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

Proposed Site GPS coordinates-(1°10'01. 32''S  36°38'28.55''E)

AUGUST 2012

FINAL PROJECT REPORT

Environmental Impact Assessment Project Report
CERTIFICATION:

Client: The Kenya Power & Lighting Company Limited

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

Project Cost: The project cost is KES 224,000,000.00 (Two hundred and twenty four million shillings).

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LIST OF ABBREVIATIONS

Table 1.1 List of Abbreviations

<table>
<thead>
<tr>
<th>Abbr.</th>
<th>Description</th>
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<tbody>
<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<tr>
<td>DAO</td>
<td>District Agricultural Officer</td>
</tr>
<tr>
<td>DO</td>
<td>District Officer</td>
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<tr>
<td>DC</td>
<td>District Commissioner</td>
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<tr>
<td>EA</td>
<td>Environmental Audit</td>
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<tr>
<td>SHE</td>
<td>Environment Health and Safety</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<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>ESMP</td>
<td>Environmental Management Plan</td>
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<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<tr>
<td>GHGs</td>
<td>Green House Gases</td>
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<tr>
<td>Ha</td>
<td>Hectare</td>
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<tr>
<td>HVF</td>
<td>Heavy Vehicle Fuel</td>
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<tr>
<td>IDO</td>
<td>Industrial Diesel Oil</td>
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<tr>
<td>KWS</td>
<td>Kenya Wildlife Service</td>
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<tr>
<td>L.R</td>
<td>Land Registration</td>
</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>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>NOx</td>
<td>Oxides of Nitrogen</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Health and Safety Act</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate Matter</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SEM</td>
<td>Sustainable Environmental Management</td>
</tr>
<tr>
<td>SOx</td>
<td>Oxides of Sulphur</td>
</tr>
<tr>
<td>STD</td>
<td>Sexually Transmitted Diseases</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS

CERTIFICATION: ...................................................................................................................................... II
LIST OF ABBREVIATIONS .......................................................................................................................... III
TABLE OF CONTENTS .................................................................................................................................. IV
LIST OF TABLES AND FIGURES .................................................................................................................. IX
EXECUTIVE SUMMARY .............................................................................................................................. X

CHAPTER ONE: INTRODUCTION AND PROJECT BRIEF ........................................................................ 1
1.1 Introduction ............................................................................................................................................. 1

1.2 Project background ................................................................................................................................. 1

1.3 Justification of the Proposed Project ..................................................................................................... 2

1.4 Scope and Objectives of the Study ........................................................................................................ 2

1.5 Terms of Reference (ToR) for the EIA Process .................................................................................... 4

1.6 EIA Approach ....................................................................................................................................... 5

1.7 EIA Methodology ................................................................................................................................... 5

CHAPTER TWO: DESCRIPTION OF THE PROPOSED PROJECT .......................................................... 9

2.1 Introduction ............................................................................................................................................. 9

2.2 Project Location and Land Ownership ................................................................................................. 9

2.3 Project Justification ............................................................................................................................... 9

2.4 Description of the project ...................................................................................................................... 10

2.5 Technical aspects of a substation ......................................................................................................... 10

2.6 Project Activities ................................................................................................................................ 12
  2.6.1 Construction activities will involve the following: ................................................................. 13
  2.6.2 Operation Phase Activities ........................................................................................................... 14
  2.7.3 Project’s Decommissioning Activities ......................................................................................... 14

2.7 Input Materials ..................................................................................................................................... 15

2.8 Cost of Proposed Project ...................................................................................................................... 15
CHAPTER THREE: BASELINE INFORMATION OF THE STUDY AREA ..................... 17

3.1 Introduction ........................................................................................................ 17

3.2 Location and size .................................................................................................. 17

3.3 Physiographic and Natural Conditions of the project Area ................................ 18
  3.3.1 land and soils .................................................................................................... 18
  3.3.2 Topography ..................................................................................................... 19
  3.3.2.1 Climate ........................................................................................................ 19
  3.3.2.2 Natural resources ....................................................................................... 19

3.4 Population ........................................................................................................... 19

3.5 Infrastructure ....................................................................................................... 21

3.6 Trade, Tourism and Industry ................................................................................ 21

3.7 Agriculture .......................................................................................................... 21

3.8 Environment, water and sanitation ...................................................................... 21

3.9 Socio economic assessment of the potentially affected community ...................... 22

CHAPTER FOUR: RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS ........ 23

4.1 Introduction .......................................................................................................... 23

4.2 Environmental Policy Framework ....................................................................... 23

4.3 Institutional Framework ...................................................................................... 23
  4.3.1 National Environment Management Authority (NEMA) .............................. 24
  4.3.2 Provincial and District Environment Committees .......................................... 25
  4.3.3 Public Complaints Committee ................................................................. 25
  4.3.4 National Environment Action Plan Committee ............................................. 25
  4.3.5 Standards and Enforcement Review Committee .......................................... 26
  4.3.6 National Environment Tribunal ............................................................... 26
  4.3.7 National Environment Council (NEC) ...................................................... 26

4.4 Kenyan Environmental Legal Framework ............................................................. 26
  4.4.1 The Environment Management and Co-ordination Act, 1999 ..................... 27
  4.4.2 Public Health Act (Cap. 242) ......................................................................... 33
  4.4.3 Local Government Act (Rev. 1998) .............................................................. 34
  4.4.4. Physical Planning Act, 1996 ....................................................................... 36
  4.4.5 Land Planning Act (Cap. 303) ..................................................................... 37
  4.4.6 The Radiation Protection Act (Cap 243 Laws of Kenya) .............................. 37
4.5 International Environmental Guidelines ........................................................................ 46

4.6 Environmental Policy ................................................................................................. 49
  4.6.1 Sessional Paper No. 6 of 1999 on Environment and Development .......... 49
  4.6.2 National Environmental Action Plan (NEAP) ................................................. 49

CHAPTER FIVE: PUBLIC AND STAKEHOLDERS CONSULTATION ......................... 50

5.1 Introduction ................................................................................................................ 50

5.2 Objective of Public and Stakeholders Consultation ............................................... 50

5.3 Sources of Information ............................................................................................. 50

5.4 Comments and Responses from the consultations ................................................... 50

CHAPTER SIX: CONSIDERATION OF PROJECT ALTERNATIVES ....................... 52

6.1 Consideration of project alternatives ........................................................................ 52

6.2 Alternative Designs .................................................................................................. 52

6.3 Analysis of Alternative Construction Materials and Technology ......................... 52

6.4 Alternative Sources of Energy .................................................................................. 53

6.5 Alternative Substation Site ....................................................................................... 53

6.6 The ‘Do-nothing’ Option .......................................................................................... 55

CHAPTER SEVEN: CONSTRUCTION MATERIALS ...................................................... 56
CHAPTER EIGHT: IDENTIFICATION AND ASSESSMENT OF POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

8.1 Introduction ......................................................................................................................... 58

8.2 Impact Identification and Assessment .................................................................................... 58

8.3 Positive Impacts of the Proposed substation ......................................................................... 59

8.4 Identification of Negative Project Impacts and Mitigation Measures ..................................... 61

8.4.1 Soils and Geology ............................................................................................................. 61

8.4.2 Air quality ......................................................................................................................... 62

8.4.3 Pollution from Solid Waste generation ............................................................................. 64

8.4.4 Impacts on Water Resources and Water Quality ............................................................ 65

8.4.5 Noise and vibration ......................................................................................................... 66

8.4.6 Impacts from Hazardous materials ................................................................................. 67

8.4.7 Accidental Oil Spills Or Leaks ......................................................................................... 68

8.4.8 Fire Hazards .................................................................................................................... 68

8.4.9 Visual Intrusion and aesthetic impacts ............................................................................ 69

8.4.11 Traffic congestion / Road Wear/Tear ............................................................................ 70

8.4.12 Occupational Health and safety Impacts .................................................................... 71

8.4.13 Impacts on Public Health ............................................................................................. 72

8.4.14 Electric and magnetic fields (EMFs) ............................................................................. 73

8.5 Contractor code of Conduct ................................................................................................. 73

8.6 Summary of Impacts .......................................................................................................... 73

CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) .......... 78

9.1 Introduction .......................................................................................................................... 78

9.2 Approach to Environmental Impact Management .............................................................. 78

9.2.1 Proponent’s SHE (Safety Health and Environment) Policy ............................................. 79

9.2.2 Planning and Design .......................................................................................................... 79

9.2.3 Management of Impacts during Construction Phase .................................................... 80

9.2.4 Management of Impacts during Operation Phase ......................................................... 80

9.2.5 Checking and Corrective Action ..................................................................................... 81

9.2.6 Management Review ....................................................................................................... 82

9.3 Impact Mitigation and Management Measures ................................................................... 82

9.3.1 Management Plans .......................................................................................................... 82
9.4 Environmental and Social Monitoring Plan (ESMoP) ................................................................. 103

9.5 Rehabilitation and Decommissioning Management Plan .................................................................. 104

CHAPTER TEN: ASSUMPTIONS, UNCERTAINTIES ENCOUNTERED AND GAPS IN KNOWLEDGE .................................................................................................................. 106

10.1 Introduction .................................................................................................................................... 106

10.2 Uncertainty and Difficulties in Compiling Information .................................................................. 106

10.3 Gaps in Knowledge ....................................................................................................................... 107

CHAPTER ELEVEN: CONCLUSIONS AND RECOMMENDATIONS ......................................................... 108

11.1 Conclusion ...................................................................................................................................... 108

11.2 Recommendations .......................................................................................................................... 109

11.3 Authorization Opinion .................................................................................................................... 110

REFERENCES ........................................................................................................................................ 112

ANNEXES ............................................................................................................................................ 113

Annex 1: Copy of Land Ownership Documents ..................................................................................... 113

Annex 2: Change of use .......................................................................................................................... 115

Annex 3: Schematic diagram of the Substation ....................................................................................... 116

Annex 4: Minutes of Public Consultative Meeting Held In Project area .................................................. 117

Annex 5: Photo plate ............................................................................................................................... 121

Annex 6: Lead Experts Practicing License .............................................................................................. 122

Annex 7: Sample of Public Consultation Questionnaires used during the public consultations exercise. ........ 123
LIST OF TABLES AND FIGURES

Table 1.1 List of Abbreviations ........................................................................................................... iii
Figure 1.1: Summary of EIA procedure ........................................................................................................ 8
Figure 2.1: Standard schematic diagram of 66/11kV substation ................................................................. 12
Table 3.1 Kikuyu District Administrative Units Population Distribution by Sex, Number of
Households, Area, Density .......................................................................................................................... 20
Figure 4.1: Institutional Framework under the EMCA ................................................................................. 24
Table 4.1: NEMA Waste Water Discharge Guidelines ........................................................................... 30
Table 4.2: Permissible Noise Levels ......................................................................................................... 33
Table 8.1: Present a Summary of Significance of the Identified Impacts of the Proposed Project ... 74
Table 8.2: Summary of Project Potential Impacts in all aspects ................................................................. 76
Table 9.1: Environmental Management Plan during CONSTRUCTION PHASE of the proposed Rironi
66/11kV Substation ...................................................................................................................................... 88
Table 9.2: Environmental management Plan for the OPERATIONAL PHASE of the proposed Rironi
66/11kV substation. .................................................................................................................................... 96
Table 9.3: Environmental management Plan for the DECOMMISSIONING PHASE of the proposed
66/11kV Rironi substation. .......................................................................................................................... 101
Table 9.4: Environmental and Social Monitoring Plan (ESMP) ................................................................. 103
Table 9.5: Environmental monitoring Plan for the decommissioning phase of Project ..................... 105
EXECUTIVE SUMMARY

Introduction
The Kenya Power and Lighting Company (KPLC) plans to construct a 66/11kV substation in Kikuyu division of Kikuyu district. The project is in line with the company’s plans to strengthen and expand the electrical infrastructure in the country. The proposed substation will be constructed on a piece of land owned by the company. The substation will have two 10 MVA transformers to step down power from 66kV to 11kV for distribution. The project site is in Kerwa sub location, Kerwa location along Nakuru-Nairobi highway about 200m from National oil petro station. The area is commonly referred to as Kagia farm.

The project’s objective is to meet the high power demand and reduce poor and unreliable supply and technical losses associated with supplying the area with long distance distribution lines. It is expected that any project that is out of character with the surrounding must undergo Environmental Impact Assessment prior to construction. This requirement is enshrined in (EMCA 1999) and the main objective is to identify both positive and negative impacts of the project to the environment. The EIA should also propose adequate mitigation measures to address the negative impacts. The EIA report aids National Environmental Management Authority in making a decision on whether the project should proceed or not.

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

Scope and Criteria of the Environmental Impact Assessment
The scope of this Environmental Impact Assessment covers the following areas:
- Description of the proposed project,
- The baseline environmental and socio-economic conditions of the area,
Proposed Rironi 66/11 KV Substation in Kikuyu District

- Provisions of the relevant environmental laws,
- Public participation
- Identification and discussion of potential adverse impacts to the environment
- Appropriate mitigation measures,
- Development of an Environmental Management Plan.

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

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

The study team adopted a participatory approach in collecting primary data. Consultations and discussions with the immediate neighbours was undertaken to get their views and opinions. Further literature reviews were extensively done to source information from secondary sources such as legal statutes and relevant project documents. Among the key activities undertaken during the assessment were:

- Physical inspections of the proposed site
- Photography,
- Review of relevant documents with necessary information on the proposed project such as schematic diagram.
- Interviews and consultations with different stakeholders and the immediate neighboring land users. Questionnaires were administered to obtain their honest opinion regarding the project (samples have been annexed to this report),
- Assessment 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 assessed for the proposed development include: Ecological considerations (biological diversity, sustainable use of ecological resources and ecosystem maintenance), social considerations (economic impacts, social cohesion or disruption, effects on human health, immigration or emigration, communication and effects on culture and objects of cultural value), Landscape considerations, visual impacts, compatibility with surrounding areas and amenity and land use considerations (water sources, effects of proposed project on surrounding land use potentials and possibility of multiple uses).

Project Description
The proposed substation will have two 10 MVA transformers to step down voltage from 66 kV to 11kV for distribution. The proposed substation will have one double circuit 66kV incoming feeder from the existing 66kV line (Limuru to Kikuyu line) that is a few
metres from the proposed site and five 11kV outgoing feeders/spans to join the existing 11kV lines. This will be a Turnkey type of project where the contractor will come up with the final designs and construct the substation and associated facilities.

**Project Justification**

The project is justifiable from a demand side of view, i.e the country’s increasing economic growth and vision 2030 objectives which have resulted in a rise in current and future demand for power. This calls for urgent responses in expanding the power infrastructure capacity. The proposed project is geared towards; ensuring stable and quality power supply, meeting increasing power demand, improvement on distribution line security and hence cushion against losses occasioned by power failures and blackouts in Kerwa and its environs. Other benefits will accrue to the national economy in different aspects.

**Legal and Regulatory Framework**

Kenya’s development projects must be checked for environmental protection and conservation to ensure sustainable development the absence of which would cause development at the expense of the environment. This importance is manifested by several statutes which touch on environmental matters. Most of these statutes are sector specific covering issues such as land use, public health, occupational health and safety, water quality, soil erosion, wildlife, air quality etc. Previously, environmental management activities were implemented through a variety of instruments such as policy statements, permits and licenses and sectoral laws.

The Environmental Management and Coordination Act legislation in 1999 provided for the establishment of an appropriate legal and institutional framework for the management and protection of the environment. Laws relevant to this project include:

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

Public Consultation
The law requires that public participation be conducted during environmental impact assessments. The role of public participation is to identify potentially affected persons and provide them opportunity to give their views and opinions on the project during the EIA process. Various stakeholders were engaged by the EIA team so that they could offer their opinions, alternatives, impacts and any other information that is necessary at project planning level to facilitate informed decision-making. In complying with the public participation process (PPP), EIA consultative meeting and interviews were organized to engage the stakeholders.

