*23MVA 66/11 kV substation Project.**

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>0</td>
</tr>
<tr>
<td>2. Rehabilitation of project site</td>
<td>1. Implement an appropriate re-vegetation programme to restore the site to its original status</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>10,000</td>
</tr>
<tr>
<td>Vegetable disturbance</td>
<td>2. Consider use of indigenous plant species in re-vegetation</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>One-off</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3. Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>Once-off</td>
<td>0</td>
</tr>
</tbody>
</table>

3. Minimization of Generation of Dust
<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation of dust</strong></td>
<td>1. Watering all active demolition areas as and when necessary to lay dust.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>During Decommissioning</td>
<td>To be determined</td>
</tr>
<tr>
<td></td>
<td>2. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Increase noise and vibration</strong></td>
<td>1. Install portable barriers to shield compressors and other small stationary equipment where necessary.</td>
<td>Resident Project Manager &amp; Contractor</td>
<td>During Decommissioning</td>
<td>To be determined</td>
</tr>
<tr>
<td></td>
<td>2. Demolish mainly during the day. The time that most of the neighbours are out working.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Co-ordinate with relevant agencies regarding all substation construction activities in the residential areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Reduction of Noise and vibrations
CHAPTER TEN: ASSUMPTIONS, UNCERTAINTIES ENCOUNTERED AND GAPS IN KNOWLEDGE.

10.1 Introduction
The following assumptions were made in preparing this EIA

- Final designs will minimize risks from external factors which could threaten the integrity of the facility such as: risks from landslides and other natural calamities
- Technical data and information provided by the proponent and the specialists are accurate and up-to-date
- Measures will be put in place to minimize threats or damage from third parties e.g. terrorist attack
- The ESMP will be implemented accordingly.
- The public involvement process has been sufficiently effective in identifying the critical issues that needed to be addressed
- The Proponent will undertake monitoring to track the implementation of the ESMP to ensure that management measures are effective to avoid, minimize and mitigate impacts
- Corrective action will be undertaken to address shortcomings and/or non-performances.

10.2 Uncertainty and Difficulties in Compiling Information
Uncertainty arises from a variety of aspects in any development, and for this particular assessment they may emanate from the following:

- Being a Turnkey project final designs were not available
- Changes that may occur in baseline conditions, due to external factors over the lifetime of the project;
- Uncertainty in design information which should be dealt with by the definition of design parameters for the development by the Contractor and Proponent; and
- Uncertainty in relation to project planning and implementation as the detailed program and means of construction may be influenced by the choice of contractor.

The difficulties in compiling the information for this assessment report have related principally to the above sources of uncertainty. To obviate these difficulties the lead Expert has used his past experience wherever possible and consultation with Proponent to gauge and recommend appropriate mitigation measures in this study report.
10.3 Gaps in Knowledge
This assessment does not consider how the present global meltdown/ economic recession and donor funding may affect the construction and management of the proposed project.
CHAPTER ELEVEN: CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions
The analysis of the EIA has evidenced that the construction and operation of the proposed substation would have positive impacts to the Proponent and Kenyan society at large. The impacts will include Increase in reliable and sustainable clean energy, employment to local community members, increase in the national/local investment, increase in Government revenue, improvement of standards of living for Kiambu county residents. However, despite the outlined positive impacts, the proposed development will cause some negative impacts such as Noise Pollution, dust generation, Soil erosion, oil spills, solid waste generation, Occupational hazards among others.

An Environmental and Socio- economic Management Plan (E&SMP) outline has been developed to ensure sustainability of the project area activities from construction through operation to decommissioning. The plan provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitorable indicators. Implementation timeframes and responsibilities are defined, and where practicable, the cost estimates for recommended measures are also provided.

A monitoring plan will be 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.

From the findings of this study, the following conclusions are made:
- The impacts that will be adverse will be temporary during the construction phase and can be managed to acceptable levels with the implementation of the recommendation of the mitigation measures for the project
- The potential adverse impacts associated with the proposed project are possible to mitigate successfully. The impacts before implementation of mitigation measures are assessed as very low to medium low and the ratings are expected to improve further with the implementation of the proposed mitigation measures
- The project will be designed, constructed, and operated according to the acceptable industry norms and standards. Successful implementation of the proposed EMP will ensure environmental sustainability.
- The proposed project will generate socio-economic benefits which would not be realized if the no development option is considered.
The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. The substation and associated structures will be installed to the required planning/architectural/structural designs and standards. During project implementation, operation and decommissioning stages sustainable environmental management (SEM) would be ensured; avoiding inadequate use of natural resources, conserving nature sensitively and guaranteeing a respectful and fair treatment of all people working on the project, general public at the vicinity and the expected beneficiaries of the project.

