ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED ISIOLO-MARALAL TRANSMISSION LINE PROJECT

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EXECUTIVE SUMMARY

Introduction

According to the Ministry of Energy, the existing power transmission system capacity is constrained particularly during peak hours when system voltages in parts of Nairobi, Coast, West Kenya and Mount Kenya drop below acceptable levels, causing occasional load shedding despite the availability of generation capacity.

To address these constraints, the Kenya Electricity Transmission Company (KETRACO) has identified the need for a number of new transmission projects. Among these projects is the 220kV Double Circuit Isiolo – Maralal transmission line project. The project is aimed at enhancing the adequacy, reliability, and security of electricity power supply in Samburu County. The project will also help meet the increasing demand for power supply and minimize the frequency of power outages.

A new 132kV substation is proposed to be constructed at Maralal by 2017 with connectivity to Rumuruti through Maralal-Rumuruti 132kV transmission line. The load demand at Maralal substation is of order of 2-8 MW over the years. To improve the reliability of power supply of Maralal substation, it is proposed to connect Maralal to Isiolo substation.

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

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

Study Objectives

The principal objective of this assessment was to identify significant potential impacts of the project on environmental and social aspects, and to formulate recommendations to ensure that the proposed project

takes into consideration appropriate measures to mitigate any adverse impacts to the environment and people's health through all of its phases (construction, implementation and decommissioning phases).

Study Methodology

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

The key activities undertaken during the assessment included the following:

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

Conclusion

An Environmental and Social Management Plan (ESMP) outline has been developed to ensure sustainability of the site activities from construction through operation to decommissioning. The plan provides a general outlay of the activities, associated impacts, and mitigation action plans. Implementation timeframes and responsibilities are defined, and where practicable, the cost estimates for recommended measures are also provided.

A monitoring plan has also been developed and highlights some of the environmental performance indicators that should be monitored. Monitoring creates possibilities to call to attention changes and problems in environmental quality. It involves the continuous or periodic review of operational and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental

degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted.

It is strongly recommended that a concerted effort is made by the site management in particular, to implement the Environmental Management and Monitoring Plan provided herein. Following the commissioning of the proposed 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.

It is quite evident from this study that the construction and operation of the proposed project will bring positive effects in the project area including improved supply of electricity, creation of employment opportunities, gains in the local and national economy, provision of market for supply of building materials, informal sectors benefits, Increase in revenue, Improvement in the quality of life for the workers and community members, and Improved security.

Considering the proposed location, construction, management, mitigation and monitoring plan that will be put in place, the project is considered important, strategic and beneficial and given that all identified potential negative impacts can be mitigated and that no community objection was received, the project may be allowed to proceed.

Table of Contents

LIST OF TABLES

LIST OF APPENDIXES

LIST OF ABBREVIATIONS

AFD	Agence Francaise de Development
AfDB	African Development Bank
AGO	Automotive Gas Oil
AST	Above Ground Storage Tank
CB	Circuit Breaker
CT	Current Transformer
CVT	Constant Voltage Transformer
CO_2	Carbon Dioxide
CO	Carbon Monoxide
DO	District Officer
DOHSS	Directorate of Occupational Health and Safety Services
DC	District Commissioner
EA	Environmental Audit
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMCA	Environmental Management and Coordination Act, 1999
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
ERC	Energy Regulatory Commission
GDC	Geothermal Development Company
GHGs	Green House Gases
GoK	Government of Kenya
HFO	Heavy Fuel Oil
IPP	Independent Power Producer
KenGen	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KPLC	Kenya Power and Lighting Company
Kshs.	Kenya Shillings
kV	Kilo Volt
KWH	Kilo Watt Hour
KWS	Kenya Wildlife Service

LCPDP	Least Cost Power Development Plan
L.R	Land Registration
mg/kg	Milli grams per kilogram
MoE	Ministry of Energy
MW	Mega Watts
MVA	Mega Volt Amperes
NEMA	National Environment Management Authority
NOX	Oxides of Nitrogen
OSHA	Occupation Safety and Health Act
PM	Particulate Matter
PPE	Personal Protective Equipment
REA	Rural Electrification Authority
SF_6	Sulphur Hexafloride
SHE	Safety Health and Environment
SOX	Oxides of Sulphur
STD	Sexually Transmitted Diseases
WRMA	Water Resources Management Authority

CHAPTER 1: INTRODUCTION

1.1: PROJECT BACKGROUND

Vision 2030 is Kenya's development blueprint covering the period 2008 to 2030. The objective of Vision 2030 is to help transform Kenya into a, "middle-income country providing a high quality of life to all of its citizens by the year 2030". The Vision outlines the Government of Kenya's economic growth objectives.

Vision 2030 recognizes the energy sector as one of the infrastructure enablers of the economic, social and political pillars underlying the Vision. The sessional paper No. 4 of 2004 on Energy recognizes that affordable, quality and cost effective energy services is an important prerequisite for attainment of accelerated social and economic growth and development. In view of these considerations, energy sector development is a key policy concern for Kenya's development.

To guide the energy sector development, the Ministry of Energy in 2011 developed the Least Cost Power Development Plan (LCPDP). In pursuit of the provisions of section 5 (g) of the Energy Act No. 12 of 2006 that mandates the Energy Regulatory Commission to prepare Indicative National Energy Plans, the Commission in conjunction with key stakeholders in the energy sector including; officers from the Ministry of Energy (MoE); Kenya Electricity Generating Company (KenGen); Kenya Power and Lighting Company (KPLC); Kenya Electricity Transmission Company (KETRACO); Geothermal Development Company (GDC); Rural Electrification Authority (REA); The Ministry of State for Planning, National Development; Kenya Vision 2030 Board, Kenya Investment Authority (KenInvest); Kenya Private Sector Alliance (KEPSA); and the Kenya National Bureau of Statistics (KNBS); updates the LCPDP every second year. This report focuses on developments in the electric power sub-sector and takes a long-term view of the sector, given a set of assumptions.

According to ERC annual report 2014/2015, The demand for electric power continued to rise significantly over the last five years driven by a combination of normal growth, increased connections in urban and rural areas as well as the country's envisaged transformation into a newly industrialized country as articulated in Vision 2030. However, the power market remained unbalanced with this demand not fully met by supply. This is mostly due to system constraints and weather challenges. The peak demand rose from 1468MW in 2013/14 to 1512MW in 2014/15. The supply of electricity showed a 6.8% increase from 8,839GWh in 2013/14 to 9280GWh in

2014/15. The recorded total consumption also demonstrated a significant increase, recording a total of 7655GWh compared to 7244GWh in 2013/2014.