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

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

Anticipated Negative Impacts
- Noise pollution
- Dust
- Stress on road infrastructure
- Soil erosion
- Decreased air quality
Proposed Mitigation measures

- Hurdling of the construction area.
- Ensure any soil stockpiles are enclosed/covered/watered during dry or windy conditions to reduce dust emissions during construction.
- Construction trucks removing soil from the site, delivering dusty construction materials to the site should be covered to prevent material dust.
- Drivers shall be instructed to drive at low speeds.
- The transformer areas shall have oil containment and bund wall to guard against accidental oil spill.
- Sprinkle the construction area with water to keep dust levels down.
- Dust masks should be provided to all personnel in areas prone to dust emissions throughout the period of construction.
- Vehicles must not be left idling.
- No burning of any waste materials on site.
- Areas cleared of vegetation at the substation site, and where no substation structures are, shall be rehabilitated by grass to prevent soil erosion.
- Drainages shall be constructed to control storm water.
- Noise pollution shall be mitigated by ensuring that noisy operations are done during the day only and also by properly maintaining construction machinery.
- HIV/AIDS awareness campaigns shall be carried out for employees and the surrounding members of public.
- Solid wastes generated, shall be carted away as soon as possible for appropriate disposal.
- Occupational safety measures shall be put in place, including provision of suitable and adequate personal protective clothing and equipment to construction employees.
- Scaffolding to be placed to protect the public from dust.
- Danger/Caution warning notices shall be placed appropriately.
- Emergency response measures shall be put in place.
- Only qualified authorized operational staff shall work at the substation.
Proposed Rironi 66/11 KV Substation in Kikuyu District

- The site shall be rehabilitated to its original state as far as is reasonably practical after decommissioning.
- Construction to proceed in the dry season if possible to minimize soil erosion.
- Perimeter wall shall be constructed around the substation

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

Summary of Environmental and Social Management Plan (ESMP)
One of the chapters in this report is an environmental social management and monitoring plan that should be implemented to ensure environmental conservation and protection. An Environmental and Social Management Plan (ESMP) provides a logical framework within which identified negative environmental and socio-economic impacts can be mitigated and monitored. The plan ensures that the negative environmental impacts are controlled and mitigated effectively. ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. The ESMP covers all phases of the project.

The responsibility of ensuring environmental protection during all phases of the projects rests entirely with the proponent. The proponents departments led by, Safety, Health and Environment (SHE), distribution, and other relevant departments will be charged with have primary responsibility. Therefore the proponent shall keep a close eye at the contractor during construction and decommissioning phases.

During construction, the proponent shall conduct inspections to ensure that the ESMP and ESMoP are being implemented effectively. This EIA therefore requires that the ESMP and ESMoP be integrated into the Design Report with appropriate allocation of funds in the Bills of Quantities. The contract for construction should bear clauses binding the contractor to implement impact mitigation as part of the civil works.
Conclusion
The Environmental impact assessment indicates that the construction and operation of the proposed substation will result in both positive and negative impacts. The impacts are economical, social and environmental. An Environmental and Social Management Plan (E& SMP) has been prepared to ensure sustainability of the project activities from construction through operation to decommissioning.

Additionally, a monitoring plan has been developed and highlights some of the environmental performance indicators that should be monitored. Monitoring will provide an opportunity to timely respond to any changes and problems in environmental quality.

The assessment makes the following conclusions;
- The project will generate socio-economic benefits which would not be realized in the absence of the project.
- Successful implementation of the proposed ESMP will ensure environmental sustainability.
- The project will be designed, constructed, and operated in accordance with acceptable industry norms and standards.

Recommendations
It has already been noted that the construction and operation of the proposed project will bring positive impacts in the project area. However, the project will also give rise to negative impacts which should be addressed and mitigated against.

It is strongly recommended that the site management must make effort, to implement the Environmental Management and Monitoring Plan provided. The contractor must be careful to ensure implementation of the EMP and proper supervision by the proponent is crucial for mitigating the anticipated impacts and ensuring structural strength, safety, and efficient operation of the project. Following the commissioning of the project, annual statutory Environmental and Safety Audits must be carried out.

Based on the assessment of the proposed location, construction management, mitigation and monitoring plan that will be implemented, the project is considered beneficial and may be allowed to proceed.
CHAPTER ONE: INTRODUCTION AND PROJECT BRIEF

1.1 Introduction

The Kenya Power and Lighting Company plans to construct a 66/11kV substation in Kikuyu division of Kikuyu district. This is in response to an increase in demand for power and the need to expand electricity infrastructure. Kenya’s power current grid infrastructure is unable to keep pace with increased demand over the years with demand reaching 7.9% as at 2010/2011 financial year. Power outages are common occurrence especially within Kerwa and its environs and hence the construction of the proposed substation will result in reliable and quality power supply in the area.

The national energy key stakeholders, who include amongst others, the Ministry of Energy, Kenya Power, Kenya Electricity Transmission Company (KETRACO), Kenya Energy Generating Company (KenGen) and Energy Regulation Commission (ERC) carried out the country’s power-demand projections for the medium term. The results indicated a need for capacity enhancement to satisfy the projected demand. Demand for electricity has been increasing due to desire for the country’s efforts to achieve high economic growth and Vision 2030. Consequently, there is need to plan for sufficient electricity capacity additions to meet the increasing demand.

All new development projects must be assessed for Environmental protection and conservation to ensure sustainable development. For the ecosystem to be sustainable there is need for a balance between human settlement, development projects and the natural ecosystem, which is a symbiotic relationship. This can be achieved through careful planning and the establishment of appropriate management systems. Consequently the need to plan activities has become an essential component of the development process. A number of planning mechanisms have been put in place to ensure that minimum damage is caused to the environment. Environmental planning is also integrated with other planning processes such as physical planning, economic planning, and development planning. Environmental Impact Assessment (EIA) is considered part of Environmental planning. EIAs are undertaken for proposed activities that are likely to have significant adverse impact on the environment and are subjected to a decision of a competent national authority i.e National Environment Management Authority (NEMA)-Kenya.

1.2 Project background

Kenya’s national access to electricity is estimated at 29%. The Government of Kenya, through Vision 2030 aims to raise access to electricity to 40% by year 2020. This increased level of electrification will result in increased demand for electricity which will require major expansion in power generation, transmission and distribution infrastructure in the country.
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, 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 proposed substation will significantly reduce the current high losses and poor quality of power supply by overstrained lines from Kitsuru substation.

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

1.3 Justification of the Proposed Project

As earlier noted, studies on power load have shown the need for capacity enhancement to ensure stable and quality power supply amidst increasing power demand. Rironi 66/11kV substation project is justifiable in that it will stabilize power supply; improve on distribution line security while guarding against losses due to power failures and blackouts. The division and its environs are supplied with power from Kikuyu substation which results in technical losses due to long length of distribution line. The proposed substation will help in meeting the highlighted challenges in power supply. 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 distribution.

Various benefits will also accrue from the proposed project such as improved power supply, reduced blackouts, quality and reliable supply and a reduction in technical losses. Further, the economy will benefit both directly and indirectly as better power supply is a key ingredient of economic growth. Other benefits include Value Added Taxes (VAT) imposed on construction materials and various fees charged by different government institutions. Last but not least, the planning and design of the project is well thought out and has taken into consideration all the necessary interventions needed to mitigate negative impacts on the environment and safeguard safety of workers throughout all phases.

1.4 Scope and Objectives of the Study

The National Environment Management Authority (NEMA) requires all new projects that are out of character with the host environment be subjected to an Environmental Impact Assessment (EIA) at the planning stages. This is to ensure
that potential environmental and social impacts are addressed during the design, construction, operation and decommissioning of the project.

Scope
The main objective of this assessment was to identify potential environmental and social impacts of the project. Further, it sought to formulate appropriate mitigation measures and recommendations to ensure that the identified negative impacts do not harm the environment.

The assessment was carried out in line with EMCA 1999 and the Environmental Impact Assessment and Audit Regulations, 2003. Further, reference to relevant sectoral legal provisions has been made to ensure compliance with them during construction, operation and decommissioning of the proposed project.

The EIA scope largely covered the following areas:

Baseline Conditions:
- Environmental setting (climate, topography, geology, hydrology, ecology, water resources sensitive areas, baseline noise levels, air quality and soil quality analysis).
- Socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.).
- Infrastructural issues (roads, water supplies, drainage systems, electricity distribution system, etc.).

Legal and policy framework:
The report makes reference to other relevant national environmental laws, regulations and by-laws and other laws and policies to ensure compliance.

A participatory approach was adopted for the immediate neighbourhood in discussing relevant issues including:
- Biological impacts
- Physical impacts
- Project acceptability
- Land use aspects
- Social, cultural and economic impacts
- Environmental impacts
- Legal Compliance.

Specific objectives of the assessment:
The specific objectives of the assessment were;
Present an outline of the project background,

Establish environmental baseline conditions of the project area and review all available information and data related to the project,

Identify key areas for environmental, health and safety concerns as well as the anticipated impacts associated with the proposed project.

Establish a comprehensive environmental management plan covering the construction, operation and decommissioning phases of the project,

Preparation of a comprehensive project report in accordance with the local environmental legislation and submission to NEMA for further instructions and/or approval.

1.5 Terms of Reference (ToR) for the EIA Process

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

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

- Asses the suitability of the proposed location to construct a 66/11kV substation.
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- A description of the technology, procedures and processes to be used, in the implementation of the project.
- A description of materials to be used in the construction and implementation of the project, the products, by-products and waste to be generated by the project.
- A description of the potentially affected environment.
- A description of environmental effects of the project including the 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.
Proposed Rironi 66/11 KV Substation in Kikuyu District

- Propose measures to prevent health hazards and to ensure safety in the working environment for the employees and the neighbouring community.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.

1.6 EIA Approach

In undertaking this assessment attention was paid to 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 enabled collection of quality data needed for the report.

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 proposed project site.

Project scoping was the next stage which was done to delineate project issues that required detailed analysis.

1.7 EIA Methodology

Various methods were employed to ensure relevant and adequate data was collected. The methods included;

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

- Legislations and institutional framework governing the proposed project
- Licenses and permits requirements
- Nature of the project
- Baseline information of the project area
- Types of waste likely to be generated.

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

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

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

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

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

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

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

Step 4: Identification of Potential Environmental and Social Impacts
The Potential Environmental impacts were identified, classified and magnitude determined.
Step 5: Impact Assessment and Consultations
The Environmental and Social Impacts were analyzed, assessed and discussed in details involving consultations with the Proponent and other stakeholders.

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

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

Specific 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 (E&SMP) for the entire project cycle to include mitigation measures to be taken during and after implementation of the project and an action plan for the prevention and management of foreseeable accidents during the project cycle.
- An Environmental and Social Monitoring Plan (ESMP)
Figure 1.1: Summary of EIA procedure
CHAPTER TWO: DESCRIPTION OF THE PROPOSED PROJECT

2.1 Introduction
In this chapter, a detailed description of the proposed project in terms of the location, nature and associated aspects is presented. In addition, project activities and materials to be used are discussed.

2.2 Project Location and Land Ownership
The proposed site where the substation will be constructed belongs to the proponent which was purchased on a willing seller, willing buyer basis. The land is situated along Nairobi-Nakuru highway at an area called Kerwa a few metres from the Kerwa shopping centre. It is also less than 100 metres from National oil petrol station. The proponent has 0.3928 hectares of land registered under Kenya power and lighting company. The land title is attached as annex 1. Administratively, the site is in Kagia farm village, Kerwa sub location, Burinditu location, Kikuyu division of Kikuyu district. Currently, the plot is fallow with a few shrubs and grass.

The KPLC is in the process of acquiring change of use from agricultural to electrical substation installation.

Site GPS coordinates - 1°10'01. 32''S 36°38'28.55''E

2.3 Project Justification
It has been ascertained by power Load studies that there is need for capacity enhancement to ensure stable and quality power supply to meet the increasing demand. The 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. The area is currently supplied from Kikuyu substation
For better service delivery a substation needs to be as close as possible to the area it will serve in order to minimize technical losses associated with long distances of distribution. The commissioning of the substation will guarantee stable and quality supply of electricity to Kikuyu division and its environs.

2.4 Description of the project
Kenya power plans to construct a 66/11 kV substation which will comprise two 10MVA transformers to step down power for distribution within the division and the entire district. This will be a Turnkey type of project where the contractor will design and construct the substation.

The main objective is to construct a new 66/11kV Substation. This is to upgrade the existing power network.

The 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.
- Designing and constructing of a 66/11 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

2.5 Technical aspects of a substation
A sub-station is a vital component of electricity generation, transmission and distribution system. The main role of a substation is to transform voltages from high to low and vice versa, using transformers and other heavy-duty electrical switchgear. The project is a step down substation i.e. 66kV to 11kV. After stepping down, electricity is fed to distribution lines running to specific geographic areas to supply customers.

The proposed project will have the following specifications:

<table>
<thead>
<tr>
<th>Substation</th>
<th>Proposed Rironi Substation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage levels</td>
<td>66/11 kV</td>
</tr>
<tr>
<td>Transformer ratings</td>
<td>2 x 10 MVA</td>
</tr>
<tr>
<td>One Incoming 66kV feeder</td>
<td>Five Outgoing 11kV feeders</td>
</tr>
</tbody>
</table>

The project is on a “Turnkey” basis where KPLC will float tenders for the design and construction of the specified substation and the associated incomer and feeder lines. The winning contractor(s) will provide the substation designs which will be submitted to KPLC for approval. If the designs are approved, the contractor(s) will be required to construct the substation and hand over the completed substation to KPLC for operation.
Typical Substation Design
The substation will be up to approved design and standard with the following features:

a) Substation yard with: - incoming 1 X 66 kV lines, outgoing 5 X 11 kV lines, switch gear, steel structures, protection equipment, 2 X 10 MVA transformers mounted on a concrete plinth, with oil containment pits, an oil separator at the edge point from which drainage channels connect to storm water drainage system, a vehicle driveway & parking bay and cable trenches

b) Control equipment house with: - control panels’ room, switch gear room, communication room, battery room, office, toilet, pantry, cable trenches

c) Guard house with toilet both secluded from the main substation yard

d) Stone perimeter wall with a gate

e) Access road to the substation

The substation will use modern distribution and control equipment while the works shall conform to current best practice in the international Energy industry in all respects.

The substation will be fed from the existing Nairobi North-Limuru 66 kV line which is a few metres from the proposed site on the same side of the road. The tee off from the 66kV line will be along a murram road which is adjacent to the petrol station to avoid passing across private property.

The 66kV line will be constructed along the road from the tee off to the substation using concrete poles. The 66kV will be a double circuit i.e one entering the substation and the other leaving the substation using the same posts. Five 11kV short span lines will leave the substation to join the existing 11kV lines within the area. The schematic diagram shows the layout of the proposed substation. Four of the outgoing feeders will cross the highway using micro tunnel which will not cause any disturbance to the road. Micro tunneling is a trenchless construction method used to install pipelines beneath highways, railroads, runways, harbors, rivers, and environmentally sensitive areas. Micro tunneling is defined as a remotely-controlled, guided, pipe-jacking operation that provides continuous support to the excavation face by applying mechanical or fluid pressure to balance groundwater and earth pressures. One outgoing feeder will go as an overhead on the same side of the substation across the farms.
Access
It is proposed that the 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 50m, 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.

Fencing and Security
The substation will have a perimeter wall, security lights and a guard throughout. This is because a substation is a high voltage area with potential health hazards if safety regulations and rules are not observed. The substation will be lit at night, and danger signs will be put to warn the public from accessing the substation.

2.6 Project Activities
The contractor to design and construct the substation will be selected through a competitive bidding process. Construction will be supervised by KPLC to make sure works are undertaken according to specifications to ensure quality work is achieved.

It is anticipated that the proposed site will undergo alteration during construction to install the two 10 MVA transformers and associated structures. The contractor
shall be guided by safety requirements and precautions, established local and international environmental protection regulations alongside company Safety Health and Environment policy.

2.6.1 Construction activities will involve the following:

- Site investigations necessary for design and construction on a sound engineering basis.
- Holding of the site with iron sheet and a stone perimeter wall will be constructed
- Ground breaking and removal of vegetation
- Leveling the ground.
- Civil works on site including construction of access road, digging foundations and concrete works
- Compaction and filling with gravel of the areas to form foundations
- Delivery of civil work construction materials, transformer, tools, electrical equipment to project site.
- Storm water drainage construction
- Construction of bund walls to hold transformer in case of accidental oil 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 66kV line to the substation
- Connection of power to outgoing 11kV feeders.
- Load testing
- Remedying of defects after functional tests

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

Vegetation clearance and soil excavation
The proposed site currently lay fallow (not cultivated) although the area is generally agricultural. It is covered with grass and short shrubs with 3 young pear trees. Crops grown within the vicinity include; maize, beans and bananas.

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

Construction Supervision
It is the responsibility of the proponent to ensure close supervision during
construction phase to achieve the following:

- 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.
- Workers use personal protective equipment (such as hand gloves, helmets,
  safety shoes ear muffs, overalls and dust coats) at all times.
- Proper disposal of waste material and toilet facilities are provided for
  construction workers
- Provision of first aid kit and firefighting equipment (portable cylinders) and
  placement at strategic positions for access
- Emergency response procedures are in place and all workers are trained in
  effecting them.
- Any work involving deep excavations, elevated heights and lifting heavy
  loads, poses a number of risks to personnel. The Contractor shall ensure
  that personnel are equipped with the correct protective clothing and
  equipment and are ready to work safely while also safeguarding the
  environment.