In relation to the proposed mitigation measures that will be incorporated during construction, operational and decommissioning phases; the development’s input to the society and environment; the project is considered beneficial and important.

**11.2 Recommendations**

It is quite evident from this study that the construction and operation of the proposed substation with associated lines will bring positive effects in the project area including Reduction of environmental degradation, 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 national industrial production, Increase in revenue, Improvement in the quality of life for the workers and residents, Optimal use of land and Improved security.

However, although the project will bring various positive impacts, negative impacts will also be experienced hence the need to address and mitigate them.

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 project, 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.

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

Recommendations for the prevention and mitigation of adverse impacts are as follows:
All solid waste materials and debris resulting from construction of the substation must be disposed off at approved dumpsites.

Construction activities must be undertaken only during the day i.e. between 0800 hours to 1800 hours. This will minimize disturbance to the general public within the proximity of the site/project.

The proponent and contractor should follow the guidelines as set by relevant authorities to safeguard and envisage environmental management principles during installation, operation and decommissioning of the proposed 66/11kV substation.

Maintenance activities for vehicles must be carried out in service bays and garages off site to reduce chances of oils or grease or other maintenance materials, from coming into contact with environment (water or soil).

Once construction of substation is done, restoration of the worked areas should be carried out immediately by backfilling, landscaping/leveling and planting of low grass (in open areas) and suitable tree species.

Ensure proper water usage during construction phases.

Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of rubbing metal bodies.

Workers must be provided with complete protective and safety gear. They must have working boots, complete overalls, helmets, gloves, earmuffs, nose-masks, goggles etc.

Fully equipped first aid kits must be provided within the site.

Environmental Audits should be carried annually or as prescribed by the Authority during the operational phase and invitation of Inspectors and Experts from NEMA to ascertain compliance with the provided ESMP and set NEMA regulations and Standards.

Recommendation is for the implementation of this project to be supported at all levels and for KPLC adhere to all the proposed mitigation measures outlined in this study, the various relevant guidelines and legislation governing resettlement and compensation, sensitive ecosystems, labor force management, public and worker health and safety, management of hazardous and contaminating material and management of wastes.

Diligence on the part of the contractor and proper supervision by the proponent is crucial for mitigating the predicted impacts and ensuring structural strength, safety, and efficient operation of the project.
REFERENCES

The following list of references was referred to in preparing this Project Report:

- British Standard (BS) 5228 Part 4, 1997: Noise Control on Construction and Open Sites: Code of Practice for Noise and Vibration Control applicable to piling operations
- British Standard (BS) 8233:1999: Sound Insulation and Noise Reduction for Buildings
- British Standard (BS) 5228 Part 1, 1997: Noise and Vibration Control on Construction and Open Sites
- Kiambu West District Development Plan, 2008 - 2012
- Environmental Assessment Source Book, 1999 (World Bank),
- George, C. and Lee, N., 2000 Environmental Assessment in Developing and Transitional Countries, Willey: Chichster, UK
- Government of Kenya (GoK), Building code, Building order 1968 and Grade 11 Building Order 1968
- Government of Kenya: Medical Examination Rules 2005

• Sombroek WG, Braun HMH & Van der Pouw BJA, 1982: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, 1980 (Kenya Soil Survey, Nairobi),
ANNEXES

Annex 1: Copy of Land Ownership Documents

[Image of a Title Deed]

This is to certify that KENYA POWER AND LIGHTING COMPANY LIMITED is (are) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the KIAMBU District Land Registry this 21st day of MARCH 2012.
**Proposed Uplands 66/11kV substation in Lari District**

Environmental Impact Assessment Study Report Page 96

<table>
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<th>ENTRY NO.</th>
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<th>ADDRESS AND DESCRIPTION OF REGISTERED PROPRIETOR</th>
<th>CONSIDERATION AND REMARKS</th>
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REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

MLS/TD/02/A2/02
A No. 677724
Annex 2: Substation designs and layout
Annex 3: Minutes of Public Consultative Meeting Held In Project area  
Date 28/7/2012  
Venue: Project site  
Agenda: Public Consultation for Environmental Impact Assessment for Uplands 66/11 kV Substation.  