The number of customers connected to the national grid increased by 30.5% from 2,767,983 in 2013/14 to 3,611,904 in 2014/15. The customer base had increased by 18.7% between 2012/13 and 2013/14. This increase in number of customers was as a result of the "last mile connectivity" by KPLC where life line customers were being connected at KES 1,160.00 and continued enhanced connectivity by the Rural Electrification Authority to schools and other public amenities. The sales of the commercial and industrial customer category increased marginally, from 3,819GWh in the year 2013/2014 to 4,030GWh in 2014/2015.

As at June 2015, Kenya had an installed electricity generation capacity of 2,299MW comprising of hydro (821MW), thermal (827MW), geothermal (598MW), wind (25.5MW), co-generation (26MW), and solar (0.57MW).

Table 1.1: Installed Capacity and Effective Power Generation

	Installed MW	**Effective MW**
Hydro	820.7	800
Geothermal	588.0	579.9
Thermal (MSD)	720.0	701.5
Temporary Thermal (HSD)	30.0	30.0
Thermal (GT)	60.0	54.0
Wind	25.5	25.5
Cogeneration	26.0	21.5
Interconnected systems	2,270	2,210
Off grid thermal	26.8	23.1
Off grid wind	0.66	0.61
Off grid solar	0.55	0.212
Imports	000	000
Total capacity	**2,299**	**2,234**

Source; KPLC 2014/2015

The existing transmission network lengths stands at 1,434km of 220kV and 2,513km of 132kV while the distribution network stands at 1,212km of 66kV, 20,778km of 33kV and 30,860km of 11kV lines respectively. Sub-station capacity expanded from 3,181MVA in 2013/14 to 3,612MVA in 2014/15.

Table;Transmission Circuit Network (kms)

Voltage (KV)	**2014/2015**
220	1,527
132	2,527
66	1,212
33	21,370
11	32,823
415/240 or 433/250	23,502
TOTAL	**82,961**

Source; ERC

The existing transmission system capacity is constrained particularly during peak hours when system voltages in parts of Nairobi, Coast, West Kenya and Mount Kenya drop below acceptable levels, causing occasional load shedding despite the availability of generation capacity.

To address these constraints, the Kenya Electricity Transmission Company (KETRACO) has identified the need for a number of new transmission projects. Among these projects is the 220kV Double Circuit Isiolo – Maralal transmission line project. The project is aimed at enhancing the adequacy, reliability, and security of electricity power supply in Samburu County. The project will also help meet the increasing demand for power supply and minimize the frequency of power outages.

A new 132kV substation is proposed to be constructed at Maralal by 2017 with connectivity to Rumuruti through Maralal-Rumuruti 132kV S/c transmission line. The load demand at Maralal substation is of order of 2-8 MW over the years. To improve the reliability of power supply of Maralal substation, it is proposed to connect Maralal to Isiolo substation.

The Kenya Government policy on all new projects requires that an Environmental and Social Impact Assessment (ESIA) study be carried out at the project planning phase in order to ensure that significant

impacts on the environment are taken into consideration at the construction, operations and decommissioning stages.

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

1.2: STUDY OBJECTIVES

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

The specific objectives of this ESIA were to:

- Identify and assess all potential environmental and social impacts of the proposed project;
- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;
- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
- Prepare an Environmental Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

1.3: TERMS OF REFERENCE (TOR) FOR THE ESIA PROCESS

The following are the TOR for the ESIA process

- Description of the baseline environment (physical, biological, social and cultural)
- Detailed description of the proposed project
- Review Legislative and regulatory framework that relate to the project
- Identify potential environmental impacts that could result from the project

- Carry out public consultation on positive and negative impacts of the project
- Propose mitigation measures against identified environmental and social impacts of the project
- Development of an Environmental Management Plan to mitigate negative impacts
- Development of an Environmental Monitoring Plan
- Prepare an Environmental and Social Impact Assessment Report

1.4: SCOPE OF THE STUDY

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the immediate environment as may be affected or may affect the proposed project. Any potential impacts (localized or delocalized) are also evaluated as guided by EMCA 1999 and the Environmental Management and Coordination (Environmental impact assessment and Audit) Regulations, 2003. This report includes an assessment of impacts of the construction, operations and decommissioning of the proposed project site and its environs with reference to the following:

- A review of the policy , legal and administrative framework
- Description of the proposed project.
- Baseline information (bio-physical and socio-economic)
- Assessment of the potential environmental impacts of the proposed project on the biophysical, social-economic, religious and cultural aspect
- Recommendation of cost effective measures to be used to mitigate against the anticipated negative impacts
- Proposition of alternatives
- Problems (non-conformity) identification and recommendation of measures to improve the existing management system;
- Preparation of an Environmental and Social Impact Assessment Report compliant to the Environmental Management and Coordination Act (1999) and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

1.5: ESIA APPROACH AND METHODOLOGY

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

of the community in the project areas, and discussions with key informants (local administration and heads of departments)

The key activities undertaken during the assessment included the following:

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

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

Step 1: Screening

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

Step 2: Desk Study

Documentation review was a continuous exercise that involved a study of available documents on the project including the project set-up plans and architect's statement, land ownership documentation, environmental legislation and regulations, district development plans, location maps, etc.

Step 3: Site Assessment

Site assessment was conducted between 22nd and 30th September 2016 to establish:

- Land ownership, usage and conflicts;
- Flora, fauna and avifauna found on the site;
- The site landscape
- Surface water bodies within the neighbourhood of the site and;

- The general environment and its sensitive receptors found within the environs of the site.

Step 4: Public Consultation

Detailed stakeholders consultations for this study were undertaken from 22nd to 28th September 2016. These consultations were conducted in the form of:

- Key Informant Interviews and questionnaires:-
- Open-ended questionnaires and
- Public Barazas,

Step 5: Reporting

The ESIA Study Report was written in accordance with the Environmental (Impact Assessment and Audit) Regulations, 2003.

CHAPTER 2: PROJECT DESCRIPTION

2.1: PROJECT DESCRIPTION

The project will essentially involve the construction of a 220kV double circuit transmission line from Isiolo to Maralal

Detailed scope of work for the project is as follows:

1. Transmission Line
   a) Isiolo – Maralal 220kV D/c line (165km)
2. Substation
   a) Substation Extension at Isiolo
   b) Substation Extension at Maralal

2.2: TRANSMISSION LINE DESIGN

2.2.1; Line Configuration

The 220 kV D/c transmission line shall have vertical configuration of conductors.

2.2.2; Towers

The towers shall be self-supporting latticed bolted steel towers fabricated from structural steel. Tower components and bolts & nuts shall be hot dip galvanized.

The following configuration of towers shall be used in the line:

a) 'S' type suspension towers for upto 2 degree angle of deviation.
b) 'LA' type light angle tension towers for upto 15 degree angle of deviation.
c) 'MA' type light angle tension towers for upto 30 degree angle of deviation.
d) 'HA' type light angle tension towers for upto 60 degree angle of deviation and suitable for dead end condition. These shall also be used for terminal locations.