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

2.6.2 Operation Phase Activities:
Operation phase of the project will involve distribution of power from the
substation. Therefore no unauthorized person shall be allowed to access the
substation. This is in line with company policy to ensure safety of staff and the
public. Activities undertaken in the substation include;

- Switching
- Periodical maintenance works by authorized staff
- Internal and external environmental and safety audits

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

- Removal of transformers and associated switching equipments
Demolish and carefully handle components that contain oil like the transformer
- Removal of electrical fittings, bus bars and steel poles/structures
- 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 site should be rehabilitated and restored to its former state through:
- Appropriate landscaping.
- Removal of any soils that may have been impacted by oils or fuels for offsite disposal (away from the project area) remediation.

2.7 Input Materials
Construction of the substation will entail quality materials and procedures to ensure quality work, occupational and public safety and environmental sustainability. The following inputs will be required for construction:
- Construction materials e.g. sand, cement, natural building stone blocks, hard core, gravel, ballast, timber, nails, among others.
- Timber (e.g. doors and frames, fixed furniture, etc.),
- Water
- Paints, solvents, white wash, etc.,
- Labour force (of both skilled and unskilled workers).

Substation associated facilities
- Two 10 MVA transformers.
- Busbars, switch gears, circuit breakers and capacitors
- Lightning arrestors and steel structures
- Control room

2.8 Cost of Proposed Project
The estimated cost of the project is Kshs. 224.000.000.00 (two hundred and twenty four million to install the substation and associated structures)

2.9 Target Group for the EIA Report
The EIA Report will be used by different stakeholders that are involved at different phases of the project. The report presents vital information on procedures and plans to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various
Proposed Rironi 66/11 KV Substation in Kikuyu District

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:

- The proponent
- 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 of the substation;
- Staff that will be involved in the management and operation of the substation.
- Government regulatory agencies such as NEMA and Energy Regulatory Commission (ERC).
CHAPTER THREE: BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction
This chapter provides background information of the district in terms of its administrative units, climate, settlement patterns and the major geographical features. It is worth noting that the project site is in the newly created Kikuyu district. The district was curved from Kiambu West district and much of the baseline information is from Kiambu West district development plan.

3.2 Location and size
Kikuyu district was one of the divisions in Kiambu West district. The district has an area of 106.4km². There are two divisions namely Kikuyu and Kabete. The district neighbours Limuru to the north and its headquarters is about twenty kilometers from Nairobi city centre.
3.3 Physiographic and Natural Conditions of the project Area

3.3.1 land and soils

The district is covered by three categories of soils which are high level upland soils, plateau soils and volcanic footbridges soils. These soils are of varying fertility levels. Most of the district is covered by soils from volcanic footbridges. These are well drained soils with moderate fertility. They are red to dark brown friable clays.
which are suited for coffee, tea and pyrethrum. There are also sandy and clay soils that support drought resistant crops such as soya beans and sunflower as well as ranching. These soils are found in former Kikuyu division.

3.3.2 Topography
Kiambu West district lies within the altitude 1,500 and 2,550 metres above sea level. It is divided into four broad categories namely upper highland, upper midland, lower highlands and lower midland. Some of the district particularly the upper highland and midland are characterized by steep ranges due to volcanic activities in the Rift valley which passes through the western part of the district. Kikuyu district which was formerly a division lies in lower highland falling between 1,800 and 2,550 metres above sea level and contains characteristics of plateaus with widely spaced parallel ridges and high structural plains.

3.3.2.1 Climate
The district experiences biomodal type of rainfall. The long rains fall between mid March to May and the short rains fall in mid October and November. The annual rainfall varies with altitude, with higher areas receiving as high as 2,000mm and lower areas receiving as low as 600mm. The mean temperature is 26°C with temperatures ranging from 7.1°C in upper highlands to 34°C in the lower midlands of Karai and Kikuyu division.

3.3.2.2 Natural resources
Land is the primary resource in the district. The water resource is from two principal sources which are surface and sub surface. Surface water resources is from permanent rivers and springs such as Gatamaiyu, Bathi, Nyamweru, Roromo and Ondiri mainly found in the upper highlands with the rest receiving water from ground water surface. There are swamps such as Ondiri, Nyakumu, Riu, Riunderi in Kikuyu, Manguo and Roromo in Limuru and Lari in Lari division.

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

3.4 Population
The total population of Kiambu West was estimated to be 493,158 at the start of the plan period (2008). The young generation constitutes a high proportion. The data below is specific for Kikuyu district and females outnumber the males.
Table 3.1 Kikuyu District Administrative Units Population Distribution by Sex, Number of Households, Area, Density

<table>
<thead>
<tr>
<th>Administrative Unit</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Households</th>
<th>Area in Sq. Km.</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kikuyu Division</td>
<td>73,045</td>
<td>76,652</td>
<td>149,697</td>
<td>43,513</td>
<td>179.3</td>
<td>835</td>
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<td>Karai Location</td>
<td>15,382</td>
<td>16,070</td>
<td>31,452</td>
<td>8,339</td>
<td>100.8</td>
<td>312</td>
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<tr>
<td>Sublocations</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nachu</td>
<td>2,010</td>
<td>2,104</td>
<td>4,127</td>
<td>1,098</td>
<td>9.8</td>
<td>551</td>
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<tr>
<td>Renguti</td>
<td>2,587</td>
<td>2,820</td>
<td>5,407</td>
<td>1,400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karai</td>
<td>882</td>
<td>898</td>
<td>1,780</td>
<td>437</td>
<td>5.6</td>
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<td>Lusegeti</td>
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<td>3,291</td>
<td>6,526</td>
<td>1,684</td>
<td>11.4</td>
<td>573</td>
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<td>Gikambura</td>
<td>6,655</td>
<td>6,957</td>
<td>13,612</td>
<td>3,720</td>
<td>11.9</td>
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<td>Kikuyu location</td>
<td>22,472</td>
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<td>Kerwa</td>
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<td>14866</td>
<td>3542</td>
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<tr>
<td>Kari</td>
<td>1293</td>
<td>1302</td>
<td>2595</td>
<td>667</td>
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<td>Sigona</td>
<td>5,979</td>
<td>5,978</td>
<td>11,957</td>
<td>3,653</td>
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<td>Kikuyu T/Ship</td>
<td>7,887</td>
<td>8,415</td>
<td>16,302</td>
<td>4,980</td>
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<td>Gitiba</td>
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<td>Thogoto</td>
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<td>14,183</td>
<td>27,082</td>
<td>8,710</td>
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<td>24,295</td>
<td>7,374</td>
<td>3.5</td>
<td>6,911</td>
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<td>57,325</td>
<td>58,807</td>
<td>116,132</td>
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<td>2,045</td>
</tr>
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<td>Muguga location</td>
<td>22,506</td>
<td>10,395</td>
<td>45,901</td>
<td>12,936</td>
<td>10.2</td>
<td>1,981</td>
</tr>
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<td>Sublocations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muguga</td>
<td>6,160</td>
<td>6,658</td>
<td>12,818</td>
<td>3,407</td>
<td>6.3</td>
<td>2,033</td>
</tr>
<tr>
<td>Kahuho</td>
<td>3,672</td>
<td>3,654</td>
<td>7,326</td>
<td>1,838</td>
<td>6.1</td>
<td>1,209</td>
</tr>
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<td>Gitaru</td>
<td>7,269</td>
<td>7,461</td>
<td>14,730</td>
<td>4,580</td>
<td>4.2</td>
<td>3,543</td>
</tr>
<tr>
<td>Kanyariri</td>
<td>5,405</td>
<td>5,622</td>
<td>11,027</td>
<td>3,111</td>
<td>6.6</td>
<td>1,660</td>
</tr>
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<td>Nyathuna location</td>
<td>14,228</td>
<td>14,543</td>
<td>28,771</td>
<td>7,794</td>
<td>17.8</td>
<td>1,614</td>
</tr>
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<td>Sublocations</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Nyathuna</td>
<td>3,267</td>
<td>3,337</td>
<td>6,604</td>
<td>1,746</td>
<td>5.2</td>
<td>1,267</td>
</tr>
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<td>Kirangari</td>
<td>4,777</td>
<td>4,966</td>
<td>9,743</td>
<td>2,695</td>
<td>4.8</td>
<td>2,038</td>
</tr>
<tr>
<td>Karura</td>
<td>2,746</td>
<td>2,852</td>
<td>5,598</td>
<td>1,511</td>
<td>4.5</td>
<td>1,241</td>
</tr>
<tr>
<td>Gathiga</td>
<td>3,438</td>
<td>3,388</td>
<td>6,826</td>
<td>1,842</td>
<td>3.3</td>
<td>2,054</td>
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<td>20,869</td>
<td>41,460</td>
<td>12,802</td>
<td>15.8</td>
<td>2,625</td>
</tr>
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<td>Sublocations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chura</td>
<td>1,689</td>
<td>1,731</td>
<td>3,420</td>
<td>948</td>
<td>2.7</td>
<td>1,248</td>
</tr>
<tr>
<td>Ruku</td>
<td>3,639</td>
<td>3,744</td>
<td>7,383</td>
<td>2,195</td>
<td>3.0</td>
<td>2,488</td>
</tr>
<tr>
<td>Kibichiku</td>
<td>8,267</td>
<td>7,859</td>
<td>16,126</td>
<td>5,213</td>
<td>5.1</td>
<td>3,155</td>
</tr>
<tr>
<td>Lower Kabete</td>
<td>6,996</td>
<td>7,535</td>
<td>14,531</td>
<td>4,446</td>
<td>5.0</td>
<td>2,919</td>
</tr>
</tbody>
</table>
3.5 Infrastructure
This sector supports all other sectors and consists of transport, energy, housing, public works and road subsectors. The district has a fair coverage of classified roads with 256kms of bitumen, 255kms gravel surface and 195kms earth surface. The district is well supplied with electricity with 33.7 households connected as at the beginning of the planning period. At the beginning of the planning period kikuyu has 90 km road of bitumen, 80km gravel and 80km earth.

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

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

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

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

Introduction
This section gives a general description of the area neighboring the proposed site. Currently the proposed site is not tilled and has grass and a few very short shrubs.

Methodology
Data was collected using observation and discussions with the respondents/persons near the proposed site.

Location of the proposed site
The site is along Nairobi-Nakuru highway about 100m from Kenya Kerwa shopping centre. In deed the plot is three plots away from national oil petrol station and a few metres away is Stephjoy school. The area is commonly known as Kagia farm.

Economic activities
People from the area are engaged in different economic activities including; formal employment, farming, businesses (shops, groceries, hardwares, bar, rental houses filling station and salons).

Nature of housing
Most of the residential buildings are permanent with few flats.

Source of water and sanitation
The main source of water within the proposed site is borehole. There is no water at the substation site and the contractor will make his own arrangements during construction.

Land ownership
Land ownership is free hold with most of it owned by families.

Sources of energy
The neighbours use different sources of energy mainly electricity and paraffin for lighting. The main source energy for cooking is charcoal, wood and gas. There is demand for electricity.

The project comes in handy because demand for electricity in the area continues to increase.
CHAPTER FOUR: RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

4.1 Introduction
Kenya in its bid to develop has experienced various environmental challenges such as; land degradation, loss of biodiversity and habitat, human animal conflicts, land use conflicts, waste management, water management and environmental pollution. This has been occasioned by failure to pay attention to negative effects of development process. Further, poor law enforcement and lack of awareness and inadequate information on the consequences of people’s interaction with the environment has resulted to environmental degradation.

Development projects if not properly and adequately conceived has potential to cause environmental degradation and damage. Indeed, development projects have the potential to damage the natural resources upon which economies are based. Therefore, Environmental Impact Assessment is a useful tool used at planning phase of projects to help in safeguarding the environment from the negative effects of developmental activities. Globally, it is generally accepted that development projects must be economically viable, socially acceptable and environmentally sound.

In a bid to protect the environment, Kenya has over the years been using several 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. It is only in 1999 that the Environmental Management and Coordination Act (EMCA) came to be.

4.2 Environmental Policy Framework
The country does not have a national environmental policy. What exist are sectoral policies addressing the environment. There is need to harmonize all the policies to come up with a national one whose primary objective is to ensure compliance and enforcement of the law. Such a policy would also harmonize all approaches towards environmental management and strengthen cross-sectoral collaboration and coordination. Consequently, the country has been guided by legislations and regulations and the leading one being Environmental Management and Coordination Act (EMCA) of 1999.

4.3 Institutional Framework
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. The EMCA established various administrative bodies to operationalize EMCA. These include among others:

**Figure 4.1: Institutional Framework under the EMCA**

### 4.3.1 National Environment Management Authority (NEMA)

The main mandate of NEMA is general supervision and co-ordination of 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. Further, NEMA’s mandate is executed through 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 the district. They also 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:

- 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
- 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.

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:

- 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.
- Contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intragenerational equity.
- 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.
- 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 cooperation among public departments, local authorities, private sector, non-governmental organizations and such other organizations engaged in environmental protection programmes.

4.4 Kenyan Environmental Legal Framework
Previously, environmental management activities were implemented through a variety of instruments such as policy statements, permits and licences 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.
4.4.1 The Environment Management and Co-ordination Act, 1999

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

The main objective of the Act is to:

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

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

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.

- **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 and the contractor.*

- **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

The proponent will comply with the regulation by ensuring waste water is properly disposed through all phases of the project.
### 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>Nil</td>
<td>30</td>
</tr>
<tr>
<td>Oils(mineral, animal &amp; vegetable)</td>
<td>Mg/l</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Total phenol not to exceed</td>
<td>Mg/l</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Copper (Cu) not to exceed</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Zinc (Zn) not to exceed</td>
<td>Mg/l</td>
<td>5.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Lead (Pb) not to exceed</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Arsenic (As) not to exceed</td>
<td>Mg/l</td>
<td>0.2</td>
<td>0.002</td>
</tr>
<tr>
<td>Total Mercury (Hg) not to exceed</td>
<td>Mg/l</td>
<td>0.05</td>
<td>0.005</td>
</tr>
<tr>
<td>Alkyl mercury not to exceed</td>
<td>Mg/l</td>
<td>0.01</td>
<td>0.001</td>
</tr>
<tr>
<td>PCB (Polychlorinated biphenyl) not to exceed</td>
<td>Mg/l</td>
<td>Nil</td>
<td>0.003</td>
</tr>
<tr>
<td>Pesticides residues not to exceed</td>
<td>Mg/l</td>
<td>Nil</td>
<td>0.05</td>
</tr>
<tr>
<td>Sulphates not to exceed</td>
<td>Mg/l</td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>Dissolved manganese (Mn)</td>
<td>Mg/l</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>Chromium (total)</td>
<td>Mg/l</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Chloride not to exceed</td>
<td>Mg/l</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Fluoride not to exceed</td>
<td>Mg/l</td>
<td>-</td>
<td>2.0</td>
</tr>
<tr>
<td>Coliform bacteria</td>
<td>-</td>
<td>-</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°C of the ambient</td>
<td>+/- 2°C of ambient temperature</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:

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

The 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.

Being a substation, the project will generate limited amount of solid and liquid waste. Solid and liquid waste will be disposed in appropriate way to ensure it does not harm the environment.

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 on 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. This regulation will be adhered to by the contractor and the proponent. Handling of fossil fuels is discussed in the ESMP.

c) Environmental Management and Coordination, (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009

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

The project site is not in a wetland.

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 NEMA during the construction phase of the project.

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

Table 4.2: Permissible Noise Levels

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

4.4.2 Public Health Act (Cap. 242)

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

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

In response to this law, the environmental management plan (ESMP) advises the Proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost.

4.4.3 Local Government Act (Rev. 1998)

This Act provides for the establishment of authorities for local government, to define their functions and to provide for matters connected therewith and incidental thereto. In all areas where the project shall be undertaken, the local authorities will require 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 ESMP in this Act or any other written law on the grounds that the activity does not conform to the requirements of any by-laws in force in the area of such local authority the granting of the license would be contrary to the public interest.