The chief for Gituamba location called the meeting to order at 11.30 a.m and invited one of the community members to make a prayer to kick off the meeting.  

Peter Ndonga the chief welcomed all in attendance and requested them to participate fully during the meeting. He then called on the EIA team to explain the agenda of the meeting in details.  

Wilfred Koech (Environmentalist) highlighted the need/justification for the project and the EIA process including consultations. He further explained the nature of the project and the positive impacts of the project such as; increased supply of electricity, direct and indirect skilled and non-skilled employment opportunities, gains in the local and national economy, increase in government revenue, provision of market for supply of construction materials, lightening arrestors, security light, informal sectors benefits among others e.t.c.  

Wilfred also labored on the negative impacts of the project which are soil erosion due to vegetation clearance, dust, solid waste, noise, visual intrusion and aesthetic impacts, impacts of construction material sourcing (e.g. quarrying), occupational health and safety impacts, social vices, public safety, waste and stress on local infrastructure.  

Roseline Njeru a socio economist explained educated the public on safety of electricity. She also explained that there will be one incoming 66kV feeder line while the outgoing lines 11kV would be four. She noted that these lines will use the road reserve and negligible economic impacts were expected.  

Pius Ngari an environmentalist urged the public to own the project and safeguard the power infrastructure. He asked the public to be vigilant on transformer vandals. He noted that most of the negative impacts will occur during construction and so are temporary. However, the proponent would provide mitigation measures for the negative impacts through Environmental and social management plan.
Question and answer/suggestions session

Question 1: When is the project going to take off?

Answer: The project has to be licensed by NEMA before any construction can begin.

Question 2: How sure are we that we shall get employment during construction?

Answer: The contractors are under instruction to give unskilled and semi-skilled labour to the local people and if that does not happen the matter should be raised through the provincial administration.

Question 3: Because you are cutting trees can’t you compensate the community by building an AP camp?

Answer: The mandate of KPLC does not go to that level. In deed the company’s corporate social responsibility covers environment, education and health. This may not be possible.

Question 4: Why is there black outs even when the dams are full?

Answer: Power outages are caused by many reasons including system overload. So not all the time we have blackouts it linked to low water levels in the dams.

Question 5: Please sponsor some children from this place to proceed to colleges.

Answer: This matter falls under corporate social responsibility. The support that is given is normally community based not directly to an individual. However the community must also make a formal request to the company.

Question 6: Can’t you do the access road all the way to the primary school?

Answer: An access road to the substation will be done but not to the school. This is because it is beyond KPLC mandate.

Question 7: There were some people cultivating the land. Will you allow them to harvest?

Answer: Since these are subsistence crops they will harvest before construction begins since we have to be licensed first.

Question 8: You people do not read our meters and bring us estimates why?
**Answer:** ideally meters should be read every month. Incase yours is not read just check the reading and give the cashier for computation or complain to the customer service desk at Limuru

The list of attendance is attached.
List of attendance

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Annex 4: Photo plate

Proposed site—trees that will be cut

Cultivated portion of the proposed site

Environmentalist addressing Baraza

Chief addressing baraza

Water pipes running along the site

Socio economist addressing baraza
Annex 5: Lead Experts Practicing License

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENCE

WILFRED K. KOECH

M/S...........................................(individual or firm) of

Address... P.O. BOX 35943-00200
.................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, 1999

Dated this ...25th........ Day of... JANUARY...........2012.....

Signature..............................................

(Seal)

Director General
The National Environment Management Authority

Conditions of Licence
1. This licence expires on 31st December 2012.
2. The expert shall comply with the Code of Practice and Professional Ethics for EIA / EA experts.
3. The expert shall comply with the attached conditions.

P. T. O.
Annex 6: Sample of Public Consultation Questionnaires used during the public consultations exercise
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE........................
DATE ........................................