The standard extensions/truncations normally used for various types of towers are as follows:

a) S : -3m, 0m, 3m, 6m,18m
b) LA & MA : : -3m, 0m, 3m, 6m
c) HA : -3m, 0m, 3m, 6m, 18m

Besides the standard body extensions, the following leg extensions shall also be designed to be used at hill slope locations:

All towers : -2m, -1m, 0m, 1m, 2m, 3m

In addition to the above, special towers, for major river crossing, power line crossing and the places where the terrain is particularly different, such as approach to the sub-station, forest stretches etc. shall also be used. All towers shall be designed in accordance with latest edition of International Standards.

Structural steel sections used in towers shall be of Mild Steel (MS) and High Tensile (HT) steel of requisite quality as per ASTM A36M and A572M(Grade 345) respectively or equivalent International Standards.

All structural steel shall be hot dip galvanized in accordance with the requirements of ASTM A123M. The minimum coating thickness shall not be less than 86 microns, equivalent to 610 g/sq.m.

The basic spans, wind spans and weight spans for various towers are as follows:

Basic Span = 300 m

Table 2.1; Basic Spans, Wind Span and Weight Span

Sl. No.	Application	Designation	Angle (degree)	Wind Span (m)	Weight Span (m)	
					Max.	Min.
1	Suspension	S	0 -2	300	450	100
2	Tension	LA	0 - 15	300	450	200
3	Tension	MA	15 -30	300	450	200
4	Tension	HA	30 -60	300	600	500

Tower Type LA, MA & HA can be used for longer wind spans with reduced angle of deviation in the valleys wherever ground clearance permits so.

All international codes for design of Steel Transmission Line Tower have switched over to probabilistic method of design from deterministic method. In this regard, following standards shall be adopted:

a) ASCE-52:1988 - "Guide for Design of Steel Transmission Line Towers" issued by American Society of Civil Engineers.
b) IEC – 826:1991 - “Technical Report on Loading and Strength of Overhead Transmission Line Towers" issued by the International Electro Technical Commission.

All structures shall be designed to withstand loadings due to maximum wind,
maximum ice prevalent in the line route.

2.2.3; Conductors

Conventional ACSR type conductor is proposed based on system requirements as this is the most common type of conductors with proven technology having low cost & easy availability.

Single ACSR Lynx conductor (30/2.79 mm Aluminum and 7/2.79 mm steel) of overall diameter 19.53 mm shall be used.

The maximum allowable every day tension shall not exceed 20% of the ultimate tensile strength of the conductor.

2.2.4; Earthwire

Optical Ground Wire (OPGW) shall be used on the line. The mechanical & electrical characteristics of OPGW shall be similar to the conventional aluminium clad steel wire of 7/3.15mm. The OPGW shall contain 48 nos. of fibres (DWSM) conforming to ITU-T G.652D.

OPGW shall withstand two successive lightning stroke of 150 kA. Shielding angles of 30 deg is considered for transmission line.

The maximum allowable every day tension shall not exceed 15% of the ultimate tensile strength of the OPGW.

2.2.5; Insulator and Hardware Fittings

The Insulator strings shall consist of Standard discs made of either electro-porcelain or toughened glass for a three phase, 132 kV transmission line in a medium polluted atmosphere (20 mm/kV phase-to-phase) The discs shall be cap and pin, ball and
socket type.

As an alternative, insulator strings with composite long rod insulators shall be used. Suitable hardware fittings shall be used for attachment of the insulators with the tower at one end and also for supporting the conductors

at the other end. Corona control rings or grading rings will be used for improving corona and RIV performance as well as to improve the voltage distribution across the insulators discs.

2.2.6; Line Accessories

Mid span compression joint for conductor/ earthwire

Compression joints suitable for conductor /earth wire shall be used for joining two lengths of conductor / earthwire. The minimum slipping strength of the joint after compression shall not be less than 95% of the UTS of conductor / earthwire.

Repair sleeve for conductor

Repair sleeve shall be used only for repairing not more than two strands broken in the outer layer of aluminium. It shall be of compression type in two parts with provision of seat of sliding of keeper piece.

Vibration dampers for conductor/ earthwire

Stockbridge vibration dampers shall be used to reduce the maximum dynamic strain caused by aeolian vibrations to a value of 150 micro-strain.

Flexible copper bond for earthwire

Flexible copper bonds shall be used for good electrical continuity between the earth wire and the tower. Two bonds per suspension tower and four bonds per tension tower shall be used.

Suspension/Tension clamps for earthwire

Suitable suspension / tension clamps shall be used for attachment of earthwire at suspension/tension towers.

2.2.7; Tower foundations

Reinforced Cement concrete footings are proposed to be used for all types of towers in conformity with the practice followed in Kenya. All the footing of the tower are proposed to be of spread type footing with maximum depth of 3.0 meters below ground level and all the four footings of the tower shall be similar irrespective of down thrust and uplift.

The locations where chiseling, drilling and blasting is required for excavation, hard rock type foundations are to be used. For these locations rock anchoring is to be provided to resist the uplift.

2.2.8; Grounding

The tower footing resistance shall be kept below 10 ohms. Normally pipe type grounding shall be used. In case of rocky ground where the ground resistance is high, counterpoise earthing shall be used to bring the tower footing resistance down to acceptable level.

2.2.9; River Crossings

Special towers shall be used for major river crossings where the span is more than 600 mtrs with anchor towers on either end of river crossing span.

2.2.10: Power line, Railway line, Road and Telecommunication line crossings

The transmission lines shall be crossing power lines, railway lines roads and Post &Telecommunication lines for which suitable extensions of towers shall be used. The standard extension normally used for various types of towers are as follows:

a) A & C : 3m, 6m, 9m
b) B & D : 3m, 6m,9m, 18m & 25m

2.3: SUBSTATION DESIGN

The basic design concepts for the Substations are described in the following paragraphs. It shall be noted that these parameters shall act as basic design parameters for the Substations and for bidding purposes, detailed specifications are to be framed.

The substations are assumed to be designed with the aim of keeping the costs at minimum and accordingly only equipment considered to be strictly necessary have been included. However, due considerations have been taken with respect to:

a) Easy and risk-free operation
b) Enable easy maintenance and repair
c) Enabling future modifications and expansions
d) The importance of the respective substations

The switchgear in the substations would be conventional outdoor air-insulated switchgear for 220kV, 132 kV and 33kV. Equipment for control, protection and auxiliary power will be housed in a small control room building. The Single Line Diagram for all the Substations considered present assignment i.e. Assignment IV has been enclosed with this document.