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

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

For maintenance of such sewerage systems, the following relevant clauses have been drawn from section 169 of the Act that reads in part “A municipal council may for purposes of carrying out any drainage or sewerage works------”: 
“--------cause such sewers, drains and pipes to be made, altered, deepened, covered, laid and maintained either within or without as may be necessary for effectively disposing of the sewage and draining of its area ------“
“--------carry such sewers, drains and pipes through, across, or under any public road, street, square or open place laid out for public road, street, square or open space without paying compensation and after giving 30 days notices in writing to the owner or occupier of the intention to do so ------“
“-------from time to time alter, enlarge, divert, discontinue, close-up or destroy any sewers, drains, or pipes under its control ------“
Section 170, allows the right of access to private property at all times by local authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs. In addition, the municipal Council may establish and maintain sewage farms or disposal works, and dispose of the effluent there from, 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/minimization/avoidance of adverse impacts arising from the project activities.

4.4.4. Physical Planning Act, 1996

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

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

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

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.
Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The Environmental Impact Assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to it's original conditions.

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

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

In complying with this Act, the contractor in conjunction with the proponent will submit and liaise with District planning officer for design approvals for the proposed project.

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

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

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

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

4.4.7 Energy Act of 2006

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

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

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

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

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

Licensing and 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.*

4.4.8 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 resource, 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 authorized 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.

All construction, operation and decommissioning phases will take caution to contain oil spills to prevent soil and water pollution.

4.4.9 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.

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

4.4.11 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 (1) 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 authorization 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 conservation/protected area and this act will not be triggered by the project at all the stages.

4.4.12 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 will be complied with in the construction and management of the project.

4.4.13 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 is not in any Gazetted forest nor any conservation area hence the Act will not be triggered but the proponent will adhere to recommendations in the ESMP in regards to vegetation clearance and the provisions of this act will be observed where applicable._

**4.4.14 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._

**Health**

It is required that every premise must be kept clean and should not be overcrowded. The office should have adequate ventilation to allow circulation of fresh air. 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, subject to conformity with any standards prescribed by rules. Food and drinks should not be taken in dangerous places or workrooms. Provision of suitable protective clothing and appliances where necessary such as 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.

Safety
To ensure 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.

Welfare
The occupier is expected to supply adequate safe water for drinking to the employees. 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 to.

This Act will be complied with during all stages of the project. The environmental management plan (ESMP) advises the proponent on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost.
4.4.15 Work Injury and Benefits Act, 2007
This Act provides for compensation to employees for work related injuries and disease contracted in the course of their employment and for connected purposes. Key sections of the Act include the obligations of employers; right to compensation; reporting of accidents; compensation; occupational diseases; medical aid etc.
*In case of any accidents or incidents during the project cycle, this Act will guide the course of action to be taken.*

4.4.16 Occupiers Liability Act (Cap. 34)
The Act places safety responsibility of the visitors on the occupier of a premise. It is the duty of occupier of the premises to his visitors in respect of danger and risk due to the state of the premises or to things omitted or attributes an affliction on his/her health to a toxic materials in the premises.
*The proponent will ensure the safety of authorized persons within the substation.*

4.4.17 The Traffic Act Chapter 295 Laws of Kenya
This Act consolidates the law relating to traffic on all public roads. Key sections include registration and licensing of vehicles; driving licenses; driving and other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other than motor vehicles and other road users.

Many types of equipment and fuel shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the stipulated road regulations. The Act also prohibits encroachment on and damage to roads including land reserved for roads.
*The project will observe the provisions of the Act.*

4.4.18 The Civil Aviation Act Cap 394
Under this Act, the Kenya Civil Aviation Authority (KCAA) has to authorize and approve the height of Transmission lines and masts when they are on or proximal to flight Paths so as to ensure the safety of flying aircraft.

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

Failure to adhere to the provisions of this act, one commits an offence and upon conviction shall be liable to a fine not exceeding two million shillings or to imprisonment for a term not exceeding three years or to both.
The proposed project is a substation and is not along the flight path and so this Act will not be triggered.

4.4.19 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 designs will observe the required road reserves, relevant road widening surrenders and will construct an access road to the substation.

4.4.20 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 affect agricultural farms as the land is owned by the proponent and is currently fallow.

4.4.21 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 gazetted under the Act.

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

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

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

The Act will be complied with by the proponent through getting the legal documentation for the land.

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

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

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. The EMP should be followed as outlined to ensure protection of the environment and the public.

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.

**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 inter-generationally inclusive social and economic benefits.

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 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.

**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 be constructed on the proponent’s land.

**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 substation is not near any gazetted forest or any National Park.

**4.6 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. Intergovernmental 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 105 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.

4.6 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.
The requirements of EIA and environmental audits will be adhered to by the proponent.

4.6.2 National Environmental Action Plan (NEAP)
The NEAP for Kenya was prepared in 1994. It was a deliberate plan to integrate environmental considerations in to 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.
CHAPTER FIVE: PUBLIC AND STAKEHOLDERS CONSULTATION

5.1 Introduction
Public consultation is a main component of Environmental impact assessment. Therefore the EIA team undertook public/stakeholder consultation (PSC) for the proposed project in accordance with the requirements as stipulated in the EMCA, 1999 and EIA/EA Regulations 2003.

The aim of public participation is to identify potentially affected persons and stakeholders and allow them an opportunity to provide input/opinions and comment on the project during the EIA process. It also provides a forum for creating awareness to the public and other parties on positive and negative impacts of the proposed project. The opinions received on alternatives are investigated while impacts and any other information at project planning level facilitate informed decision-making.

5.2 Objective of Public and Stakeholders Consultation
The objectives of public participation in the EIA process are to provide an opportunity to share information about the proposed project and receive feedback from the stakeholders and the public.

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

5.4 Local community and Stakeholder Consultation
The community members were consulted through a public baraza. This involved liaising with the provincial administration to organize a public baraza for persons living in the sub location in which the proposed project will be constructed. At this level the public were engaged in a discussion by the EIA team. This involved a description of the project and outlining the positive and negative impacts of the project. Additionally, a pre-designed questionnaire was also used to gather data.

5.4 Comments and Responses from the consultations
During consultations the stakeholders were given a chance to ask questions make suggestions and comments in regard to the project. All comments received on the consultation were incorporated into the final impact assessment Report.

The stakeholders highlighted the posited impacts they felt would accrue from the project while the also enumerated the negative impacts and asked the proponent to do what they can to reduce impacts.
Positive Issues
- No more blackouts
- Employment opportunities
- Other people can apply and get power
- More businesses
- Better lighting
- Security lights
- Enhanced security

Negative Issues
- Work related injuries
- Traffic due to heavy vehicles turning
- Noise
- Dust
- Electrocution
- Fires
- Influx of people
- Stress on the infrastructure
- Increased water demand

The following suggestions were raised during stakeholders’ consultation meetings:
- Education for the people on use of electricity
- Alternative source of water
- Local people must get jobs
- Control dust levels
- Noise pollution should be controlled.
- The proponent should put up security lights
- Put danger signs to warn the public to keep off.

The consultation process gave a go ahead to the proposed project provided the negative impacts will be mitigated.
CHAPTER SIX: CONSIDERATION OF PROJECT ALTERNATIVES

6.1 Consideration of project alternatives
During the assessment, various alternatives available to the project were considered. The alternatives considered for the proposed substation project include; the do nothing alternative, alternative substation site, alternative designs, alternative construction materials, and alternative sources of energy.

6.2 Alternative Designs
The project will have both incoming and outgoing feeders. Different designs have been chosen for each depending on different circumstances as discussed below. The design for the incoming feeder will be an overhead line which was considered feasible it will be teed off from an existing 66kV overhead line.

The four outgoing feeders will originate from the substation and go across the road to join other existing 11kV lines. These four lines cross the road through micro tunneling. Micro tunneling is a trenchless construction method used to install pipelines beneath highways, railroads, runways, harbors, rivers, and environmentally sensitive areas. Micro tunneling is defined as a remotely-controlled, guided, pipe-jacking operation that provides continuous support to the excavation face by applying mechanical or fluid pressure to balance groundwater and earth pressures.

An overhead design could have been used for the four outgoing lines. However, due to the number of lines there will be demand for more space for the way leave. Further, the lines are across the high way and will cause visual intrusion. Underground cabling would require disturbance of a large area of the highway. This would result in traffic as the highway is quite busy.

The fifth outgoing feeder will be an overhead line. This design was chosen because the line will pass through private property and an overhead line will cause limited disturbance to their property and is also less costly compared to underground cabling.

6.3 Analysis of Alternative Construction Materials and Technology
It is planned that 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 efficiency in power distribution.

Previously support structures in a substation were wooden. Currently, the company is moving from wood to steel. Steel has been chosen because of its durability, strength and therefore all support structures will be steel. A perimeter stone wall will be constructed instead of using wooden poles and wire mesh for. A perimeter
wall is chosen because it is more durable and offers better protection and security. In deed use of steel poles and construction of a perimeter wall will require negligible maintenance costs. The projects design will be chosen paying attention to efficiency in installation and maintenance. The final designs will be done by the contractor and will be approved before construction begins.

6.4 Alternative Sources of Energy
The project objective is to boost power supply. 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. However, 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 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 increased concentration of green house gases in the atmosphere. Other alternatives would be generating solar power. Solar Power is green energy with minimal maintenance costs but it is capital intensive. This is not yet adequately explored for commercial purposes in Kenya. Many people still opt to be connected to the national power grid for domestic and commercial purposes.

6.5 Alternative Substation Site
Choosing a site for a substation involves site visits to the study area, preliminary site investigations and consultation by KPLC officers from different departments. The suitability of potential substation sites identified during the initial site visits was assessed in terms of various suitability criteria and technical restrictions stipulated by KPLC, as outlined below:

- **Size** - this is key because potential sites must be sufficient for the average size of a substation and associated incoming and outgoing power lines.
- **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;
- **Topography** - gently sloping topography is preferred especially in flood prone areas. 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. The site is gently sloping.
- **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 - the site was assessed in terms of its ecological value at both a macro and micro scale i.e. within the site and the environment surrounding the site. Both a fauna and floral investigation may be required, with particular emphasis on ensuring the protection of endemic and red data species and their habitat, should they be present. An identified site that has a high ecological value may be excluded from the list of potential sites;

- 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. The site is not on a hill and will not cause visual intrusion as there are other buildings near the site.

- 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. The site is accessible as it is along a tarmac road.

- 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. The site is near the incoming power line. In addition the lines crossing the road will be micro tunneled and only one overhead line will pass across private land with minimum distractions.

- Public acceptability - public acceptance criteria relate to such issues as the possible adverse impact on public health, safety, access to natural resources and local land and property values.

Based on the above-mentioned suitability criteria and technical restrictions, KPLC has identified one potential site for the location of the proposed Rironi substation. The site was acquired on a willing seller and willing buyer. The site was selected after the considerations discussed. Relocation option to a different site is an option available for the project implementation. The project proponent can look for alternative land to accommodate the scale and size of the project. However, this will be a costly venture, which takes long without a guarantee that the land
would be available. It is recommendable that the proponent be allowed to install the project at the already available site.

6.6 The ‘Do-nothing’ Option

The area is supplied with power all the way from Kitsuru substation. This results in technical losses occasioned by the long distribution distance covered resulting in poor power supply and frequent blackouts. It is therefore important for KPLC to establish a new 66/11kV substation in the area to cater for existing and projected electricity demand.

If the do-nothing option is chosen, it means that the substation will not be constructed. Therefore, 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 connect new customers would be severely limited as demand for electricity continues to increase. This will also 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 current customers will continue to suffer poor quality of power supply
- Would be customers will not be connected
- 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 Governments efforts towards achieving Vision 2030 will not be realized.

The expert is of the opinion that ‘do-nothing’ option is more costly in terms of lost opportunities and is not a acceptable option based on the current demand for power, and should therefore be discouraged.
CHAPTER SEVEN: CONSTRUCTION MATERIALS

7.1 Introduction
In this chapter resources required for construction and implementation of the project are identified. However at this stage, it is not known the exact quantities for the project. Therefore, the team attempts an identification of the resources required but the exact quantities will be in the detailed bill of quantities.

Human labour will also be involved. 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.

7.2 Safety of the facility
A substation is a no access area for the public. This is because it poses hazards to the public if safety aspects are not put in place. Further, the project is prone to both natural and man-made disasters. Although, it is difficult to prevent the occurrence of the natural disasters, the consequences should be reduced through technical and architectural designs. Man-made disasters on the other hand are preventable. The following safety concerns will be addressed in the proposed project.

Natural disasters
The risk of natural disaster will be eliminated or reduced at the design level. The designs will be of high standard and incorporate modern technology to guard against adverse impacts that may arise as a result of a natural disaster. The designs must also be approved before construction.

Malicious damage or theft
By its very nature a substation is a high risk area for people with no knowledge of the facility. Indeed, it is only persons who are authorized through trainings and possess particular knowledge are allowed to a substation. Therefore, the substation will be fenced by putting up a perimeter stone wall to keep off the public. Other measures to be taken to prevent other malicious damage such as terrorist attack include regular monitoring and inspection of the substation and its associated infrastructure.

7.3 Hazard Risk Assessment
Once the substation is complete, it is advisable that an hazard risk assessment (HRA) be commissioned by the proponent before it is energized. The HRA will be conducted on the proposed project to determine the potential risks the project would 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:

- Scope of the safety emergency plan
- Aim of the safety emergency plan
- Safety regulations
- Notification of local authorities
- Details of the project
- 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
CHAPTER EIGHT: IDENTIFICATION AND ASSESSMENT OF POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

8.1 Introduction
Development project presents both positive and negative impacts. This chapter identifies and discusses the impacts associated with the proposed project. The impacts are identified across the three phases namely: construction, operational and decommissioning as presented in the following sections.

8.2 Impact Identification and Assessment
Identification of project’s positive and negative environmental impacts was done through consultations and use of experts’ judgment. The identified and assessed impact are presented in tables according to project phases, prior to and post mitigation. Additionally, the study goes further to categorize the impacts in terms of direct or indirect, temporary or permanent, major or minor.

8.2.1 Assessing of Impacts
The anticipated potential impacts of the proposed project are as follows:

a) Soils and Geology
   - Potential for and sedimentation
   - Contamination of soil
   - Weakening of the geological structure

b) Ecological
   - Vegetation clearance
   - Impact on natural habitats

c) Air quality
   - Decreased air quality due to dust emission
   - Fugitive emissions

d) Water Resources & Water Quality
   - Competition for water resources
   - Decreased water quality due to soil erosion

e) Noise and vibration
   - Deterioration in ambient noise quality

f) Visual and aesthetic impacts
   - Visual intrusion
   - Impact on natural environmental aesthetic

g) Increase Traffic
   - Accidents as a result of increased traffic
   - Damage to roads and other transport infrastructure

h) Occupational Health and safety
   - Occupational Health and safety
   - Public safety

   - Damage to the infrastructure by third party
i) Public Health
   - Communicable disease
   - HIV & AIDS
   - Social vices

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, their management and mitigation.

8.3 Positive Impacts of the Proposed Substation
This section enumerates and discusses the positive impacts associated with the proposed project during construction, operation and decommissioning phases.

Positive impacts during construction phase

*Creation of employment opportunities*
Various employment opportunities will be available during construction. The opportunities will be both skilled and unskilled. Majority of the unskilled and semi skilled jobs will be taken up by the local community. The approximate number of workers to be employed by the proposed project is not yet known, however, this will contribute to easing unemployment level in the area. There will be a trickledown effect to the economy at large resulting from new income revenues as well as services provided through this project.

*Provision of Market for Supply of Building Materials*
During this phase, the project will require supply of building materials most of which will be sourced locally at the nearest trading centre and its environs. Therefore the project will provide ready market for local enterprises with such materials and boosts the economy at large.

*Boosting of businesses*
The coming of the project will result in promotion of businesses both in the formal and informal sectors. These include activities such as hotel, shops, artisan industries and food vending who will be benefit directly from the construction, as people working there will need commodities from them. This will promote the informal sector in securing some temporary revenues and hence improved livelihoods.

*Compatibility with existing and proposed land uses*
The proposed project site is located along Nakuru-Nairobi highway road. The site touches the tarmac road with some commercial buildings about 200 metres away. The buildings are a petrol station, residential flat, and businesses. There are also residential houses in the neighboring and a shopping centre. The proposed project will not conflict with the existing and perhaps future developments in the area.
Positive Impacts during Operation Phase

Quality, reliable power supply
The project is being constructed in order to boost power supply. Once operational the area will benefit from reliable and quality power supply. Frequent blackouts will be a thing of the past and the increased power demands will be met. The area close to the substation will benefit from reduced impacts of lightning due to installation of lightning arrestors.

Employment creation
Employment opportunities will also be created during the operation phase of the project. Opportunities that will be created include unskilled, semi skilled to skilled jobs. These will involve security personnel, and staff to man the substation. Others service providers include fire alarm and first aid box service providers.