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation?  - tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT ......................................
DISTRICT ..............................................
LOCATION/AREA .......................................
ID NO. ..............................................
ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 28/7/2019

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? [tick as appropriate]

   Yes [ ]  No [ ]

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

ID NO.
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE.............................
DATE...........28/07/2012
RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   (1) ____________
   (2) ____________
   (3) ____________
   (4) ____________

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   (5) ____________
   (6) ____________
   (7) ____________

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   (8) ____________
   (9) ____________
   (10) ____________
   (11) ____________

4. Do you support the construction and operation of the proposed substation? Tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

ID NO. 11503129

Environmental Impact Assessment Study Report Page 109
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 30/12/2021

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? (tick as appropriate)

   Yes ☑   No

NAME OF RESPONDENT: John

DISTRICT: Kibwezi

LOCATION/AREA: Kibwezi

ID NO.: 2345678901234567890
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE...........................
DATE....................
RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? - tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT .........................
DISTRICT..........................
LOCATION/AREA......................
ID NO. ............................
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE..........................
DATE...28/1/12..........
RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   Employment development
   Infrastructure
   Economic growth

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   Environmental

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? **tick as appropriate**
   Yes [ ]
   No [ ]

NAME OF RESPONDENT: [signature] N. NAMANGI
DISTRICT: [Lari]
LOCATION/AREA: [Hamunxa]
ID NO.: []

Environment Impact Assessment Study Report
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? \textit{tick as appropriate}

Yes \[\checkmark\] No \[\square\]

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

ID NO.
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

   [Blank Line]

   [Blank Line]

   [Blank Line]

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

   [Blank Line]

   [Blank Line]

   [Blank Line]

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

   [Blank Line]

   [Blank Line]

   [Blank Line]

4. Do you support the construction and operation of the proposed substation? tick as appropriate

   Yes [ ] No [ ]

   NAME OF RESPONDENT 

   DISTRICT

   LOCATION/AREA

   ID NO.
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

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3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? *tick as appropriate*

Yes ☐ No ☐

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

ID NO.
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

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3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? (tick as appropriate)

   Yes [ ] No [ ]

NAME OF RESPONDENT: Simion Peter Kemuya
DISTRICT: Lari, Kwale County
LOCATION/AREA: Chimumba Sub Location
ID NO.: 30682712
ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 28/07/2013

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? **tick as appropriate**

   Yes [ ] No [ ]

NAME OF RESPONDENT: Lawrence Kamau

DISTRICT: Kiam bug West

LOCATION/AREA: Kimaarika

ID NO: 241.92.22.31
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   The community will benefit from the substation, creating new jobs and economic growth.

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   Limited access to the一幅 area.

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   Cooperate with the residents and provide

4. Do you support the construction and operation of the proposed substation?—tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT: [Signature]
DISTRICT: Lari
LOCATION/AREA: Chaka Village
ID NO.: 123456789
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 28/03/2022

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   - Economic development
   - Improved security
   - Light up areas

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   
   

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   - Increase corporate social responsibility
   - Specifying location in terms of institutions

4. Do you support the construction and operation of the proposed substation? - tick as appropriate
   - Yes [ ]
   - No [ ]

NAME OF RESPONDENT: Kamanu Wilson
DISTRICT: Lari
LOCATION/AREA: Waturu
ID NO.: 232410281
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

DATE........................................

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? Tick as appropriate

   Yes    No

NAME OF RESPONDENT.................................................................

DISTRICT.................................................................

LOCATION/AREA.................................................................

ID NO.................................................................
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? - tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

ID NO.
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE......................
DATE....................

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   a. Communications will have improved access
   b. Nielsen will be able to expand
   c. Power will increase

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   a. Noise increase

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

   Proper Management of the site

4. Do you support the construction and operation of the proposed substation? *tick as appropriate
   Yes [ ]
   No [ ]

NAME OF RESPONDENT ..................................................
PETER K. MONTONE
DISTRICT .................................................................
LARI
LOCATION/AREA ........................................................
OIL TRAMWAY
ID NO. .................................................................
ENIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED
UPLANDS 66/11kV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

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2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

4. Do you support the construction and operation of the proposed substation? *tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

ID NO. 


Kenya Power
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED UPLANDS 66/11KV SUBSTATION

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 28/3/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/OTHER STAKEHOLDERS

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?

- (a) Prominence will benefit through job creation.
- (b) Those who will be working in the substation will benefit by doing business within the area because they will be buying their needs in the same area.

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?

- (a) Increased noise due to mechanical issues.
- (b) Cost of living due to infrastructure costs.

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?

- (a) Silent operations during night.
- (b) Use of noise barriers.

4. Do you support the construction and operation of the proposed substation? Tick as appropriate

- Yes [ ]
- No [ ]

NAME OF RESPONDENT: [Signature]

DISTRICT: Lari

LOCATION AREA: Sitwam RA

ID NO.: 1234567890