ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT PROJECT REPORT FOR THE PROPOSED MASENO 33/11KV SUBSTATION IN EMUHAYA DISTRICT

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CERTIFICATION:

Client: Kenya Power and Lighting Company Limited

Assignment: To carry out an Environmental & Social Impact Assessment of the Proposed 33/11 KV Substation in Emuhaya District.

Project Cost: KES 84,146,895/= 

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## LIST OF ABBREVIATIONS

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<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<tr>
<td>CO(_2)</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>DAO</td>
<td>District Agricultural Officer</td>
</tr>
<tr>
<td>DO</td>
<td>District Officer</td>
</tr>
<tr>
<td>DC</td>
<td>District Commissioner</td>
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<tr>
<td>EA</td>
<td>Environmental Audit</td>
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<tr>
<td>EHS</td>
<td>Environment Health and Safety</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>ERC</td>
<td>Energy Regulatory Commission</td>
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<tr>
<td>ESIA</td>
<td>Environmental &amp; Social Impact Assessment</td>
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<tr>
<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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<tr>
<td>EMP</td>
<td>Environment Management Plan</td>
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<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<tr>
<td>ESMP</td>
<td>Environmental and Social Monitoring Plan</td>
</tr>
<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>HEP</td>
<td>Hydro Electric Power</td>
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<tr>
<td>HOD</td>
<td>Head Of Department</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>KenGen</td>
<td>Kenya Energy Generating Company</td>
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<tr>
<td>KPC</td>
<td>Kenya Pipeline Corporation</td>
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<tr>
<td>KPLC</td>
<td>Kenya Power &amp; Lighting Company</td>
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<tr>
<td>KETRAC O</td>
<td>Kenya Electricity Transmission Company</td>
</tr>
<tr>
<td>kV</td>
<td>Kilo Volt</td>
</tr>
<tr>
<td>MVA</td>
<td>Mega Volt Amps</td>
</tr>
<tr>
<td>KW</td>
<td>Kilo Watt</td>
</tr>
<tr>
<td>KWS</td>
<td>Kenya Wildlife Service</td>
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<tr>
<td>L,R</td>
<td>Land Registration</td>
</tr>
<tr>
<td>MOA</td>
<td>Ministry of Agriculture</td>
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<tr>
<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>
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<tr>
<td>NO(_x)</td>
<td>Oxides of Nitrogen</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Act</td>
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<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>
</tr>
<tr>
<td>SO(_x)</td>
<td>Oxides of Sulphur</td>
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<tr>
<td>SHE</td>
<td>Safety, Health and Environment</td>
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<td>STD</td>
<td>Sexually Transmitted Diseases</td>
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EXECUTIVE SUMMARY

Introduction

The Kenya Power & Lighting Company Limited intends to construct and commission a 33/11kV Substation in Luanda Division, Emuhaya District. This has been occasioned by the ongoing expansion of the district due to the decentralization of activities emanating from the new constitution and increase in infrastructural developments which requires more power. The proposed Sub-station will have one overhead 33 kV medium voltage incoming line which will originate from the existing 33/11 kV Kisian substation. The proposed new substation will also have four overhead 11 kV outgoing feeders. Currently, Kenya suffers from unreliable and unstable power grid infrastructure that is unable to keep pace with a demand for electricity at 5.3% annually. Power outages are common occurrence hence if the Maseno 33/11 kV Substation is not constructed the problem will certainly result in unreliable power supply for the rapidly increasing power consumers. Development in the area has additionally been spurred by the presence of Maseno University, the new Emuhaya District and associated administrative units and the increased domestic/commercial needs for electrical power.

Under The Least Cost Power Development Plan 2010-2030, the KPLC customer base is expected to grow by 200,000 connections every year creating an annual demand growth of about 80MW. The national economic growth for Kenya is on upward trajectory as exemplified by the economic performance of 2010 which recorded 4% as compared to 2.6% in 2009. The country’s economy is projected to grow by 5.7 percent for 2011 financial year. It is anticipated that the economic growth pattern will surpass the economic growth pattern witnessed before December 2007 of 7.1 percent as the country gears towards the realization of vision 2030. Significant effect of this growth is notable in agriculture, tourism and construction among others. Considering that electricity demand is demand driven that is heavily influenced by the economic performance of the country, there is need to plan for sufficient electricity capacity additions to meet the growth aspirations of the Vision 2030.

Project Background

Currently, national access to electricity is estimated at 18%. The Government of Kenya, as part of the 2030 Vision aims, to raise access to electricity to 20% by end of 2010 and to 40% by 2020. This increased level of electrification will result in increased demand for electricity which will require major expansion in power generation and transmission infrastructure in the country.

The interconnected system has an installed capacity of 1,375 MW comprising: 757 MW of hydro; 198 MW of geothermal; 0.4 MW of wind; 279 MW of thermal; 26 MW of co-generation; and 60 MW provided by emergency diesel generators. This power is transmitted countrywide through the transmission network, which comprises of 1,323 kilometres (km) of 220 kV transmission line, 2,122 km of 132 kV transmission line and 632 km of 66 kV transmission line. Kenya is currently interconnected with Uganda through a 132 kV double circuit transmission line rated at 2x86 MVA.

The existing transmission 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, The Kenya Power & Lighting Company (KPLC) has identified the need for a number of substations which are now at various stages of development across the country. Emuhaya District and Maseno area account for sizeable percent of the country's demand for electricity in West Kenya region. The distribution network around region will therefore require major expansion and reinforcement in order to deliver power to the main load centres.

The proposed substation is expected to be funded by the Government of Kenya through Kenya Power through funding raised through rights issue. To ensure that the above project is implemented in an environmentally and socially sound and sustainable manner, KPLC has engaged the services of environmental experts registered by NEMA to conduct an environmental and Social Impact Assessment ESIA for the proposed project. The ESIA will be conducted as per the Environmental Management and Coordination Act 1999, and the subsequent Environmental Impact Assessment and Audit Regulations of 2003.

It should be noted at this stage that the exact location of the proposed substation has been determined after the completion of the technical studies for the project. These technical studies took into consideration, as appropriate, information that will come to light through the undertaking of the ESIA studies and way-leave negotiations with potentially affected parties.

Objectives of the ESIA Study

- 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;
- Collect baseline socio-economic data of the project area and potential impacts expected from project during construction, implementation, operation and decommissioning;
- Develop an Environmental Monitoring Program during construction and operation and present plans to minimize, mitigate, or eliminate negative effects and impacts;
- Develop Environmental Management Plan implementation mechanisms;
- Identify and contact stakeholders to seek their views on the proposed project;

Scope and Criteria of the Environmental & Social Impact Assessment

The Government of Kenya policy on all new projects, programs or activities requires that an Environmental Impact Assessment is carried out at the planning stages of any proposed undertaking. The scope of this Environmental Impact Assessment, therefore, 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 outline.

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 construct, commission and decommissioning of the substation project.
Terms of reference:

- Establish the suitability of the proposed location to construct the substation sustainably, efficiently and effectively supply power within Emuhaya District and Maseno area and their environs.
- 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.
- An economic and social analysis of the project area.

Study Methodology

This study was carried out through desktop studies and field investigations. The experts conducted extensive literature review 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.

In order to address these issues the study team adopted a participatory approach where the client and the immediate surrounding communities were consulted in addition to reviews and references to sources of information including legal statutes, design and relevant project documents. Among the key activities undertaken during the assessment were:

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

(ii) Review of documents with necessary information on the proposed project, the site planning and implementation plan as well as the desired structural design.

(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 opened up or closed) and land use considerations (water sources, effects of proposal on surrounding land use potentials and possibility of multiple uses).

**Project Description**

**Technical Characteristics of the Proposed Substation**

The purpose of a substation is to alter the characteristics of high voltage electricity to lower voltage electricity that is suitable for electrical reticulation to the end users (e.g. residential units). The proposed substation will accommodate one 7.5 MVA transformer which will reduce the voltage from 33kV to 11kV from which point it can be delivered to various feeders and reticulated to the consumer. The proposed Maseno 33/11kV substation will cover a ground area of approximately 80m x 60m in extent. KPLC has acquired a 0.7 acres parcel of land along the Kisumu Busia Road, at Luanda area, Emuhaya District. The land is located between Luanda town and the Luanda – Kima road junction, approximately 200 metres from the Luanda – Kima road junction. This land can sufficiently accommodate the substation, the incoming and outgoing lines and a turning area for vehicles.

The proposed substation is to have an incoming 33kV line, three equipped 11kV feeder bays and one spare bay for future purposes. The substation will be designed to accommodate a future 33kV feeder bay, additional transformer and two additional MV feeder bays. It is proposed that the proposed Maseno substation have one access road, which will need to be designed according to KPLC’s standards taking into account the Ministry of Road’s requirements. The length of the access road will be approximately 20m from Kisumu-Busia road.

The entire perimeter of the substation will be fenced and a gate will be constructed at the entrance to the site which will be locked at all times. The substation will be lit at night, and a photocell will be used to automatically switch on the lights at a set time each evening.

The proposed project will involve construction, operation and commissioning of a 33/11kV substation. The proposed project will cover an area approximated 1 acre.

**Project objectives**

The main objective is to construct a new 33/11kV substation. Specific objectives include:

- Designing and constructing of a 33/11kV Substation 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
Project Justification

The project is justifiable in that it will stabilize power supply, improve on distribution line security hence cushioning against losses occasioned by power supply failures and interruptions/blackouts and enhanced public safety. This will facilitate investments hitherto constrained by lack of electric power. It is important to note that this has been occasioned by the ongoing infrastructural development within the devolved Government Counties in the project area, where there are increasing needs of electric energy. Furthermore, the use of concrete poles will be beneficial to the environment because it will greatly reduce deforestation and illegal logging for electric wooden poles. Although wood structures are relatively cheap compared to concrete pole structures the performance of wooden poles has proved poor due to their short life time and subsequent poor reliability and very high operational and maintenance costs.

Project cost

The project cost is one hundred and fifty million shillings only (Kshs. 80 million).

Baseline information / description of project area environment

Project Regional Location

The proposed project is located at Ematenje village, Ebusiralo sub-location, Luanda Township Location, Luanda Division, Emuhaya District, Vihiga County. The responsible local authority is Luanda Town Council. The project will be constructed within the 0.7 acre land belonging to Kenya Power. The project site is approximately one kilometer from Luanda town and also five kilometers from Maseno town that hosts the Maseno University. Luanda town is a busy transit centre along the busy Kisumu – Busia road. The town also boasts of a busy daily market that sells a variety of commodities.

Climatic conditions

The district receives bi-modal rainfall with an annual average of 1750mm. The district is in rich in streams and rivers that traverse the district and drain into Lake Victoria. There are two major rivers in the district i.e. Esalwa and Yala. The Equator cuts across the district. The district has two agro-ecological zones i.e. upper midland zone and the lower midland zone. The altitude ranges between 1350m and 1500m above sea level. The average annual temperature ranges between 18°C and 22°C.

Geology and Soils

The major part of the district consists of soils of Kavirondian origin. They are composed of red loam soils. The soils are deep well drained dystric acrisols that are slightly acidic to alkaline. Granite rocks are visibly present in the area. These soils are often rich in organic matter and range from fertile to moderately fertile. The soils have great agricultural potential that supports the high population density in the area. The distinguishing agricultural characteristics of project area are mainly subsistence mixed farming i.e. livestock and crop farming. The crops grown in the project area include maize, beans, cassava, sweet potatoes, peanuts and local vegetables.
Biodiversity

The proposed site is currently inhabited by the family of the original land owners, who are set to vacate the land as soon as the land transaction is finalized. By the time of writing this report, the sale agreement had been signed and part payment had been done. Part of the parcel of land is bare although it has previously been used for maize and beans growing.

The vegetation that will be cleared on the proposed site is mainly grass. Physical/ manual clearing is recommended for this project. A semi-permanent house standing on the land will also be demolished.

Legal and Regulatory Framework

Kenya has over 77 Statutes which relate to environmental concerns. Most of these statutes are sector specific, covering issues such as land use, occupational health and safety, water quality, wildlife, public health; soil erosion, air quality etc. Previously, environmental management activities were implemented through a variety of instruments such as policy statements, permits and licences 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 Coordination Act, 1999
- Public Health Act (Cap. 242)
- Land Planning Act (Cap. 303)
- Physical Planning Act, 1996
- Local Government Act (Rev. 1998)
- Water Act, 2002
- Energy Act of 2006
- The Standards Act Cap 496
- Penal Code Act (Cap.63)
- The Wildlife Conservation and Management Act, Cap 376
- The Lakes and Rivers Act Chapter 409
- The Forestry Services Act, 2005
- Occupational Safety and Health Act, 2007
- Occupiers Liability Act (Cap. 34)
- The Radiation Protection Act (Cap 243 Laws of Kenya)
- The Traffic Act Chapter 403 Laws of Kenya
- The Public Roads and Roads of Access Act (Cap 22 Laws of Kenya)
- The Way leaves Act Cap 292
- The Agriculture Act, Cap 318 of 1980 (revised 1986)
- Antiquities and Monuments Act, 1983 (Cap 215)
- The Registration of Titles Act Cap 281
- The Land Titles Act Cap 282
- The Land Acquisition Act Chapter 295
- The Civil Aviation Act Cap 394
- World Bank /IFC Environment and Social Safeguards Policies
- Environment Assessment (Operational Policy, OP/BP 4.01)
Public Consultation

The purpose of public participation is to identify Project Affected Persons (PAPs) and to allow such parties the opportunity to provide input and comment on the EIA process, including issues and alternatives that are to be investigated, thereby facilitating informed decision-making.

Consultations were undertaken as part of the ESIA in order to obtain the views of stakeholders, their concerns and suggestions towards sustainable implementation of the project. Members of the immediate community, interested and affected persons within the immediate area likely to be affected by the project were consulted. The consultation was done through stakeholder consultative meetings, structured project forms/key informant interview schedule, household visits and administration of Public Participation questionnaires.

The following were the major concerns that were raised up by various stakeholders in regard to the proposed project

Positive Issues

- Employment opportunities
- Improvement of local and national economy
- Boosting of the informal sector
- Improved Security
- Improved Electricity Supply
- Increased protection from possible lightning strikes

Negative Issues

- Visual intrusion
- Increased dust pollution at the construction phase
- Increased Noise Level and Vibration
- Accidents during construction
- Possibility of spread of sexually transmitted diseases
- Electromagnetic radiations
- Electrocution and vandalism

Public stakeholder consultation was undertaken in order to obtain the above views and concerns of the stakeholders. The stakeholders raised a number of pertinent issues which some were responded to during the consultation while the rest have been addressed in the environmental management plan. Generally the stakeholders consulted were in support of the proposed project.
Project Potential Environmental and Social Impacts

Both positive and negative impacts that are associated with the proposed substation during the construction, operation and decommissioning phases were identified. The following positive and negative impacts are associated with the proposed project.

Anticipated Positive Impacts

- Reduction in environmental degradation because of use of stainless steel pylons.
- Direct and indirect skilled and non-skilled employment opportunities.
- Gains in the local and national economy and increase in revenue.
- Provision of market for supply of construction materials.
- Informal sectors benefits.
- Acceleration of the investment process in the region.
- Reduction in pressure on biomass which comes from forest resources.
- Improved communication

Anticipated Negative Impacts

Against the background of the above positive impacts, there will be negative impacts emanating from the construction, operation and subsequent decommissioning activities of the substation. The negative impacts will include:

- Soil and geology (Soil erosion and siltation impacts from vegetation clearance)
- Ecological Impacts (Loss of habitat, Destruction of flora and fauna, Vegetation Clearance, disturbance)
- Air quality (Dust and fugitive emissions pollution)
- Solid waste generation
- Noise and Vibrations (Increase in noise levels)
- Visual intrusion and aesthetic impacts
- Fire Hazards
- Impacts of construction material sourcing (e.g. quarrying)
- Traffic congestion and road tear and wear
- Occupational health and safety impacts – Increased risk of accidents, Occupational hazards & Fire Outbreaks
- Hazardous waste materials
- Impacts of fuel, lubricating oil and chemical storage
- Impacts on public health - possibility of increased incidence of disease transmission
- Stress on local infrastructure.

Proposed Mitigation measures

- 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

During construction, where water is available, sprinkle the construction area with water to keep dust levels down.

Drivers of construction vehicles must be supervised so that they do not leave vehicles idling and they limit the vehicular speeds so that dust levels are lowered.

No burning of any waste materials whatsoever should be permitted within the site during construction

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.

Electrical Safety 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.

Dust masks should be provided to all personnel in areas prone to dust emissions throughout the period of construction.

Emergency response measures shall be put in place.

Only qualified authorized operational staff shall work at the substation.

Danger/Caution warning notices shall be placed where necessary.

The site shall be rehabilitated to its original state as far as is reasonably practical.

Minimize the need to construct new access tracks wherever possible by using existing access roads and tracks wherever available.

Ensure minimum clearance distances between conductors and ground, waterways, road crossings, buildings, communication systems etc. are incorporated into design.

Strictly define ROW clearing activities in the contract specifications and in the Environmental Management Plan (EMP).

String conductors under tension to minimize potential damage to remaining ground vegetation.

Decommission and rehabilitate excess temporary access tracks as soon as they are no longer required.

Construction to proceed in the dry season if possible to minimize soil erosion and mass wasting and to limit loss of crops (which are not grown in the dry season); where construction is required in the rainy season, potentially unstable slopes to be avoided.

Scaffolding to be placed over roadways at locations conductors are being strung to ensure traffic flow is maintained and public safety is provided.
Project alternatives

The possible options are available for the proposed substation as follows:

- The ‘Do-nothing’ Option – based on utilizing existing facilities as it is without undertaking any new works.
- 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
- Analysis of Alternative Construction Materials and Technology-
- Alternative Substation Sites
- Alternative energy source

Summary of Environmental and Social Management Plan (ESMP)

The Environmental and Social management and monitoring plans address specific concerns and mitigation measures encountered during the engineering, procurement and construction phases of the proposed substation project.

To ensure that the negative environmental impacts can be controlled and mitigated effectively, a stringent and scientific management and monitoring plan has been prepared. The ESIA proposes to utilize existing structures with KPLC management, including Safety, Health and Environment (SHE) department and the KPLC Project Implementing Unit (KPIU), be responsible for ensuring that the overall environmental and social targets are achieved and that the environmental responsibilities and obligations of the ESIA are satisfied during the life of the project.

The project manager shall conduct quarterly inspections/audits to ensure that the system for implementation of the ESMP and ESMoP is operating effectively. This ESIA therefore requires that the ESMP 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 KPLC will mount own internal monitoring to ascertain environmental and social sensitivity at all stages of project development.

Conclusion and Recommendations

Conclusion

It is quite evident from this study that the construction and operation of the proposed construction of the proposed Maseno 33/11kV substation will bring positive effects in the study area including creation of employment, increase in power to the local grid, stabilize power in the region, increase in revenue and the resulting improvement of the welfare of the local population among others. However, although the project will come with various positive impacts, negative impacts will also be experienced hence the need to assess them and put in place appropriate mitigation measures. The negative impacts of this project include: Increased population in the project area, which is mostly rural and lacking essential services and facilities; increased pressure on infrastructure and possible social crime among others.
Both in the short term as well as in the long term, adverse changes that would warrant the non-implementation of the project are not envisaged. The long term benefits of the project justify its commission.

It can be stated hereby that:-

i. The proposed project will generate socio-economic benefits which would not be realized if the no development of option is considered.

ii. 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.

iii. The project will be designed, constructed, and operated according to the acceptable industry norms and standards. Successful implementation of the proposed EMP will minimize or reduce the environment impacts to the acceptable levels.

iv. The negative impacts that will arise during the project cycle will be mitigated.

v. 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.

**Recommendations**

It is hereby recommended that the project be allowed to go on provided the following conditions have been met:-

i. Mitigation measures outlined in this report should be adhered to and the Environmental Management Plan (EMP) implemented to the letter. The implementation of this EMP in the entire life cycle of the proposed project (i.e. construction, operation and de-commissioning) is considered to be key in achieving the appropriate environmental management standards as detailed in this study report.

ii. KPLC should undertake environmental audits (EA) of the project after every 12 months after completion of the project to confirm the efficacy of the ESMP.

iii. KPLC should carry out a survey and demarcate the boundaries shown on the proposed line to identify those who will be affected.

iv. KPLC should promote re-forestation within Emuhaya District by providing tree seedlings to the local authorities to retain the aesthetic value of the area.

In view of this study, the project as currently proposed is environmentally sound. This report has disclosed all potential adverse impacts most of which have readily available means to effective mitigation as already discussed, and to be implemented as part of the project design. Overall, the project enjoys a net positive regime which will greatly improve upon pursuit of the ESMP as proposed.
1 CHAPTER ONE: INTRODUCTION AND PROJECT BRIEF

1.1 Introduction

The KPLC intends to construct and commission a 33/11kV substation in Luanda Division, Emuhaya District. The substation is hereby referred to as the Maseno 33/11 kV Substation. This has been occasioned by the ongoing expansion of the District, increase in infrastructural developments which requires more power. Currently, Kenya suffers from unreliable and unstable power grid infrastructure that is unable to keep pace with a demand for electricity at 4.9% annually. Power outages are common occurrence hence if the Maseno substation is not constructed the problem will certainly result in unreliable power supply for major upcoming light industries and other clients in catchment areas.

Under The Least Cost Power Development Plan 2010-2030, KPLC customer base is expected to grow by 200,000 connections every year creating an annual demand growth of about 80MW. The national economic growth for Kenya is on upward trajectory as exemplified by the economic performance of 2009 that recorded 2.6 percent. The country’s economy is projected to grow between 4 percent and 5 percent for 2010-2011 financial year. It is anticipated that the economic growth pattern will surpass the economic growth pattern witnessed before December 2007 of 7.1 percent as the country gears towards the realization of vision 2030. Significant effect of this growth is notable in agriculture, tourism and construction among others. Considering that electricity demand is demand driven that is heavily influenced by the economic performance of the country, there is need to plan for sufficient electricity capacity additions to meet the growth aspirations of the Vision 2030.

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

Currently, national access to electricity is estimated at 18%. The Government of Kenya, as part of the 2030 Vision aims, to raise access to electricity to 20% by end of 2010 and to 40% by 2020. This increased level of electrification will result in increased demand for electricity which will require major expansion in power generation and transmission infrastructure in the country.

The interconnected system has an installed capacity of 1,375 MW comprising: 757 MW of hydro; 198 MW of geothermal; 0.4 MW of wind; 279 MW of thermal; 26 MW of co-generation; and 60 MW provided by emergency diesel generators. This power is transmitted countrywide through the transmission network, which comprises of 1,323 kilometres (km) of 220 kV transmission line, 2,122 km of 132 kV transmission line and 632 km of 66 kV transmission line. Kenya is currently interconnected with Uganda through a 132 kV double circuit transmission line rated at 2x86 MVA.