2.2.1; 220kV System Substation concept

The 220kV system is considered with one and a half breaker switching scheme for better reliability, availability and enable easy maintenance.

Each 220kV line/transformer/bus reactor shall be terminated in respective independent bay having switchgear equipment, protection and control system. The scheme has two main buses. Each diameter comprising of three bays (i.e. 2 nos main bays & 1 no tie bay) shall be terminated to both the buses. All 220kV Isolators and earth switches devices are assumed motor-operated.
For the 220kV system of the substation the following switchgear has been considered:

The main bay for transformer/line/Bus Reactor shall include

a) Circuit-breaker with single pole & three pole operation - 1 pc
b) Isolator with one earth E/S (one on each side of the circuit breaker) - 2 pcs
c) Isolator with one earth switch for line/transformer/reactor - 1 pc
d) Current transformer (one per phase) - 3 pcs
e) Capacitive Voltage transformers (one per phase) - 3 pcs (only for line and main bus)
f) Surge Arrestors (one per phase) - 3pcs

The tie bay shall include

a) Circuit-breaker with single pole & three pole operation - 1 pc
b) Isolator with one earth E/S (one on each side of the circuit breaker) - 2 pcs
c) Current transformers (one per phase) - 3 pcs

Each main bus shall include

a) Bus Capacitive Voltage transformers (one per phase) - 3 pcs
b) Earth Switch - 1 pc

The advantage of one and a half breaker switching scheme is that the availability (line or transformer) will not be generally affected each time the bay equipment for the particular feeder needs to be maintained. However the advantage of better reliability, availability and ease of maintenance is at a small incremental cost.

All equipments shall comply to IEC/equivalent international standards. The switchyard layout is considered with adequate space for road and accessibility for easy maintenance of bay equipments.

2.2.2; Design Requirement

The following table shows the minimum design requirements from point of view of the electrical system and other general data.

Table 2.2: Substations Design requirements

Data	**220kV**
Operating Voltage	220 kV
Max. Continous System Voltage	245 kV
System frequency	50 Hz
Maximum Design Load	1600 A
Rated Circuit Current	40 kA,1Sec
Power Frequency Withstand Voltage (rms) at System Frequency for 1 min.	460 kV
Rated BIL (Crest)	1050 kVp
System Earthing	Solid

2.2.3; Power Transformers

Outdoor transformers are assumed. Power transformers shall conform to IEC: 60076 in general. These transformers shall generally have OLTC cooling arrangement type ONAN/ONAF .The air core reactance shall be of the order of 20%. Tertiary windings shall be provided for large auto transformers, which shall be capable of being loaded.

The transformers shall be provided with Nitrogen Injection based Fire Prevention & Extinguishing System for all new 220kV Sub-stations. All the 220/33kV & 132/33kV Transformers would be two-winding type and 220/132kV transformers shall be auto transformer with on-load tap-changers. The neutral earthing of the transformers/reactors shall be solidly grounded.

Space should be foreseen in the layout so that the transformers can be replaced with bigger transformers in future. Also there will be space for accommodating minimum one no of transformers in future.

2.2.4; Shunt Reactors

Shunt Reactors, wherever provided, shall comply to IEC:289/IS:5553 in general 245kV & 145kV Shunt reactors shall have linear characteristics upto 1.4 p.u. voltage. These should be ONAN Cooled. The neutral of bus reactors shall be solidly grounded.

2.2.5; Circuit Breakers

Circuit breakers shall in general comply to IEC 62271-100 & IEC-60694 and shall be of SF6 type for 245/145kV and Vacuum type for 36kV. The rated break time shall not exceed 65 ms for 245kV & 145kV circuit breakers. 220kV & 132kV Circuit Breaker shall be suitable for single phase and three phase auto reclosing. However, 132kV CB for Transformer/reactor bays and all the 33kV Circuit breakers shall be suitable for three phase auto reclosing.

2.2.6; Isolators

The isolators shall comply to IEC 62271-102 in general. Isolators shall be generally horizontal double break type keeping in view the bus switching schemes proposed. Isolators shall be motor operated. Earth switches are provided at various locations to facilitate maintenance. Main blades and earth blades shall be interlocked and interlock shall be fail safe type. All earth switches shall be motor operated type.

2.2.7; Current Transformers

Current Transformers shall comply to IEC 60044-1 in general. All ratios shall be obtained by secondary taps. Current transformers shall have five secondary cores for 220KV & 132kV. The metering core shall be of 0.2S accuracy class. For 33kV CT maximum 3 Nos. secondary cores with metering core of 0.2 accuracy class shall be considered. The burden and knee point voltage shall be in accordance with the requirements of the system including possible feeds for telemetry.

2.2.8; Capacitor Voltage Transformers

Voltage transformers shall comply with IEC 60044-5 in general. These shall have three secondaries out of which two shall be used for protection and one for metering. Accuracy class for protection core shall be 3 P and for metering core shall be 0.2. The Capacitance of CVT shall be 4400pF depending on requirements.

2.2.9; Surge Arresters

Station class current limiting, heavy duty gapless type Surge arresters conforming to IEC 60099-4 in general shall be provided. The rated voltage of Surge arrester and other characteristics are chosen in accordance with system requirements. Surge arresters shall be provided near line entrances and transformers/reactors so as to achieve proper insulation coordination. These shall be fitted with pressure relief devices and diverting ports

suitable for preventing shattering of porcelain housing providing path for the flow of rated currents in the event of arrestors failure.

The switchgear shall be designed and specified to withstand operating conditions and duty requirements.

2.2.10; Auxiliary power

For new substations, duplicated station service supply should be foreseen, so that there will be no interruption of service even if one supply should suffer a failure. (Cost of duplicated supply is moderate compared to the overall cost of the substation.)

Operation of circuit-breakers and systems for protection and control will be fed from a DC-system with battery back-up. Voltage will be 110V-DC to cope with the physical distances in the sub-stations. The system will be isolated from earth to reduce risk of mal-operation because of earth-faults. The DC system will be duplicated, including two rectifiers and two batteries. This is to enable maintenance, repair and replacements without interrupting the supply.

One No. of DG set of suitable capacity should be considered for each new sub-station.

2.2.11; Control and protection

The control and monitoring of the sub-station shall be using Sub-station Automation System based on IEC 61850 communication protocol. The sub-station shall have provision for operation from local and remote i.e. Remote control centre/National Load Dispatch using Fiber optic based SDH communication equipment.

Protective functions will be split between the two DC systems to ensure the best independency between protection functions that are back-up for each other.
Circuit breakers will have duplicated trip coils. Trip coil circuits will include circuit supervision. Protective relays will be programmable and will include test facilities.