Reduction of pollution associated with thermal power generation, kerosene and wood fuel:
Residents in the area use different sources of energy. Electricity supply will imply that as many as are willing can apply for connection and get connected. This will result in reduced individuals using diesel generators, less reliance on kerosene, wood fuel and charcoal. This would mean less carbon dioxide is released to the environment and destruction of forests will be reduced hence decreasing greenhouse gases.

Improvement of local and national economy
Stable and reliable power supply will open up business opportunities for self-employment. This will result in income improvements at the individual level and for the national economy. More customers will be connected and retail of reliable electricity by the power utility firm will attract increased tax revenues to the government.

Education
Reliable and quality power supply will result in indirect benefits. These include supplying stabilized power to public facilities such as laboratories in schools, hospitals and churches. Increased lighting creates an enabling environment for studies at school and at homes. It will also enable setting up of Information and Communication Technology opportunities within the area.
Positive Impacts during Decommissioning Phase

Employment Opportunities
Once the project has served its purpose it will then be decommissioned. This will involve demolition and removal of the substation and all its facilities. During demolition, unskilled, semiskilled and skilled employment opportunities will be available to the public.

Site Rehabilitation:
After demolition of the proposed project, rehabilitation of the project site will be carried out to restore it to its original status or to a better state than it was. This will include replacement of topsoil and re-vegetation which will lead to restoration of the visual, vegetative and aesthetic state of the site.

8.4 Identification of Negative Project Impacts and Mitigation Measures
The project will also have negative impacts. However adverse impacts are not anticipated due to its size and nature. The negative impacts and their mitigation are discussed below.

8.4.1 Soils and Geology
Soil erosion impact from vegetation clearance
During clearing of the area to pave way for ground breaking soil erosion may take place. This will be due to surface run off or blowing away by the wind in not properly managed. This is bound to happen because the soil will be loose. The project site has is covered with grass vegetation clearance will take place.

Contamination of soil
The potential sources of soil contamination during construction phase are oil /fuel leaks or spills from machinery used in site preparation and 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 contaminate the soil.

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. Additionally the transformers base will have oil containment and an oil separator to curb any leaks of oil reaching the ground.

During decommissioning phase, soil contamination could occur especially with the use of machinery in demolition of the facility.
Proposed Mitigation Measures

- The contractor should avoid ground breaking during the seasons of high rainfall.
- Monitoring of areas of exposed soil during rainy seasons during construction phase of the project to ensure that any incidents of erosion are quickly controlled.
- The contractor should ensure recovery of exposed soils with grass and other ground cover as soon as possible.
- The contractor should ensure that construction related impacts like erosion and cut slope destabilizing should be addressed through landscaping and grassing, carting away and proper disposal of construction materials.
- The contractor should put up proper drainage to avoid unnecessary erosion and do compaction of spoil areas to avoid land instability in form of soil subsidence, slip and mass movement.
- Landscaping of the completed site.
- 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.
- The contractor should ensure waste water generated is discharged or drained into approved drainage facilities.
- The contractor should ensure planting and irrigation of cut and fill slopes as well as installation of erosion control and drainage devices that comply with the requirements of Factories (Building Operations and Works of Engineering Construction) Rules 1984.
  - 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.
- Re-vegetate exposed areas around the site so as to mitigate erosion of soil by storm water runoff.

8.4.2 Air quality

**Decreased air quality due to dust emission**

Initial activities such as site clearing, excavation if done in dry weather conditions will result in dust pollution. Air emission from construction machinery, including dust, is regarded as a nuisance when it reduces visibility and is aesthetically displeasing. This is expected during construction works. Dust will be generated from construction earthworks, transportation activities and aggregate mixing.

Dust emission is not anticipated during operation phase because the site surface will be concrete paved and hence limited or no generation of dust.
During decommissioning phase, dust emission would be generated from debris and soil resulting from demolition process.

**Fugitive emissions**
During demolition, construction and decommissioning phases, fugitive emissions are expected from the diesel operated construction machinery and vehicles.

**Proposed Mitigation Measures for Air Quality**

**Dust Emissions**
- The construction area should be fenced off to reduce dust to the public
- Proper scarf folding should be done to minimize dust emissions to the public
- Sprinkle loose surface earth areas with water to keep dust levels down.
- During demolition and construction, the debris and stockpiles of earth should be enclosed/covered/watered during dry or windy conditions to reduce dust emissions. The debris should be disposed in appropriate areas approved by NEMA.
- 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;
- 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 of 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.
- Cover all trucks hauling soil, and other loose materials or require all trucks to maintain at least two feet of freeboard.

**Fugitive Emissions**
- It is the responsibility of the contractor to ensure that the construction machinery and equipment are appropriate and fit to prevent fugitive emissions.
- Minimize vehicle idling time.
- The contractor shall ensure that all equipment shall be properly serviced 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
Proposed Rironi 66/11 KV Substation in Kikuyu District

maintaining vehicles in good state of service, fuel and lubricants to be of standardized quality and sourced from approved suppliers.

- A maintenance plan for the construction machinery and vehicles shall be implemented to prevent excessive emissions during the construction phase of the project.

Reduction of emission would 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 to the site.

8.4.3 Pollution from Solid Waste generation

It is expected that solid waste will be generated through all phases of the project. However, the operation phase has little waste. Solid waste is anticipated to be produced during site preparation, civil works such as demolition debris, spoil from excavations, scrap metal, mortar, wood, paper, masonry chips and left over food stuffs. Effects of mismanaged waste include:

- Public nuisance due to littering or smell in case of rotting
- Contamination of soils and water courses
- Creation of breeding grounds for vermin like rats and cockroaches

Construction waste will include:

- Cleared vegetation
- Excavated soil
- Earthworks
- Waste paper
- Redundant sections of pre stressed concrete

During operation phase, waste to be generated includes food wrappings in case the substation will be manned, paper waste and components/parts of the facility’s infrastructure being removed during replacement.

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

Proposed Mitigation Measures

- Ensure 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;
- Contractor to put in place and comply with a site waste management plan

- Dispose demolition debris appropriately
Separation of 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.

Provide litter collection facilities such as bins

The contractor should comply with the requirement of OSHA ACT 2007 and Building rules on storage of construction materials

Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time

8.4.4 Impacts on Water Resources and Water Quality

During construction, excavation activities will involve soil exposure which results in soil erosion due to wind and heavy rains. Soil erosion can lead to siltation/sedimentation of down slope watercourses. Waste from cement can also result in the pollution of watercourses. Seepage from spilled fuels and oils and leaking 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 project are not anticipated because waste water will be channelled appropriately and there are few activities that may lead in erosion.

Decommissioning activities may also lead to erosion especially if done during the rainy seasons. However, the activities will be small-scaled and will occur on a once-off basis over a short duration.

Generally, due to the localized area of impact, the overall significance of the related impacts on water quality is considered to be low, provided the necessary mitigation/management measures are implemented.

Proposed Mitigation Measures

Measures shall be put in place to minimize erosion and sediment transport, especially during construction and decommissioning activities. These measures include:

- Clear the necessary areas only.
- Appropriate remedial measures shall be implemented by the contractor in the event of erosion.
- 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.
- No vehicle maintenance and service shall be done at project site but in approved garages or service stations to avoid any possible oil and fuel spills that could contaminate soils and possibly ground water quality.
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 water courses.

Ensure that potential sources of petro-chemical pollution are handled in such a way to reduce chances of spills and leaks.

Contractor to make suitable arrangements for water requirements and to provide alternative supply in case the local supply is not sufficient.

Construction activities to avoid any unchannelled flow of water at the site.

Storage areas that contain hazardous substances should be bundled with an approved impermeable liner and provision for a pit to be made in case of oil spill.

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 i.e. skips or bins of sufficient capacity and designed to contain and prevent refuse from being blown by wind, thereby preventing the potential pollution of surface water and surrounding areas by litter;

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;

Areas contaminated by spilled concrete and/or fuels and oils leaking from vehicles and machinery should be cleaned immediately.

8.4.5 Noise and vibration

During construction activities noise pollution will occur and is bound to be a nuisance and a disturbance to neighboring communities and local fauna. This noise is from construction equipment and activities but will be temporary.

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 an adverse impact on ambient noise. The level of traffic noise will increase depending on the traffic volume. General guideline 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 be minimal or negligible.
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.

**Proposed Mitigation Measures for Noise and Vibration**

These proposed mitigation measures aims to ensure that noise generated by construction and operation activities is kept to minimum and adheres to relevant noise standards. They include:

- Fencing off the construction site with iron sheet during construction
- Install portable barriers to shield compactors thereby reducing noise levels.
- Use of noise-suppression techniques to minimize the impact of construction noise at the project site.
- Use equipment designed with noise control elements.
- Co-ordinate with relevant agencies regarding all construction.
- Control the project area to avoid unnecessary access by idlers
- Limit vehicles to 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 8am and 5pm daily) from Monday to Saturday, or as required in terms of legislation.
- Compliance with the recently issued Noise and Vibration Regulations of 2009 is expected at all the phases of the project.
- Perimeter wall will be constructed

### 8.4.6 Impacts from Hazardous materials

Some hazardous materials will be used at one point of the project cycle. They include insulating oil/gases such as sulphur Hexafluoride (SF6), paints, solvents and oils. Spilled chemicals can contaminate soil as well as pollute water resources. Additionally, hazardous and flammable substances if improperly stored and handled on site become potential health hazard for construction workers and the public. The amount of hazardous waste generated will be little safe during painting of the control room and finishing’s. During operation, hazardous waste that will be generated include lead-acid batteries although few in number. It is the responsibility of the proponent to dispose the batteries appropriately.

**Proposed mitigation measures**

- Maintenance of construction vehicles will not be done on site
- All hazardous products and waste should be labeled and handled properly to avoid contact with the ground
- Old batteries shall be disposed off appropriately by the proponent.
8.4.7 Accidental Oil Spills Or Leaks
There is possibility of oil leaks from construction vehicles. Further, transformers are the main source of oil once during operations phase. During operations, transformers will be maintained in a good state of repair, regular service as necessary and any change or addition of oil will be done cautiously to avoid any oil leaks. In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately.

The transformers will have containment pit of one and half capacity of the transformer oil. In case of a spill or leak it will go to the containment and hence no contact with the ground.

Proposed Mitigation Measures
- It is proposed that the refueling and maintenance of large vehicles will not take place at the construction site.
- Transformer oil containment will be constructed to contain any leaks or spills.
- Liquid petroleum fuels for vehicles and other equipment should not be stored at the substation during operation phase.
- Contractor to create awareness for the employees on site on company procedures of dealing with spills and leaks from oil storage tanks for the construction machinery through induction and safety training.
- Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks.
- 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 materials.
- The contractor should also provide security to guard against vandalism when the site is unattended.
- The contractor should assemble and clearly list the relevant emergency telephone contact numbers for staff, and brief staff on the procedures in case of a spill.
- Proper training for the handling and use of fuels and hazardous material for construction workers.
- All chemicals should be stored within the budded areas and clearly labeled detailing the nature and quantity of chemicals within individual containers.

8.4.8 Fire Hazards
During the three phases of the project, fire hazards are likely to occur especially when precaution measures are not taken to account. 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 be 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, it may promote fires if cigarette butts are dropped.

**Proposed Mitigation Measures**

The following measures should be put in place to prevent fire hazards:

- Create awareness to the construction workers on potential fire hazards
- Provision of firefighting equipment on site during construction.
- No smoking shall be done on construction site
- No smoking signs shall be posted at the construction site
- A fire evacuation plan must be posted in various points of the construction site including procedures to take when a fire is reported.
- Once constructed the substation will be equipped with adequate firefighting equipment of high standards and in key strategic points.
- Fire/smoke detection alarm systems and portable fire extinguishers (dry powder and Carbon dioxide) shall be installed.
- Fire evacuation plan shall be posted in the control room and any other strategic point
- All substation operators must be trained on fire management.
- A fire Assembly point should be identified and marked
- No smoking signs shall be posted within the substation

**8.4.9 Visual Intrusion and aesthetic impacts**

Generally, the proposed project will not affect the overall aesthetic effect of the project. 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 and its utilities may be viewed as part of the infrastructure necessary to sustain 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 activity of the viewer (living in the area, driving through or sightseeing)
- The physical relationship of the viewer and the substation (distance and sight)

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)

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 both agricultural and commercial facilities, it is anticipated that the proposed development will not significantly affect the aesthetics of the area.

8.4.10 Impacts of construction material sourcing (e.g. quarrying)

The construction of the project use of materials such as; stone, ballast, sand and hardcore. It is anticipated that they will 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

- The contractor should source all building materials such as stone, sand, ballast and hard core from NEMA approved sites.
- Ensure accurate budgeting and estimation of actual construction materials to avoid wastage.
- Reuse of construction materials where possible.

8.4.11 Traffic congestion / Road Wear/Tear

The road to the proposed site is tarmacked as it is along the Nakuru-Nairobi highway. Therefore, the substation is easily accessible. The highway is busy throughout the day. Construction of the substation will increase vehicles using the highway. The impacts of these include damage to the road, traffic congestion and there is potential injury to vehicles and pedestrians if appropriate caution is not taken.

The impacts related to traffic during construction are:

Increased Traffic
The construction phase of the project will involve increased number of vehicles including heavy trucks. There will be temporary and minor disruptions to traffic movement and safety concerns of local inhabitants and workers as a result of increased traffic movements, particularly from large construction/transport trucks. No traffic is anticipated during operation save for little traffic during decommissioning.
Accidents as a result of increased traffic
At construction phase, 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
As already noted, there will be increased traffic which implies more pressure on the road infrastructure. Such impacts are associated with demolition and construction of the proposed project and are not anticipated during the operational phase.

Proposed Mitigation Measures
- All vehicles coming to the construction site should carry the recommended weight.
- All drivers coming to the site must observe traffic rules and exercise courtesy to other road users.

Where traffic is anticipated, the contractor shall:
- Employ a road safety officer to oversee implementation of the traffic controls
- Regular maintenance of delivery and dispatch trucks

8.4.12 Occupational Health and safety Impacts
There are several activities involved during construction. These activities can pose potential health and safety risks to the workers. The activities include excavation, backfilling, civil works and, stringing of conductors. Risk of accidents and incidents are high during construction activities due to use of hoists, heavy duty equipment, machinery and vehicles. Further, construction workers will be in direct contact with heavy machinery and equipment. The same risks are likely during decommissioning. The operation phase has the risk of electrocution.

Health and Safety Impacts
As already noted during construction, the safety and health of employees 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 and animals accessing the site such as 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.
Such impacts are associated with decommissioning. During operation, there is minimal risk of electrocution occasioned by failure to observe safety rules while in the substation. This is mainly to staff as a substation is a no access zone for the public.

Proposed Mitigation Measures
- The contractor should use skilled personnel for activities that demand that.
- Awareness creation on safety to workers while at construction and demolition site.
- Staff coming to the substation should be knowledgeable on safety precautions to take
- A perimeter wall shall be constructed to keep off wildlife

8.4.13 Impacts on Public Health
Construction of the substation will bring new interactions between people. These interactions are likely to pose risks to the social fabric of the society. Such risks include public health related issues such as (HIV/AIDS, communicable and sexually transmitted diseases (STDs).

Influx of People
Due to the temporary influx of semi-skilled and skilled labour during construction there is likelihood that some interaction with locals can cause tensions as well as opportunities for the spread communicable diseases. These risks can be managed through consultations with local communities prior and during construction as well as informing workers on local cultural values and health matters.

HIV/AIDS
New interactions between workers and locals can pose potential risks for transmission of HIV/AIDS. The contractor is impressed upon not to set a construction camp on site. Further, the contractor will provide public education/information about HIV/AIDS transmission and prevention measures.

Social Vices
Due to the fact that construction activities will attract new people to the project area, social vices like drug abuse and theft may pose security concerns. Sensitization and awareness creation need to be done before and during the construction works.

Proposed Mitigation Measures
Most of these impacts involve observing appropriate behaviour to avoid exposure to health risks and security concerns. This calls for awareness creation sessions prior to any work commencing onsite, where the target audience is all the project personnel. The awareness creation should include but not be limited to the following:
Ways to minimize social vices
- Liaise with provincial administration for security matters
- An understanding of the key environmental features of the work site and environs
- HIV/AIDS preventive measures
- Health risks pertinent to the site.

At the community level awareness creation on social vices including HIV/AIDS issues was done by the EIA team and the provincial administration will continue to sensitize the people during their public barazas.