The existing transmission system capacity is constrained particularly during peak hours when system voltages in parts of Nairobi, West Kenya and Mount Kenya drop significantly, 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 country which is now at various stages of development. The West Kenya Region accounts for sizeable per cent of the country’s demand for electricity. The distribution network around West Kenya will therefore require major expansion and reinforcement in order to deliver power to the main load centres.

Construction of a new substation to serve part of Emuhaya district and the surrounding areas will significantly reduce the currently high losses and poor supply quality by overstrained 33kV lines in the region. Furthermore, construction of a 33/11 Substation with a 33kV bus-bar will provide additional flexibility as it will be possible to add more incoming and outgoing lines in future if required.

The proposed substation is expected to be funded by the Government of Kenya through Kenya Power through funding raised through rights issue. To ensure that the above project is implemented in an environmentally and socially sound and sustainable manner, KPLC has engaged the services of environmental experts registered by NEMA to conduct an environmental and Social Impact Assessment ESIA for the proposed project. The ESIA will be conducted as per the Environmental Management and Coordination Act 1999, and the subsequent Environmental Impact Assessment and Audit Regulations of 2003.

It should be noted at this stage that the exact location of the proposed substations has been done but may be subject to review during the ongoing technical studies for the project. These technical studies will take into consideration, as appropriate, information that comes to light through the undertaking of the ESIA studies and way-leave negotiations with potentially affected parties.
1.3 Scope and Objectives of the Study

The National Environment Management Authority (NEMA) Policy on all new projects, programs or activities requires that an Environmental Impact Assessment is carried out at the planning stages of any proposed undertaking that is out of character with the host environment to ensure that Potential environmental and social impacts are taken into consideration during the design, construction, operation and decommissioning of the facility.

1.3.1 Scope

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

The assessment was undertaken in compliance with the Environmental Management and Coordination Act 1999 and also the Environmental Impact Assessment and Audit Regulations, 2003. In addition, appropriate sectoral legal provisions relevant to such projects have also been referred to for the necessary considerations during the construction, commissioning, operation and decommissioning of the proposed substation associated.

Specific objectives of the study included the following:

- Present an outline of the project background,
- Establish the 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 implementation and commissioning,
- 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.

The ESIA 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:

- Focusing on the relevant national environmental laws, regulations and by-laws and other laws and policies focusing on allied activities relative to the proposed project.
Interactive approach was adopted for the immediate neighbourhood in discussing relevant issues including among others:

- Land use aspects,
- Neighbourhood issues,
- Project acceptability,
- Social, cultural and economic aspects,
- Environmental Impacts
  - Physical impacts,
  - Biological impacts,
  - Legal Compliance.

1.3.2 Terms of Reference (ToR) for the ESIA Process

The ESIA Experts were assigned the task of carrying out Environmental and Social Impact Assessment of the proposed Maseno 33/11kV substation. The scope covered various activities related to: construction works of the proposed development which included all works of civil, mechanical, electrical or other nature necessary to construct, commission and decommissioning of the substation project. The output of this work is a comprehensive Environmental and Social Impact Assessment Study Report which will aid NEMA in deciding whether to approve or disapprove installation and operation of the substation Project as well as meeting the requirements of the World Bank Environmental and Social Safeguard Policies.

The ESIA experts conducted the study guided by the following terms of reference:

- Establish the suitability of the proposed location to construct the 33/11kV 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 social and cultural effects 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.
- An economic and social analysis of the project.
1.4 ESIA Approach and Methodology

The approach chosen in undertaking this study was careful to take into account EMCA, 1999 requirements as well as the Environmental Impact Assessment and Audit Regulations, 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan. The approach and methodology applied during the study enabled collection of both primary and secondary data. Qualitative and quantitative methods of data collection were employed. Secondary data was obtained through literature reviews while primary data was obtained through physical observations, photography, interviews and stakeholders’ consultation.

The initial stage of this assessment was project screening. 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 areas within the proposed site through assessment of project maps. This screening indicated that the proposed power substation is among the listed projects under Schedule 2 of EMCA, 1999 thus requires an EIA study.

Project scoping was the next stage which was done to delineate project issues that required detailed analysis. This step involved collection of primary and secondary data through field visits and literature review respectively.

Key activities undertaken during the assessment included the following:
- Physical inspections of the proposed project area
- Literature review of relevant documents
- Stakeholder consultations with the line ministries and project affected persons
- Report writing

Desk study/literature review
A critical literature review of secondary data was done to establish the following:
- Relevant legislations and institutional framework governing the proposed project
- Licenses and permits requirements and conditions;
- Baseline information of the project area
- Types of waste likely to be generated.

Figure 1-1: Summary of ESIA Procedure

ESIA Study Report

Development of ESMP

Formulation of Mitigation Measures

Impact assessment and analysis

Identification of Potential Impacts

TOR

Scoping

Project Screening

ESIA Approach and Methodology

Environmental Impact Assessment Project Report
Public Consultations

Section 17 of the Environmental (Impact Assessment and Audit) Regulations of 2003, requires that all ESIA Studies undertake Public Consultation (PC) as part of the study. The aim of the PC is to ensure that all stakeholders interested in a proposed project such as project beneficiaries and the general public in the vicinity of the proposed project be identified and their opinion considered during project planning, design, construction, operation and decommissioning phase. Consequently, public 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 community to raise issues and concerns pertaining to the project.

Public consultations were conducted thorough administering of questionnaires to few neighbors of the project while key stakeholder forum organized at district headquarters in the DC’s board room. Key stakeholders views on the project were solicited through interviews and discussions with the heads of various line ministries at the district.

In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, informal interviews with a random sample of people from the surrounding community, use of public participation forms, photography, and discussions with other stakeholders.

The key activities undertaken during the assessment were:

- Continuous discussions with the stakeholders and accessing other sources of information on the proposed project details, the site planning and implementation plan,
- Physical inspection of the proposed site, photography, and interviews with people in the immediate neighbourhood. Public participation forms were used to record their opinion regarding the project.
- Evaluation of the activities around the site and the environmental setting of the wider area. This was achieved through existing information, literature and physical observations,
- Review of available documentation,
- Reporting and submission.

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

**Step 1: Project Concepts**

The project details, scope, design, implementation, tests, commissioning 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, stakeholder 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&SMMP for the project life was developed indicating parameters to be monitored, persons responsible, timing and costs involved.

Specific issues covered in the project report include but are not limited to:
- Name of the proponent, address and contact person
- Title of the project
- Objectives and scope of the project
- Nature of the project;
- Location of the proposed project, 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 (ESMP) 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)

Study Team
This ESIA study was conducted by a team of experts that comprised the following professionals.
I. Wilfred Koech – Lead Expert, NEMA Reg. No. 0259
II. Samuel Abaya – Lead Expert, NEMA Reg. 1245 – Socio–Economist
III. Roseline Njeru – Socio – Economist
IV. Eng. Eliud Limo – Senior Transmission Engineer
V. Pius Ngari – Associate Expert Reg. No. 1862
VI. Simon Mwangangi – Lead Expert, NEMA Reg. No. 2046
VII. Jacob Akinala – Lead Expert, NEMA Reg. No. 0729
VIII. Samuel Abaya – Lead Expert, NEMA Reg. 1245
IX. James Gitau – Technical Safety Engineer
CHAPTER TWO: DESCRIPTION OF PROPOSED DEVELOPMENT PROJECT

2.1 Introduction
This chapter provides an overview of the proposed substation as currently designed. The description borrows largely from documentation availed by the KPLC team.

2.2 Location of the Project
The proposed project is located at Ematenje village, Ebusiralo sub-location, Luanda Township Location, Luanda Division, Emuhaya District, Vihiga County. The responsible local authority is Luanda Town Council. The project will be constructed within the 0.7 acre land belonging to Kenya Power. The project site is approximately 25kilometres from Kisumu City and one kilometer from Luanda town and also five kilometers from Maseno town that hosts the Maseno University. Luanda town is a busy transit centre along the busy Kisumu – Busia road. The town also boasts of a busy daily market that sells a variety of commodities.

Figure 2-1: Proposed Maseno 33/11kV project site location

2.3 Project objectives
Kenya power desires to construct a 33/11 kV substation which will comprise of one 7.5MVA transformer to step down power from 33kV to 11kV for distribution within Emuhaya district and Maseno area. Specific objectives of the project include; boosting the existing load to stabilize power supply and ensure quality power for the customers not to mention meeting the increasing power demand.

The main objective is to construct a new 33/11kV Substation. This is to upgrade the existing power network. Specific objectives include;
- Designing and constructing of a 33/11 kV substation 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.
2.4 Project Justification

Power Load studies have shown need for capacity enhancement to ensure stable and quality power supply amid increasing power demand. The Maseno 33/11kV substation project is justifiable in that it will stabilize power supply, improve on distribution line security hence cushioning against losses occasioned by power failures and blackouts. There is also need to reduce technical losses associated with long transmission distances.

The Substation needs to be as close as possible to the area it will serve to minimize on technical losses associated with long distances of transmission. Kenya Power has already acquired the land on which the substation is to be constructed. The commissioning of the Substation will guarantee stable and quality supply of electricity to Emuhaya District and its environs.

2.5 Project Need

The existing 11kV electrification network in Emuhaya area is highly constrained in terms of capacity and is therefore unable to supply additional electrification load growth in entire region of Emuhaya town council. It is therefore imperative for KPLC to establish a new 33/11kV network of power-lines and substations on the Maseno and Luanda area of Emuhaya district to strengthen the existing electrification network and cater for the projected electrification load in the future.

In addition, the development of the Maseno 33/11kV substation as part of the larger West Kenya electrification project in which KPLC has proposed constructing substations to form a closed circuit (ring) of lines on the different areas. As such, the development of the new substation at Luanda/Maseno area is imperative in enabling KPLC to establish the required closed circuit system of powerlines within Emuhaya District and its environs.

2.6 Project Desirability

The proposed Maseno 33/11kV substation will provide an additional supply of electricity to Emuhaya District. A large number of households in this area currently do not have electricity and are reliant upon candles for lighting purposes. A dedicated, additional supply of electricity will enable many previously un-serviced households to receive electricity. Should the proposed developments 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 33kV electrical system. This will consequently have a significant negative impact on existing and proposed new developments in the area, including industries, tourism, education and agriculture.
2.7 Description of the Project

2.7.1 Existing Vegetation
The proposed site is currently bare as it has been used for agricultural crops before it was acquired by the proponent. The area is characterized by the following tree and vegetation species: *Lantana Camara*, *Gravellia*, *Eucalyptus*, star and couch grass. The area is mainly mixed subsistence farming and livestock and poultry rearing. The crops grown around include; maize, beans, sweet potatoes, bananas, sorghum, millet and local vegetables. The vegetation that will be cleared on the proposed site is mainly grass. Physical/ manual clearing is recommended for this project.

2.7.2 Technical aspects of a substation
A sub-station is a vital component 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 down substation i.e. 33kilo-Volts to 11kilo-Volts. After stepping down, electricity is fed to distribution lines running to specific geographic areas to supply customers after further stepping of the voltage 11kilo-Volts to 415 volts and 240 volts for industrial/large-scale and domestic usage respectively.

The proposed 33/11 kV substation will have the following components; one 7.5MVA transformer and its bay, in-coming & out-going feeders, switch gears, bus bars, steel structures, cabling units, lightning arrestors, a parking bay, control panels and a guard house. The windings of such large transformer are immersed in transformer oil. It is a highly refined mineral oil that is stable at high temperatures and has excellent electrical insulating properties. Its functions are to insulate, suppress corona and arcing, and to serve as a coolant. Also, because it provides part of the electrical insulation between internal live parts, it must remain stable at high temperatures over an extended period.

The incoming line to the substation will be from the existing 33 kV line from Kisian substation located near Kisumu City.

Associated facilities include; a small office and a control room to house the high voltage monitoring and control instrumentation and equipment. The sub-station will also be equipped with KPLC’s own internal micro-wave telecommunications facilities. When operational, the sub-station will be manned on a 24-hour basis. A sentry house will also be constructed for the security guard.

2.7.3 Size
The proposed Maseno 33/11 kV Substation will be approximately 50m x 40m in extent. KPLC has acquired a parcel of land measuring 0.7 acres to accommodate the proposed substation, turning of vehicles and the incoming and outgoing lines.

2.7.4 Electrical Infrastructure
The proposed substation is to have an incoming 33kV, three equipped 11kV feeder bays and one spare bay for future purposes. The substation will be designed to accommodate a future 33kV feeder bay, additional transformer and two additional MV feeder bays. The design will incorporate allowances for the use of a mobile transformer for emergency conditions.
A standard “brick type” control room will be constructed inside the boundary of the substation yard for the protection of the line and substation equipment, as per KPLC’s standard control room layout.

In addition to the control room, the substation will also have steelwork A-frame bus bar structures of approximately 12m – 13m in height for the 11kV feeder lines, and column and beam steelwork busbar structures of approximately 12m – 13m in height for the 33kV line.

In terms of lightning protection for the substation, overhead screening will be provided by protective cones afforded by A-frame peak and lightning mast peaks. Equipment within the substation yard will be shielded by the steelwork (columns, beams and A-frames) structures and overhead steel wires. All steel work will be connected to an earth mat to prevent potentially high voltages from arising.

2.7.5 Access

It is proposed that the Maseno 33/11 kV Substation have one access road, which will be designed according to KPLC’s standards, taking into account the Ministry of Road’s requirements. The length of the access road will be approximately 10m, while the width of the road will be determined by need, such as equipment size, whereby the maximum allowable width is 5m. 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. A line of sight will need to be maintained on either side of the access road during operation. It is proposed that the access road be constructed off the Kisumu -Busia Road to the substation site.

2.7.6 Fencing and Security

The entire perimeter of the substation will be fenced KPLC’s standard fencing i.e. either 2.4m steel palisade fencing or 2.4m steel post mesh fencing. A gate will be constructed at the entrance to the site which will be locked at all times. The substation will be lit at night, and a photocell will be used to automatically switch on the lights at a set time each evening.

2.7.7 Project Activities

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 ensure works are undertaken in accordance to specifications. This is to ensure quality work is achieved.

It is anticipated that the proposed site will undergo alteration during construction to install the 7.5MVA for the 33/11 kV distribution substation and associated structures. Safety requirements and precautions, established local and international environmental protection regulations alongside company policy shall guide the contractor during construction phase.

Construction activities will involve the following:

- Hoarding off the site will be done with iron sheet and a stone perimeter wall will be constructed
- The Contractor shall perform any site investigations in good time as may be necessary for the progress of design and construction on a sound engineering basis.
- Ground breaking and removal of existing vegetation
- Leveling the ground.
- Civil works on site including construction of access road, digging foundations and concrete works
- Delivery of civil work construction materials, transformer, tools, electrical equipment to project site.
- Compaction and filling with gravel of the areas to form foundations
- Storm water drainage construction
- Construction of bund walls to hold in case of accidental leakage
- 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
- Connection of power from the existing 33kV line to the substation
- Load testing
- Remedy ing 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.

**Operational phase**
- Training of the proponents operating and maintenance personnel
- During operational phase the proponents personnel will mainly do switching
- Periodical maintenance works

Throughout the project life, the proponent and contractor shall adhere to all requirements of National Environmental Management Authority (NEMA) and any other applicable legislation regarding environmental and socio-economic impacts.

**Soil Excavation**
Excavation of the top soil shall be done to pave way for the construction of the substation. Soil excavation process shall be done with utmost care to ensure that the excavated soil is not improperly heaped or not 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’s Safety, Health 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**
Throughout the construction phase, close supervision shall be carried out by the proponent to ensure:
- Workers use personal protective equipment (such as hand gloves, helmets, safety shoes ear muffs, overalls and dust coats) 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.
- Provision of first aid kit and firefighting equipment (portable cylinders) and placement at strategic positions for access
- Proper disposal of waste material and toilet facilities are provided for construction workers
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 develop a Safety Plan before commencement of each phase of the construction. This will ensure that personnel are equipped with the correct protective clothing and equipment and are ready to work safely while also safeguarding the environment.

**Operation Phase:**
During operation phase of the project, no unauthorized persons shall access the substation. This is in line with KPLC’s SHE Policy and Electrical Safety Rules to ensure safety of staff and the public. Routine maintenance shall be carried out by authorized staff.

**Area of Impact**
The substation will be constructed on the proponents land. Approximately, the area under the substation will be 50m by 40m.

**Project’s Decommissioning Activities**
At the decommissioning/demolition phase, the following activities will take place;

- Removal of transformer and associated switching equipments
- Removal of electrical fittings, bus bars and steel poles/structures
- Demolish and carefully handle components that contain oil like the transformer
- Ensure proper handling of the demolished materials and have an authorized and guided transportation and disposal away from human settlement, water bodies and wildlife conservation area
- Demolish and remove all the concrete works

During this phase, the proponent shall restore the host environment close to its original state.

The proponent shall submit a decommissioning plan to NEMA in good time prior to decommissioning. The decommissioning plan should include a restoration plan.

The host environment should be rehabilitated and restored to its former state through:

- Approved and appropriate landscaping methodology.
- Planting of indigenous vegetation.
- Removal of any soils that may have been impacted by oils or fuels for offsite (away from the project area) remediation.

**2.7.8 Input Materials**
Construction of the substation is expected to use quality construction materials and procedures to ensure quality work and occupational and public safety and the environment. The following inputs will be required for construction:

- Raw construction materials e.g. sand, cement, natural building stone blocks, hard core, gravel, concrete among others.
- Timber (e.g. doors and frames, fixed furniture, etc.),
- Paints, solvents, white wash, etc.,
- Labour force (of both skilled and unskilled workers).
• One 7.5 MVA transformer.
• Bus bars, Switch gears, Circuit breakers and Capacitors
• Lightning arrestors and steel structure members
• Water

2.8 Cost of Proposed Project
The proposed substation shall be 25kms from Kisumu town and is situated along Kisumu - Busia road and is projected to cost a total sum of **Kshs. 80million** to construct the substation and associated structures

2.9 Site and Land Ownership
The proposed site is classified as agricultural land. The land parcel, Sub Division Number W/Bunyore/Ebusikhale/95, measuring approximately 0.7 acres has been acquired (purchased) by The Kenya Power and Lighting Company Ltd on a willing seller – willing buyer basis. The KPLC has also processed change of user for the piece of land awaiting approval. See attached copy of the Sale Agreement in the **appendix 4**

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

The report will be useful to the following stakeholders:
- Relevant government ministries and agencies
- Affected and Interested persons;
- Engineers to be involved in supervision of the construction works.
- Contractors to be engaged in the construction works for the 7.5MVA substation;
- Staff that will be involved in the management and operation of the 7.5MVA 33/11 kV substation.
- Government regulatory agencies such as National Environment and Management Authority (NEMA) and Energy Regulatory Commission (ERC).
3 CHAPTER THREE: BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

This chapter describes the study area Emuhaya district broadly in terms of physical features, size, administrative and political features, physiographic and natural conditions. The information provided is from the District Development Plan for Emuhaya District.

3.2 Current Administrative Location of the project

The proposed project is located at Ematenje village, Ebusiralo sub-location, Luanda Township Location, Luanda Division, Emuhaya District, Vihiga County. The responsible local authority is Luanda Town Council. The project will be constructed within the 0.7 acre land belonging to Kenya Power. The project site is approximately one kilometer from Luanda town and also five kilometers from Maseno town that hosts the Maseno University. The project will be constructed within the 0.7 acre land belonging to The Kenya Power & Lighting Company Limited. The distinguishing characteristics of project area are mainly relatively small plots for subsistence mixed farming. The area is gradually becoming urbanized with business and residential structures coming up especially close to the Kisumu – Busia road.

Emuhaya District is one of the districts that make up Western Province and it comprises of two Divisions; Luanda and Emuhaya. Emuhaya Division houses the Emuhuya District headquarters. The district was carved from Vihiga District in 2007. It borders Butere District in the North, Vihiga District in the East, Kisumu West District in the South and Siaya District in the West. It covers a total area of 173.2km². The Equator cuts across part of the district at Latitude 0° and Longitude 34° 35’. The district has one local authority namely Luanda Town Council. The district has one constituency namely Emuhaya Constituency.
Figure 3-2: Map showing Location of Emuhaya District in Kenya
Figure 3-3: Satellite image of proposed project site area

Figure 3-4: Map of the general regional area
3.3 Administrative and political units

3.3.1 Administrative and Political Units

Emuhaya District is one of the districts that make up Western Province and it comprises of two Divisions; Luanda and Emuhaya. Emuhaya Division houses the Emuhuya District headquarters. The district was carved from Vihiga District in 2007. It borders Butere District in the North, Vihiga District in the East, Kisumu West District in the South and Siaya District in the West. It covers a total area of 173.2km². The Equator cuts across part of the district at Latitude 0° and Longitude 34° 35’. The district has one local authority namely Luanda Town Council.

Table 3-1: Area of the District by Administrative Units

<table>
<thead>
<tr>
<th>Division</th>
<th>Area (km²)</th>
<th>Number of Locations</th>
<th>Number of Sub-locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luanda</td>
<td>98.6</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Emuhaya</td>
<td>74.6</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>173.2</td>
<td>8</td>
<td>38</td>
</tr>
</tbody>
</table>

*Source: Emuhaya District Development Plan 2008 – 2012*

The district has one constituency namely Emuhaya Constituency and seven electoral wards.

Table 3-2: Electoral Wards in the Constituency

<table>
<thead>
<tr>
<th>Constituency name</th>
<th>Number of electoral wards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emuhaya</td>
<td>7</td>
</tr>
</tbody>
</table>

*Source: Emuhaya District Development Plan 2008 – 2012*

Figure 3-5: Emuhaya District Administrative and Political units
3.3.2 Settlement Patterns
The migration trends and settlement patterns in the district have been mainly influenced by climate, infrastructure, security, soil fertility, and the terrain among others. Settlement patterns in the district correspond with natural physical features. Some areas in the district are physically endowed with granite rocks. Luanda town has also attracted many people because a large fraction of the population engages in small-scale businesses. Some other people have settled around other market centres. Most rocky areas especially around Bunyore hills have remained unsettled or have sparsely distributed households. There are pockets of absolute poverty in the district in some households distributed in the entire district. The majority of people in the district grow their own food crops or buy food from the market centres. The source of food at the market centres is importation from other districts.

3.4 Physiographic and Natural Conditions

3.4.1 Topographic features
The topography of the district is characterized by rocky ridges, natural and exotic trees, shrubs. The district has an altitude that ranges between 1350mm and 1500mm above sea level. The district is rich in streams and rivers that traverse the district and drain into Lake Victoria. There are two major rivers in the district i.e. Esalwa and Yala. The distinguishing agricultural characteristics of project area are mainly subsistence mixed farming i.e. livestock and crop farming. The crops grown in the project area include maize, beans, cassava, sweet potatoes, peanuts and local vegetables.