The protection scheme shall include:

220kV lines:

- Line differential protection (Main-I)
- Distance protection (Main-II)
- Directional earth fault protection
- Autoreclosing with synchro-check
- Breaker failure protection

- Synchro-check blocking of circuit-breaker closing

Transformer 220kV bays:

- Differential protection
- Directional overcurrent protection
- Directional earth fault protection
- Restricted earth fault protections
- Overload protection
- Overflux protection
- Breaker failure protection
- Bucholz relay for transformer tank
- Bucholz relay for on-load tap changer
- Temperature protection (oil and winding)
- Oil level protection
- Pressure relief device

Transformer 33kV bay:

- Restricted earth-fault protection
- Non-directional earth-fault protection
- Non-directional earth-fault protection

220kV/132kV bus:

- Busbar protection

33kV lines:

- Non directional over-current protection
- Non-directional earth-fault protection
- Auto-reclosing function
- Synch-check blocking of circuit breaker closing
- Under frequency protection with load shedding of 33kV lines

For tele-protection, data & speech application, optical fibre based telecommunication (SDH) equipment has been considered. For 132kV & 220kV transmission line protection scheme i.e. Line Differential Relays & Distance Relays above communication link has been considered. The new substation shall be integrated into the existing Load Dispatch Centre.

2.3: TRANSMISSION LINE ROUTE

The route of traverse and proposed substation sites are roughly defined by coordinates as follows;-

Table 2.3; Isiolo – Maralal Coordinates (UTM ARC 1960)

Proposed Isiolo – Maralal Transmission Line Route					
	UTM Arc 1960 37N		**Geographical**		**Description**
D_A	E	N	Lat	Long	County
T-OFF	341341.448	46369.071	0.4194230	37.5743110	Isiolo
AT1	341416.982	51838.930	0.4689000	37.5749800	Isiolo
AT2	323778.490	62598.257	0.5661800	37.4164960	Isiolo
AT3	323309.097	65314.031	0.5907420	37.4122720	Samburu
AT4	310038.115	103168.990	0.9330700	37.2929200	Samburu
AT5	261870.359	96127.514	0.8691650	36.8602830	Samburu
AT6	251757.093	101429.819	0.9170510	36.7694260	Samburu
AT7	230245.178	100809.827	0.9113200	36.5762470	Samburu
SSTN	229833.725	113429.797	1.0254010	36.5724710	Samburu

Table 2.4; Proposed Isiolo Substation

E	**N**
341989.26	45110.84
340997.08	45124.07
340990.98	46281.66
341989.66	46305.51

Table2.5; Proposed Maralal Substation

E	**N**
228791.908	114009.766
229999.072	114026.303
230023.805	113432.709
228804.066	113414.026

2.4: PROJECT JUSTIFICATION

Currently electricity is accessible to less than 20% of the total population and approximately 5% of rural population. The government's goal is to accelerate access rate to 40% of rural population by 2040.To achieve this, the government has prepared the Energy Scale up program covering the period 2008 to 2017.This would be approached from among others, improvement and expansions of the system networks. This project will contribute in the expansion of the transmission network.

A new 132kV substation is proposed to be constructed at Maralal by 2017 with connectivity to Rumuruti through Maralal-Rumuruti 132kV S/c transmission line. The load demand at Maralal substation is of order of 2-8 MW over the years. To improve the reliability of power supply of Maralal substation, it is proposed to connect Maralal to Isiolo substation.

2.5: PROJECT BUDGET

The estimated cost of the project is approximately **US$ nineteen million four hundred and fout thousand, six hundred and eighty six (19,404,686).**

2.6: TARGET GROUP FOR THE ESIA REPORT

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

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

- Funding agencies and donors;
- Relevant government ministries and agencies for policy implementation;
- Affected and Interested persons;
- Planners and Engineers to be involved in preparation of designs and plans for the project;
- Contractors to be engaged in the project;
- People to be involved in the management and operation of the project.

2.7: ANALYSIS FOR ALTERNATIVES

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

2.7.1; The "Do Nothing" Option

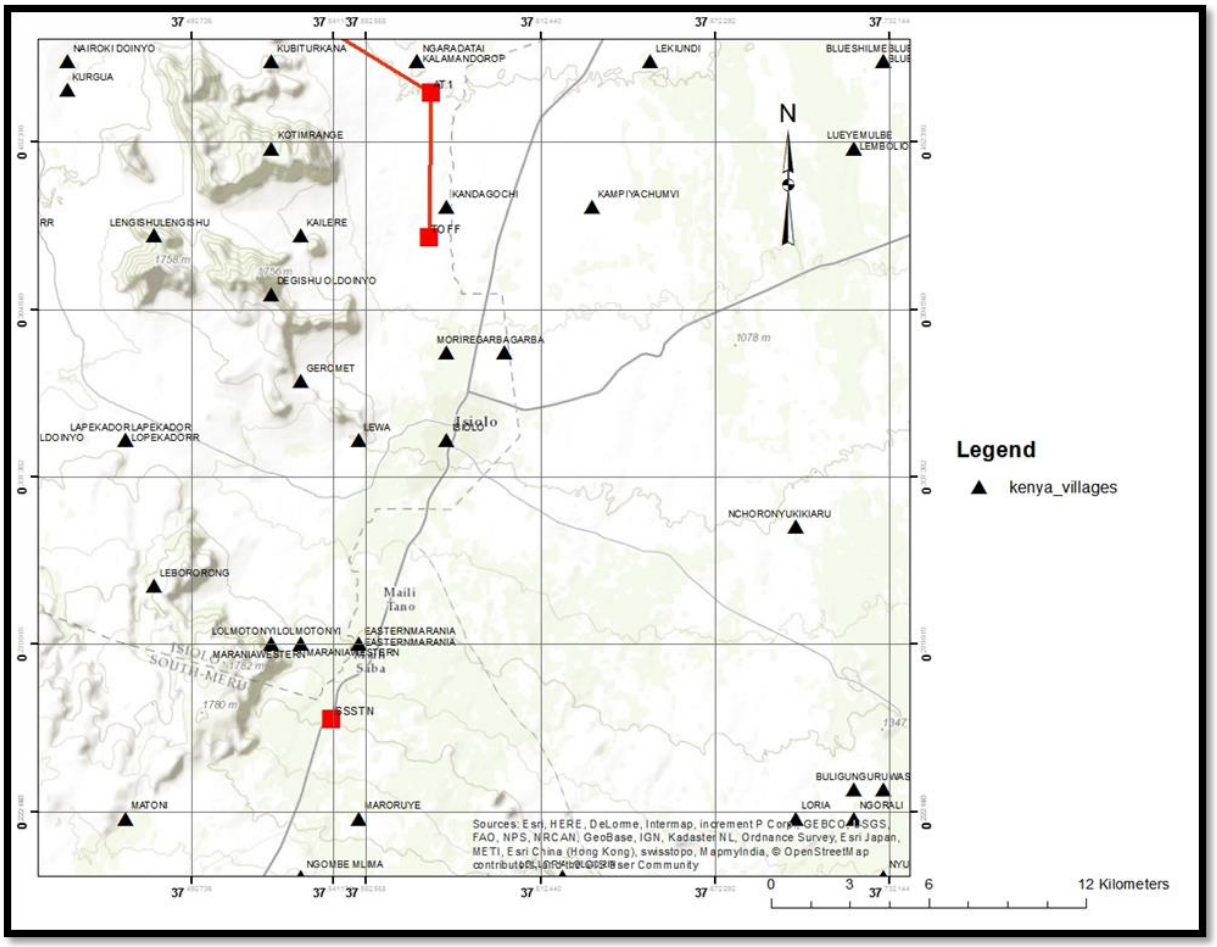
For this project, the no-development option would mean the proposed project will not be implemented. The implications of this would be no additional reliability and security of electricity supply to Samburu County and the surrounding regions. Given that the level of impacts associated with the project are low and that there is high probability of mitigation of these negative impacts, the "no-go" option would not be the most viable option in this instance.