8.4.14 Electric and magnetic fields (EMFs)
Electric magnetic fields are only anticipated during operation period but these are negligible. The exposure to would be little EMFs is highly negligible because once energized the substation’s high voltage sections are out of bounds for staff. Indeed the substation once complete is a no access zone and staff go within the electrical section during operations and maintenance which are few. During maintenance, works are done while the substation is dead i.e power is switched off. Consequently the study does not anticipate impacts of EMFs.

8.5 Contractor code of Conduct
It is expected that the contractor and the staff will conduct themselves with due regard of others and should uphold highest values. The contractor should also submit method statements covering the procedures for the main activities that can generate emergency situations through accidents or neglect of responsibilities. These situations include, but not limited to:
- Accidental fires
- Accidents at the work place
- Accidental oil leaks and spillages
- Vehicle and plant accidents

8.6 Summary of Impacts
All the impacts identified will be temporary and their effects will reduce with mitigation measures. Table 8.1 presents a summary of the identified impacts in terms of significance rating based on the expert’s opinion through a scale of very low, low, medium, high and not anticipated. 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 8.2.
Table 8.1: Present a Summary of Significance of the Identified Impacts of the Proposed Project

**Significance of Impacts**

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>SIGNIFICANCE RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction Phase</td>
</tr>
<tr>
<td></td>
<td>Without mitigation</td>
</tr>
<tr>
<td><strong>Soil and Geology</strong></td>
<td></td>
</tr>
<tr>
<td>Potential for soil erosion and sedimentation</td>
<td>Medium negative impact</td>
</tr>
<tr>
<td>Soil contamination</td>
<td>low negative impact</td>
</tr>
<tr>
<td>Weakening of the geological stability</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td><strong>Ecology</strong></td>
<td></td>
</tr>
<tr>
<td>Impact on terrestrial ecology</td>
<td>Medium low negative impact</td>
</tr>
<tr>
<td>Vegetation clearance</td>
<td>low negative impact</td>
</tr>
<tr>
<td>Impact on Aquatic environment</td>
<td>Not anticipated</td>
</tr>
<tr>
<td><strong>Air quality</strong></td>
<td></td>
</tr>
<tr>
<td>Decrease in air quality due to dust</td>
<td>Low negative impact</td>
</tr>
<tr>
<td>Fugitive emissions</td>
<td>Low negative impact</td>
</tr>
<tr>
<td><strong>Waste generation</strong></td>
<td></td>
</tr>
<tr>
<td>Pollution from waste generation</td>
<td>Low negative impact</td>
</tr>
<tr>
<td><strong>Water quality</strong></td>
<td></td>
</tr>
<tr>
<td>Decreased water quality</td>
<td>low negative impact</td>
</tr>
<tr>
<td><strong>Noise and vibration</strong></td>
<td></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>Deterioration in ambient noise quality</td>
<td>low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td>Low Negative impact</td>
<td>Very low negative impact</td>
<td>Low negative impact</td>
</tr>
<tr>
<td>Impact on soil and water resources</td>
<td>Low Negative impact</td>
<td>Very low negative impact</td>
<td>Low negative impact</td>
</tr>
<tr>
<td>Potential fire hazards</td>
<td>Low Negative impact</td>
<td>Very low negative impact</td>
<td>Low negative impact</td>
</tr>
<tr>
<td>Accidental oil leaks and spillage</td>
<td>Low Negative impact</td>
<td>Very low negative impact</td>
<td>Low negative impact</td>
</tr>
<tr>
<td>Visual impacts</td>
<td>Impact on visual landscape</td>
<td>Very low negative impact</td>
<td>Very low negative impact</td>
</tr>
<tr>
<td>Socio-economic</td>
<td>Creation of Employment</td>
<td>Low positive impact</td>
<td>High positive impact</td>
</tr>
<tr>
<td>Gains in the Local and National Economy</td>
<td>Low positive impact</td>
<td>High positive impact</td>
<td>Medium positive impact</td>
</tr>
<tr>
<td>Provision of Market for Supply of Building Materials</td>
<td>Low positive impact</td>
<td>High positive impact</td>
<td>Not anticipated</td>
</tr>
<tr>
<td>Informal Sectors Benefits</td>
<td>Low positive impact</td>
<td>positive impact</td>
<td>Not anticipated</td>
</tr>
<tr>
<td>Influx of people</td>
<td>Low negative impact</td>
<td>Very low negative impact</td>
<td>Not anticipated</td>
</tr>
<tr>
<td>Traffic impacts</td>
<td>Accidents as a result of increased traffic</td>
<td>Low negative impact</td>
<td>Very low negative impact</td>
</tr>
</tbody>
</table>
### Table 8.2: 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>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Opportunities</td>
<td>Positive</td>
<td>Direct &amp; Indirect</td>
<td>Permanent/ Temporary</td>
<td>Major</td>
<td></td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Gains in the Local and National Economy</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td></td>
<td>/</td>
<td>/</td>
<td>x</td>
</tr>
<tr>
<td>Provision of Market for Supply of Building Materials</td>
<td>Positive</td>
<td>Direct</td>
<td>Temporary</td>
<td>Major</td>
<td></td>
<td>/</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Informal Sectors Benefits</td>
<td>Positive</td>
<td>Direct &amp; Indirect</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td>/</td>
<td>x</td>
<td>/</td>
</tr>
<tr>
<td>Increase in electricity supply</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td></td>
<td>x</td>
<td>/</td>
<td>x</td>
</tr>
<tr>
<td>Visual and aesthetic impacts</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
<td></td>
<td>/</td>
<td>/</td>
<td>x</td>
</tr>
<tr>
<td>Impacts of terrestrial ecology</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>minor</td>
<td></td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Environmental &amp; Social Impact</td>
<td>Positive/ Negative</td>
<td>Direct/ Indirect</td>
<td>Temporary/ Permanent</td>
<td>Major/ Minor</td>
<td>Occurrence</td>
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<td></td>
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<tr>
<td>(on farm) Destruction of existing vegetation)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public health (Possible Exposure of Workers to Diseases)</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Major</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Social impacts</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation of Exhaust Emissions</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust Emissions</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water quality</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Health and Safety (Workers accidents and hazards)</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth and construction material sourcing</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Major</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Generation</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion impacts from vegetation clearance</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous Materials/oils</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise impacts</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Outbreaks</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic congestion / road wear and tear</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel &amp; chemical storage</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

In order to deal/mitigate against identified negative impacts an Environmental and Social Management Plan (ESMP) has been presented in the next chapter.
CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

9.1 Introduction

It is evident that new projects pose environmental damage and can threaten sustainable development. Therefore new projects should mitigate negative impacts to ensure environmental conservation and protection. Consequently, an ESMP is proposed as a master plan to ensure environmental protection. The ESMP specifies the methods for managing the environmental aspects of the proposed development. Monitoring requirements are also detailed within the ESMP, particularly for those environmental aspects that give rise to potentially significant impacts.

An Environmental and Social Management Plan (ESMP) for development projects provides a logical framework within which identified negative environmental and social impacts can be mitigated and monitored. Further, 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 EIA as it provides a checklist for project monitoring and evaluation. The ESMP is prepared based on identified potential negative impacts and mitigation measures during construction, operational and decommissioning phases.

The ESMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of the following project phases: design, construction, operation and decommissioning.

9.2 Approach to Environmental Impact Management

It is expected that the responsibility of the proponent to ensure ESMP rests with the proponent. The proponent’s (SHE) department and project engineer will be responsible for the proposed ESMP in liaison with other relevant departments. The proponent has to keep a close eye to monitor implementation of the ESMP.

There are five broad components of environment, health and safety management cycle. These are;

- 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, construction, operation and decommissioning phases.
9.2.1 Proponent’s SHE (Safety Health and Environment) Policy

The management of KPLC is committed to safety health and environment. This commitment is enshrined in the SHE policy in a bid to conserve and protect the environment and ensuring safety of workers while undertaking its operations. The policy underscores that the proponent is committed to creation of a conducive, health, safe and eco-friendly working environment. The policy further states that in order to achieve the stated objective, the proponent and contractor shall as appropriate:

- Comply with the SHE policy
- Plan and prepare for all conceivable emergencies and disasters related to different phases
- Uphold and implement sound SHE standards throughout all phases of the project.
- Strive to continually improve SHE aspects management through training and audit
- Follow best practice in SHE compliance with an aim to be industry leaders
- Require all their business partners to manage their own SHE in line with sustainable development.

9.2.2 Planning and Design

It is very vital at planning and design phase to incorporate potential negative impacts so that design options can mitigate some of them. At the planning phase it involves the following activities:

- Site investigation.
- Identifying and defining the various environmental aspects and related potential negative impacts that can result from the project.
- 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.

The EIA takes care of the planning stage of environmental conservation. The potential impacts of the proposed project have been discussed in chapter 9 of this project report. The mitigation measures provided in the ESMP are geared towards addressing the anticipated adverse impacts. Being a turnkey project the contractor is responsible for the designs of the project in conjunction with the proponent. 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 designs of the project must be approved prior to construction.

9.2.3 Management of Impacts during Construction Phase

Most of the impacts will be experienced during construction. The ESMP identifies measures to put in place in order to avoid and mitigate negative impacts and optimize benefits arising from activities during construction phase. The focus of project management at this phase will include:

- Maintenance of complaints register
- Personnel and contractor management
- Conduct onsite management
- Emergency preparedness
- Management and mitigation of impacts such as noise, dust, safety and pollution

The proponent is responsible for ensuring that the contractor adheres to all mitigation measures. Further the contractor is supposed to meet construction relevant national and international standards.

9.2.4 Management of Impacts during Operation Phase

The projects output will be power supply. Mitigation measures for the operation phase rests with the proponent. For the purpose of the ESMP there are two principal mechanisms for the implementation of management and mitigation measures:

- 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 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 in 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. To facilitate coordinated and
purposeful implementation, the ESMP management and mitigation measures are grouped into plans.

9.2.5 Checking and Corrective Action

It is not only worth to check implementation status but also very important to implement necessary corrective action. These 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:

- Continuous inspections of the operational controls and general state of the operations.
- Monitoring selected environmental quality variables
- 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 efficiency of the ESMP.

Monitoring

The environmental variables that are to be monitored are largely described in the ESMP. Monitoring results must be presented for review on an ongoing basis so that if objectives and targets are not met, corrective action can be taken.

Inspections: Construction Phase

It is crucial to undertake inspections as there provide an opportunity for independent opinion especially at this phase which has the most negative impacts. Inspection will involve impromptu visits to the construction site to check progress of ESMP implementation. It further allows for potential SHE transgressions to be identified proactively, so that mitigation can be quickly and effectively implemented.

Internal and External Audits

Once the project is operational internal audits will be carried out annually. Where the monitoring data and the inspection reports highlight a serious problem, an external audit can be commissioned 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 SHE performance.
Corrective Action
There are several mechanisms for implementing corrective action exist for all phases of the project. 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).

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 continuous basis. 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 SHE performance to relevant stakeholders.

9.2.6 Management Review
The final component of the ESMP 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.

9.3 Impact Mitigation and Management Measures
The section presents mitigation and management measures for the identified negative impacts of the proposed project. The section also provides description of the management plans within which management and mitigation measures will be addressed. 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.

9.3.1 Management Plans
All the identified impacts will be implemented through specific management plans. This is necessitated by the fact that most of the mitigation measures cannot be implemented as discrete, isolated actions because there are spatial, temporal and there are interactions among impacts. The plans recommended for managing the potential impacts of the proposed project include:
- Water quality management plan
- Soil conservation management plan
- Noise management plan
9.3.1.1 Soil Conservation Management Plan
The aim of soil conservation plan is to conserve soil for rehabilitation. The plan will include the following requirements:
- Only 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.
- Construct drainage to keep off storm water from flowing through the site.
- Topsoil shall not be disturbed more than is absolutely necessary on the construction site, and should be used for backfilling as much as possible.
- All cleared areas shall be surfaced as soon as possible after construction.

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

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. These public complaints should be responded to as a matter of urgency and where possible, measures taken to minimize the cause of dust.

Emissions
- The contractor must prevent pollution by fugitive emissions from vehicles and construction equipment. This shall be accomplished through regular maintenance of this equipment.

9.2.1.3 Noise management plan
It is the responsibility of the contractor to reduce noise emitted during construction and decommissioning. The noise must be kept to a minimum and adherence to relevant noise standards is expected. The noise management plan includes:
- Construction activities must be limited to working hours (i.e. between 6.00 a.m to 6.00 pm 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.
All landowners, residents and public who might be grieved by noise levels are free 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.

9.2.1.4 Water Management Plan
Although there is no river near the construction site it is very important to ensure protection of rivers far away and also ground water. The aim of this plan is to ensure that water quality is conserved throughout the project phases. The plan 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: Legal Notice No. 121 of 2006. EMCA 1999, and Water Act, 2002.
- Minimize soil erosion and sediment transport, especially during construction activities by 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
- 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.

9.2.1.5 Effluent management
Proper arrangements must be done to provide suitable sanitation and sewage facilities for construction workers. During operation the same should be provided. Since there is no sewer system, septic tanks shall be constructed.

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

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.
- Manage all hazardous materials and waste in a safe and responsible manner, and prevent contamination of soils, 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 oils.

The contractor shall ensure oil spills/leaks are prevented or minimized.

- The Contractor shall ensure that works 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.

Fire Prevention and management

- Necessary precautions shall be taken to prevent fires 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.

Neighboring 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.

Complaints register

The Contractor shall establish and maintain a register for periodic review by the proponent that logs all the complaints raised by the neighbors 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.

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 create awareness to minimize diseases likely to be contracted by the construction workers as a result of the proposed project such as HIV &AIDs.
Ensure that health and safety of immediate neighbors and the public is not threatened.

The contractor shall ensure that construction work is undertaken in manner not likely to pose risks to community health and safety.

The proponent to create awareness among the neighbors on dangers of mishandling electricity. Put warning signs to warn the public from accessing the substation.

9.2.1.7 Construction Control Plan (CCP)
The CCP for the proposed project shall cover the following:

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

Control of material supply and burrow areas
- Sourcing of materials needed for construction shall be from licensed mines and/or quarries from Rironi area and its environs.
- The contractor shall comply with relevant legislations in instances where materials are to be obtained from a new burrow area.

Rehabilitation
- Once construction is complete, the contractor shall clear the site of construction materials and dispose wastes in appropriate disposal sites.
- All temporary works on the construction site shall be removed. Further, grass shall be grown on the sloppy areas where retaining wall will not be constructed to control soil erosion.

Labour and Human Resources Plan
In designing the labour and human resources plan Contractor shall:
- Comply with the provisions of Employment Act, 2007
- Give priority to qualified local people when hiring employees.

9.2.1.8 Emergency Management and Response Plan
The Proponent shall rollout and implement their documented emergency response plan. The EMRP shall include:

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

Information pertaining to emergency management shall be reported through the SHE reporting process

- A risk assessment report will be compiled prior to commissioning of the facility.

**Emergency Response Plan**

KPLC will compile a comprehensive Safety Emergency Management Plan (SEMP) for the facility.

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

Table 9.1 presents the ESMP which covers the proposed management and mitigation measures for the identified impacts. This addresses the dual objective of the ESMP namely, to fully disclose the commitments undertaken by KPLC, and to provide managers and staff of KPLC with a clear framework for ESMP implementation.