3.4.2 Climatic conditions
The district receives bi-modal rainfall with an annual average of 1750mm. The Equator cuts across the district. The district has two agro-ecological zones i.e. upper midland zone and the lower midland zone. The altitude ranges between 1350m and 1500m above sea level. The average annual temperature ranges between 18°C and 22°C. The district is ever green as the dry spells are very short.

3.4.3 Geology and Soils
The major part of the district consists of soils of Kavirondian origin. They are composed of red loam soils. In some areas there are murram soils. The soils are deep well drained dystric acrisols that are slightly acidic to alkaline. Granite rocks are visibly present in the area, especially around the Bunyore hills area. These soils are often rich in organic matter and range from fertile to moderately fertile. The soils have great agricultural potential that supports the high population density in the area.

3.4.4 Biodiversity
Generally, the district is well covered with vegetation as majority of the local people have embraced agro-forestry. The Bunyore hills area that is unsuitable for agricultural activities due to its rocky nature, is characterized by natural trees.

The proposed site currently has a domestic semi-permanent house and some maize crops. A small portion near the road is bare with grass only. The vegetation that will be cleared on the proposed site is mainly a few Eucalyptus trees and scattered short shrubs such as Lantana Camara and grass. Physical/ manual clearing is recommended for this project.
3.4.5 Population

According to the 1999 Population and Housing Census, the population in the district was 161,712 persons with a growth rate of 2.2% per annum. At this growth rate, the 2008 population was estimated to be 213,754 and is projected to rise to 241,972 in 2012 as indicated in Table 3-3. This was expected to result in increased demands on health, education and other social facilities.

Table 3-3: Population Projections by Age Cohort

<table>
<thead>
<tr>
<th>Age Cohort</th>
<th>1999 (Census)</th>
<th>2008 (Projections)</th>
<th>2010 (Projections)</th>
<th>2012 (Projections)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>T</td>
<td>M</td>
</tr>
<tr>
<td>0-4</td>
<td>12,293</td>
<td>12,478</td>
<td>24,772</td>
<td>16,250</td>
</tr>
<tr>
<td>5-9</td>
<td>11,717</td>
<td>11,829</td>
<td>23,545</td>
<td>15,487</td>
</tr>
<tr>
<td>10-14</td>
<td>13,083</td>
<td>13,389</td>
<td>26,472</td>
<td>17,293</td>
</tr>
<tr>
<td>15-19</td>
<td>9,667</td>
<td>10,387</td>
<td>20,053</td>
<td>12,777</td>
</tr>
<tr>
<td>20-24</td>
<td>4,914</td>
<td>7,046</td>
<td>11,961</td>
<td>6,496</td>
</tr>
<tr>
<td>25-29</td>
<td>3,537</td>
<td>5,383</td>
<td>8,920</td>
<td>4,675</td>
</tr>
<tr>
<td>30-34</td>
<td>3,010</td>
<td>4,443</td>
<td>7,453</td>
<td>3,979</td>
</tr>
<tr>
<td>35-39</td>
<td>2,701</td>
<td>4,078</td>
<td>6,779</td>
<td>3,570</td>
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<tr>
<td>40-44</td>
<td>2,455</td>
<td>3,464</td>
<td>5,919</td>
<td>3,246</td>
</tr>
<tr>
<td>45-49</td>
<td>2,297</td>
<td>3,008</td>
<td>5,305</td>
<td>3,037</td>
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<tr>
<td>50-54</td>
<td>1,970</td>
<td>2,551</td>
<td>4,522</td>
<td>2,605</td>
</tr>
<tr>
<td>55-59</td>
<td>1,603</td>
<td>2,082</td>
<td>3,685</td>
<td>2,119</td>
</tr>
<tr>
<td>60-64</td>
<td>1,571</td>
<td>1,980</td>
<td>3,551</td>
<td>2,076</td>
</tr>
<tr>
<td>65-69</td>
<td>1,405</td>
<td>1,616</td>
<td>3,021</td>
<td>1,857</td>
</tr>
<tr>
<td>70-74</td>
<td>1,057</td>
<td>1,151</td>
<td>2,208</td>
<td>1,398</td>
</tr>
<tr>
<td>75-79</td>
<td>745</td>
<td>754</td>
<td>1,499</td>
<td>985</td>
</tr>
<tr>
<td>80+</td>
<td>758</td>
<td>1,012</td>
<td>1,770</td>
<td>1,002</td>
</tr>
<tr>
<td>Age not stated</td>
<td>146</td>
<td>131</td>
<td>277</td>
<td>192</td>
</tr>
<tr>
<td>Total</td>
<td>74,929</td>
<td>86,782</td>
<td>161,712</td>
<td>99,044</td>
</tr>
</tbody>
</table>

Source: District Statistics Office, Emuhaya 2008

It is worth noting that the population trend indicates that the Labour Force age bracket (15 – 64 years) was expected to be 106,361 persons in 2012. The plan therefore needs to give weight to issues that affect this age bracket. A sizeable proportion of this population consists of unskilled and semi-skilled persons. This implies that measures must be put in place to create more economic opportunities for their absorption and meaningful engagement. This means that investments in tertiary learning institutions will need to be undertaken.
3.5 Population Density and Distribution

The district is generally densely populated with the projected average density in 2008 being 1,234 persons per km$^2$ as shown in the table below. This is mainly attributed to high fertility rate and small land holdings.

Table 3-4: Population Distribution and Density by Administrative Division

<table>
<thead>
<tr>
<th>Division</th>
<th>1999 Census</th>
<th>2008 Projections</th>
<th>2010 Projections</th>
<th>2012 Projections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pop.</td>
<td>Density (Km$^2$)</td>
<td>Pop.</td>
<td>Density (Km$^2$)</td>
</tr>
<tr>
<td>Luanda</td>
<td>92,462</td>
<td>938</td>
<td>122,217</td>
<td>1,240</td>
</tr>
<tr>
<td>Emuhaya</td>
<td>69,250</td>
<td>928</td>
<td>91,535</td>
<td>1,227</td>
</tr>
<tr>
<td>Total</td>
<td>161,712</td>
<td>1,934</td>
<td>213,752</td>
<td>1,234</td>
</tr>
</tbody>
</table>

Source: District statistics office, Emuhaya 2008

3.5.1 Agriculture and rural development

Agriculture sub-sector

Emuhaya District has 164km$^2$ arable land out of the total area of 173.2km$^2$. This land is used for farming although the average agricultural farm size is about 0.5 hectares which is too small for any substantial farming to be done. This has made households to concentrate more on subsistence farming with a high bias in maize farming. Modern farming is indeed rare as most people use the traditional farming methods. Besides, there is the problem of poor market access in addition to inadequate affordable credit and inputs to farmers. Access to agricultural information has also been limited. However, the district is endowed with many rivers and springs which have a high irrigation potential for vibrant modern farming.

Fish farming is practised, but the population of fish farmers is low with areas that are covered by ponds being 15,766m$^2$. The number of fish ponds stands at around 147. There has been a marked improvement in fish production after sustained fish farming training to farmers. The potential for fish production remains high though lack of appropriate storage facilities is still a challenge.

A sizeable population in the district engage in forest related activities for forest products such as firewood, timber or even fencing poles that have gained value. The numbers of tree nurseries stand at around 40 with around 650,000 seedlings of both indigenous and exotic type.

The district cooperative movement is characterized by few active cooperative societies which are mainly dormant with low active membership. Main challenges include mismanagement and generally ignorant members.

Most households own livestock on a small scale due to insufficient land size although the climate is generally good. There is need to improve on the livestock farming methods.
3.5.2 Trade tourism and industry

Luanda town is well established in terms of businesses and has been a relatively very busy centre during the main market days on Mondays and Thursdays although the market operates on a daily basis. It attracts businesses mostly from Western and Nyanza provinces although some businesses come from as far as in the Rift Valley province. This provides a good opportunity for banking and other financial service providers to expand their businesses in Luanda Town. Electricity is available in most parts of the district although the supply is not very steady with occasional interruptions. Steady supply of electricity is a prerequisite for business prosperity.

There are however no substantive industries. Emuhaya district has favourable climatic conditions which provide great potential for horticultural products and other high value crops. There are also immeasurable quantities of rocks that can be used for ballast making on a large scale.

3.5.3 Physical infrastructure

The sector consists of transport, energy, roads, public works and housing. It is an enabler for growth of the other sectors and the pattern of infrastructure distribution network is important when considering the district’s development potential. Infrastructure facilities not only provide important services but triggers complementary linkages to emerge that enhance sectoral and district development. The lack of one type of infrastructure facility in the district hampers the development of others and creates regional imbalance in infrastructure provision.

Roads

The district has a poor road network and other forms of communication infrastructure. This has made it very difficult to transport farm produce to reach the markets in time. One of the good roads passing through the district is the Kisumu-Busia highway. Tarmarked roads are very few and others are worn out. Majority of the roads have murrum surfaces which are hardly passable during the rainy season. The poor road network also contributes to insecurity as security personnel are unable to quickly respond to distress calls.

Electricity

The district has 8.3% of its population having access to electricity. There are six trading centres in the district and they are all connected to electricity. There have been a frequent power interruptions which the Kenya Power and Lighting Company attributes an increasingly overloaded network. The electricity network overload can also be attributed to the rural electrification programme projects that are being implemented in the district.

3.5.4 Water and sanitation

Majority of the people in the district do not have access to piped water and rely on rainwater, spring water from both protected and unprotected springs, boreholes, wells and rivers. Most of this water is not treated and can cause waterborne diseases. With the creation of the district, major water works are underway including the Maseno Water Supply and the Emusire pipeline. This will lead to the provision of clean water and improved sanitation.
3.5.5 Gender inequalities

Women are more than men and their contribution towards economic growth exceed that of men, but they have little control over key resources and decision making. Gender inequality has led to sidelining of women in ownership of property especially land. The girl-child is not considered when it comes to matters of land inheritance and as such women are denied the benefits of land inheritance and as such women are denied the benefits of land ownership such as its use as collateral for bank loans. Although women participate more in agricultural production, they lack control over land and other productive resource.

Women are also overburdened in that they are engaged in both reproductive and productive while men are only engaged in productive roles. As a result of the skewed distribution of roles against women the value of their contribution in economic development has not been well documented. With the existing gender inequality in accessing productive assets, poverty levels will continue to increase unless the issue is addressed.

In the past a good number of development projects failed to achieve targets because gender roles were biased against women since men dominated most development project committees. Women have continued to bear the brunt of domestic abuse, neglect and disinheriting thus denying them their right to pursue better living standards. No meaningful and sustainable success can be made without appreciating the roles and contributions made by both women and men.

Women participation in decision-making will be enhanced through capacity building to enable them attain skills in decision-making and leadership.

3.5.6 Disaster Management

The district is prone to a number of disasters both natural and manmade. The most notable disasters stem from road accidents, disease outbreaks, landslides, drought and floods among others.

Road accidents are common on the Kisumu – Busia Highway. Accidents along these roads have claimed several lives and most of those who perish are productive people within the district and its neighbours. Other common accidents that have been reported along the road include fire from overturned petrol tankers from which the local populace attempts to siphon the petrol whenever such accidents occur.

The main animal disease outbreaks reported include Anthrax and Rift Valley Fever. Under the Health sub-sector, the main challenges include poor sanitation due to poor personal hygiene, water pollution and environmental degradation, slow behavioural change on HIV/AIDS, inadequacy of disease prevention practices by families and contamination.

Frequent drought impacts agriculture negatively occasioning supply of relief food. Its impact is also felt across other sectors and this affects livelihood of residents of the district.

3.5.7 Environmental Conservation and Management

Environmental Conservation and Management aim at promoting sustainable and equitable use of resources for posterity and prosperity. There is a very high and positive correlation between environmental degradation and poverty. Where there is high poverty level, the environment is degraded as people pursue agricultural production and other activities such as sand harvesting in the rivers and streams.

Environmental focus has been enhanced by the establishment of the NEMA office at the district and hence there are supervisory activities on environmental matters.
4  CHAPTER FOUR: RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

4.1  Introduction

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

There is a growing concern in Kenya and at global level that many forms of development activities 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.

4.2  Environmental Policy Framework

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

4.3  Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environment Management Authority (NEMA), the 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 ESIA 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 Standards and Enforcement Review Committee (SERC)—advises the NEMA on the criteria and procedures for the measurement of environmental quality in Kenya. Environmental quality relates to air quality, wastewater quality, waste quality, noise quality, land use quality, etc. The institutional framework for EMCA is shown in Figure 3.1.

Figure 4-1: Institutional Framework under the EMCA
4.3.1 National Environment Management Authority (NEMA)

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:

4.3.2 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.

4.3.3 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.

4.3.4 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.

4.3.5 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.

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

4.3.7 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.

4.3.8 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.

4.3.9 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, gives Waste Water Discharge Guidelines from NEMA.
Table 4-1: NEMA Waste Water Discharge Guidelines

<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>10</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>-</td>
<td>1000/100ml</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 temperature of the sewer</td>
<td>+/- 2° C of ambient 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>Colour</td>
<td></td>
<td>-</td>
<td>Not objectionable to the eye or not to exceed 5 mg Pt/l</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 coordinate, 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 4-2: 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. Silent Zone</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>B. Places of Worship</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>C. Residential: Indoor</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>D. Mixed residential (with some commercial and places of entertainment )</td>
<td>55</td>
<td>35</td>
</tr>
<tr>
<td>E. Commercial</td>
<td>60</td>
<td>35</td>
</tr>
</tbody>
</table>

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

### 4.3.10 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.

4.3.11 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 ------"
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“------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.

4.3.12 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, subsection 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 its 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.

4.3.13 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 is liaising with MASENO (Emuhaya) District Planning officer to get clearance as concerns the intended project and existing development plans.

4.3.14 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.

4.3.15 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, wholesale, 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.*

### 4.3.16 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.*

### 4.3.17 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.*

### 4.3.18 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 (I) stipulates that any person who not being an officer of Kenya Wildlife Service hunts any animal in a National Park shall be guilty of a forfeiture offence and liable to a fine or imprisonment. Subsection 2 of the Act likewise provides that any person who, without authorisation conveys into a National Park, or being within the area thereof, in possession of, any weapon, ammunition, explosive, trap or poison, shall be guilty of a forfeiture offence.
The Act 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.

4.3.19 **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.

4.3.20 **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.

4.3.21 **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.
4.3.21.1 **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.

4.3.21.2 **Safety**

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

4.3.21.3 **Welfare**

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

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

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

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

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

4.3.22 **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.
4.3.23 **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.

4.3.24 **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.*

4.3.25 **The Traffic Act Chapter 403 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.*

4.3.26 **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. It is not on road reserves.

4.3.27 **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.

4.3.28 **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.

4.3.29 **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.

4.3.30 **The Registration of Titles Act Cap 281**

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

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

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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._

### 4.3.31 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._

### 4.3.32 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.

### 4.3.33 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 Gazette, 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 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.

4.5 World Bank 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.

4.5.1 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.

4.5.2 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.

4.5.3 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.

4.5.4 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.

4.5.5 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.

4.5.6 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).

Environmental Conventions and Treaties

4.5.7 World Commission on Environment and Development
The Commission commonly referred to as “the Brutland Commission” focused on the environmental aspects of development, in particular, the emphasis on sustainable development that produces no lasting damage to biosphere, and to particular ecosystems. In addition, environmental sustainability is the economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainable development maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement.

4.5.8 Convention on Biological Diversity (1992)
This was ratified on 11th September 1994. Agenda 21 – a programme of action for sustainable development worldwide, the Rio Declaration on Environment and Development was adopted by more that 178 governments at the United Nations Conference on Environment and Development, known as the Earth Summit, held in Rio de Janeiro, Brazil from 3rd to 14th June 1992. Principle No. 10 of the declaration underscore that environmental issues are best handled with participation of all concerned citizens at all the relevant levels. At the national level, each individual shall have appropriate access to information that is concerning environment that is held by public authorities. States shall encourage and facilitate public participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy shall be provided. The foregoing discussion is relevant to the proposed development because EMCA demands that public must be involved before any development project that is likely to have adverse impacts to the environment is initiated by a proponent. The Act has further established Public Complaints Committee (PCC) where the issues raised by the public in regard to any proposed development can be addressed.

4.5.9 Montreal Protocol, 1987
The Montreal Protocol on Substances that deplete the ozone layer (1987) was ratified on November 9, 1988. This treaty was designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion.

4.5.10 United Nations Convention to combat Desertification (1994)
An agreement to combat desertification and mitigate the effects of drought through national action programs that incorporate long term strategies supported by international cooperation and partnership arrangements.
4.5.11 United Nations Framework Convention on Climate Change (1992)

International environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992. The treaty is aimed at reduced emissions of greenhouse gas in order to combat global warming.

4.5.12 Bamako Convention (1991)

A treaty of African nations prohibiting the import of any hazardous (including radioactive) wastes.


An amendment to the international treaty on climate change, assigning mandatory emission limitations for the reduction of greenhouse gas emissions to the signatory nations.

4.6 Environmental Policy

4.6.1 Sessional Paper No. 6 of 1999 on Environment and Development

Every person in Kenya is entitled to a clean and healthy environment and has a duty to safeguard and enhance the environment. As envisioned in Sessional Paper No. 6 of 1999 on Environment and Development, Kenya should strive to move along the path of sustainable development to meet the needs of the current generation without compromising the ability of the resource base to meet those of future generations. The overall goal is hence to integrate environmental concerns into the national planning and management processes and provide guidelines for environmentally sustainable development. The policy paper emphasizes that environmental impact assessment must be undertaken by the developer as an integral part of a project preparation. It also proposed for periodic environmental auditing to investigate if developer is fully mitigating the impacts identified in the assessment report.

4.6.2 National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in 1994. It was a deliberate policy to integrate environmental considerations into the country’s social and economic development process. The integration was achieved through multi-sectoral approach and a comprehensive framework to ensure that environmental management and conservation of natural resources is an integral part of societal decision-making process.

4.6.3 Poverty Reduction Strategy Paper (PRSP)

The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya’s commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without the participation of the poor. The proposed project, during and after implementation, will offer jobs to many Kenyans as a way of contributing to this noble objective of reducing poverty.
5 CHAPTER FIVE: PUBLIC CONSULTATION AND PARTICIPATION

5.1 Public Stakeholder Consultation
Public participation is an essential and legislative requirement for environmental authorization. The ESIA team undertook the public stakeholder consultation (PSC) for the proposed project in accordance with the requirements for an EIA Study stipulated in the EMCA, 1999 and EIA/EA Regulations 2003.

The purpose of public participation is to identify PAPs and to allow such parties the opportunity to provide input and comment on the EIA process, including issues and alternatives that are to be investigated, thereby facilitating informed decision-making. In complying with the public participation process (PPP) for the EIA, consultations were carried out to ensure that issues, concerns and potential impacts identified by PAPs, including the authorities, proponents, technical specialists and the public are addressed fully.

5.2 Sources of Information
Public participation was a key component of the ESIA of the Proposed Maseno 33/11 kV Substation. Positive and negative views and comments of the immediate neighbours were sought as from 23rd November 2011 to 2nd December 2011. The exercise was conducted through one on one consultation with various relevant stakeholders at the Emuhaya District HQs and Luanda Divisional office. Public consultations were conducted through the use pre-designed questionnaires and interviews with neighbours within the project area at the project site in Luanda.

5.3 Objective of Public Stakeholder Consultation
The objectives of public participation in an EIA are to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to assist them identify issues of concern, and provide suggestions for enhanced benefits and alternatives.

5.4 Approach used in carrying out the PSC
The Proponent in consultation with the team of experts informed the neighbors as well as the relevant authorities two weeks before consultation began. Owing to the sizeable number of the stakeholders, the experts opted to do individual consultation, focused group consultation. The following stakeholders were consulted:

| 1. District Commissioner, Emuhaya | 14. Ministry of Public Health and Sanitation, |
| 2. District Officer, Luanda       | 15. Ministry of Youth Affairs, |
| 3. District Physical Planning Officer | 16. Ministry of Works, |
| 4. District Development officer, | 17. Ministry of Local Government, |
| 5. District Livestock officer, | 18. Luanda Town Council |
| 6. District Water Officer, | 19. Local Administration |
| 7. District Social Services Officer, | 20. Civil Society Rep- EYAA; |
| 8. District Environment Officer | 21. Political leaders- area Councilors’ |
| 9. District surveyor, | 22. Members of the public owning property |
| 10. District Information Officer, | neighboring the substation |
| 12. Ministry of Agriculture, | 24. Kenya Forestry Service |
| 13. Ministry of Forest, | |
5.5 Project Notification

Key stakeholders Notification Letter
A project notification letters were compiled for the EIA, which informed all the key and public stakeholders of the proposed development and invited them to give opinions in the project. Background information and EIA process description was done and a comments/response form was issued to stakeholders, which enabled them provide comments and suggestions on the project.

The notification letter was distributed to all identified key and public stakeholders through the provincial administration offices. A copy of the Notification Letter addressed through provincial administration offices has been included in the Annexes.

5.6 Site Visit and Consultation with Relevant Authorities

5.6.1 Meeting with District commissioner’s team (HODs)
Since the project area falls under the jurisdictions of one District, consultations were made with the Emuhaya District Commissioner to get their views and inputs on the project. The DC and his team were in support of the project and added that it of great importance to ensure that the public is widely consulted and awareness created coupled appropriate compensation for those to be affected by the proposed project.

5.6.2 Local community consultation
Public consultations through interviews and pre designed questionnaires were done which included visits to different neighbours to solicit views and inputs from them on the proposed 33/11 kV substation.

5.7 Comments and Responses from the Stakeholders

During consultations the Scope of activities associated with project were presented by ESIA expert to the stakeholders and community members. The audience was then asked to make suggestions, comments and ask questions for clarifications. All comments received on the consultation were incorporated into the Final Impact Assessment Report and submitted to the NEMA for the issuance of a decision on the proposed development.

Detailed Public Participation and Consultation was envisaged as part of the EIA exercise as required under EMCA 1999 regulations. The consultations were undertaken as part of the ESIA in order to obtain the views of stakeholders, their concerns and suggestions towards sustainable implementation of the project. The summary of the various stakeholders concerns and suggestions are summarized below.

The following were the major concerns that were raised up by various stakeholders in regard to the proposed project

Positive Issues
- Employment opportunities
- Improvement of local and national economy
- Boosting of the informal sector
- Improved Security
- Improved Electricity Supply
- Increased protection from Possible lightning strikes
Negative Issues

- Visual Impacts
- Increased dust pollution
- Increased Noise Level and Vibration
- Accidents during Construction
- Fear of immorality
- There would be electromagnetic radiations
- Electrocution and
- Vandalism

The following suggestions were raised during stakeholders’ consultation meetings:

- KPLC should provide stepped-down voltage power to the residents within the proposed line for domestic use
- Compensation of land should be done with consideration of the current economic situation
- The proponent should ensure that trees are not cut down unnecessarily and those that will be felled should be replaced elsewhere.
- The Proponent should ensure proper environmental management practices are put in place.
- The proponent should consider employing casual workers from the neighbourhood during construction phase of the project.
- Noise pollution should be controlled.
- The proponent should put up security lights as well tight security for materials during construction.