2.7.2; Demand-side Management Option

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

2.7.3; Line Routing and Substation Siting Alternatives

The site of the proposed Isiolo substation as per the guiding feasibility study 'Feasibility Study for Kenya Power Transmission Improvement Project (Assignment 4), KETRACO' is not the site that the new Isiolo substation sits. The two sites are 18.6km apart. This owes to the fact that, the feasibility study was prepared in 2014 while the site of the substation was acquired in the year 2015.



To remedy this disconnect, the consultant considered various route options to connect the Isiolo substation to the proposed transmission line.

Two alternatives were arrived at based on the following factors;

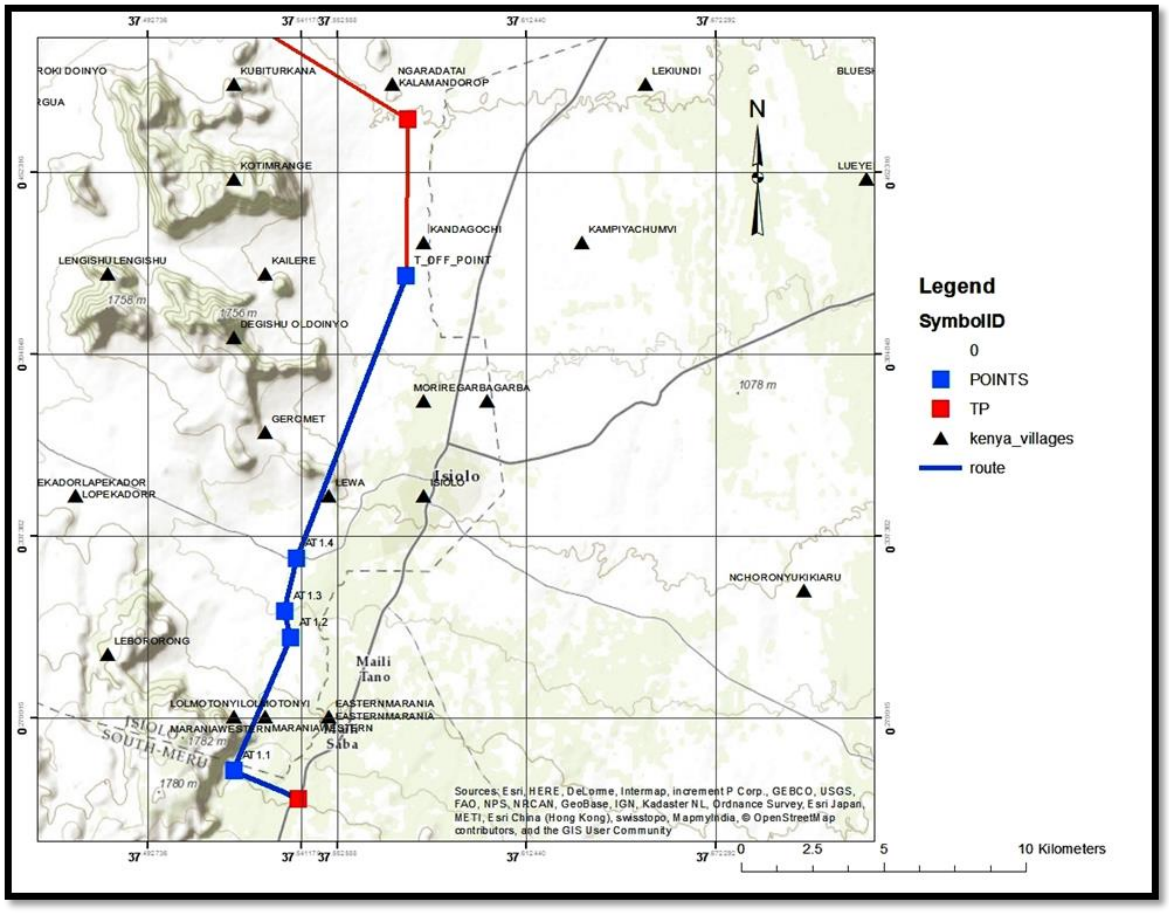
1. Distance
2. Human settlement
3. Ecologically sensitive areas including Conservancies and watersheds
4. Topography

Alternative 1

In this alternative, the proposed route will take an initial northerly direction from the KETRACO Isiolo substation, to cross over the Nanyuki – Isiolo highway and then run parallel to the highway avoiding Isiolo town and joining the proposed transmission line at the earlier proposed site of the take - off.

The route is illustrated below;

ID	Latitude	Longitude
AT1.1	0.262977°	37.519860°
AT1.2	0.305188°	37.537809°
AT1.3	0.313340°	37.535978°
AT1.4	0.330108°	37.539719°
T_OFF	0.419423°	37.574311°