In addition, the ESMP 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 actions required under the ESMP. It is particularly useful where management/mitigation measures extend across phases.
Table 9.1: Environmental Management Plan during CONSTRUCTION PHASE of the proposed Rironi 66/11 kV Substation

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand of Raw material</td>
<td>1. Accurate budgeting and estimation of actual construction materials to avoid wastage.</td>
<td>Proponents supervising engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2. Building materials to be sourced from local suppliers who use environmentally friendly processes in their operations.</td>
<td>Proponents supervising engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3. Proper storage to ensure minimal damage or loss of materials at the construction site.</td>
<td>Proponents supervising engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4. Use at least 5%-10% recycled refurbished or salvaged materials to reduce the use of raw materials and divert material from dumpsites.</td>
<td>Proponents supervising engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td>2. Minimize vegetation disturbance at and or around construction site</td>
<td>1. Ensure proper demarcation and delineation of the project area to be affected by construction works.</td>
<td>Contractor, Proponents supervising engineer</td>
<td>1 month</td>
<td>0</td>
</tr>
<tr>
<td>VEGETATION DISTURBANCE</td>
<td>2. Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.</td>
<td>Proponents supervising engineer</td>
<td>1 month</td>
<td>In contract</td>
</tr>
<tr>
<td></td>
<td>3. Designate access routes and parking within the site.</td>
<td>Contractor</td>
<td>1 month</td>
<td>In contract</td>
</tr>
</tbody>
</table>

Proposed Rironi 66/11 kV substation in Kikuyu district
<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Introduction of vegetation (trees, shrubs and grass) on open spaces and around the project site and their maintenance.</td>
<td>Contractor</td>
<td>Once</td>
<td>In contract</td>
<td></td>
</tr>
<tr>
<td>5. Landscaping to help in revegetation of part of the project area after construction.</td>
<td>Contractor</td>
<td>1 month</td>
<td>In contract</td>
<td></td>
</tr>
</tbody>
</table>

3. Reduce storm-water, runoff and soil erosion

<table>
<thead>
<tr>
<th>Increased storm water, runoff and soil erosion</th>
<th>1. Install rain water harvesting to acquire water for use and avoid surface run off.</th>
<th>Proponents supervising engineer &amp; Contractor</th>
<th>Once</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Construct drainage to take care of storm water. Minimize impervious area infiltration.</td>
<td>Contractor &amp; Proponents supervising engineer</td>
<td>1 month</td>
<td>contract</td>
<td></td>
</tr>
<tr>
<td>3. Soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.</td>
<td>Contractor &amp; Proponents supervising engineer</td>
<td>1 month</td>
<td>contract</td>
<td></td>
</tr>
<tr>
<td>4. Ensure that construction vehicles are restricted to use existing graded roads</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Ensure that any compacted areas are ripped to reduce run-off.</td>
<td>Contractor</td>
<td>2 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Site excavation works to be planned such that a section is completed and rehabilitated before another section begins.</td>
<td>Contractor &amp; Proponents supervising engineer</td>
<td>Throughout construction period</td>
<td>In contract</td>
<td></td>
</tr>
</tbody>
</table>
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Interconnected open drains will be</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>Contract</td>
<td></td>
</tr>
<tr>
<td>provided on site.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

|                                          | 2. Accurate estimation of the dimensions and quantities of materials required.                      | Contractor                           | One-off                        | 0          |
|                                          | 3. Use durable materials that will not need often replacement.                                      | Proponents supervising engineer & Contractor | Throughout construction period | 0          |
|                                          | 4. Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to elements | Contractor                           | One-off                        | 0          |
|                                          | 5. Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste | Proponents supervising engineer & Contractor | Throughout construction period | 0          |
|                                          | 6. Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site | Contractor                           | Throughout construction period | 0          |
### Expected Negative Impacts and Recommended Mitigation Measures

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Dispose waste more responsibly by contracting a registered waste handler who will dispose the wastes at designated sites</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8. Waste collection bins to be provided at designated points on site</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

#### 5. Air Pollution

##### Dust emission

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ensure strict enforcement of on-site speed limit regulations</td>
<td>Proponents supervising engineer &amp; Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2. Sprinkle water on graded access routes when necessary to reduce dust</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3. Personal Protective equipment to be provided to employees and worn</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

##### Exhaust emission

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vehicle idling time shall be minimized</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2. Ensure construction vehicles are properly maintained</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3. Sensitize truck drivers to avoid unnecessary running engines of stationary vehicles</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

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

#### Noise and vibration

<table>
<thead>
<tr>
<th>Impact</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise and vibration</td>
<td>1. Sensitize construction drivers to avoid running of vehicle engines or unnecessary hooting</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>Routine site operation</td>
</tr>
<tr>
<td></td>
<td>2. Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>Routine site operation</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that construction machinery are kept in good condition to reduce noise generation</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures (containers) to minimize ambient noise levels.</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5. The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.</td>
<td>Proponents supervising engineer &amp; contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
</tbody>
</table>

8. Minimize water consumption and ensure more efficient and safe water use

<table>
<thead>
<tr>
<th>Impact</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased Water Demand</td>
<td>1. Water to be brought in using water boozers</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2. Harness rainwater for construction and watering grass</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3. Install water conserving taps that turn-off automatically when water is not being used</td>
<td>Contractor</td>
<td>One-off</td>
<td>40% more than price of ordinary taps</td>
</tr>
</tbody>
</table>

**Proposed Rironi 66/11 kV substation in Kikuyu district**

**Environmental Impact Assessment Project Report**

Page 92
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Promote recycling and reuse of water as much as possible</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6. Install a discharge meter at water outlets to determine and monitor total water usage</td>
<td>Contractor</td>
<td>One-off</td>
<td>Contract</td>
<td></td>
</tr>
<tr>
<td>7. Promptly detect and repair of water pipe and tank leaks</td>
<td>Contractor/proponent</td>
<td>Throughout construction period</td>
<td>Contract/operational costs of proponent</td>
<td></td>
</tr>
<tr>
<td>8. Sensitize construction workers to conserve water at all times</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>9. Ensure taps are not running when not in use</td>
<td>Proponent and Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**9. Minimize release of liquid effluent**

<table>
<thead>
<tr>
<th>Generation of wastewater</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide appropriate sanitation facilities</td>
<td>Contractor</td>
<td>One-off</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2. Provide means for handling sewage generated at the construction site</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>Contract</td>
<td></td>
</tr>
<tr>
<td>3. Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated</td>
<td>Contractor</td>
<td>Throughout construction period</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

10. Minimize occupational health and safety risks
### Expected Negative Impacts

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Statutory Requirements</strong></td>
<td>Ensure compliance with OSHA, (Building Operations and Works of Engineering Construction Rules), L.N. 40 of 1984</td>
<td>Contractor</td>
<td>During the construction period</td>
<td>0</td>
</tr>
<tr>
<td><strong>Worksite Safety and Health Hazards to Employees</strong></td>
<td>Ensure compliance with the Occupational Safety and Health Act (OSHA) 2007 provisions e.g. Employees to be provided with appropriate PPE</td>
<td>Contractor</td>
<td>One-off</td>
<td>Contract</td>
</tr>
<tr>
<td><strong>11. Minimize Oil Spills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oil spills Hazards</strong></td>
<td>Install oil trapping equipments in areas when there is a likelihood of oil spillage. No maintenance will be carried out at the construction site</td>
<td>Contractor</td>
<td>Continuous</td>
<td>50,000</td>
</tr>
</tbody>
</table>
Operational Phase ESMP

Once commissioned the project will have minimum negative impacts. These also need to be mitigated against in order to protect the environment. The negative impacts and maximization of positive impacts associated with the operational phase of proposed project are outlined in this section.

Table 9.2 indicates the operational phase ESMP.
Table 9.2: Environmental management Plan for the OPERATIONAL PHASE of the proposed Rironi 66/11kV substation.

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Provide solid waste handling facilities such as rubbish bins</td>
<td>Proponent</td>
<td>One-off</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that solid wastes generated at the substation are regularly disposed of appropriately at authorized disposal sites</td>
<td>Proponent</td>
<td>Continuous</td>
<td>Operations and maintenance budget.</td>
</tr>
<tr>
<td>Solid waste generation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Ensuring Efficient Liquid waste management</td>
<td>1. Paving of substation surface to reduce spilled liquid waste from reaching sub-surface</td>
<td>Proponent and contractor</td>
<td>During Construction</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td></td>
<td>2. Provide means for handling sewage generated e.g use of septic tanks</td>
<td>Proponent Contractor</td>
<td>During construction</td>
<td>Part of construction cost</td>
</tr>
<tr>
<td></td>
<td>3. Minimise risks of sewage release into environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected Negative Impacts</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Time Frame</td>
<td>Cost (Ksh)</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Release of sewage into the environment</td>
<td>1. Proper septic tanks that are checked regularly.</td>
<td>Proponent</td>
<td>One-off</td>
<td>Part of maintenance budget.</td>
</tr>
<tr>
<td></td>
<td>2. Conduct regular inspections for sewage pipe blockages or damages and fix appropriately</td>
<td>Proponent</td>
<td>During entire operation period</td>
<td>500 per inspection</td>
</tr>
<tr>
<td>High demand for energy</td>
<td>1. Switch off electrical equipment, appliances and lights when not being used</td>
<td>Engineer in charge of substations</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2. Install occupation sensing lighting at various locations such as storage areas which are not in use all the time</td>
<td>Contractor/Engineer in charge of substations</td>
<td>One-off</td>
<td>Contract</td>
</tr>
<tr>
<td></td>
<td>3. Install energy saving fluorescent tubes at all lighting points within the substation instead of bulbs which consume higher electric energy</td>
<td>Contractor/Engineer in charge of substations</td>
<td>One-off</td>
<td>Contract</td>
</tr>
<tr>
<td></td>
<td>4. Monitor energy use during the operation of the project and set targets for efficient energy use</td>
<td>Engineer in charge of substations</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5. Sensitize the substation workers to use energy efficiently</td>
<td>Engineer in charge of substations</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td>Expected Negative Impacts</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Time Frame</td>
<td>Cost (Ksh)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>5. Minimize water consumption and ensure more efficient and safe water use</td>
<td>1. Promptly detect and repair of water pipe and tank leaks</td>
<td>Administration department</td>
<td>Continuous</td>
<td>Maintenance budget</td>
</tr>
<tr>
<td></td>
<td>2. Staff and stakeholders to be sensitized on water conservation techniques.</td>
<td>Engineer in charge of substations</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3. Ensure taps are not running when not in use</td>
<td>Engineer in charge of substations and staff</td>
<td>Continuous</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4. Install water conserving taps that turn-off when water is not being used</td>
<td>Engineer in charge of substations</td>
<td>One-off</td>
<td>40% more than ordinary taps</td>
</tr>
<tr>
<td></td>
<td>5. Install a discharge meter at water outlets to determine and monitor total water usage</td>
<td>Engineer in charge of substations</td>
<td>One-off</td>
<td>Part of construction budget</td>
</tr>
<tr>
<td>High water demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Provide PPE to workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Ensure the general safety and security of the proposed Rironi substation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Safety and Security Impacts

1. Ensure the general safety and security at all times by providing day and night security guards.
2. Adequate lighting within and around the substation.

**Engineer in charge of substations /administration manager**

**Continuous**

**Operations and maintenance budget**

### Air Pollution

1. Enforce low speed limits for vehicles coming to the substation.

**Engineer in charge of substations**

**Continuous**

### Minimization of Fire Hazards

1. Installation of fire fighting equipments.
2. Develop and display fire evaluation plan.
3. Training of staff in fire management.

**Engineer in charge of substations and SHE manager**

**Continuous during operation**

**200,000**

### Worksite Safety and Health Hazards to Employees

Ensure compliance with the Occupational Safety and Health Act (OSHA) 2007 provisions e.g. Employees to be provided with appropriate PPE and training on safety.

**Engineer in charge of substations and SHE manager**

**Continuous**

**In training budgets**
Decommissioning Phase ESMP
During phase out i.e decommissioning phase, some negative impacts are anticipated and mitigation measures must be put in place to ensure environmental protection. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the substation are outlined in the table 9.3.
Table 9.3: Environmental management Plan for the DECOMMISSIONING PHASE of the proposed 66/11kV Rironi substation.

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Mitigation Measures</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition waste management</td>
<td>1. Proper disposal of the remains in NEMA approved dump sites 2. Donating to locals what can be reused.</td>
<td>Contractor</td>
<td>One-off</td>
<td>Demolition/contractor budget</td>
</tr>
<tr>
<td></td>
<td>2. All 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 Manager &amp; Contractor</td>
<td>One-off</td>
<td>0</td>
</tr>
<tr>
<td>2. Rehabilitation of project site</td>
<td>1. Re vegetate to restore the site to its original status</td>
<td>Contractor</td>
<td>One-off</td>
<td>Demolition budget</td>
</tr>
<tr>
<td>Vegetation disturbance</td>
<td>2. Consider use of indigenous plant species in re-vegetation</td>
<td>Contractor</td>
<td>One-off</td>
<td>Demolition budget</td>
</tr>
<tr>
<td>3. Minimization of Generation of Dust</td>
<td>1. Watering all active demolition areas as and when necessary to lay off dust.</td>
<td></td>
<td>One-off</td>
<td>Demolition budget</td>
</tr>
<tr>
<td>Expected Negative Impacts</td>
<td>Recommended Mitigation Measures</td>
<td>Responsible Party</td>
<td>Time Frame</td>
<td>Cost (Ksh)</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>2. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.</td>
<td>Proponent’s supervising engineer &amp; Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at demolition sites.</td>
<td>Proponent’s supervising engineer &amp; Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4. Reduction of Noise and vibrations

<table>
<thead>
<tr>
<th>Increased noise and vibration</th>
<th>1. Install portable barriers to shield compressors and other small stationary equipment where necessary.</th>
<th>Proponent’s supervising engineer &amp; Contractor</th>
<th>During Decommissioning</th>
<th>To be determined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Demolish mainly during the day. The time that most of the neighbours are out working.</td>
<td>Proponent’s supervising engineer &amp; Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.4 Environmental and Social Monitoring Plan (ESMoP)

Introduction

Monitoring of the project is crucial to check on progress and implementation of Environmental and social management plan. Therefore, the proposed project will be subjected to monitoring i.e routine monitoring against standards or performance criteria; and periodic review. During construction phase, the proponent will monitor the contractor’s activities in order to verify that the management/mitigation measures are implemented as contained in the ESMP. 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 ESMP 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.

The environmental and social parameters, timing, cost and responsible person for the proposed project are summarized in table 9.4.

**Table 9.4: 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>Vegetation and Habitat Loss</td>
<td>Assess the area cleared of Vegetation</td>
<td>During Construction</td>
<td>Included in the Contract</td>
<td>Proponent and Contractor</td>
</tr>
<tr>
<td>Noise</td>
<td>Measure the Noise Level within the Project area</td>
<td>Construction, Operation</td>
<td>Included in contract and Operating costs</td>
<td>Proponent and Contractor</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Assess size of rills or galleys forming from accelerated run off from compacted areas</td>
<td>During construction phase</td>
<td>Included in contract</td>
<td>Proponent and Contractor</td>
</tr>
<tr>
<td>Increased water Demand</td>
<td>Check the source of water and litres used</td>
<td>During Construction</td>
<td>Included in the Construction</td>
<td>Proponent and Contractor</td>
</tr>
<tr>
<td>Fire hazards</td>
<td>Record any fire incidences and investigate possible causes</td>
<td>Throughout project cycle</td>
<td>In Contract and operations budget</td>
<td>Proponent and Contractor</td>
</tr>
</tbody>
</table>
## 9.5 Rehabilitation and Decommissioning Management Plan

The rehabilitation and decommissioning management plan include the following:

### Preparation for closure

a) The proponent shall develop rehabilitation and decommissioning plan in conjunction with relevant stakeholders at least one year before actual demolition.

b) The proponent shall investigate practical options for closure of the project and submit a report to relevant authorities NEMA included.

c) The proponent to explore options of re-use and recycling of the demolished materials.

### Decommissioning

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

b) The Proponent shall undertake an assessment of the area to identify any contaminated areas and remediate them accordingly.

### Post Closure

The Proponent shall ensure that the facility’s site is free of impacts associated with the 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 project.
### Table 9.5: Environmental monitoring Plan for the decommissioning phase of Project

<table>
<thead>
<tr>
<th>Expected Negative Impacts</th>
<th>Recommended Measures</th>
<th>Mitigation</th>
<th>Responsible Party</th>
<th>Time Frame</th>
<th>Estm. Cost (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demolition waste</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Demolition waste</td>
<td>1. Use of an integrated solid waste management system i.e. through recycling and reusing</td>
<td>Project proponent &amp; Contractor</td>
<td>One-off</td>
<td>500,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. All machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible or they be taken to a licensed waste disposal site</td>
<td>Project proponent &amp; Contractor</td>
<td>One-off</td>
<td>500,000</td>
<td></td>
</tr>
<tr>
<td><strong>Vegetation disturbance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Rehabilitation of project site</td>
<td>1. Implement an appropriate re-vegetation programme to restore the site to its original status</td>
<td>Project proponent &amp; Contractor</td>
<td>One-off</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Consider use of indigenous plant species in re-vegetation</td>
<td>Project proponent &amp; Contractor</td>
<td>One-off</td>
<td>100,000</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER TEN: ASSUMPTIONS, UNCERTAINTIES ENCOUNTERED AND GAPS IN KNOWLEDGE.

10.1 Introduction
The following assumptions were made in preparing this EIA

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

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

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

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

11.1 Conclusion
Flowing from the assessment, it is evident that, the construction and operation of the proposed project will have positive impacts to the proponent, Kenyan economy and society at large. The impacts will include; reliable quality power supply, employment opportunities, increase in the national/local investment and increase in government revenue. However, despite the outlined positive impacts, the proposed development will cause some negative impacts such as; noise pollution, dust generation, soil erosion, possibility of oil spills, solid waste generation, occupational hazards among others.