Generally the stakeholders consulted were in support of the proposed project.
6 CHAPTER SIX: CONSTRUCTION MATERIALS

This section of the Project Report qualitatively outlines the resources that are required for construction and implementation of the project. Exact quantities of materials are not known at this stage of the project. Consequently an identification and estimation of the resources required for construction and implementation of the project are provided in the following subsections.

6.1 Labour

The size and the composition of the workforce will be at the discretion of the contractor(s). The contractors will adhere to the Employment Act of 2007 in the recruitment and management of the employees.

6.2 Safety of the facility

The Proposed project like other similar projects could be prone to both natural and man-made disasters. It should be noted that it is difficult to prevent the occurrence of the natural disaster but the consequences could be reduced by engineering measures. Man-made disasters on the other are preventable. The following safety concerns will be addressed in the proposed project.

6.2.1 Natural disasters

In order to reduce the impacts of any potential natural disaster, the proposed project will be designed according to acceptable standards and code and shall be able to reasonably withstand any impacts which may arise as a result of the worst credible seismic event.

6.2.2 Malicious damage or theft

The proposed project could be prone to malicious damage such as terrorist attack or theft. In order to prevent the occurrence of such events, the following measures will be taken:

• Regular monitoring and inspection of the substation and its associated infrastructure.

6.3 Hazard Risk Assessment

Hazard risk assessment is one of the concerns associated with substation. The HRA will be conducted on the proposed project to determine the potential risks the project will pose in its lifecycle. The risk assessment will be done in accordance with the Occupational Safety and Health Act of 2007.

The HRA will include an emergency response procedure which will be based on the company’s emergency procedures for substation and associated facilities. As a minimum requirement, the emergency management plan will cover the following aspects:

• Safety regulations
• Scope of the safety emergency plan
• Notification of local authorities
• Details of the proposed project
• Aim of the safety emergency plan
• Objectives of the study emergency plan
• Emergency arrangements, procedures and plans
• Roles and responsibilities in the event of an emergency
• Evacuation of people
• The role of local communities
• Regular testing of the safety emergency plan
• The risk assessment will include as a minimum:
A general process of the project being investigated
- A description of the potential major incidents associated with that type of installation and the consequences of such incidents
- An estimation of the probability of a major incident
- A copy of the site emergency plan
- An estimation of the damages in the case of an explosion or fire
- An estimation of the effects of toxic gas releases.
- The potential effect of an incident on the project or part thereof or an adjacent project or part thereof.
- The potential effect of a major incident on any other installations, members of the public and residential areas.
- Meteorological tendencies
- The suitability of existing emergency procedures for the risks identified.
- Any requirements laid down in the OSHA 2007 and EMCA 1999.
- Recommendations regarding any organizational measures
7 CHAPTER SEVEN: PRODUCTS, BY-PRODUCTS AND WASTE

7.1 Introduction
This section provides an overview of the products, by-products and wastes to be generated by the project. Most of these will be generated during the construction phase of the project while some will be generated during the operation and decommissioning phases.

7.1.1 Construction Phase
The final product after construction phase is a modern substation and its associated structures.

7.1.1.1 By-products
During the construction phase of the project it is envisaged that the by-products might include:
- Metal cuttings generated from the construction activities
- Any excess construction materials brought to the project site by the contractor which can be reused later
- Excavated material

7.1.1.2 Waste
During construction the proposed project is anticipated to generate different waste which shall include:

Domestic Waste from the Construction Area
The workers will not be supplied with any forms of foodstuffs. They are expected to buy or carry their own food. Plastic bags and containers which the workers will use to carry their food are expected to increase within the site and in the immediate vicinity. Other forms of waste include sanitary waste and therefore the provision of sanitary facilities will need to be considered both for the site construction workers and the visiting population.

Site Construction Waste
The project will generate waste from the site construction activities which includes:
- Excavated soils and vegetation;
- Construction equipment and maintenance wastes;
- Dust and fumes;
- Scrap metals;
- Packaging materials, etc.

Dust
The construction activities that will occur particularly during the site excavation process will generate dust and other particulates particularly during dry weather conditions that will be released into the atmosphere.

Smoke Emissions
The site machinery, equipment and trucks brought in by the contractor are expected to generate smoke emissions when in operation during the construction activities. The concentration of emissions will depend on the maintenance levels of the equipment, machinery and trucks used by the Contractor.
7.1.2 Operation Phase

7.1.2.1 Products
The primary product of the proposed project during the operational phase will be 33/11kV power distribution substation.

7.1.2.2 By-products
The only byproduct anticipated to be generated during operational phase is conductor wires and scrap metals during replacement which takes several years before being replaced.

7.1.2.3 Waste
The wastes that will be generated will include;

Domestic Waste
Some of the domestic waste to be generated at the facility will waste such as paper, empty cans.

Process waste
No waste is anticipated from the process since the project entails substation and its associated infrastructures only.

7.1.3 Decommissioning Phase

7.1.3.1 Products and By-products
During the decommissioning phase it is expected that there will be no product. However the By-products during decommissioning phase will include:
- Metal generated from the decommissioning of substation and associated infrastructure; and
- Foundation materials which can be donated to individuals for reuse

7.1.3.2 Waste
During the Decommissioning phase of the proposed project, several waste products are expected to be generated. These shall include:
- Metals from substation infrastructure
- Remains of concrete from demolition of substation foundation
- Dusts and fumes;
- Scrap metals;

7.1.3.3 Dust
The activities that will occur particularly during the demolition process will generate a considerable amount of dust and other particulates that will be released into the atmosphere.

7.1.3.4 Smoke Emissions
The demolition machinery, equipment and trucks brought in by the Contractor are expected to generate smoke emissions. The concentration of emissions will depend on the maintenance levels of the equipment, machinery and trucks used by the Contractor.
CHAPTER EIGHT: IDENTIFICATION AND ASSESSMENT OF POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

8.1 Introduction
This Section identifies and discusses both negative and positive impacts associated with the proposed construction of 33/11kV 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 power-line and these are discussed below.

8.2 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 and or positive impact.

The summary of the main potential impacts of the proposed project are listed in Table 8.4 & 8.5 and analyzed into different categories based on stakeholder's views and perceptions as well as the consultant’s experience and trainings in undertaking ESIA 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.

8.2.1 Assessing significance of Impacts
The following criteria were used to assess the significance of potential impacts of the proposed project.
Table 8-1: Summary of magnitude of potential impacts

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>1</td>
</tr>
<tr>
<td>Minor</td>
<td>2</td>
</tr>
<tr>
<td>Marginal</td>
<td>3</td>
</tr>
<tr>
<td>Significant</td>
<td>4</td>
</tr>
<tr>
<td>Catastrophic</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geographic Extent of Impact</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;500M2</td>
<td>1</td>
</tr>
<tr>
<td>500m2-999m2</td>
<td>2</td>
</tr>
<tr>
<td>1Km2-10Km2</td>
<td>3</td>
</tr>
<tr>
<td>11Km2-100Km2</td>
<td>4</td>
</tr>
<tr>
<td>&gt;100Km2</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of Impact</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 month</td>
<td>1</td>
</tr>
<tr>
<td>1-12 months</td>
<td>2</td>
</tr>
<tr>
<td>13-36 months</td>
<td>3</td>
</tr>
<tr>
<td>37-72 months</td>
<td>4</td>
</tr>
<tr>
<td>&gt;72 months</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 8-2: Consequence tabulation table (Magnitude+ Geographic extent + Duration of the impact)

<table>
<thead>
<tr>
<th>Consequence (Magnitude+ Geographic extent + Duration of the impact)</th>
<th>Likelihood (Frequency of Activity frequency of impact)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
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<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
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<tr>
<td></td>
<td>6</td>
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<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>
### Table 8-3: Impacts Significance rating, value and respective colour code

<table>
<thead>
<tr>
<th>Significance rating</th>
<th>Value</th>
<th>Colour code</th>
<th>Negative impact Management Recommendation</th>
<th>Positive impact Management Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>126-150</td>
<td>Red</td>
<td>Propose mitigation measures</td>
<td>Maintain current management</td>
</tr>
<tr>
<td>High</td>
<td>100-120</td>
<td>Orange</td>
<td>Propose mitigation measures</td>
<td>Maintain current management</td>
</tr>
<tr>
<td>Medium high</td>
<td>77-105</td>
<td>Yellow</td>
<td>Propose mitigation measures</td>
<td>Maintain current management</td>
</tr>
<tr>
<td>Low medium</td>
<td>52-75</td>
<td>Green</td>
<td>Maintain current management</td>
<td>Improve current management</td>
</tr>
<tr>
<td>Low</td>
<td>20-50</td>
<td>Blue</td>
<td>Maintain current management</td>
<td>Improve current management</td>
</tr>
<tr>
<td>Very low</td>
<td>4-24</td>
<td>Grey</td>
<td>Maintain current management</td>
<td>Improve current management</td>
</tr>
</tbody>
</table>

### 8.3 Potential impacts of the proposed project

The following are the potential impacts of the proposed project:

- **a) Soils and Geology**
  - Increased erosion potential and sedimentation
  - Contamination of soil
  - Weakening of the geological structure
- **b) Ecological**
  - Impact on vegetations
  - Impact on natural habitats
- **c) Air quality**
  - Decreased air quality due to dust emission
  - Fugitive emissions
  - Air pollution from incidence
- **d) Water Resources & Water Quality**
  - Decreased water quality due to soil contamination and soil erosion
- **e) Noise and vibration**
  - Deterioration in ambient noise quality
- **f) Visual and aesthetic impacts**
  - Impact on the visual landscape
  - Impact on natural environmental aesthetic
- **g) Socio-economic**
  - Compatibility with existing and proposed land uses
  - Creation of employment opportunities
  - Loss of livelihoods
  - Influx of people
- **h) Increase Traffic**
  - Accidents as a result of increased traffic
- Damage to roads and other transport infrastructure

i) Occupational Health and safety
- Health and safety
- Community safety
- Damage to the infrastructure by third party

j) Public Health
- Communicable disease
- HIV & AIDS

8.4 Assessment of impacts

The key impacts identified for the proposed project are highlighted according to the relevant project phases. The Experts utilized precautionary principles to establish the significance of impacts and their management and mitigation.

8.5 Positive Impacts of the Proposed Substation

The positive impacts associated with the proposed 33/11kV substation project during construction, operation and decommissioning phases are discussed in the following sections;

8.5.1 Creation of employment opportunities

The proposed project will generate job opportunities (skilled and unskilled labour) during construction and operation phases. Different types and level of employment opportunities are anticipated during construction, operation and decommission. Though the approximate number of workers to be employed by the proposed project is not yet known, it will contribute to easing unemployment level in the affected district. There is also trickledown effect to the economy at large resulting from the employment opportunities as well as services provided through this project.

8.5.2 Provision of Market for Supply of Building Materials

The project will require supply of small quantities of building materials like cement, concrete and sand, most of which can be sourced locally in Luanda and Kisumu towns. This provides ready market for local enterprises with such materials.

8.5.3 Boosting of the informal sector

During the construction phase of the proposed substation it is expected that the other businesses in the informal sector will flourish. These include activities such as hotel and accommodation, shops, artisan industries and food vending who will be benefiting directly from the construction, operational and decommissioning staff members who will be buying commodities from them. This will promote the informal sector in securing some temporary revenue and hence livelihood.

8.5.4 Accessibility

The development of an access road of about 10m to the site will help nearby residents to have an easier accessibility to their premises.

8.5.5 Compatibility with existing and proposed land uses

As mentioned in the previous sections of this report, the proposed project site is located along Kisumu-Busia road a stretch which is mainly dominated by subsistence farming, educational and technical institutions and a few business enterprises. In addition, the area is characterized by a few other
residential houses establishments. It is important to note that no structure will be affected or be relocated within the vicinity hence there is no resettlement is anticipated. The proposed project is therefore compatible with the existing developments. The proposed project will not conflict with the existing and perhaps future developments in the area.

8.5.6 Environmental Benefits
There will be reduction in environmental degradation due to use of steel towers/pylons instead of using wooden based poles. Furthermore, the presence of KPLC with its well elaborate Corporate Social Responsibility (CSR) on environment conservation will help the Town Council and nearby residents in improving town beautification program and farm forests respectively through provision of free tree seedlings.

8.5.7 Local Benefits and Opportunities for Electricity Supply

Aspects and Impacts
The development of the substation will result in the provision of an essential social service in providing electrification to a large number of households. In addition, there are some opportunities for job creation in the local market during construction i.e. waste removal, catering, bush clearing and rehabilitation.

Construction Phase
Table 8-4 below summarizes and assesses the significance of the potential local benefits during the construction phase both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

**Table 8-4: Impact Significance Determination Rating for Local Benefits during the Construction Phase**

<table>
<thead>
<tr>
<th>Without mitigation</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>8</th>
<th>8</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td></td>
<td>64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mitigation measures
- Local labour should be sourced for the construction activities where possible;
- Construction should involve, wherever possible, labor-intensive methods and practices; and
- Construction personnel should undergo training in general construction procedures as well as policies and practices i.e. operational health and safety requirements

<table>
<thead>
<tr>
<th>With mitigation</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>9</th>
<th>9</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td></td>
<td>81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Operational Phase
Table 8-5 below assesses the potential operational related benefits and opportunities for electricity supply both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

**Table 8-5: Impact Significance Determination Rating for Local Benefits and Opportunities for Electricity Supply during the Operational Phase.**

<table>
<thead>
<tr>
<th>Without mitigation</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>9</th>
<th>8</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td></td>
<td>72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mitigation measures
- KPLC should ensure sufficient budget is assigned for ongoing maintenance of the powerline infrastructure.
Concluding Remarks
The proposed substation will contribute to electricity supply and infrastructure development in the Luanda Town council and its environs, thereby supporting improved social services and improved basic living conditions for the residents of the area. The overall significance rating in terms of local benefits during the construction phase is considered medium-high (positive), while the overall significance rating in terms of local benefits and opportunities for electricity supply during the operational phase is considered very high (positive).

8.6 Negative impacts of the Proposed Substation

Identification of Negative Project Impacts and mitigation measures
This section identifies and discusses the projects adverse impacts and the populations that will be affected. The project does not anticipate adverse impacts due to the short distance and the fact that the site is not under settlement. Few of the negative impacts are discussed below. Further, impacts on livelihoods associated with land acquisition are discussed. Identification of impacts was done through consultations with key line ministries and department and a few stakeholders who live within the vicinity.

8.6.1 Impacts on Soils and Geology

8.6.1.1 Soil erosion impact from vegetation clearance
The building of foundation and excavation process for substation foundation can potentially exacerbate soil erosion. In addition to the loss of productive land due to soil erosion and land acquisition for substation construction, soils can be impacted as a result of disposal of waste materials, and compaction with heavy machinery used for the establishment of the substation structures.

Vegetation clearance and foundation works would expose soils in the affected areas and leave them vulnerable to erosion by heavy rainfall and surface runoff.

8.6.1.2 Increased erosion potential and sedimentation
The proposed project site is covered with soils which can easily be eroded by storm water or overland flows. It is anticipated that soil erosion will occur during site preparation especially during rainy conditions once the vegetation which binds these loose soil is stripped away. During operation phase, the risk of erosion is low.

8.6.1.3 Contamination of soil
The potential sources of soil contamination during construction phase are oil /fuel leaks or spills from machinery used in site preparation such as trucks used in transporting construction materials. Depending on the size and source of the spill, liquid and gaseous state, petroleum hydrocarbons may remain mobile for long periods of time, threatening to pollute groundwater.

During operation phase soil contamination is not anticipated because of the presence of the concrete paved surface which will prevent any potential contaminant from reaching the subsurface layers and is thus not assessed. During decommissioning phase, soil contamination could occur especially with the use of machinery in demolition of the facility.
Aspects and Impacts
The development of the substation will involve vegetation clearing leaving exposed soil surfaces which have the potential to erode easily if left uncovered. Excavated material will be deposited next to the foundation trenches prior to backfilling, and surplus soil, after backfilling of foundation excavations, is usually spread out evenly around the construction site. If foundation excavations for the substation occur on unstable ground, along with the effects of vegetation clearing, erosion of topsoil by wind and water, as well as gulley erosion, may occur until the area is re-vegetated. The primary impact on soils is therefore the potential loss of soils / soil erosion.

Impact rating for soil and Geology during construction phase
Table 8-6 below assesses the potential construction related impacts on soils both with and without Mitigation measures. The recommended mitigation measures are similarly summarized in the table.

<table>
<thead>
<tr>
<th>Mitigation measures</th>
<th>Area specific</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Mitigation measures</td>
<td>The contractor to compact spoil areas and undertake and effective drainage of spoil sites in order to avoid land instability in form of soil subsidence, slip and mass movement.</td>
<td>The contractor should ensure landscaping of the completed site.</td>
<td>Areas compacted by vehicles during site preparation and construction should be scarified (ripped) by the contractor in order to allow penetration of plant roots and the re growth of the natural vegetation.</td>
<td>The contractor should ensure waste water generated is discharged into approved drainage facilities.</td>
<td>Proper drainage channels and leveling especially of the access road to reduce run-off velocity and increase infiltration of rain water into the soil. Proper compaction will also be done along the access road.</td>
<td>Within the project site, construction vehicles will be restricted to designated areas to avoid soil compaction, while any compacted areas will be ripped to reduce run-off. Caution will be required during construction at times of heavy rains.</td>
</tr>
<tr>
<td>With mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

Concluding Remarks
Due to the localised and small scale effects of the excavation and the gentle slope of the land the overall significance of the construction related impacts on soils is considered to be low, while the operational related impact is considered to be very low, provided the necessary mitigation / management measures are implemented.

8.6.2 Impacts on Flora and Fauna
The construction of the substation infrastructure will involve vegetation clearing for substation foundation and access road. Exposed soil surfaces have the potential to erode easily if left uncovered.
which could lead to further loss of vegetation. Excavated material will be deposited next to excavations and will remain there until backfilling is complete. This will entail the temporary covering of surface vegetation and may lead to damage of vegetation if left covered for too long a period. Further vegetation / habitat loss may result due to the creation of temporary access routes during construction. The clearing of indigenous vegetation during construction may also result in the further encroachment of alien vegetation onto the site. There is also the potential for injury or death to animals accessing the site as a result of construction activities i.e. injury / death resulting from the operation of heavy machinery used to construct the substation facilities, falling into foundation excavations, etc.

The proposed site is characterized by minimal vegetative cover except for a few plant species which include Eucalyptus Grandis and Lantana Camara mainly found along the boundary fence and near the road where it cross to Kenya Power proposed substation. These plants will be removed during construction phase and consequently result in loss of their ecological as well as their other values; economic and medicinal. During operation no plants will be affected. During decommissioning phase there will be no effect on the terrestrial ecology because the site would not have any vegetation but the area will be rehabilitated to improve on the vegetative cover of the area.

Table 8-6 below assesses the potential construction related impacts to flora and fauna both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

**Table 8-6: Impact Significance Determination Rating for Impacts to Fauna and Flora during the Construction Phase**

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>7</td>
<td>8</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitigation measures</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>6</td>
<td>7</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8-7 below assesses the potential operational related impacts on flora and fauna both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

**Table 8-7: Impact Significance Determination Rating for Impacts to Fauna and Flora during the Operational Phase**

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>8</td>
<td>5</td>
<td>Low</td>
</tr>
</tbody>
</table>
Mitigation measures

- The on-going management of the substation should include the removal of alien vegetation that may have encroached onto the site;
- Should herbicides be required for the control of vegetation within the substation, only trained personnel should handle and apply the herbicides and applications should not occur before or after rain periods;
- Alien plant areas should be monitored during operation and further spreading of alien vegetation should be controlled;

<table>
<thead>
<tr>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>4</th>
<th>3</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Concluding Remarks
The preferred site for Substation is mainly in a subsistence agricultural area and the vegetation has been disturbed due to the presence of livestock and cultivation. The route follows existing roads and tracks and therefore will not require the construction of long access road. Due to the localized extent of the development and small-scale nature of the development the overall significance of the construction related impacts on flora and fauna is considered to be low while the operational related impact is considered to be very low, provided the necessary mitigation / management measures are implemented.

8.6.3 Air quality

Decreased air quality due to dust emission
During construction phase, potential dust pollution will emanate from site preparation activities such as stripping and excavation particularly if it takes place during dry weather conditions. Dust emissions might impact on the visibility of the nearby roads consequently impacting on the traffic safety. Air emission from construction machinery, including dust, is regarded as a nuisance when it reduces visibility, soils private property is aesthetically displeasing or affects palatability of grazing. This is expected during construction works. Dust will be generated from construction earthworks, transportation activities and aggregate mixing. Emission is not anticipated during operation phase because the site surface will be concrete paved and hence limited or no generation of dust. While during decommissioning phase, dust emission would be generated from debris and soil resulting from demolition process.

Fugitive emissions
During construction phases, fugitive emissions are expected from the diesel operated construction machinery and vehicles. Similar emissions to those for construction phase are expected during decommissioning phase. The emissions will be generated from the machinery used in demolition work.
Proposed Mitigation Measures for Air Quality

Dust Emissions

- During construction, any stockpiles of earth should be enclosed/covers/watered during dry or windy conditions to reduce dust emissions;
- Construction trucks moving materials to site, delivering sand and cement to the site should be covered to prevent material dust emissions 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.
- During construction, where necessary, sprinkle loose surface earth areas with water to keep dust levels down.
- Masks should be provided to all personnel in areas prone to dust emissions during construction.
- Drivers of construction vehicles must be sensitized 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, NO\textsubscript{x}, SO\textsubscript{x} and suspended particulate matter;
- 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.
  - Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
  - Apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at demolition sites.

Fugitive Emissions

- The Contractor shall ensure that the construction machinery and equipment are appropriate and fit to prevent fugitive emissions, as per national standards or international practices. The Proponent shall ensure the regular maintenance of this equipment.
- A maintenance plan for the construction machinery and vehicles shall be implemented to prevent excessive emissions during the construction phase of the project.
- Vehicle idling time shall be minimized.
- Alternatively fuelled construction equipment shall be used where feasible.
- Equipment shall be properly tuned and maintained.
- Emissions of other contaminants (NO\textsubscript{x}, CO\textsubscript{2}, SO\textsubscript{x} and diesel related PM\textsubscript{10}) that would occur from Vehicle exhaust emissions could be reduced by maintaining vehicles in good state of service, fuel and lubricants to be of standardized quality and sourced from approved suppliers.

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.

8.6.4 Pollution from Waste generation
Solid waste anticipated to be produced during site preparation, electromechanical and civil works include spoil from excavations, scrap metal, mortar, wood, paper, masonry chips and left over food stuff. Effects of mismanaged waste include:
- Public nuisance due to littering or smell from rotting
- Creation of breeding grounds from vermin like rats and cockroaches
- Contamination of soils and water courses

Construction material waste will include:
Some wastes will be generated throughout the project cycle. During construction phase, waste will be generated from construction activities, domestic waste from construction team, waste oil and lubricants, containers of used construction materials, parts generated from vehicle and machinery maintenance.