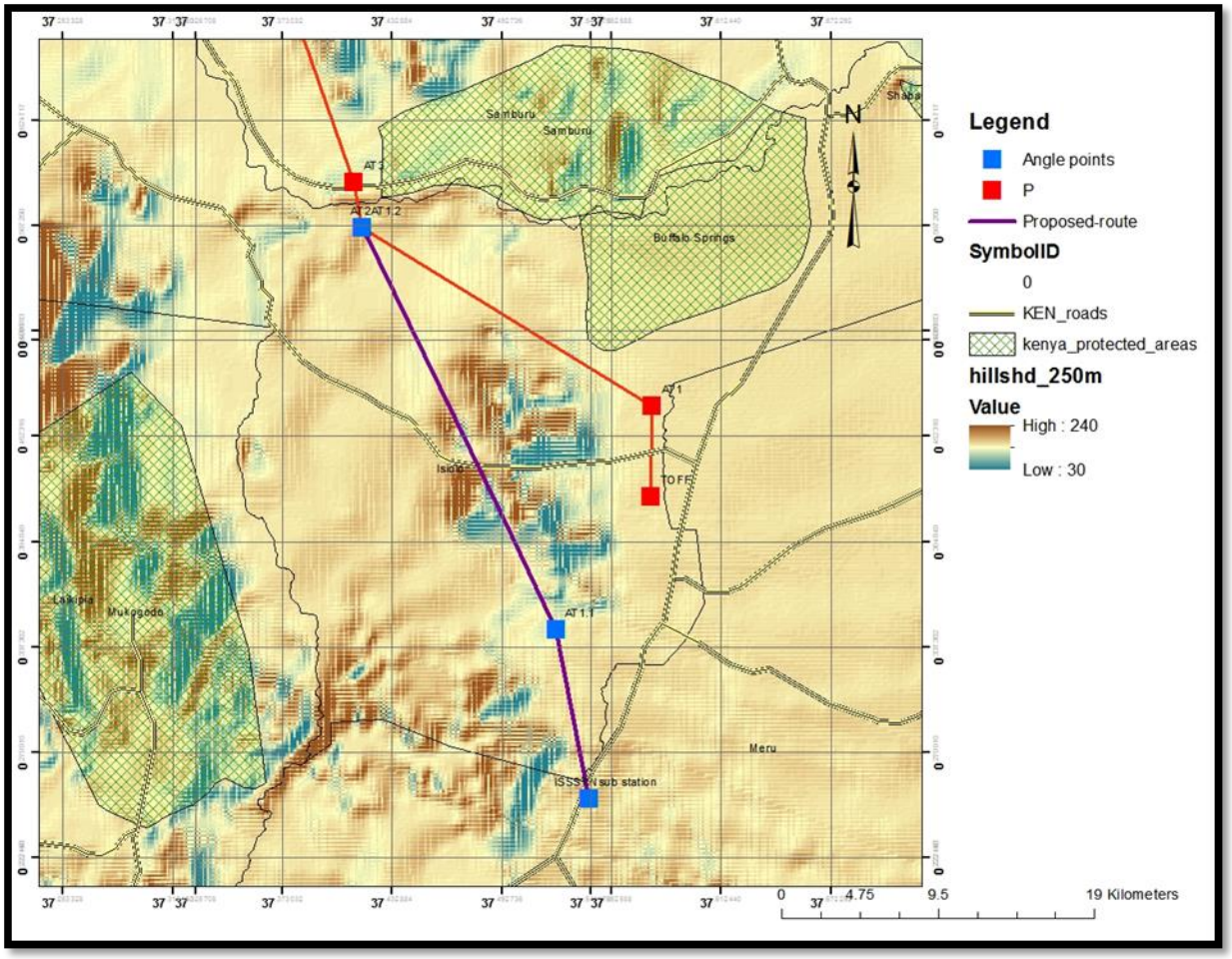
Proposed route for alternative 1.

Alternative 2;

In this alternative, the proposed route will take a northerly direction from the KETRACO Isiolo substation, crosses over the Nanyuki – Isiolo highway, avoid heavy settlements and conservancies, and join the proposed transmission line at AT2

The route is illustrated below;

ID	Latitude	Longitude
AT1.1	0.346553°	37.522465°
AT1.2	0.566189°	37.416502°
Substation	0.254185°	37.540512°



2.7.4; Alternative Processes and Materials

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

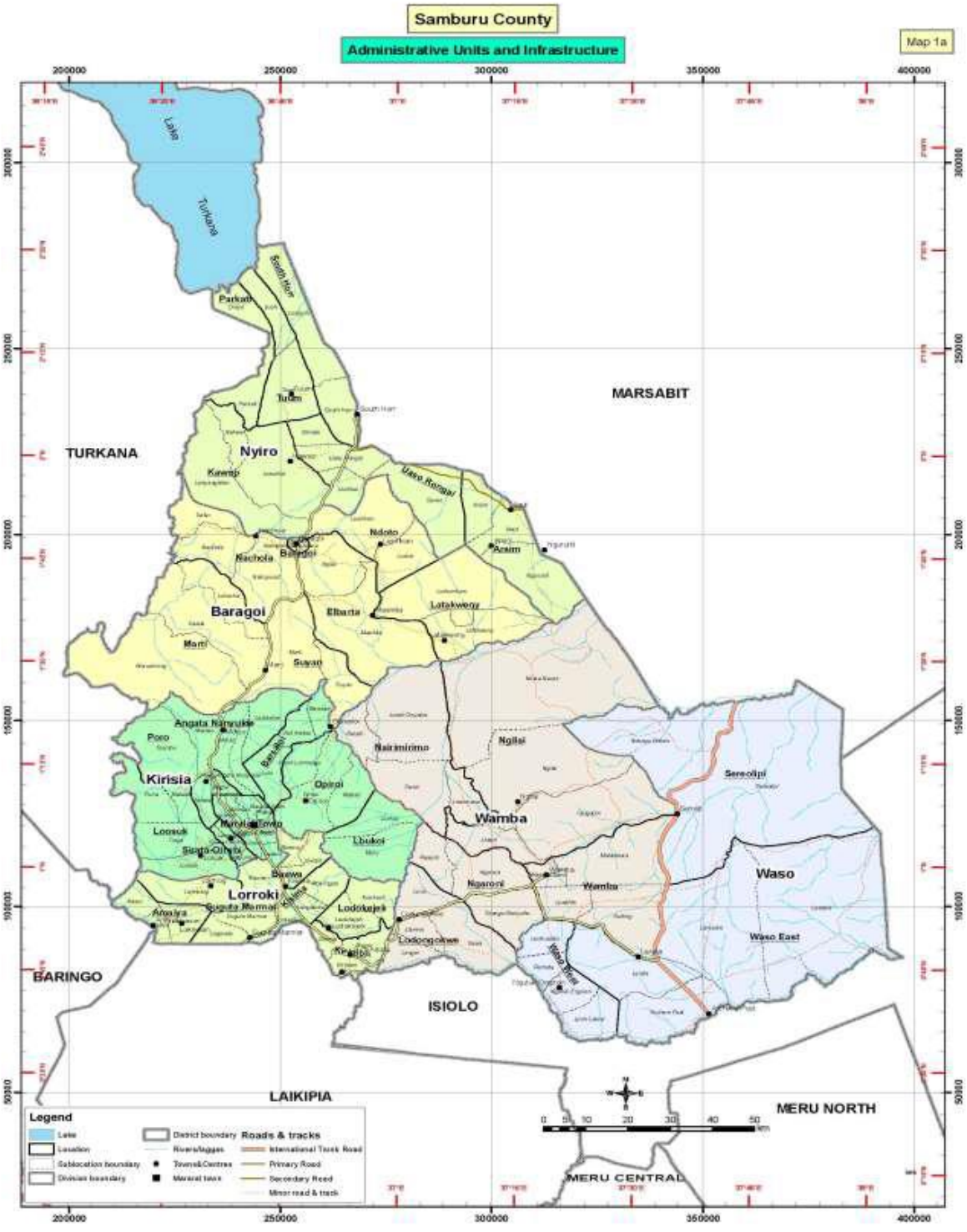
CHAPTER 3: ENVIRONMENTAL SET-UP OF THE PROPOSED AREA