In a bid to reduce the negative impacts, an Environmental and Social Management Plan (E&SMP) has been developed to ensure sustainability of the project activities from construction through operation to decommissioning. The plan outlines project activities, associated impacts, mitigation measures and parameters to be monitored. Implementation timeframes and responsibilities are defined, and where practical, the cost estimates for recommended measures are also provided.

Most of the negative impacts will occur during construction. Therefore monitoring is very crucial to check implementation of the ESMP. It will help in identifying changes or impacts that occur to the environment due to project activities. It involves continuous 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 and mitigated.

From the findings of this study, the following conclusions are made:
- Most of the negative impacts will occur in construction phase.
- The proposed project will generate socio-economic benefits which would not be realized if the project is not implemented.
- The negative 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 ESMP will ensure environmental sustainability.
The proposed project design will adhere to all applicable laws and procedures. The project associated infrastructures will be constructed to the required planning/architectural/structural designs and standards.

During project implementation, operation and decommissioning stages sustainable environmental management (SEM) will be ensured; avoiding excess use of natural resources, conserving nature 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 line with the proposed mitigation measures, the proposed project is beneficial to the proponent, consumers and the economy at large.

11.2 Recommendations
As earlier noted, the proposed project will bring positive impacts including, creation of employment opportunities, gains in the local and national economy, better power supply, provision of market for supply of building materials, informal sectors benefits, increase in revenue, improvement in the quality of life for public and optimal use of land. The positive impacts notwithstanding, the project will bring various negative impacts hence the need to address and mitigate them.

It is strongly recommended that a concerted effort between the proponent and the contractor be exercised in implementing the Environmental Management and Monitoring Plan. 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.

In regard to 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:

- 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 project.
- Construction activities must be undertaken only during the day i.e. between 0600 hours to 1800 hours.
All solid waste materials and debris resulting from the project must be disposed off at approved dumpsites.

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).

Ensure proper water usage during construction phase.

Proper and regular maintenance of construction machinery and equipment to 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.

Undertake Environmental and safety audits annually or as prescribed by the Authority during the operational phase

The study recommends implementation of this project subject to adherence to all the proposed mitigation measures and other relevant guidelines and legislation governing; labor force management, public and occupational, health and safety, management of hazardous and contaminating material and management of wastes.

The proponent must closely supervise construction to ensure implementation of EMSP while the contractor is expected to exercise diligence while working to achieve impacts mitigation and ensure structural strength, safety, and efficient operation of the project.

11.3 Authorization Opinion

The expert/environmental practitioner is required by NEMA to provide an opinion as to whether the activity/proposed project should or should not be authorized. Therefore, a qualified opinion is given and in this regard the Lead expert believes that sufficient information is available for NEMA to make a decision. The fundamental opinion is whether to allow development which brings socio-economic benefits 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. If NEMA authorizes the proposed development, NEMA must also decide whether all the components of the applicant’s preferred alternatives are acceptable. The Lead Expert believes that the EIA assessment has 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 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 the opinion of the Environmental expert that the anticipated negative impacts can readily and effectively be mitigated. Generally, 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:

- British Standard (BS) 5228 Part 4, 1997: Noise Control on Construction and Open Sites: Code of Practice for Noise and Vibration Control applicable to piling operations
- British Standard (BS) 8103:1999: Sound Insulation and Noise Reduction for Buildings
- British Standard (BS) 5228 Part 1, 1997: Noise and Vibration Control on Construction and Open Sites
- Environmental Assessment Source Book, 1999 (World Bank),
- George, C. and Lee, N., 2000 Environmental Assessment in Developing and Transitional Countries, Willey: Chichester, UK
- Government of Kenya (GoK), Building code, Building order 1968 and Grade 11 Building Order 1968
- Government of Kenya: Medical Examination Rules 2005
- Kiambu West District Development Plan, 2008 - 2012
ANNEXES

Annex 1: Copy of Land Ownership Documents

[Image of a copy of a certificate of title]

[Text of the certificate of title]

- **Republic of Kenya**
- **The Registration of Titles Act** (Chapter 281)
- **Certificate of Title**
- **Title Number**: I.R. 03997
- **Term**: 999
- **Annual Rent Shillings**: 1,406/= (Revisable)
- **I hereby certify that**: PAUL KINUTEA HIRHU & CHRISTOPHER KASANJA CHEGE

of KIKUYU (Post Office Box Number 323) in the Republic of Kenya pursuant to a Transfer registered as Number I.R. 30310/11

is/are now registered proprietor(s) as Lessee(s) as tenants in common in equal shares from the Government of the Republic of Kenya for the term of nine hundred and ninety nine (999)

years for the first day of July One thousand nine hundred

and nine of all that piece of land situate S. of Limuru Town

in the KIAMBU District containing by measurement eight decimal three nine two eight

hectares) (one road reserve) (0.3926) of a

hectares) (one) or thereabouts and being Land Reference Number 12049/20

(Original Number

as delineated on Land Survey Plan Number 226155

annexed to the said Transfer

SUBJECT however to the revisable annual rent of Shillings one thousand four hundred and sixty

(1,460/=) (Revisable)

and to the Act Special Conditions Encumbrances and other matters specified in the Memorandum hereunder written.

In witness whereof I have hereunto set my hand and seal this Twenty fifth day of May One thousand nine hundred and


**Memorandum**

1. The Government Lands Act (Chapter 280).
2. The Special Conditions contained in a Grant registered as Number I.R. 26489/1
3. Registration of Titles Act (Chapter 281)
4. Caveat by E.A. Power and Lighting company limited registered on I.R. 26489/2
Annex 2: Change of use

Change of use is in the process and will be submitted.
Annex 3: Schematic diagram of the Substation
Annex 4: Minutes of Public Consultative Meeting Held In Project area
Date 23/3/2012

Venue: Kagia farm (public meeting ground) near the Project site

Agenda: Public Consultation for Environmental Impact Assessment for 66/11 kV Substation.

The meeting began by a word of prayer from one of the community members at 15.21 p.m

The assistant chief of Kerwa sub location welcomed all in attendance and expressed the need for all the people to participate in the meeting. He then called on the EIA team to explain the agenda of the meeting in details. Pius Ngari (Environmentalist) explained the importance of EIA process and the role of consultations before construction decisions are made. He further explained the need for the project and the type of substation and associated structures i.e the incoming and outgoing feeders to be constructed. Additionally, the environmentalist explained the positive impacts of the project including; increased supply of electricity, direct and indirect skilled and non-skilled employment opportunities, gains in the local and national economy, increase in government revenue, provision of market for supply of construction materials, informal sectors benefits among others e.t.c.

Roseline Njeru a socio economist explained the negative impacts of the project such as: soil erosion due to vegetation clearance, dust, solid waste, noise, visual intrusion and aesthetic impacts, impacts of construction material sourcing (e.g. quarrying), occupational health and safety impacts, social vices, public safety, hazardous waste and stress on local infrastructure.

It was also noted that most of the negative impacts will occur during construction and so are temporary. However, the proponent would provide mitigation measures for the negative impacts through and Environmental and social management plan.

Question and answer/suggestions session

Question 1: When is the project taking off?

Answer: the project has to be licensed by NEMA before any construction can begin.
Question 2: Are we going to be supplied directly from the new lines to be constructed?

Answer: No. Power will be fed to the substation and then be distributed through the existing low voltage lines.

Question 3: How sure are we that we shall get employment during construction?

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

Question 4: What about the lines passing over the highway?

Answer: The highway will not be disturbed. The line will pass through micro tunneling.

Question 5: We have engineers and technicians, why can’t you offer them skilled jobs.

Answer: The work will be given to a contractor and all will be free to apply.

The list of attendance is attached.
List of attendance

KENYA POWER AND LIGHTING COMPANY-ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED RIRONI 66/11KV SUBSTATION.

ACTIVITY: PUBLIC CONSULTATION (BARAZA)

DATE: 23/3/2012

VENUE: KAGIA FARM

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<th>SIGNATURE</th>
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<td>ASST/CHIEF KAEI</td>
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<td>GEORGE C. KANYAGO</td>
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<td>PETER K. MUGURI</td>
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<td>JOHN NGICI MUTUKI</td>
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<td>Peter Njia Ngunga</td>
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<td>Pius Muga</td>
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Annex 5: Photo plate

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<th>Proposed site (viewed along the Nairobi Nakuru highway)</th>
<th>Proposed site</th>
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<td>Businesses and flats near the site</td>
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Annex 6: Lead Experts Practicing License

FORM 7

(r.15(2))

Application Reference No: ................. 1131

License No: .................................. 0259

FOR OFFICIAL USE

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

WILFRED K. KOECH

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

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

...........NAIROBI..................................................................................

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

........... LEAD..................................................................................

in accordance with the provisions of the Environmental Management and Coordination Act, 1999

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

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

(Seal)

Director General

The National Environment Management Authority
Annex 7: Sample of Public Consultation Questionnaires used during the public consultations exercise.
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE...................
DATE: 23/05/12...
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   - There will be constant power supply
   - There will be enhanced security

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

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   - The contractor should mark the construction site during daytime.

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

NAME OF RESPONDENT: [Redacted, name redacted]
DISTRICT: Kikuyu
LOCATION/AREA: Kikuyu
ID NO. [Redacted, ID number redacted]
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE..................
DATE..............................
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   
2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   
3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   
4. Do you support the construction and operation of the proposed substation? tick as appropriate
   Yes [ ] No [ ]

NAME OF RESPONDENT ...
DISTRICT..........................
LOCATION/AREA...KAG-road 
ID NO. ...
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE..........................
DATE..........................
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

   The construction of the substation will improve access to electricity, bring development to the area, and create job opportunities.

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

   The construction will cause disruption to the local community, and the noise may affect the health of residents.

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

   The construction will be done in phases, and the noise will be controlled with barriers.

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

NAME OF RESPONDENT: [ ]

DISTRICT: [ ]

LOCATION/AREA: [ ]

ID NO.: [ ]
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 23/3/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

NAME OF RESPONDENT: Christopher Karujo
DISTRICT: Kikuyu
LOCATION/AREA:
ID NO.: 72697927

[Handwritten notes and signatures]
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11kV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE:...

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   a. Employment
   b. Electricity Power will increase
   c. Security will be sufficient
   d. 

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   a. Noise will affects schools, etc.
   b. 
   c. Skilled people from the area might be of negative influence
   d. 

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   a. To make sure that they work during day times
   b. To minimize dust by watering the site
   c. To ensure contractors of good conduct
   d. 

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

NAME OF RESPONDENT: Michael N Kigen
DISTRICT: Kikuyu
LOCATION/AREA: 
ID NO: 

...
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

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

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

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

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 23/11/2022

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

NAME OF RESPONDENT: FREDRICK KURUK

DISTRICT: Kikuyu

LOCATION/AREA: Kikuyu, Kenya

ID NO.: 220674760
ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE................................
DATE: 27/02/2002
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 28/11/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   1. Increased Employment
   2. Security
   3. Electrical Power will increase

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   1. Disturbance big noise
   2. Dust
   3. Misconduct of contractors

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   1. No Working during night hours
   2. To control dust by maximising dust
   3. To build wall around to control construction

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

NAME OF RESPONDENT: Samuel Njuguna Nganga
DISTRICT: Kiambu
LOCATION/AREA: Kikuyu Town
ID NO. 1081136

Proposed 66/11kV substation in Kikuyu District

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 23/03/20/22

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 31/03/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

   Yes [ ] No [ ]

NAME OF RESPONDENT: [Signature]

DISTRICT: [Signature]

LOCATION/AREA: [Signature]

ID NO.: [Signature]
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 23/2/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

- [ ] There will be no power loss due to theft
- [ ] Job creation for the community
- [ ] Increase due to electricity addition
- [ ] Security
- [ ] People can have their jobs

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

- [ ] Dust to be a health hazard
- [ ] Noise due to construction
- [ ] Vehicles likely to be monitoring
- [ ] Dust and noise from ongoing construction

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

- [ ] To pour water to avoid dust
- [ ] To save the area to avoid electricity (execute)
- [ ] To save financially

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

- [ ] Yes
- [ ] No

NAME OF RESPONDENT: Ngare Waumbi

DISTRICT: Kikuyu

LOCATION/AREA: Kerewa

ID NO: 1884869
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 2023/03/04

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   - Will have enough power supply
   - Schools will have enough knowledge (common)
   - Good streets

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   - Reduction in psyches caused by loud noises from the foreign (unidentified)
   - Noise

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   - Develop traffic maps
   - Use wire fences for the amazon children

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

NAME OF RESPONDENT: [Signature]
DISTRICT: KIKUYU
LOCATION/AREA: KIKUYU
ID NO.: 3168500

Kения Power

Environmental Impact Assessment Project Report  Page 138
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 23/3/2022

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

[Tick where applicable]

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

[Tick where applicable]

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

[Tick where applicable]

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

[ ] Yes [ ] No

NAME OF RESPONDENT

DISTRICT

LOCATION/AREA

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

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 3/17/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

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

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

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

   Yes [ ]  No [ ]

NAME OF RESPONDENT: [Signature]

DISTRICT: Kikuyu

LOCATION/AREA: Ken:Trans

ID NO.: 253871677
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE..........................
DATE........23/1/2012..........................
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   1. Jobs created
   2. Enhanced power production
   3. Enhanced community

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   1. Dust during construction
   2. Noise
   3. Danger of electric shock

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   1. Construction site should be cordoned off
   2. Power cut-off on site to avoid electrocution

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

NAME OF RESPONDENT: Kennedy Njungo
DISTRICT: Kikuyu
LOCATION/AREA: Kikuyu
ID NO. 27293230
ENIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE..........................
DATE..................................%
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   - Noise
   - Environmental pollution
   - Health hazards
   - Noise due to excessive frequencies

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   - Security wire around the site
   - Bells during the day time

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

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

PUBLIC CONSULTATION QUESTIONNAIRE..........................
DATE: 20TH MARCH, 2012
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   - Employment opportunities
   - Industrial development
   - Better connectivity
   - Improved living conditions
   - Increased agricultural productivity

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   - People may lose their homes, farmland, and land
   - Soil erosion and decreased water levels
   - Air and noise pollution

3. Propose various mitigation measures that the proponent/project developer should put in place to address the negative impacts you have mentioned?
   - Find alternative land for the people displaced
   - Employment opportunities
   - Mitigation techniques

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

NAME OF RESPONDENT: [signature]
DISTRICT: [signature]
LOCATION/AREA: [signature]
ID NO.: [signature]
ENVIROMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE

DATE: 23/03/2012

RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

   - Increased opportunity
   - Increased Ramirez
   - Increased security
   - Increased water supply

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

   - Noise pollution
   - Dust
   - Reduced property value
   - Increased accidents

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

   - Work should be done during the day time.
   - Watering

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

   Yes [ ] No [ ]

NAME OF RESPONDENT: [ ]

DISTRICT: [ ]

LOCATION/AREA: [ ]

ID NO.: [ ]
ENVIRONMENTAL IMPACT ASSESSMENT QUESTIONNAIRE FOR THE PROPOSED RIRONI 66/11 KV SUBSTATION.

PUBLIC CONSULTATION QUESTIONNAIRE........................
DATE........22/3/2012
RESPONDENTS: MEMBERS OF THE PUBLIC/NEIGHBOURING THE SITE

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

   This area will develop and the residents will benefit from the proposed project.

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

   No impacts.

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

   To make sure the area residents benefit from the project.

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

   Yes ☑ No ☐

NAME OF RESPONDENT: Kapha Kanyago
DISTRICT: Kikuyu
LOCATION/AREA: KERUJA
ID NO. 0762319
Environmental Impact Assessment Questionnaire for the Proposed Rironi 66/11KV Substation.

Public Consultation Questionnaire

Date: 30-02-2012

Respondents: Members of the Public/Neighbouring the Site

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

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

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

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

   Yes [X]        No [ ]

Name of Respondent: [Signature]

District: [Signature]

Location/area: [Signature]

ID No.: [Signature]
ENvironmental Impact Assessment Questionnaire for the Proposed Rironi 66/11 kV Substation.

Public Consultation Questionnaire...

Date...

Respondents: Members of the public/neighbouring the site

1. What positive impacts/benefits do you think/anticipate will arise during construction, operation and decommissioning of the proposed substation?
   - Improved standard of living infrastructure
   - Improved communication and information exchange
   - Reduction in crime due to quick reporting of incidents

2. What are the negative impacts that could result from the construction, operation and decommissioning of the proposed substation?
   - Attract theft of transformer, power cables
   - Environmental pollution through

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

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

Name of Respondent: Carolin Imaya
District: Kikuyu
Location/Area: Kabete
ID No. 21882877

Environmental Impact Assessment Project Report  Page 147