During operation phase, waste to be generated include domestic waste generated by the operation staff at the distribution substation, components/parts of the facility’s infrastructure being removed during replacement; vegetative wastes from substation compound clearance during routine maintenance and also redundant electronic equipment.

During decommissioning phase, the main waste generated will be demolished parts of the facility which include; concrete boulders, scrap metals, plastics and rubber among others.

**Proposed Mitigation Measures**

- The contractor should adhere to the site waste management plan
- KPLC and Contractor should ensure that spoil from excavations is arranged according to the various soil layers. This soil can then be returned during landscaping and the rehabilitation, in the correct order which they were removed that is top soil last;
- The contractor should separate hazardous waste from non-hazardous. Hazardous wastes included waste contaminated with petroleum product. Waste should then be handled, collected, transported and disposed according to the Environmental Management and coordination (waste management) regulations of 2006.
- KPLC should ensure that waste is recycled and re-used where possible. Recycling bins for glass, metal, newspaper, plastic bottles and other recyclable site solid wastes should be provided onsite and/or for the site curbside collection. Waste that cannot be re-used on site should be transported to the correct yard to be specified by KPLC;
- For waste handling the contractor should provide litter collection facilities such as bins
- The contractor should comply with the requirement of OSHA 2007 and Building rules on storage of construction materials
- No burning of trash will be done on site.
- Any personal effects like food packaging will effectively be removed by the contractor to appropriate disposal points.
- Additional recommendations for minimization of solid waste during construction of the proposed Maseno 33/11 kV Substation include:-
  - 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
  - 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
  - Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
  - Use of construction materials containing recycled content where possible and in accordance with accepted standards
8.6.5 Impacts on Water Quality and Water Resources

The construction of substation and its associated infrastructures may interfere with the natural drainage systems and modify flow of surface water, and these changes can contribute to soil erosion, flooding, channel modification, downstream scouring and sedimentation in stream and other drainage channels.

The proposed substation site is not located in any water. Effluent discharged from cement slag during substation foundation construction, can all pose pollution risks to streams. Although temporary in nature, these impacts can be ongoing if disused work sites are not rehabilitated and adequate drainage works constructed to prevent erosion.

Exposed soil surfaces can erode easily through the action of both wind and water which in turn can lead to the siltation / sedimentation of down slope watercourses. Although the use of cement on-site will be minimal, (i.e. for the casting of foundations for the substation), inappropriate use and / or storage of concrete on-site can also result in the pollution of nearby watercourses. Seepage from spilled fuels and oils and leaking plant machinery can also negatively impact on adjacent surface water courses which could lead to the potential contamination of groundwater.

Impacts on water quality during operation of the substation are not anticipated.

Construction Phase

Table 8-8 below assesses the potential construction related impacts on water quality both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>6</td>
<td>7</td>
<td>Low</td>
</tr>
<tr>
<td>Mitigation measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• Unchannelled flow of water at the site during construction should be controlled to avoid soil erosion;</td>
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</tr>
<tr>
<td>• Storage areas that contain hazardous substances should be binned with an approved impermeable liner</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>• The excavation and use of rubbish pits during construction should be strictly prohibited. A waste disposal area should be designated within the active construction area and this should be equipped with suitable containers.</td>
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</tr>
<tr>
<td>• Care should be taken during concrete pouring activities to ensure there is no pollution of surface water and the surrounding areas during the undertaking of this activity;</td>
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</tr>
<tr>
<td>• Areas contaminated by spilled concrete and / or fuels and oils leaking from vehicles and machinery should be cleaned immediately.</td>
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<td></td>
</tr>
<tr>
<td>• Siting of towers away from drainage lines and floodways to minimize interference to natural drainage systems.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Limiting areas cleared of vegetation, stabilizing the soils on the sloppy areas by planting of grass.</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Remedial measures shall be implemented by the Contractor in the event of erosion resulting in the sedimentation of surrounding areas after due consideration of the costs and benefits of such removal activity.</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Infrastructure shall be designed to ensure that contaminated run-off does not reach watercourses. In the event of an oil spill the procedures contained in the emergency response plan will come into effect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vehicle maintenance and service should be done away from project site in approved garages or service stations to avoid any possible oil and fuel spills that could contaminate soils and possibly ground water quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Construction materials containing fine particles e.g. aggregates will be stored in an enclosure away from water bodies to ensure that sediment laden water does not drain into nearby water courses.</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
- Ensure that potential sources of petro-chemical pollution are handled in such a way to reduce chances of spills and leaks.
- Train work crews in safe handling of petro-chemicals.
- Minimize soil sedimentation by developing sediment control mechanism.
- Contractor to make suitable arrangements for water requirements and to provide alternative supply to any users affected by contractor’s abstraction of local water source.

<table>
<thead>
<tr>
<th>With mitigation</th>
<th>Area</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>6</th>
<th>6</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

**Concluding Remarks**

As the construction activities are small-scale and will occur on a once-off basis over a short duration, and due to the localized area of impact, the overall significance of the construction related impacts on water quality is considered to be low, provided the necessary mitigation / management measures are implemented.

### 8.6.6 Noise and vibration

Noise resulting from access road construction may disturb neighboring communities and local fauna. This impact will be of a temporary nature only and can be minimized by adopting appropriate mitigation measures including maintaining equipment and vehicles to manufacturer’s standards and limiting operating times to daylight hours.

During construction of the proposed project, a few machineries such as excavator and graders mixers among others will be utilized. These machineries and construction vehicles will generate noise of varying magnitudes. From the prediction of the specialist study on ambient noise quality measurements, the traffic noise that will be emitted by traffic accessing the proposed project site during construction, operational and decommissioning phases is expected to have some impact on ambient noise. The level of traffic noise will increase depending on the traffic volume. General guide indicates that an increase of 20% in traffic volume approximates to a noise level increase of around 1 dB, while a doubling of traffic volume results in a noise level increase of about 3 dB. It is however, worth noting that the level of noise is attenuated with increase in distance from the source and thus the sites/objects in close proximity to the source will receive more noise in comparison to those at remote location.

During operation phase noise generation will come from humming effects especially when loading is high. The amount of noise will depend on the power load and the technology used during construction. Noise impacts during operation of the substation are not considered to be significant enough to warrant a formal assessment.

As will be the case with the construction phase, the sources of noise during decommissioning phase, will be mainly machinery and vehicles used in demolition of the facility and removing the materials from the site.

### Construction Phase

Table 8-9 below assesses the potential construction related noise impacts both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

**Table 8-9: Impact Significance Determination Rating for Noise Related Impacts during the construction Phase**

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>9</td>
<td>8</td>
<td>Low</td>
</tr>
</tbody>
</table>
Mitigation measures
- Used of noise-suppression techniques to minimize the impact of temporary construction noise.
- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use 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.
- Set and observe speed limits and avoid raving of Engines.
- The Contractor shall ensure that construction activities are limited to working hours (i.e. between 06h 00 and 9h 00 daily) from Monday to Saturday, or as required in terms of legislation and/or negotiated with local landowners.
- Noise generating equipment will be designed to control and dampen noise emissions, and will be located at a distance far enough from the nearest noise sensitive development, to ensure that the increase in ambient noise level will comply with NEMA standards.
- Compliance with the recently issued Noise and Vibration Regulations of 2009 is expected at all the phases of the project.

<table>
<thead>
<tr>
<th>With mitigation</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>8</th>
<th>7</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>56</td>
</tr>
</tbody>
</table>

Operational Phase
Table 8-10 below assesses the potential operational related noise impacts both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

Table 8-10: Impact Significance Determination Rating for Noise Related Impacts during the Operational Phase

<table>
<thead>
<tr>
<th>Mitigation measures</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>9</td>
<td>8</td>
<td>Low</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Cora rings may be used to prevent corona effect if found necessary.</td>
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<td>72</td>
</tr>
<tr>
<td>With mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>8</td>
<td>7</td>
<td>Low</td>
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<td>5</td>
<td>2</td>
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</tbody>
</table>

Concluding Remarks
As humming is generally not a problem in 33/11kV substations and only occurs during periods of high power loads which with new technology in transformers makes humming virtually non-existent, the overall significance of the operational related noise impacts is considered to be very low.
8.6.7 Visual Intrusion and aesthetic impacts

**Impact on the visual landscape and Aesthetic**

Visual intrusion caused by the construction of the Substation may cause alteration to the natural scenery of the project area. However considering the low level of Substation structures, it is expected that it is going to be insignificant. The tall steel structures may seem out of proportion and not compatible with rural and agricultural landscapes. Some people may find substation structures bordering their property particularly disruptive to scenic views. Some people however, do not notice substation structures or do not find them objectionable from an aesthetic perspective. To some, the substation ant it utilities may be viewed as part of the infrastructure necessary to sustain our everyday lives and activities. To others, the substation may be viewed in a positive light because it represents economic development.

Aesthetic impacts depend on:

- The physical relationship of the viewer and the substation (distance and sight)
- The activity of the viewer (living in the area, driving through or sightseeing)
- /stands out or blends in

A substation can affect aesthetics by:

- Removing a resource, such as clearing fences that provide visual relief in a flat landscape;
- Degrading the surrounding environment (intruding on the view of landscape)
- Enhancing a resource (evoking an image of economic strength in a developing business or industrial area)

**Aspects and Impacts**

Noise pollution may occur as a result of the operation of mechanical machinery on-site during construction and the coming and going of vehicles, particularly large trucks may be a source of disturbance, especially to the immediate neighbours of the substation. Excavated surfaces will be exposed to winds which may generate dust and further erode unvegetated surfaces on-site. The presence of heavy machinery, as well as a number of construction personnel working on the site/route will have a temporary impact on the aesthetics of the site and surrounding area.

As the proposed substation will become a permanent feature of the landscape, it is likely to have a long-term visual impact on the surrounding area.

The primary impacts on aesthetics during construction and operation are:

- Dust and noise; and
- Impact on the visual quality of the landscape.

Due to the fact that the substation will become a permanent feature of the landscape the duration of impacts will be long-term. However, as the proposed substation site is located within an area of agricultural land mainly with subsistence crops, it is anticipated that the proposed development will not contribute to the devaluation of adjacent properties to a significant extent.

**Construction Phase**

Table 8-11 below assesses the potential construction related impacts on aesthetics both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

| Mitigation Extent Duration Severity Frequency of activity Probability of impact Consequences Likelihood Significance |
|-----------------|------------------|------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Without mitigation Area specific One month to one year Small/potentially harmful Daily Highly unlikely 6 7 Low |

**Table 8-11: Impact Significance Determination Rating for Impacts on Aesthetics during the Construction Phase**
Proposed Maseno 33/11 kV Substation in Emuhaya District

Mitigation measures

- Review the visual intrusiveness of the current substation design, and consider engaging local industrial designers to generate a functional, aesthetic and environmentally friendly substation design;
- Where possible, straight line runs are maximized so that the need for angle towers, which have a more negative visual impact due to their heavier construction, is minimized;
- Where possible the proposed incoming and outgoing feeders will be located adjacent to, and parallel to an existing 33 &11 kV lines. This limits effects to an already disturbed area, rather than creating a new, discrete second corridor and impact zone;
- Existing tracks will be used for construction and maintenance operations as much as possible;
- In terms of nuisance factors affecting neighbouring residents, particularly noise, the construction programme will only be determined closer to the time of construction but should be undertaken in negotiation with surrounding land users, where practical;
- Surrounding land users should be informed of the intention to undertake construction activities in time
- Exposed areas should be dampened on a regular basis to prevent dust.

<table>
<thead>
<tr>
<th>Mitigation measures</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>5</th>
<th>6</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>With mitigation</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
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<td>30</td>
</tr>
</tbody>
</table>

Operational Phase

Table 8-12 below assesses the potential operational related impacts on aesthetics both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

Table 8-12: Impact Significance Determination Rating for Impacts on Aesthetics during the Operational Phase

<table>
<thead>
<tr>
<th>Without mitigation</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
<th>8</th>
<th>5</th>
<th>Low</th>
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<tbody>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
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<td>40</td>
</tr>
<tr>
<td>Mitigation measures</td>
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<tr>
<td>With mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>7</td>
<td>4</td>
<td>Low</td>
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<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
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<td>28</td>
</tr>
</tbody>
</table>

Concluding Remarks

The impacts as they relate to aesthetics are primarily associated with the operation of the substation, due to the short duration of the construction period. However, as the proposed substation site is located within an area which largely subsistence agricultural land, the overall significance of the construction related impacts on aesthetics is considered to be low, while the operational related impact is also considered to be low, provided the necessary mitigation /management measures are implemented.

8.6.8 Fire Hazards

Smoking is one of causes of fires and this can happen during the project circle (construction, operation and decommissioning. Keeping of fuels onsite during construction can a potential cause of fire. During operation electrical faults can result in fire hazard within the substation and its environs. If vegetation in the substation is left unchecked or slash waste from routine maintenance is left to accumulate within the substation, sufficient fuel can accumulate that may promote fires if cigarette butts are dropped.
Proposed Mitigation Measures
The proposed Sub-Station will be equipped with adequate firefighting equipment of high standards and in key strategic points all over the project site. Fire/smoke detection alarm systems and portable fire extinguishers (dry powder and Carbon dioxide) shall be installed. A fire evacuation plan shall be posted in various points of the construction site including procedures to take when a fire is reported. All substation operators must be trained on fire management. Regular fire drills shall be undertaken. A fire Assembly point should be identified and marked and “NO SMOKING” signs mounted conspicuously.

8.6.9 Impacts of construction material sourcing (e.g. quarrying)
Earth materials needed for construction (e.g. concrete, sand, aggregate) is anticipated to be obtained from quarry and mining operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly supports, encourages and promotes environmental degradation at the illegal quarry sites and causes medium to long term negative impacts at source, including landslides.

Proposed Mitigation Measures
- Construction contract should stipulate that the contractor sources materials from an approved site
- The tender documents should specify required standards and certification for procurement for all materials and appliances.
- The sources of all construction materials should be from approved sources; for example hardcore for building should be obtained from bona fide commercial quarries.
- Building materials such as sand, ballast and hard core will be sourced from NEMA approved sites.
- Proponent and Contractor will ensure accurate budgeting and estimation of actual construction requirement to 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 construction materials and use of recycled building materials.

8.6.10 Traffic congestion / Road Wear/Tear
Transportation and Traffic Safety Aspects and Impacts
The existing roads will be used to gain access to the substation site. These roads are in relatively good condition and are frequently utilized by Public services, private and transit vehicles. However, the frequent passage of light and heavy vehicles accessing the substation site while construction is in progress may generate noise as well as cause damage to existing roads, traffic congestion and potential injury to vehicles and pedestrians.

The primary impacts related to traffic during construction are:
- Damage / deterioration of roads;
- Congestion of vehicular traffic; and
- Vehicular and pedestrian safety.

Such impacts are associated with construction of the substation and power line and are not anticipated during the operational phase.

Increased Traffic
There will be temporary minor disruptions to traffic movement, and increased safety concerns of local inhabitants and workers during construction of the substation as a result of increased traffic movements, particularly from large construction/transport trucks.
Accidents as a result of increased traffic
During construction phase, the construction vehicles used in transportation of materials and workers will contribute to increase in traffic on the nearby roads. Because of traffic jam some motorists might be tempted to break the traffic rules and in the process cause accidents. While during operation phase, no traffic impacts are anticipated.

Damage to roads and transport infrastructure
Damage to the nearby roads is likely during construction phase due to movement of heavy machinery, equipment and components into the project site and out after completion of construction work.

Construction Phase
Table 8-13 below assesses the potential construction related impacts on transportation and traffic safety both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

Table 8-13: Impact Significance Determination Rating for Transportation and Traffic

<table>
<thead>
<tr>
<th>Mitigation Measures</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
<td>6</td>
<td>7</td>
<td>Low</td>
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</tr>
<tr>
<td>Mitigation measures</td>
<td>KPLC and contractor should choose traffic routes to reduce the impact in the neighbourhood avoiding, as far as practical any sensitive areas</td>
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<td></td>
<td>The contractor should ensure due regard of drivers to traffic regulations and insist at all times that courtesy be shown to other road users</td>
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<td></td>
<td>Where traffic is anticipated, the contractor in close consultation with KPLC should ensure:</td>
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<td></td>
<td>Effecting of traffic routes depending on delivery and dispatch to reduce the congestion impact in the neighborhood.</td>
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<td></td>
<td>Choice of routes depending on delivery and dispatch to reduce the congestion impact in the neighborhood</td>
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<td></td>
<td>Employment of a road safety coordinator to oversee implementation of the traffic controls</td>
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<td></td>
<td>Regular maintenance of delivery and dispatch trucks.</td>
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<td>Wherever possible, use should be made of the existing roads and existing tracks during construction. If damage occurs to roads or properties, it should be repaired when the work is finished;</td>
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<td></td>
<td>Personnel driving construction vehicles will be required to adhere to speed limits and all other applicable road rules in order to ensure vehicle and pedestrian safety;</td>
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<td></td>
<td>All vehicles to be in good working order, particularly as there are many pedestrians and animals in the area; and</td>
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<td></td>
<td>A safe sight distance should be maintained at all times by cutting grass or other vegetation on either side of the access road/s to the substation site.</td>
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<tr>
<td>With mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
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</table>

Concluding Remarks
Due to the short duration and small scale of the construction activities, the overall significance of the construction related impacts on transportation and traffic safety is considered to be low, provided the necessary mitigation / management measures are implemented.
8.6.11 Occupational Health and Safety Impacts

The development of the proposed facility will involve a number of activities that pose potential health and safety risks to the workers which include excavation, stripping conductors and backfilling. Risk of accidents and incidents will be heightened with the construction activities. Construction workers will be in direct contact with heavy machinery and equipment. These operations require the use of hoists, heavy duty equipment, machinery and vehicles. Apart from the regular training on health and safety, staff working on substation should be sensitized on the work within the ecological and social areas.

Health and Safety Impacts

Aspects and Impacts

The health and safety of construction personnel may be placed at risk as a result of the use of heavy machinery to construct the required substation infrastructure. There may be injury to people / animals accessing the site i.e. falling into foundation excavations. In addition, there is the potential for loitering and / or attempted theft of construction machinery and equipment present onsite during the construction period.

The primary impacts on health and safety during construction are therefore:
• Injury to people resulting from the use of machinery and equipment;
• Injury to people and animals accessing the site; and
• Increase in crime, which may harm the safety and health of the project employees.

Such impacts are associated with construction of the power line and are not anticipated during the operational phase.

Construction Phase

Table 8-14 below assesses the potential construction related impacts on health and safety both with and without mitigation measures. The recommended mitigation measures are similarly summarized in the table.

Table 8-14: Impact Significance Determination Rating for Health and Safety Related Impacts during the Construction Phase

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Extent</th>
<th>Duration</th>
<th>Severity</th>
<th>Frequency of activity</th>
<th>Probability of impact</th>
<th>Consequences</th>
<th>Likelihood</th>
<th>Significance</th>
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</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>Area specific</td>
<td>One month to one year</td>
<td>Small/potentially harmful</td>
<td>Daily</td>
<td>Highly unlikely</td>
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<tr>
<td>Mitigation measures</td>
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<tr>
<td>• The contractor should ensure registration of all the construction works by the Director, Directorate of Occupational Health and Safety Services (DOHSS) in compliance with the Buildings and Construction Engineering Rules, 1984;</td>
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<td>• The contractor should contract a qualified health and safety advisor to conduct training and monitoring of construction works;</td>
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<tr>
<td>• The contractor must ensure establishment of a health and safety committee for the project as per the Health and Safety Committee Rules 2004 of the OSHA, 2007.</td>
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<tr>
<td>• The contractor should ensure provision of appropriate personal protective equipment for staff</td>
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<tr>
<td>• KPLC should ensure that the contractor is instructed in the use of all materials that may have negative environment (including health) effects.</td>
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<tr>
<td>• KPLC should ensure that if any materials or substance is used that is at any point in the future deemed to be deleterious to health, and then it must be replaced with acceptable alternative.</td>
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<tr>
<td>• The contractor has to adhere to safety regulations outlined in the local government adoptive by laws, and the Building Operations and works of engineering construction.</td>
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<tr>
<td>• 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</td>
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</table>
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.
- A Response and Evacuation Plan must be in place in addition to safety education and training shall be provided to the employees.
- Construction personnel should be properly trained to use equipment, particularly in terms of the dangers associated with the operation of heavy plant machinery;
- Following completion or partial completion of construction activities, excavations should be barricaded to prevent injury to persons and animals accessing the site;
- 24-hour security should be provided on site during the construction period; and
- Access to the site by unauthorised personnel during the undertaking of construction activities should be prohibited.

<table>
<thead>
<tr>
<th>With mitigation</th>
<th>Area specific</th>
<th>One month to one year</th>
<th>Small/potentially harmful</th>
<th>Daily</th>
<th>Highly unlikely</th>
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<tbody>
<tr>
<td></td>
<td>2</td>
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<td>5</td>
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<td>30</td>
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</tbody>
</table>

**Concluding Remarks**
Due to the small-scale of the construction activities the overall significance of the impacts relating to health and safety during the construction phase, provided the necessary mitigation / management measures are implemented is considered to be **low**.

### 8.6.12 Hazardous materials

Hazardous materials in this sector include insulating oil/gases (e.g. polychlorinated Biphenols (PCB) and Sulphur Hexafluoride (SF6), and fuels.

Liquid petroleum fuels for vehicles and other equipment may be used and stored at transmission and distribution projects. Polychlorinated Biphenyls (PCB) were widely used as dielectric fluid to provide electrical insulation, although their use has been largely discontinued due to potential harmful effects on human health and the environment.

Spilled chemicals can contaminate soil as well as pollute water resources. Hazardous and flammable substances (e.g. Diesel oil, paints, thinner, solvents etc) when improperly stored and handled on site become potential health hazard for construction workers. It is anticipated that the refueling and maintenance of large vehicles will not take place on the construction site.

During the construction period for the proposed line project, oil spills may result from construction site equipment and storage.

**Proposed Mitigation Measures**
- The contractor should ensure that the employees on site are aware of the company procedures of dealing with spills and leaks from oil storage tanks for the construction machinery through induction and safety training
- In case of spillage the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials and/or other materials approved by KPLC.
- All vehicles and equipment should be kept in good working order, serviced regularly and stored in an area approved by KPLC.
- The contractor should also provide security to guard against vandalism when the site is unattended.
- The contractor should assembled and clearly list the relevant emergency telephone contact numbers for staff, and brief staff on the procedures.
- Appropriate training for the handling and use of fuels and hazardous material as necessary. This includes providing spill response and contingency plans
• Taking extreme care when transferring chemicals and fuel from storage vessels to equipment and machinery
• Storage of all chemicals within the budded areas clearly labeled detailing the nature and quantity of chemicals within individual containers.
• Immediate cleaning of chemical or fuel spills. The spilt liquid and clean up material should be removed, treated and transported to an appropriate site licensed for its disposal.

8.6.13 Impacts of fuel and chemical storage
Spilled chemicals and hazardous and flammable substances (e.g.) diesel oil, paints, thinner, solvents for construction workers can contaminate soil as well as pollute in shore waters. It is anticipated that refueling and maintenance of large vehicles will take place on the construction site and that, correspondingly, there will be no storage of fuel and lubricants on the site.

During the construction period for the Maseno 33/11 kV Substation, oil spills may result from fuelling projects cars.

Proposed Mitigation Measures
• The contractor should ensure that the employees on site are aware of the company procedures for dealing with spills and leaks from oil storage tanks for the construction machinery through induction and safety training
• In case of spillage the contractor should isolate the source of the oil spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by KPLC;
• KPLC and the contractor should ensure that there is always a supply of absorbent material such as saw dust onsite during construction, readily available to absorbent/breakdown spill from machinery or oil spillage
• All vehicles and equipment should be kept in good working order, serviced regularly and stored in an area approved by KPLC.
• The contractor should ensure that filling areas, oil storage drums/products storage areas have a smooth impermeable floor. The floor should be budded and sloped towards a sump to contain any spillages of substances in accordance with Kenya regulations.

8.6.14 Impacts on Public Health
This section examines the concerns for public health related to HIV/AIDS and other communicable and sexually transmitted diseases (STDs), and exposure to electric and magnetic fields (EMFs)

a). HIV/AIDS
HIV/AIDS has been declared a national disaster. It has been observed that construction works and projects are a conduit for transmission of the disease through sexual interactions between project staff and local communities.

The contractor will transport workers to active construction sites each day from the nearest urban centres, such as Kisumu, Maseno, Luanda and Emuhaya town. No camps will be used that might attract concentration of prostitutes. The contractor will, as part of each workers initial orientation and ongoing education, provide public education information about HIV/AIDS transmission and prevention measures. Condoms will be made available to project workers at the contractor's cost.
8.6.15 Social Impacts

8.6.15.1 Influx of People
Temporary influx of skilled labour during construction of substation and their interaction with locals can cause tensions as well as opportunities for the spread of socially communicable diseases. These affects can be managed by appropriate ongoing consultation with local communities throughout Project construction as well as informing workers on local cultural sensitivities and health matters.

8.6.15.2 Social Vices
Construction activities will attract an influx of people to the project area. This may lead to social vices like drug abuse, spread of diseases like HIV and may pose security concerns. Sensitization and awareness creation need to be done before and during the construction works.

8.6.15.3 Loss of employment and Livelihood
During decommissioning, the staff previously employed to man and maintains the substation will lose employment and livelihood. Decreased power supply will also lead to employment loss in the informal sector.

8.6.15.4 Health
Influx of workers from outside communities brings risk of spreading communicable diseases such as HIV/AIDS to local communities. Both workers and communities should be made aware of health implications and preventative measures provided by the Project.

8.6.16 Cumulative Impacts
Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past present or reasonably foreseeable future activities.

This section provides a description and analysis of the potential cumulative effects of the Maseno 33/11 kV Substation project and considers the effects of any such changes on:
• The biophysical environment; and
• Socio-economic conditions.

8.6.16.1 Cumulative Impact Analysis
For the most part, cumulative impacts or aspects thereof are too uncertain to be quantifiable, due to mainly lack of data availability and accuracy. This is particularly true of cumulative impacts arising from potential or future projects, the design or details of which may not be finalized or available and the direct and indirect impacts of which have not yet been assessed. Given the limited detail available regarding such future developments, the analysis that follows is necessarily of a generic nature and focuses on key issues and sensitivities for the project and how these might be influenced by cumulative impacts with other activities. In most cases, only qualitative assessments of cumulative impacts are possible, i.e. they are not formally rated.

8.6.16.2 Cumulative Biophysical Impact
The potential cumulative impact associated with the Maseno 33/11 kV Substation is the potential loss of biodiversity through a decrease in vegetation and faunal habitat. A decrease in avifauna as a result of
the operation of the facility may also occur. The clearing of natural vegetation is occurring at an increasing rate within some Flats area as a result of human population growth and development. The clearing of indigenous vegetation is resulting in a decrease in biodiversity and suitable habitat for fauna. The development of the 33/11kV will exacerbate the loss of biodiversity through the direct loss of natural vegetation within the proposed site. However with the implementation of the proposed mitigation recommendations the cumulative impact on flora and fauna is anticipated to be low.

8.6.16.3 Cumulative Socio-Economic Impact

The proposed substation development has the potential for positive cumulative socioeconomic impacts. The construction of the Maseno 33/11 kV Substation will provide an additional supply of electricity to Emuhaya District and its environs. This dedicated, additional supply of electricity will enable many previously un-serviced households to receive electricity, thereby improving the standard of living for the people within the surrounding rural area. The power outages, which are currently occurring in the area on a relatively frequent basis, will also decrease accordingly.

Summary of the identified impacts in terms of Significance of the Proposed Project are presented in table 8-15 while the summary of impacts in terms of whether they are positive or negative; direct or indirect; major or Minor and Temporary or permanent are presented in table 9-16.

Table 8-15: Summary of Significance of the Identified Impacts of the Proposed Project

Significance of Impacts

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>SIGNIFICANCE RATING</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction Phase</td>
<td>Operation Phase</td>
<td>Decommissioning phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Without mitigation</td>
<td>With mitigation</td>
<td>Without mitigation</td>
<td>With mitigation</td>
<td>Without mitigation</td>
</tr>
<tr>
<td>Soil and Geology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in erosion potential and sedimentation</td>
<td>Medium negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
<td>Not anticipated</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Contamination of soil</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
<td>Not anticipated</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Weakening of the geological stability</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
<td>Not anticipated</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Ecology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on terrestrial ecology</td>
<td>Medium low negative impact</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
</tr>
<tr>
<td>Forest and vegetation clearance</td>
<td>low negative impact</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
</tr>
<tr>
<td>Impact on Aquatic environment</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
<td>Not anticipated</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Air quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease air quality due to dust</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
<td>Not anticipated</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Fugitive</td>
<td>Very low</td>
<td>Very low</td>
<td>Not</td>
<td>Not</td>
<td>Very low</td>
</tr>
</tbody>
</table>
### IMPACT SIGNIFICANCE RATING

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>Construction Phase</th>
<th>Operation Phase</th>
<th>Decommissioning phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without mitigation</td>
<td>With mitigation</td>
<td>Without mitigation</td>
</tr>
<tr>
<td>emissions</td>
<td>negative impact</td>
<td>negative</td>
<td>anticipated</td>
</tr>
<tr>
<td>Air pollution from incidents</td>
<td>Not anticipated</td>
<td>Not anticipated</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Waste generation</td>
<td>Pollution from waste generation</td>
<td>Very low negative impact</td>
<td>Very low negative</td>
</tr>
<tr>
<td></td>
<td>Decreased water quality</td>
<td>Very low negative impact</td>
<td>Very low negative</td>
</tr>
<tr>
<td></td>
<td>Noise and vibration</td>
<td>Deterioration in ambient noise quality</td>
<td>Very low negative</td>
</tr>
<tr>
<td></td>
<td>Visual impacts</td>
<td>Impact on visual landscape</td>
<td>Very low negative</td>
</tr>
<tr>
<td></td>
<td>Socio-economic</td>
<td>Creation of employment</td>
<td>Low positive impact</td>
</tr>
<tr>
<td></td>
<td>Gains in the Local and National Economy</td>
<td>Low positive impact</td>
<td>High positive</td>
</tr>
<tr>
<td></td>
<td>Provision of Market for Supply of Building Materials</td>
<td>Low positive impact</td>
<td>Direct Minor &amp; Minor Impact</td>
</tr>
<tr>
<td></td>
<td>Informal Sectors Benefits</td>
<td>Low positive Impact</td>
<td>Direct &amp; Minor</td>
</tr>
<tr>
<td></td>
<td>Loss of livelihood</td>
<td>Medium negative impact</td>
<td>Very low negative</td>
</tr>
<tr>
<td></td>
<td>Influx of people</td>
<td>Low negative impact</td>
<td>Very low negative</td>
</tr>
<tr>
<td></td>
<td>Traffic impacts</td>
<td>Accidents as a result of increased traffic</td>
<td>Very low negative impact</td>
</tr>
</tbody>
</table>
### Table 8-16: Summary of Project Potential Impacts in all aspects

<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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td>Employment Opportunities</td>
<td>Positive</td>
<td>Direct &amp; Indirect</td>
<td>Permanent/Temporary</td>
<td>Major</td>
<td>Yes</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>Yes</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>Yes</td>
</tr>
<tr>
<td>Informal Sectors Benefits</td>
<td>Positive</td>
<td>Direct &amp; Indirect</td>
<td>Temporary</td>
<td>Minor</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase in electricity supply</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>No</td>
</tr>
<tr>
<td>Visual and aesthetic impacts</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>Yes</td>
</tr>
<tr>
<td>Impacts of terrestrial ecology (on farm private forest) Destruction of existing vegetation)</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>Yes</td>
</tr>
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</table>

**Impact Significance Rating**

<table>
<thead>
<tr>
<th>Construction Phase</th>
<th>Operation Phase</th>
<th>Decommissioning phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without mitigation</td>
<td>With mitigation</td>
<td></td>
</tr>
<tr>
<td>Damage to roads and transport infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
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<tr>
<td>Not anticipated</td>
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<td></td>
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<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Health and safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
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<tr>
<td>Very low negative impact</td>
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<td>Very low negative impact</td>
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<tr>
<td>Very low negative impact</td>
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<tr>
<td>Very low negative impact</td>
<td></td>
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</tr>
<tr>
<td>Public safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
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<td></td>
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<tr>
<td>Not anticipated</td>
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<td></td>
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<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
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<tr>
<td>Very low negative impact</td>
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<td></td>
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<tr>
<td>Not anticipated</td>
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<tr>
<td>Not anticipated</td>
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<tr>
<td>Electromagnetic Fields</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
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</tr>
<tr>
<td>Not anticipated</td>
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<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
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<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV &amp; AIDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts on Wetlands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not anticipated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low negative impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental &amp; Social Impact</td>
<td>Positive/ Negative</td>
<td>Direct/ Indirect</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Public health (Possible Exposure of Workers to Diseases)</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Social impacts</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Generation of Exhaust Emissions</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Dust Emissions</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Water quality</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Occupational Health and Safety (Workers accidents and hazards)</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Earth and construction material sourcing</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Waste Generation and management</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Soil Erosion impacts from vegetation clearance</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Hazardous Materials</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Air and noise impacts</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Fire Outbreaks</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Impacts on avifauna (Aircraft Accidents )</td>
<td>Negative</td>
<td>Direct &amp; Indirect</td>
</tr>
<tr>
<td>Change in Land use patterns</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Traffic congestion / road wear and tear</td>
<td>Negative</td>
<td>Direct</td>
</tr>
<tr>
<td>Fuel &amp; chemical storage</td>
<td>Negative</td>
<td>Direct</td>
</tr>
</tbody>
</table>
CHAPTER 9: ANALYSIS OF PROJECT ALTERNATIVES

9.1 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.

9.2 Alternative Structure Types and Designs
Overhead incoming and outgoing feeders’ power lines have been determined to be the most feasible option for the Maseno 33/11 kV Substation 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.

9.3 Analysis of Alternative Construction Materials and Technology
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 Emuhaya District and its environs.

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 design of the Maseno 33/11kv substation will be easy to install and dismantle with minimum labour requirements and maintenance costs will be minimal.

9.4 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.
9.5 The ‘Do-nothing’ Option

The existing substation and power-line networks supplying the Maseno and Luanda towns and their 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 33/11kV 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 33/11kV 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 forego 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.

9.6 Alternative Substation Site

The identification of potential substation site for the proposed Maseno 33/11 kV Substation involved site visits to the study area, preliminary site investigations and consultation with KPLC as well as IAPs.

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

- Size – potential sites need to be sufficient for the average size of a substation and associated incoming and outgoing power lines;
- 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;
- 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;
- 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;
- 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 faunal 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;
- 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 site 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
- Public acceptability – public acceptance criteria relate to such issues as the possible adverse impact on public health, quality of life, and local land and property values.

Based on the above-mentioned suitability criteria and technical restrictions, KPLC SHE has identified one potential site for the location of the proposed Maseno 33/11 kV Substation, located along Kisumu - Busia road near load centres. There was no alternative site because the proposed site was purchased on willing seller willing buyer basis. 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. This will be a costly venture, may take a long time although there is no guarantee that the land would be available. Fresh Project design and planning before the stage of implementation will cost the developer additional money. It is recommendable that the proponent be allowed to install the project in already existing site.
10 CHAPTER ELEVEN: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

10.1 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. Table 10.1 presents the mitigation measures for the potential impacts of the proposed project.

10.2 Approach to Environmental Impact Management

The proposed ESMP will be the responsibility of the SHE department of the KPLC; however, it will have links with other departments such as operation and maintenance. Section 10.3 presents the range of approaches that will be used to manage potential impacts of the proposed project.

10.3 Overview

The environment, health and safety management cycle has five broad components:

- Policy
- Planning and design
- Project implementation (covering the construction and operation phases);
- Checking and corrective action; and
- Management review

The ESMP of the proposed project covers the planning and design, construction, operation and decommissioning phases.

10.3.1 Proponent’s SHE Policy

The Proponent has in place a SHE policy for managing the SHE aspects of their operations: the policy underscores that the Proponent is committed to creation of a conducive, safe, healthy and eco-friendly working environment. The policy further states that in order to achieve the stated objective, the Proponent shall:

- Implement sound, cohesive SHE standards throughout all their business cycles and ensure these are observed by all managers and employees.
- Comply with all relevant SHE legislation
- Plan and prepare for all conceivable emergencies and disasters related to their businesses and work environment
• Strive to continually improve in their SHE management through well defined training and audit procedures
• Follow best practice in SHE best practice compliance with an aim to be industry leaders
• Require all their business partners to manage their own SHE matters in line with their policy

10.3.2 Planning and Design

Planning and design is necessary to ensure that mitigation and impact management can be effectively implemented in the context of the relevant SHE policies. Planning involves the following activities:
• Identifying and defining the various environmental aspects and related potential positive and negative impacts that can result from the company’s activities
• Establishing a procedure to identify legal and other requirements to which the organization is subject
• Identifying and defining appropriate mitigation and management measures, including those reinforcing positive impacts.
• Establishing and maintaining documented, scheduled environmental objectives and targets at each relevant function and level within the organization.
• Environmental aspects and potential impacts will emanate from the following project related activities:
• Site preparation; excavation, stripping

The potential impacts of the proposed project have been discussed in section 9 of this Project Report. The mitigation measures provided in this ESMP are geared towards addressing the anticipated adverse impacts. There is clear division of responsibility between the design team responsible for the planning of the facility and the contractor responsible for building it. The proposed facility will be built in accordance with the nationally and internationally recognized standards. The Proponent will comply with several code of practice which includes: KEBS, BS, IP, API and NFPA.

The potential environmental impacts of the proposed facility which could arise with mitigation during construction, operation and decommissioning phases include the following:
• Impacts on soils and Geology
• Impacts on ecology (terrestrial and aquatic)
• Air pollution from dust and incidents
• Water pollution through erosion
• Visual impacts
• Socio-economic impacts
• Impact on traffic
• Impacts on human health and safety

10.3.3 Management of Impacts during Construction Phase

The EMP will put in place measures to avoid and mitigate impacts and optimize benefits arising from activities during construction phase of the project. The principal focus of project management for construction phase will include:
• Personnel and contractor management
• Conduct onsite management
• Landowner relations
• Maintenance of complaints register
• Emergency preparedness; and
• Management and mitigation of impacts such as noise, dust, safety and pollution
Assignment of responsibility and contractor management is important during the construction and operation phase. The contractor will be held to the highest SHE performance requirements to ensure they meet national and international standards.

10.3.4 Management of Impacts during Operation Phase

The operation phase of the proposed project will be mainly power supply, line maintenance and clearing of Right of Way (ROW).

For the purpose of the EMP there are three principal mechanisms for the implementation of management and mitigation measures:

- **Facilities** – these can be either specific facilities that have a dedicated SHE management functions or additions to facilities that are central to the proposed project activity.
- **Procedures** – in a similar vein, procedures can be stand-alone procedures with a dedicated SHE function (such as a waste management procedure) or can be a modification to an existing activity process to affect the SHE management.
- **Assignment of responsibility and contractor management** – this is important when the contractor will be used on an ongoing basis for a range of maintenance and other functions. The contractor will be held to the same SHE performance requirements that govern KPLC.

The mechanisms for effecting the ESMP requirements are collectively called ‘operational controls’. Such operational controls require that a responsible party, a budget and an implementation schedule are specified and allocated, to further enable and facilitate implementation. In addition, roles and responsibilities need to be defined for the ESMP.

These roles include dedicated SHE management roles as well as the SHE responsibilities of other company personnel (ultimately all personnel will have an SHE role). To facilitate coordinated and purposeful implementation, the ESMP management and mitigation measures are grouped in programmes and plans.

10.3.5 Checking and Corrective Action

Checking and if necessary implementing corrective action, form the fourth component of the EMP management cycle. They ensure that:

- The required ESMP management activities are being implemented; and
- The desired outcomes are being achieved.

As such this component includes four key activities. These are

- Monitoring selected environmental quality variables as defined in the objectives and targets.
- Ongoing inspections of the operational controls and general state of the operations.
- Internal audits to assess the robustness of the ESMP or to focus on a particular performance issue.
- External audits to provide independent verification of the efficacy of the ESMP.

10.3.5.1 Monitoring

The environmental variables that are to be monitored are described in the description of the baseline environment in this report. Monitoring results must be structured and presented for review on an ongoing basis so that if objectives and targets are not met, corrective action can be taken.

10.3.5.2 Inspections: Construction Phase

An ongoing but pragmatic inspections regime will be developed that allows for potential SHE transgressions to be identified proactively, so that mitigation can be quickly and effectively implemented.
10.3.5.3  **Internal and External Audits**
Where the monitoring data and the inspection reports highlights problems, an internal audit can be used to ascertain the source of the problem and to define action to prevent its recurrence. The three key areas for audit are facilities (are they operating properly?), project procedures (are they properly designed and implemented?) and finally, and perhaps most importantly Contractor’s EHS performance.

10.3.5.4  **Corrective Action**
There are several mechanisms for implementing corrective action, both during the construction and operational phases. The main mechanisms to address transgressions include verbal instruction (in the event of minor transgressions from established procedure, usually following a site inspection); written instruction (identifying source/s of problems, usually following an audit) and contract notice (following possible breach of contract).

10.3.5.5  **Reporting**
The findings of all of the above will be structured into instructive reporting that provides information to all required parties on SHE performance, together with clearly defined corrective action where this seem to be required. Both the monitoring and inspections are reported on continuously. Within the reporting structure it is necessary to create a review function that continuously assesses the reporting and prescribes any necessary corrective action. Reporting will include the provision of information on the EHS performance to external stakeholders and surrounding communities.

10.3.5.6  **Management Review**
The final component of the EMP management cycle is a formal management review that takes place at defined intervals both during the construction and operational phases. The purpose of the management review is for senior project management to review the environmental management performance during the preceding period and to propose measures for improving that performance in the spirit of continuous improvement.

10.3.5.7  **Liaison**
Throughout the project, ongoing liaison will be maintained with authorities and communities alike to ensure the following:
- Advance warning of any project activities that may have some adverse impact on surrounding communities, e.g. clearing of construction site, erection of pylons; and
- Ongoing feedback on the environment performance of the project.

10.4  **The Proposed Project**
As discussed in detail in Chapter 2 this project report, the proposed project will comprise of a substation yard that will have a control room and also steelwork bus bar structures of approximately 12m – 13m in height for the 33kV incoming line and also for the 11kV outgoing feeder lines. In the substation yard there will be a 7.5 MVA transformer. Lightning arrestor mast will also be installed. All steel work will be connected to an earth mat to prevent potentially high voltages from arising.

10.5  **Impact Mitigation and Management**
This section presents mitigation and management measures for the identified potential impacts of the proposed project. The section also provides description of the management plans and programmes within which management and mitigation measures will be implemented. The actions and activities for decommissioning phase are dealt with in the rehabilitation and closure plan which also addresses the mitigation measures that will be ongoing once operations have ceased.
10.5.1 **Impacts and mitigation/management measures**

Table 11.1 presents the EMP for the proposed project. It covers on the proposed management and mitigation measures for the identified impacts. This addresses the dual objective of the EMP, namely to fully disclose the commitments undertaken by KPLC, and to provide managers and staff of KPLC with a clear framework for EMP implementation.

In addition, the EMP provides a schedule for the implementation of management/mitigation activities, sub-divided by project phase. The schedule shows at a glance, the timing of the many actions required under the EMP. It is particularly useful where management/mitigation measures extend across phases.

### 10.6 Management Programmes

This section presents the programmes for managing the identified impacts. It is worth noting that the use of management programmes to manage the impacts is necessitated by the fact that most of the mitigation measures cannot be implemented as discrete, isolated actions because there are spatial, temporal and casual interactions among impacts. The programmes recommended for managing the potential impacts of the proposed project include:

- Soil conservation management programme
- Water quality management programme
- Air quality management programme
- Noise management programme

The implementation of the EMP is also linked to a series of comprehensive management plans. Management and mitigation measures should be in compliance with legislative requirements. Where no legal guidance is provided, industry and/or international good practices should be applied as far as is practicable.

#### 10.6.1 Soil Conservation Management Programme

The aim of soil conservation management programme is to conserve soil for rehabilitation. The programme will include the following requirements:

- The minimum area required for infrastructure shall be cleared of vegetation
- Measures shall be taken to ensure that topsoil and subsoil excavated from the construction site is properly managed. These measures are contained in the construction environmental management plan.
- A minimum amount of storm water will be allowed to flow on to the site, and control measures to meet industry norms and standards will be implemented to ensure that storm water damage is avoided and minimized.
- Topsoil shall not be disturbed more than is absolutely necessary on the construction site, and should be used for backfilling as much as possible.
- Denuded areas shall be surfaced as soon as feasible after construction, where clearing or use has been temporarily used for construction.

#### 10.6.2 Water Management Programme

The aim of this programme is to ensure that water quality is conserved throughout the project phases. The programme includes the following:

**Surface Water**

The Proponent needs to comply with the relevant SHE legislations in executing the proposed project. Some of the legislations that cover water management include: EMCA 1999, Water Quality Regulations - Legal Notice No. 121 of 2006 and Water Act, 2002.
• Measures shall be instituted to minimize erosion and sediment transport, especially during construction activities. These measures should include: limiting areas cleared of vegetation, stabilizing the soils on the sloppy areas with stone pitching and planting of grass.
• Remedial measures shall be implemented by the contractor in the event of erosion resulting in the sedimentation of surrounding areas after due consideration of the costs and benefits of such removal activity.
• Infrastructure shall be designed to ensure that contaminated run-off does not reach watercourses. In the event of an oil spill the procedures contained in the emergency response plan will come into effect.
• A surface monitoring system, including flows and water quality, shall be established and implemented for the duration of the operation of the facility.

**Effluent management**

• Provision shall be made for suitable sewage facilities for construction workers.
• Permanent employees will use the already available sanitary facilities.

**10.6.3 Air quality management programme**

The aim of this programme is to ensure that air quality is maintained through construction, as well as operation phases. The air quality management programme includes the following:

**10.6.3.1 Dust management**

• Dust abatement measures shall be implemented to control dust generated by construction activities. Refer to the construction control plan and construction management plan.
• A complaints register and protocol will be drawn up as a means for surrounding landowners, residents and public residents to voice their issues and concerns, particularly those relating to the nuisance effects of dust. The register will be set up prior to the commencement of construction activities. These public complaints should be responded to as a matter of urgency and where possible, measures taken to minimize the cause of dust.

**10.6.3.2 Emissions**

• The Contractor shall ensure that the construction machinery and equipment are appropriate and fit to prevent fugitive emissions, as per national standards or international practices. The Proponent shall ensure the regular maintenance of this equipment.
• A maintenance plan for the construction machinery and vehicles shall be implemented to prevent excessive emissions during the construction phase of the project.

**10.6.4 Noise management programme**

This programme aims to ensure that noise generated by construction and operation activities is kept to a minimum and adheres to relevant noise standards. The noise management programme includes the following:

• The Contractor shall ensure that construction activities are limited to working hours (i.e. between 0600h and 1800h daily) from Monday to Saturday, or as required in terms of legislation and/or negotiated with local landowners.
• Noise generating equipment will be designed to control and dampen noise emissions, and will be located at a distance far enough from the nearest noise sensitive development, to ensure that the increase in ambient noise level will comply with NEMA standards.
• Landowners, residents and public shall be able to register their complaints and concerns about noise through complaints register set up prior to the commencement of construction activities. These public complaints should be responded to as a matter of urgency and where possible measures must be taken to minimize the noise.
10.7 Management Plan

10.7.1 Overview
The following management plans will be implemented during construction, operation, and decommissioning phase of the proposed project:
- Construction management plan
- Construction control plan
- Labour and human resources plan
- Workplace health and safety plan
- Community safety plan
- Emergency management and response plan
- Rehabilitation and closure management plan

10.7.2 Construction Management Plan
The construction management plan for the proposed project shall include the following:

10.7.2.1 Management of fuels and other hazardous materials
- The Contractor shall comply with all applicable laws, regulations, permit and approval conditions and requirements relevant to the storage, use, and proper disposal of hazardous materials.
- The Contractor shall manage all hazardous materials and waste in a safe and responsible manner, and shall prevent contamination of soils, pollution of water and/or harm to people or animals as a result of the use of these materials.
- The Contractor shall prepare a hazardous materials and waste management plan for inclusion in the site specific environmental plan to be submitted to the Proponent prior to establishment on site. The plan shall include, but not limited to, measures to prevent: (a) contamination of soils; (b) pollution of water; (c) safe siting and storage; (d) containment of lubricants and waste oil during maintenance of vehicles; and (e) tampering with fuel tanks.
- The contractor shall ensure oil spills/leaks are prevented or minimized. This can be achieved through: instructing employees not to be sensitive on spills; regular auditing to verify that no leaking or defective equipment is brought/used onsite.
- The Contractor shall ensure that fueling and repairs are carried out by trained personnel familiar with spill containment and clean-up procedures.
- The Contractor shall ensure that all the employees working onsite are trained on good housekeeping practices.

10.7.2.2 Management of the construction site
- The contractor shall prevent littering and the random discard of any solid waste on or around the construction site.
- The contractor shall manage hazardous waste.
- The Contractor to determine safe travelling speeds for the construction period and ensure that restrictions are enforced.

10.7.2.3 Emergency Preparedness
- The Contractor shall develop an emergency plan that will enable rapid and effective response to all types of environmental emergencies in accordance with recognized national and international standards. The emergency plan shall include establishment of a network of communication between the Contractor and emergency services including police, ambulance services, and fire brigades among others.
• The Contractor shall test emergency preparedness with drill operations and shall review drills, conduct mock emergencies and remedy shortcomings to ensure a high level of emergency readiness to deal with environmental and third party incidents.

10.7.2.4 Fire Prevention and management
• The Contractor shall take all necessary precautions to prevent fires caused either deliberately or accidentally during construction process.
• The Contractor shall prepare a fire prevention and fire emergency plan as a part of the Environmental Plan to be submitted to KPLC.
• The Contractor shall provide adequate fire fighting appliances at specified localities on the worksite to meet any emergency resulting from ignition of a fire.

10.7.2.5 Management of air quality
• The Contractor shall institute appropriate measures to minimize or avoid air quality impacts. This can be achieved through formulation of air quality management plan.
• The Contractor to minimize/control emission of dust due to traffic movement and wind erosion of stockpile material and exposed soil.
• The Contractor to mitigate emissions of gases vapours and odours by conducting initial risk assessment and the installation of procedures to control the risk.
• The Contractor to ensure that all equipment used and all facilities erected on site are designed and operated to control the emission of smoke, dust, fumes and any other air impurity into the atmosphere;

10.7.2.6 Noise Management Programme
The noise management programme is geared towards minimizing the amount of noise generated by the construction and operation activities as well ensure adherence to the relevant noise standards. The noise management programme includes the following:
• The Contractor shall comply with the legal requirements for the management of noise impact specified in the Noise Quality Regulations.
• The Contractor shall formulate noise management plan for minimizing the generation of noise and vibration from construction activities occurring on site and its impact on surrounding residents, businesses and workers.

10.7.2.7 Neighbouring land owner and occupier relations
• The Contractor shall respect the property and rights of neighboring landowners and occupiers at all times and shall treat all persons with deliberate courtesy.
• The Contractor shall respect any special agreements between the Proponent and the neighbors

10.7.2.8 Complaints register
The Contractor shall establish and maintain a register for periodic review by the Proponent that logs all the complaints raised by the neighbours or the general public about construction activities. The register shall be regularly updated and records maintained including the name of the complainant, his/her domicile and contact details, the nature of the complaint and any action taken to rectify the problem.

10.7.2.9 Health management
• The Contractor shall comply with all relevant legislative requirements governing worker health and safety (e.g. OSHA 2007 and its subsidiary legislations).
• The Contractor shall prepare and implement a programme to minimize diseases likely to be contracted by the construction workers as a result of the proposed project such as HIV &AIDs.
10.7.2.10 **Construction Control Plan (CCP)**

The CCP for the proposed project shall cover the following:

10.7.2.10.1 **Control of access**

The contractor shall ensure that the construction site is accessed by authorized persons only.

10.7.2.10.2 **Control of topsoil and subsoil**

- The contractor shall store topsoil excavated from the site in a wind ROW or stockpile which shall be discernibly separate from wind ROWs or stockpiles of any other excavated materials.
- Topsoil shall be protected from any contaminant that might impact on vegetation.
- The Contractor shall temporarily stockpile topsoil in a location that will minimize any loss due to erosion or mixing with other material.
- The Contractor shall ensure that topsoil is stockpiled in a manner and for a period of time that does not result in deterioration in its plant support capacity.

10.7.2.10.3 **Control of material supply and burrow areas**

- The Contractor shall, as far as possible, source all material needed to construct the proposed project from the licensed mines and/or quarries in Kisumu District.
- In instances where materials are to be obtained from a new burrow area; the Contractor shall comply with relevant legislations.
- The Contractor shall prepare a method statement including plans, detailing the expected quantity of excavation, temporary and permanent drainage control, the final contouring of the burrow pit and the proposed method of rehabilitation.

10.7.3 **Rehabilitation**

- After completion of construction activities, the Contractor shall clear the site of construction materials and dispose wastes in appropriate disposal sites.
- The Contractor shall remove all temporary works on the construction site and grow grass on the sloppy areas where retaining wall will not be constructed to control soil erosion.

10.7.3.1 **Labour and Human Resources Plan**

In designing the labour and human resources plan Contractor shall:

- Comply with the provisions of Employment Act, 2007
- Wherever possible, give priority to qualified local people when hiring employees.

10.7.3.2 **Workplace Health and Safety Plan**

The workplace health and safety plan to be implemented by the Contractor and KPLC shall include the following key measures:

- All relevant national legislation, including the OSHA 2007 and related regulations, shall be adhered to ensure that health and safety of proximate communities and the public at large are not threatened during construction and operational phases of the Project.
- The Proponent shall ensure workplace health and safety during the operational phase of the project.
- Health and safety performance will be continuously monitored and procedures reviewed with the aim of eliminating risk as far as reasonably practicable.

10.7.3.3 **Community health and safety plan**

The community health and safety plan to be implemented by the Contractor and KPLC shall include:

- Adherence to OSHA 2007 and its subsidiary legislations to ensure that health and safety of immediate neighbours and the public is not threatened.
• The Contractor to ensure that construction work is undertaken in manner not likely pose risks to community health and safety.
• The Proponent to undertake an independent quantitative risk assessment prior to operation of the facility. The findings of this assessment will inform the development of an emergency safety plan the Contractor and KPLC to create awareness among the neighbors on the community safety procedures

10.7.3.4 Emergency Management and Response Plan

The Proponent shall rollout and implement their documented emergency response plan at the completed footprint. The EMRP shall include:

10.7.3.5 Emergency management planning

The components of the EMRP shall include:
   a) Structure and operation of the emergency management team
   b) Establishment of an emergency management centre
   c) Information retained by the emergency management team
   d) Incidents requiring activation of the plan
   e) Incident severity classification
   f) Process to be followed in the event of an emergency

- Information pertaining to emergency management shall be reported through the HSE reporting process
- A quantitative risk assessment report will be compiled by an independent company prior to commissioning of the facility.

10.7.3.6 Emergency Response Plan

KPLC will compile a comprehensive Safety Emergency Management Plan (SEMP) for the facility in conjunction with the emergency service of the Kisumu Municipal Council. The SEMP will cover the following aspects:
   a) Kenya’s Safety regulations
   b) Scope of the SEMP
   c) Notification of local authorities
   d) Details of the facility’s system
   e) Aim of the SEMP
   f) Objectives of SEMP
   g) Roles and responsibilities in the event of an emergency
   h) Information requirements in the event of an emergency
   i) Evacuation of people
   j) The role of local communities
   k) Regular testing of the SEMP
   l) Planning for the eventuality of failure on the facility
   m) Causes of the facility’s failure
   n) Probability of facility’s failure
   o) Size and duration of the facility
   p) Hazards and effects of facility’s failure
   q) Hazard range and emergency planning distances
   r) Anticipation of worst credible incidents
## ENVIRONMENT MANAGEMENT PLAN

### Table 10-1 Possible Impacts and Recommended Mitigation Measures

<table>
<thead>
<tr>
<th>Possible Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Duration</th>
<th>Responsibility</th>
<th>Cost (Kshs.)</th>
</tr>
</thead>
</table>
| Soil and Geological impacts (soil erosion, soil contamination, soil instability) | • Areas susceptible to erosion shall be properly sloped & compacted to reduce the effect of runoff, and shall be seeded immediately;  
• Rehabilitation of exposed sites as soon as practicable  
• In case of contamination, scoop and dispose off soil appropriately  
• Ensure that the proposed project does not cause increase in erosion and sedimentation.  
• The site preparation activities should be scheduled to take place in dry season. | Construction | Contractor | Included in the Contract |
| Impacts on vegetation | • Re-vegetation and landscaping  
• KPLC will estimate Total Economic Value of lost vegetative resource, & allocate equivalent monies to support initiatives by community;  
• Ensure Proper demarcation and clear only necessary areas  
• Specify Parking, Loading and Off loading zones in the site | Construction, Operation and Decommissioning | Proponent and Contractor | 500,000 |
| Air quality & dust | • The Contractor to protect, by wetting or with a barrier, stockpiles of dust-forming material subject to wind-throw  
• Cover loads of friable material during transportation;  
• Restrict speed on loose surface roads during dry or dusty conditions;  
• Suppress dust during dry periods by use of water sprays;  
• Maintain equipment in good running condition  
• Enforce vehicle load restrictions to avoid excess emissions from engine overloading;  
• Burning of woody debris & construction waste to be prohibited within the site | Construction and decommissioning | Contractor & proponent | Included in the contract |
## Mitigation of Impacts

<table>
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<tr>
<th>Possible Impacts</th>
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<th>Duration</th>
<th>Responsibility</th>
<th>Cost (Kshs.)</th>
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</thead>
<tbody>
<tr>
<td>Pollution from waste generation</td>
<td>• Develop and implement procedures for safe and appropriate disposal of waste for all project phases.</td>
<td>Construction, Operation and Decommissioning</td>
<td>Contractor &amp; proponent</td>
<td>500,000</td>
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<td></td>
<td>• Any service/Repair of vehicles to be done offsite in approved garages or service stations</td>
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<td>Oil spillage</td>
<td>• Oil containment pit around the transformer. The pit shall be at least 1½ times the volume of oil in the transformer</td>
<td>Construction, Operation and Decommissioning</td>
<td>Contractor &amp; proponent</td>
<td>Part of the contract</td>
</tr>
<tr>
<td>Water resources and Water quality</td>
<td>• Measures shall be instituted to minimize erosion and sediment transport, especially during construction activities. These measures should include: limiting areas cleared of vegetation, stabilizing the soils on the sloppy areas with stone pitching and planting of grass.</td>
<td>Construction</td>
<td>Contractor Proponent</td>
<td>Part of the contract</td>
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<tr>
<td></td>
<td>• Remedial measures shall be implemented by the Contractor in the event of erosion resulting in the sedimentation of surrounding areas after due consideration of the costs and benefits of such removal activity.</td>
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<td>• Infrastructure shall be designed to ensure that contaminated run-off does not reach watercourses. In the event of an oil spill the procedures contained in the emergency response plan will come into effect.</td>
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<tr>
<td>Noise &amp; vibration</td>
<td>• The Contractor shall comply with the legal requirements for the management of noise impact specified in the Noise Quality Regulations.</td>
<td>Construction, Operation and Decommissioning</td>
<td>Contractor and Proponent</td>
<td>200,000</td>
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<td></td>
<td>• The Contractor shall formulate noise management plan for minimizing the generation of noise and vibration from</td>
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**Mitigation of Impacts**

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|                                  | - construction activities occurring on site and its impact on surrounding residents, businesses and workers.  
- All internal combustion equipment will have properly functioning silencers or mufflers;  
- Landowners near the site to be notified about the construction schedule & activities.  
- Noise generating activities that take place near residential or sensitive institutional receptors will be restricted to between 0600 and 1800hrs.                                                                                                                                                                                                 |                |                     |                      |
| Visual & aesthetic impacts       | - Review visual intrusiveness of current substation design;  
- Plant trees around the substation to blend with existing environment  
- Where possible, locate the new line incoming and outgoing feeders adjacent to existing power lines                                                                                                                                                                                                                                                                                                                        | Operation phase| Contractor and proponent | Included in the contract |
| Fire Hazards                     | - The Contractor shall take all necessary precautions to prevent fires caused either deliberately or accidentally during construction process.  
- The Contractor shall prepare a fire prevention and fire emergency plan as a part of the Environmental Plan to be submitted to KPLC  
- The Contractor and Proponent shall provide adequate fire fighting appliances at specified localities on the worksite to meet any emergency resulting from ignition of a fire.  
- No burning of any litter/cleared vegetation on site  
- Avoid careless handling of cigarette butts                                                                                                                                                                                                                                                                              | Construction & operation | Proponent & Contractor | Included in the contract |
| Construction Material Sourcing   | - Ensure accurate budgeting to ensure only necessary material is ordered  
- Proper storage to ensure minimal loss  
- Strip & store topsoil separate from subsoil for major site excavations;  
- Restrict movement of heavy equipment during wet-soil                                                                                                                                                                                                                                                                                                                      | Construction phase | Contractor            | Included in the contract |
### Mitigation of Impacts

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<tr>
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</tr>
</thead>
</table>
| Traffic congestion / road        | - KPLC and contractor should choose traffic routes to reduce the impact in the neighbourhood avoiding, as far as possible any sensitive areas  
  - Where traffic is anticipated, the contractor in close consultation with KPLC should ensure:  
    - Effecting of traffic routes depending on delivery and dispatch to reduce the congestion impact in the neighborhood.  
    - Due regard of drivers to traffic regulations which should be insisted upon at all times, with courtesy shown to other road users  
    - Employment of a road safety coordinator to oversee implementation of the traffic controls  
    - Regular maintenance of delivery and dispatch trucks. | Construction | Contractor     | Part of the contract |
| Tear and wear                    |                                                                                                                                 |          |                |              |
| Occupational Health & Safety     | - Staff Training and regular equipment service and testing  
  - Only trained & certified workers to install, maintain or repair electrical equipment;  
  - Use of signs, barriers and education/public outreach to prevent public contact with potentially dangerous equipment;  
  - Community policing to be encouraged to reduce vandalism  
  - Ensure provision and proper use of Personal protective Equipment  
  - Follow safe work procedures  
  - Maintain a fully stocked and accessible first aid kit | Construction, operation and Decommissioning | Proponent & contractor | 1,000,000 |
| Hazardous Materials              | - The Contractor shall comply with all applicable laws, regulations, permit and approval conditions and               | Construction and decommissioning | Contractor | Part of the contract |
### Mitigation of Impacts

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</tr>
</thead>
</table>
| Fuel & chemical storage on site      | - KPLC & the Contractor shall initiate storage & routine handling of fuels and lubricants in a weather-protected area equipped with a secondary containment system for spills;  
- KPLC personnel will be educated on proper use and disposal of hazardous materials  
- Need to develop and accidental spill management plan | Construction, operation and decommissioning | Proponent and contractor | 100,000       |

- The Contractor shall manage all hazardous materials and waste in a safe and responsible manner, and shall prevent contamination of soils, pollution of water and/or harm to people or animals as a result of the use of these materials.
- The Contractor shall prepare a hazardous materials and waste management plan for inclusion in the site specific environmental plan to be submitted to the Proponent prior to establishment on site. The plan shall include, but not limited to, measures to prevent: (a) contamination of soils; (b) pollution of water; (c) safe siting and storage
- The contractor shall place on-site tools and equipment, such as compressors on bermed impermeable sheeting to prevent oil spills/leaks from causing subsurface contamination.
- The contractor shall ensure oil spills/leaks are prevented or minimized. This can be achieved through: instructing employees to avoid spills and regular auditing to verify that no leaking or defective equipment is brought/used onsite;
- The Contractor shall ensure that fueling and repairs are carried out by trained personnel familiar with spill containment and clean-up procedures.
- The Contractor shall ensure that all the employees working onsite are trained on good housekeeping practices.
10.8 Environmental and Social Monitoring Plan (ESMP)

10.8.1 Monitoring

The proposed programmes and plans will be subjected to monitoring. Monitoring will have two elements: routine monitoring against standards or performance criteria; and periodic review or evaluation. Monitoring will often focus on the effectiveness and impact of the programme or plan as a whole.

During construction phase, the Proponent shall monitor the contractor’s activities in order to verify that the management measures/procedures/specifications are implemented as contained in the EMP. Compliance will mean that the Contractor is fulfilling their contractual obligation.

During operation phase, the Proponent will monitor facility’s operations to ensure compliance with management measures in the EMP and operation procedures. As part of this monitoring, the Proponent will undertake statutory initial environmental audit as required by the EIA/EA Regulations, 2003 and subsequent annul self environmental audits.

10.8.2 Programme Monitoring

The Proponent shall regularly monitor programme implementation. The process will include the regular monitoring of:

- Erosion of soil resulting in the immediate surroundings of the facility caused by the presence of facility or impacting on structures associated with the facility
- Air quality and ambient emissions, including dust generated by construction activities
- Noise generation during construction, operation and decommissioning phases

10.8.3 Plan Monitoring

All of the management plans make provision for monitoring and evaluation. Special attention should be given to the monitoring arrangements relating to biophysical impacts, occupational health and safety, facility operational and emergency response.

During the construction phase of the project, the Contractor’s SHE Officer shall report all environmental impacts as well as accidents and incidents to the Proponent’s SHE Officer.

The reported impacts and incidents will be captured on a database to ascertain trends and track progress in the implementation of preventive and corrective actions, and benchmarking against other, similar operations.

Depending on the level of severity, accidents and incidents will be investigated by the Contractor’s SHE officer, with key input from the line management to ensure accountability.

During operation, the Proponent's SHE department will monitor the health and safety of personnel and contractors, in compliance with legislative requirements. Emergency incidents should be reported to the relevant authorities. The reported impacts and incidents will be captured on a database to identify weakness in the emergency response plan and track progress in the implementation of preventative and corrective and benchmarking against other similar operations.
The Environmental and Social Monitoring Plan (ESMP) will provide the basis for monitoring of Potential environmental Impacts associated with the substation Project. The implementation of the Monitoring Plan together with the Environmental and Social Management Plan will provide a benchmark for future environmental audits. The ESMP provides effective observation and documentation of monitorable parameters that will help in analyzing the effectiveness of the proposed mitigation measures with the advantages of improving operational efficiency, promoting competitive advantage, improving risk management, reducing liabilities and improving business performance. The environmental and social parameters monitoring procedures and techniques for proposed project are summarized in table 10-2.

Table 10-2: Environmental and Social Monitoring Plan (ESMP)

<table>
<thead>
<tr>
<th>Potential Environmental /Social impact</th>
<th>Parameter to be monitored</th>
<th>Timing</th>
<th>Cost</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Measure the Noise Level within the Project area and at distances of 30 from the substation</td>
<td>During Construction, Operation and Decommissioning phases</td>
<td>Included in Construction contract and Operating costs</td>
<td>The KPLC and Contractor</td>
</tr>
<tr>
<td>Vegetation and Habitat Loss</td>
<td>Quantify the weight of cleared Vegetation</td>
<td>During Construction</td>
<td>Included in the Construction Contract</td>
<td>Contractor</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Assess size of rills or Gulleys forming from accelerated run off from compacted areas</td>
<td>During operation phase</td>
<td>Included in Operation costs</td>
<td>The KPLC</td>
</tr>
<tr>
<td>Increased water Demand</td>
<td>Record volume of water used</td>
<td>During Construction and Decommissioning Phases</td>
<td>Included in the Construction costs. Demolition to be determined</td>
<td>The KPLC and Contractor</td>
</tr>
<tr>
<td>Oil Spills</td>
<td>Record any leakages from Transformers. Record all accidental spills and the volume. Establish and close the cause of leakage</td>
<td>During Operation phase</td>
<td>Included in the Operating costs</td>
<td>The KPLC</td>
</tr>
<tr>
<td>Encroachment</td>
<td>Record any new settlements within the proximity of substation</td>
<td>Monthly during the first six Months from start of Construction and Quarterly for the first one year of operation then annually</td>
<td>Included in Operating Costs</td>
<td>The KPLC</td>
</tr>
<tr>
<td>Fire hazards</td>
<td>Record any Fire incidences and investigate on possible causes</td>
<td>Throughout project cycle</td>
<td>Included in contract and Operating costs</td>
<td>The Contractor and The KPLC</td>
</tr>
<tr>
<td>Occupational Health and Safety Issues</td>
<td>Record any accidents and Possible hazard scenarios</td>
<td>Throughout Project Cycle</td>
<td>Included in Contract and operating Costs</td>
<td>The Contractor and The KPLC</td>
</tr>
</tbody>
</table>
10.9 Rehabilitation and Decommissioning Management Plan

The rehabilitation and decommissioning management plan include the following:

**Planning for closure**

a) The Proponent shall develop rehabilitation and decommissioning plan in conjunction with relevant stakeholders at least one year before the end of facility’s operations.

b) The Proponent shall investigate practical options for closure of the facility at least one year before decommissioning and submit a report to relevant authorities NEMA included.

c) The Proponent to explore options of re-use and recycling of the facility’s components/structures.

**Decommissioning**

a) The Proponent shall take into consideration the health and safety of personnel, contractors, neighbors and the public during the planning and implementation of the demolition process.

b) The Proponent shall undertake a further survey to identify any contaminated areas remedy them accordingly.

c) The proponent shall ensure that there will be no oil spillage during decommissioning

**Post Closure**

The Proponent shall ensure that the facility’s site is free of impacts associated with the abandonment/closure.

The Proponent shall develop, rollout and implement a monitoring plan that includes:

a) Monitoring of the rehabilitated site to confirm whether progress is satisfactory.

b) Outline of how land improvement and future land use will be affected by the past operation and decommissioning of the transmission line and its associated infrastructure.

---

**Table 10-3: Environmental management/monitoring Plan for the decommissioning phase of Maseno and 33/11kV substation Project**

<table>
<thead>
<tr>
<th>Expected Impacts</th>
<th>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></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>Project proponent &amp; Contractor</td>
<td>One-off</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>


### 10.10 Assumptions, Uncertainties Encountered and Gaps in Knowledge

#### Assumptions

The Experts made the following assumptions in preparing this ESIA:
- All the technical data and information provided by the Proponent and the specialists are accurate and up-to-date.
- The design features will be put in place to minimize risks from external factors which could threaten the integrity of the facility which include: risks from landslides and other natural calamities; measures to minimize threats or damage from third parties e.g. terrorist attack.
- The public involvement process has been sufficiently effective in identifying the critical issues that needed to be addressed.
- The Proponent and the Contractor will implement the measures in the proposed ESMP.
- 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 and that corrective action will be undertaken to address shortcomings and/or non-performances.

#### Uncertainty and Difficulties in Compiling Information

Uncertainty arises from a variety of aspects in any development, and for this particular study report has emanated from the following:
- The changes that may occur in baseline conditions, due to external factors over the lifetime of the project;
- Uncertainty related to Proponent’s policy initiatives that might influence the assessment of future baseline and post-development conditions;
- 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 and the detailed design of the development.

The difficulties in compiling the information for this study 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 Proponents having similar projects to gauge and recommend appropriate mitigation measures in this study report.

Gaps in Knowledge

This study does not consider how the present global meltdown/ economic recession and donor funding may affect the construction and management of the proposed project.

Conclusions and Recommendations

Conclusions

The analysis of the ESIA 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 residents of Emuhaya District and its environs. 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.

**Recommendations**

It is quite evident from this study that the construction and operation of the proposed transmission line 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 neighbouring the site.
- 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 33/11kV 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.

**Authorization Opinion**

In terms NEMA requirement the environmental practitioner is required to provide an opinion as to whether the activity should or should not be authorized. Nevertheless, in this section a qualified opinion is ventured and in this regard the Lead expert believes that sufficient information is available for NEMA to take a decision. The fundamental decision is whether to allow development which brings socio-economic advantages and is consistent with planning and certain development and social responsibility, but which may impact on an area as a result of loss of biodiversity and increased avifaunal impacts. If NEMA authorizes the proposed substation development, NEMA must also decide whether all the components of the applicant’s preferred alternatives are acceptable. The Lead Expert believes that the EIA studies have shown that the applicant’s preferred alternative and technological alternatives are generally acceptable. The EIA has also assisted in the identification of essential mitigation measures that will mitigate the impacts associated with these components to within acceptable limits.

In conclusion, the expert is of the opinion that on purely ‘environmental’ grounds (i.e. the project’s potential socio-economic and biophysical implications) the application as it is currently articulated in the applicant’s proposal should be approved provided the essential mitigation measures are implemented. It is in the opinion of the Environmental Consultant that the anticipated negative impacts can readily and effectively be mitigated and on the whole the proposed project does not pose any significant threat to the Environment and may be licensed to proceed.
REFERENCES

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

- Environmental Assessment Source Book, 1999 (World Bank),
- George, C. and Lee, N., 2000 Environmental Assessment in Developing and Transitional Countries, Willey: Chichester, UK
- The Public Health Act Chapter 242 Laws of Kenya.
- The Building Code, Building Order 1968
- The Physical Planning Act 1996
- The Occupational Safety and Health Act, 2007
- The Factories and Other Places of Work (Safety and Health Committee) Rules 2004
- The Factories and Other Places of Work (Medical Examination) Rules 2005
- The Factories and Other Places of Work (Noise Prevention and Control) Rules 2005
- The Factories and Other Places of Work (Fire Risk Reduction) Rules, 2007
- The Factories and Other Places of Work (Hazardous Substances) Rules, 2007
- 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
- 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
- The Way Leaves Act, Cap. 292,
- The Survey Act, Cap. 299,
- Emuhaya District Development Plan, 2008 – 2012
ANNEXES

Annex 1: Maseno 33/11 kV Substation Designs and Layout
Annex 2: Photo Plates

General view, from the Kisumu – Busia road, of the proposed site

Maize and banana crops at the proposed site

General view of the proposed site from a different angle

Public participation

Site view, parallel to the Kisumu – Busia road

Public participation
Annex 3: Copy of Sale Agreement for the proposed substation land

REPUBLIC OF KENYA
AGREEMENT FOR SALE

THIS AGREEMENT is made the ............. Day of ............. 2011 BETWEEN JEPHRICE AYUMA ELPHAS of Post Office Box Number 472, Luanda in the Republic of Kenya (hereinafter referred to as “the Vendor” which expression shall where the context so admit include his successors and assigns) of the One Part and KENYA POWER & LIGHTING COMPANY LIMITED a limited liability company registered and incorporated in the Republic of Kenya having its registered office at Nairobi in the said Republic and of Post Office Box Number 30099, Nairobi (hereinafter referred to as the “Purchaser” which expression shall where the context so admits include its successors and assigns) of the Other part.

WHEREAS:

A. The Vendor is registered as the owner of ALL THAT piece of land situate at Bunyore within the Republic of Kenya containing by measurement Zero Decimal Seven (0.7) of an acre or thereabouts comprised in a certificate of title known as W/BUNYORE/EBUSIKHALE/95 hereinafter called “the property”.

B. The vendor has agreed to sell to the Purchaser and the Purchaser agrees to purchase from the Vendor upon the terms, conditions and special conditions referred to hereinafter the above stated property.

IT IS HEREBY AGREED as follows:-

1. The property sold is all that piece of land situate at Bunyore within the Republic of Kenya containing by measurement Zero Decimal Seven (0.7) of an acre or thereabouts comprised in a certificate of title known as W/BUNYORE/EBUSIKHALE/95 hereinafter called “the property”.

2. The interest sold is freehold.

3. The purchase price for the said property is Kenya Shillings Four Million Three Hundred Thousand (Kshs. 4,300,000/=) only, which the Purchaser shall pay to the Vendor as follows:-

   a. An interest free deposit in the sum of Kenya Shillings Four Hundred and Thirty Thousand (Kshs. 430,000/=) on or before signing this agreement.

   b. The sum of Kenya Shillings Three Million Eight Hundred and Seventy Thousand (Kshs. 3,870,000/=) shall be paid to the Vendor or released to his Advocates upon Transfer and successful registration of the purchaser’s title to the land.
4. The sale is subject to the Law Society Conditions of Sale (1989 Edition) in so far as they are not inconsistent with the conditions contained in this Agreement or specifically hereby excluded.

5. The completion Date shall be on the Business Day falling 90 days from the date hereof. For the purpose of this Agreement, the term “Business Day” shall mean a day (other than a Saturday, Sunday or a gazette public holiday in Kenya) on which banking and financial institutions are generally open for the conduct of the banking business in Kenya.

6. On or before the Completion Date the Vendor shall deliver to the Purchaser the following:
   a. A duly executed Transfer of the said Property in favour of the Purchaser;
   b. The Original Title Documents for the property in the name of the Purchaser;
   c. The Deed Plan for the said property;
   d. A valid Rates Clearance Certificate for the said property,
   e. A valid Land Rent Clearance (if any);
   f. The Land Control Board Consent and/or any other consent and documents as may be necessary to procure registration of the Transfer of the Premises in favour of the Purchaser; and
   g. Certified copies of the Vendor’s Pin Certificate and Identity Card.

7. All the outgoings (land rate and rent) if any shall be apportioned as at the date of successful registration of the transfer in favour of the Purchaser.

8. The Advocates acting for the Vendor is and the Advocate acting for the Purchaser is Robert Mahenia, Advocate, Stima Plaza, P.O. Box 30099, Nairobi.

9. The said property is sold together with all the developments and improvements thereon and except for the Vendor’s obligations to point out the beacons, the Vendor shall not be required to effect any improvements whatsoever but it does not include any moveables.

10. The Vendor undertakes to give the purchaser vacant possession of the said Premises together with all the developments standing thereon on the Completion Date and the Purchase shall thereafter be entitled use and develop the said Property as it deems fit without any interference from the Vendor or anybody claiming through or under him save for;
   a. All subsisting easements, quasi-easements and rights of way (if any)
   b. The Acts Reservations Stipulations and conditions contained or implied in the Title.

11. The property is sold free from all encumbrances.

12. The Vendor hereby represents and warrants to the Purchaser that:
   a. The said property or any part thereof is not on a buffer zone, road reserve or public land and its ownership thereof is not subject to any challenge whatsoever and shall fully indemnify the Purchaser for any loss suffered as a result of breach of this
warrant. For the avoidance of doubts, the provisions of this clause shall survive the completion of the sale and purchase of the Property herein and shall subsist without limit in point of time.

b. The Vendor has all the powers to enter into this agreement and to execute the Transfer.

c. The title of the said property is valid and legal and is not subject of any enquiry by the Government of Kenya or any person or body appointed by the Government.

d. The Vendor has good and marketable title to the said parcel of land.

13. The Vendor hereby agrees to fully indemnify and hold harmless the Purchaser for any loss, damage or expense incurred by the Purchaser pursuant to this Agreement and resulting from any of the representations and warranties stated herein being untrue or inaccurate on the date of this Agreement or on the Completion Date.

14. Without prejudice to any other terms and condition of this Agreement, if the Vendor shall fail to comply with any of its obligations arising from and under this Agreement or if any of the representations or warranties set out herein is not true or inaccurate on execution hereof or on the Completion Date, the Purchaser may give the Vendor fifteen (15) days notice in writing to comply with its obligation or make good the representation or warranty and such notice shall specify the default and require the Vendor to make it good within fifteen (15) days of such notice and if the Vendor then fails to comply with the notice, the Purchaser may (at its discretion) rescind this Agreement and the Vendor shall refund any moneys paid to the Vendor by the Purchaser or the Purchaser may sue the Vendor for specific performance of this Agreement and or damages.

15. Each party shall pay its own Advocates’ charges but the Purchaser shall pay the stamp duty and registration fees on the Transfer.

16. The Vendor hereby undertakes to point out all beacons for the said property and to replace any that might be missing.

17. All rates, duties and outgoings, shall be apportioned between the parties as at the date of registration of the Transfer and issuance of title in favour of the Purchaser.

18. OTHER CONDITIONS

a. No failure or delay to exercise any power, right or remedy shall operate as a waiver of that right, power or remedy and no single or partial exercise of any other right, power or remedy.

b. The rights and remedies provided in this agreement are cumulative and not exclusive of any right or remedies provided by law.

c. If any term or condition of this Agreement shall to any extent be found or held to be invalid or unenforceable, the parties shall negotiate in good faith to amend such term and condition so as to be valid and enforceable.

d. If any term or condition of this agreement shall to any extent be found or held to be invalid or unenforceable, the remainder of this Agreement shall not be affected and
other terms and conditions shall be valid and enforceable to the full extent permitted by law.

e. Notwithstanding the Transfer of the said parcel of land to the Purchaser this Agreement shall remain in force with regard to anything remaining to be done performed or observed hereunder and not provided for in the said Transfer.

f. Notwithstanding completion all the provisions of this Agreement shall continue in full force and effect to the extent that any of them remain to be implemented or performed.

g. Any notice required to be given hereunder shall be sufficiently served on any party if forwarded to it by registered post to its last known postal address in Kenya or hand delivered to its principal place of business. A notice given by post shall be deemed to have been served seven days after the date of such posting.

h. This Agreement is governed by and shall be interpreted according to the laws of Kenya.

IN WITNESS WHEREOF this Agreement has been duly executed by the parties hereto the day and year first hereinabove written.

SIGNED By VENDOR

JEPRICE AYUMA ELPHAS

in the presence of:

ADVOCATE 02 NOV 2011

I CERTIFY that the Vendor appeared before me and duly signed this Agreement in my presence:

Name of witness: 

Address: 

Signature: 

SEALED with the Common Seal of Purchaser

The Kenya Power & Lighting Company Limited

in the presence of:
MANAGING DIRECTOR

COMPANY SECRETARY

I CERTIFY that the Directors and/or Secretary of the Purchaser appeared before me and duly signed this Agreement in my presence:

Name of witness:
ANTONY MBUNYA KIARAHU
Advocate and Commissioner For Oaths
Address:
P. O. Box 18387 - 00500, NAIROBI
Signature:
17 NOV 2011
Annex 4: Lead Expert’s NEMA Practicing License

FORM 7

Application Reference No: ............1330..........

Licence No:..........................0729.............

FOR OFFICIAL USE

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

JACOB AKINALA
M/S ............................................................................(individual or firm) of
Address..P.O. BOX 1477-00200...........................................................
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 8th Day of FEBRUARY 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.
Annex 5: Bill of Quantities of the proposed substation

Technical report

Reference: 101012009110024 MAASENO S/STN
Address: Scheduled Start Date: 25-Nov-2009
Location: MASENO Actual Start Date:
Province: WESTERN
Responsible Center: CENTRAL OFFICE Designed by: SAKWA H MULISHA

Require Approval: Quality: % Current Status: IN PREPARATION

<table>
<thead>
<tr>
<th>Dates</th>
<th></th>
<th>Est. Delivery Date:</th>
<th>Actual Deliv.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start: 17/03/2010</td>
<td></td>
<td>17/06/2010</td>
<td>06/05/2010</td>
</tr>
</tbody>
</table>

NEW MASENO 33/11KV S/S

In order to establish New Maseno 1 x 7.5 MVA 33/11kv s/s, the following shall be proposed,

- **Code 0**
  - Way leaves
  - Public approvals
  - Per diem
  - Cost of 1No. 7.5Mva 33/11kv Tx

- **Code 1**
  - Establish 1No. 7.5Mva 33/11kv Tx

- **Code 2**
  - Construct 7500 of 3ph o/h 33kv line in 76mm²ACSR conductor
  - Note: (1) This line shall run parallel and independent of an existing 11kv line for operational purposes. The separation distances between the two voltages shall be 1.32m.

  (2) The following switches shall operate as N.O.P
  - Y11 on the proposed Kisiani ex Maseno feeder
  - Y35 on the proposed Nyamninia ex Maseno feeder
  - Y48 on a spur off the proposed Kisiani ex Maseno feeder
## WORK
### GENERAL COST ESTIMATE

**Reference:** 101012009110024  
**Address:** MAASENO S/JSTN  
**Location:** MASENO  
**Province:** WESTERN  
**Responsible Center:** CENTRAL OFFICE  
**Scheduled Start Date:** 25-Nov-2009  
**Actual Start Date:**  
**Designed by:** SAKWA H MULISHA  

### (CODE 1) - SUBSTATION

<table>
<thead>
<tr>
<th>Construction Units</th>
<th>Quantity</th>
<th>Unit Value (KSH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLE CONCRETE 12M</td>
<td>2.00</td>
<td>34,823.00</td>
</tr>
<tr>
<td>LABOUR INSTALLATION 100(11KV) &amp; 50(33KV) KVA TXS</td>
<td>1.00</td>
<td>8,940.00</td>
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<td>L.V. SUBSTATION LEADS FOR &lt;= 200 KVA SUBSTATION</td>
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<td>DAY. ELECTRICAL PLANT TEAM</td>
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<td>DAY. PROTECTION TEAM</td>
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**Sum of Construction Units:** 4,995,812.00

### Materials

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<td>CONDUCTOR 150MM2 ALUMINUM BAR</td>
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<td>SURGE DIVERTOR 11KV 10KA COMPOSITE</td>
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<td>SURGE DIVERTOR 33KV 10KA</td>
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<tr>
<td>BATTERY DC 165AH - 110VOLTS</td>
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**Sum of Materials:** 4,998,071.63

### Work Units

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<td>GATE HOUSE</td>
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<tr>
<td>PIT LATRINE</td>
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<td>CABLE TRENCHES</td>
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<tr>
<td>FOUNDATION PLINTHS</td>
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<td>ELECT. FITTINGS &amp; LIGHTING</td>
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<td>200,000.00</td>
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<tr>
<td>FIRE EXTINGUISHERS</td>
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<td>1.00</td>
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<td>ACCESS ROAD</td>
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<td>FENCING AND GATE</td>
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<td>DRAINAGE &amp; PLUMBING WORKS</td>
<td>1.00</td>
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**Sum of Work Units:** 4,998,071.63
## WORK
### GENERAL COST ESTIMATE

**Reference:** 101012009110024  
**Address:** MAASENO/S/STN  
**Location:** MASENO  
**Province:** WESTERN  
**Responsible Center:** CENTRAL OFFICE  
**Designed by:** SAKWA H MULISHA

### (CODE 1) - SUBSTATION

<table>
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<th>Work Units</th>
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<td>GROUND PREPARATION</td>
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<tr>
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<td>387,600.00</td>
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<tr>
<td>33KV CB STRUCTURE</td>
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<td>148,770.00</td>
<td>148,770.00</td>
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<tr>
<td>11KV NCT STRUCTURE</td>
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<td>11KV POST INSULATOR STRUCT.</td>
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<td>11KV KFE STEEL STRUCT.</td>
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<td>S/S EARTHING</td>
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<td>LIGHTNING MAST 16.7M HIGH</td>
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<td>11KV VTS STRUCTURE</td>
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<td>CHAINLINK FENCE</td>
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**Sum of Work Units:** 30,727,995.00

### Transport Categories

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<th>KSH</th>
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<tbody>
<tr>
<td>KM. VEHICLE BETWEEN 1350CC AND 1925CC</td>
<td>5,000.00</td>
<td>34.70</td>
<td>173,500.00</td>
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<td>KM. LORY BETWEEN 1 AND 3 TONNES</td>
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<td>KM LORY MORE THAN 5 TONNES</td>
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**Sum of Transport:** 1,101,500.00

**Subtotal:** 41,823,178.53

### (CODE 2) - H. V.

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<td>34,823.00</td>
<td>3,168,893.00</td>
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<tr>
<td>M. STRINGING CONDUCTOR 75MM2 ACSR BARE</td>
<td>22,500.00</td>
<td>90.82</td>
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<tr>
<td>M. STRINGING EARTH WIRE 25MM2 STEEL</td>
<td>7,500.00</td>
<td>39.51</td>
<td>292,525.00</td>
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<tr>
<td>ISOLATION, AIR BREAK SWITCH 33KV</td>
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<td>FITTINGS L.V. TERM. ON WALL FOR (1-WIRE), PVC</td>
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<td>M.V. AERIAL EARTH</td>
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<td>11,348.19</td>
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<td>FITT. 33KV T-OFF HORIZ. STEEL X-ARM S&lt;=75MM</td>
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<tr>
<td>STAY 33KV LIGHT</td>
<td>43.00</td>
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<td>STAY 33KV FLYING LIGHT</td>
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<td>FITT.33KV INTER DOUBLE STEEL X-ARM-CONCRETE POL.</td>
<td>18.00</td>
<td>25,390.27</td>
<td>457,024.80</td>
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Page 2 of 4
# WORK

## GENERAL COST ESTIMATE

**Reference:** 101012009110024  
**Address:** MAASENO S/SSTN  
**Location:** MASENO  
**Province:** WESTERN  
**Responsible Center:** CENTRAL OFFICE  
**Scheduled Start Date:** 25-Nov-2009  
**Actual Start Date:**  
**Designed by:** SAKWA H MULISHA

### ( CODE 2 ) - H. V.

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<tbody>
<tr>
<td>FITT 33KV HORIZ-SEC STEEL X-ARM-CONCRETE POLE</td>
<td>4.00</td>
<td>36,549.39</td>
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<tr>
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<td>6.00</td>
<td>32,505.67</td>
<td>195,035.62</td>
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**Sum of Construction Units:** 8,659,642.03

### Work Units

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<th>Quantity</th>
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<th>KSH</th>
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<tr>
<td>CONCRETE POLES 13 M</td>
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<td>50,000.00</td>
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**Sum of Work Units:** 427,000.00

### Transport Categories

| KM. VEHICLE BETWEEN 1350CC AND 3400CC           | 2,000.00 | 34.70      | 69,400.00  |
| KM LORRY MORE THAN 1 TONNE                     | 2,000.00 | 74.80      | 2,393,800.00 |
| KM 4X4 WHEEL DRIVE                              | 2,000.00 | 44.40      | 88,800.00  |

**Sum of Transport:** 2,551,800.00

**Subtotal:** 11,638,642.03

### ( CODE 0 ) - NON-C.W.S.

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<td>ISSUING NOTICE BY PRESS NOTIFICATION</td>
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**Sum of Construction Units:** 4,709,715.40

### Materials

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**Sum of Materials:** 10,710,781.12

### Work Units

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**Sum of Work Units:** 1,408,760.00

**Subtotal:** 16,629,256.52

- **CWS**: 9,355,818.60

**Subtotal:** 9,355,818.60
## WORK
### GENERAL COST ESTIMATE

<table>
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<td><strong>TOTAL ADD COST ESTIMATION:</strong></td>
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The Kenya Power & Lighting Co. Ltd.
Annex 6: Samples of Filled Public and Stakeholders Questionnaires