3.1: BACKGROUND

Samburu County

Samburu County borders Baringo County to the west, Laikipia County to the South, Isiolo County to the East, Turkana County to the northwest and Marsabit County to the north with its headquarters is Maralal town.Lake Turkana borders at the northern tip between Turkana and Marsabit counties. It covers an area of 21,022.2Km2 according to the 2009 Kenya Population and Housing Census. Samburu reserve is located north of Kenya, 200 miles Nairobi. Samburu National Park is a relatively small but Excellent Park of scrub desert, thornbush, reverine forest and swamps is situated north of Mount Kenya. Elephants and lions are plentiful and leopards are often seen. Samburu is probably the best park in northern Kenya.

The Samburu area is very dry with a lot of scrubs and some acacia trees. However, there is a river known as Uaso Nyiro where there is a narrow band of dreary palms which quite often contain groups of orange-billed parrots. This parrots are mostly heard before seeing them because are sometimes noisy but also very shy.



Map of Samburu County; Source; County Integrated Development Plan (CIDP)

3.2: PHYSIOGRAPHIC AND NATURAL CONDITIONS

3.2.1; Population

According to the 2009 Population and Housing Census, the population of Samburu County was 223,947. Given a population growth rate of 4.45 percent per annum, as opposed to the national growth rate of 3 percent, the county population is expected to have risen to 255,931 persons in 2012 comprising of 128,004 females and 127, 927 males. The population is projected to increase to 292,484 in 2015 and 319,708 in 2017. These changes represent a 24.9 percent population rise between 2012 and 2017.This increase is significant and calls for commensurate expansion of basic amenities in the county. Further, there is need to increase investment in economic activities in order to make the county self reliant in food security and creation of employment opportunities.

3.2.2; Climate and Rainfall

The climate for Samburu is hot dry with cool nights with an average annual maximum temperature of 30ºc (86F) and minimum annual temperature of 20ºc (68F). Samburu National Reserve receives 350mm (14 inches) during peak rainfall in April and November (Variable). Long rains are expected in early April to the end of May and short rains from mid-October to mid-December. Dry conditions usually prevail from June to early October and from January to March.

3.2.3; Land and Land Use

Land ownership in Samburu falls into four categories namely; Trust, communal, Government and Private. Communal land is managed by the communities while private land encompasses group ranches. The bulk of the land is not registered a situation that affects its full potential exploitation. The primary land use practices are pastoralism and wildlife conservation. These practices account for over 90 percent of the total land holding in the county. Farming is also undertaken in favourable areas like Poro in Kirisia Division, Baragoi and South Horr and Tuum in Nyiro divisions. Gazetted forests occupy 15% of land area. These forests provide habitat and foliage for both wildlife and livestock.

3.2.4; Forestry

There is a total of 3,250 km2 of gazetted forests translating to a 15.4percent forest cover in the county. This mainly consists of indigenous forests uniformly distributed across the county. The main tree species are the acarcia, commisera, brocella which are dominant in the lowlands of Samburu North and Samburu East as well as sections of Samburu Central. The highland species include: cedar, podo, chepnuts and olea, Africana amongst others these are mainly found in kirisia and porror areas. The most endangered species are the

Cedar and Podo because of their value in construction of houses particularly in upcoming urban/trading centres.

3.2.5; Main Wildlife

The County boasts of having the largest number of wildlife outside the game reserve. Some of the wild animals found in the County include; Reticulated Giraffe, the endangered bevy zebra, Besia Oryx, Grater and Lesser Kudu, Gerenuk, Somali ostrich, Pun cake tortoise, Wild Dog, lions, elephants, and buffalos in addition to the small wildlife.

3.2.6; Ranches

There are 37 registered group ranches in the entire county which occupies 37,000 acres. The main activity carried out in these ranches is livestock grazing. However the main challenge is inter clan conflict in these ranches leading to delay of land adjudication process. It is only around Mararal town, Porror area, and Kisima where the land adjudication has taken place and title deed issued.

3.2.7; Energy Access

The main source of domestic energy in the county is firewood which is used by about 70 percent of the population. There are 11 trading centres connected with electricity while 20 others have no connection. This is a major constraint in the growth of these centres. Continued use of firewood is a health and environmental concern and has contributed to forest degradation.

There are a total of 31 urban/trading centres in the entire county. Maralal is the main urban centre which hosts all government departments and is proposed to be the county headquarters. Baragoi and Wamba are other major urban centres in the county. These towns have recently experienced an increase in the level of activity especially in construction of new permanent houses. This is attributed to increased demand for better houses by civil servants and other workers who are posted to these centres after the creation of the two sub counties. These towns however lack key infrastructure such as a functional sewerage system and basic social amenities. Other centres are characterised by semipermanent houses mainly built using cedar post walls and iron roofs.

3.2.8; Main Tourist Attractions

The County is endowed with a variety of natural sceneries like the plateaus, escarpments, valleys and wildlife which could be tapped to promote tourism in the county. Currently, Samburu National Reserve hosts various lodges and game sites which are mainly in Samburu East and is the greatest revenue earning to Samburu

County. The locals also have indigenous knowledge and cultural artefacts that could be tapped to promote cultural tourism. The annual camel derby tourist promotion event in the county.

There are thirteen (13) tourist class hotels in the county with a total bed capacity of five hundred and sixty six (566). Most of these hotels are located near attraction centres such as Samburu Game reserve and Maralal Game sanctuary.

3.2.9; Industry

Samburu County has no any manufacturing industries despite the existence of potential opportunities in various economics areas such as livestock, minerals. There is a proposal for the establishment of Meloni Hide and Skin tannery project at Kisima trading which has not taken off due to group ranch ownership of land ownership. At the same time Quarrying and sand harvesting are the main ongoing mining activities and the County is endowed with various mineral deposits although their economic potential has not been ascertained nor have they been exploited for commercial purposes. Soda and salt exist in Suguta valley near Lake Logipi, graphite is found in South Horr, while barely, chronicle talc, columbium and titanium are found around Baragoi. Stillimanite is found near kiengok Hill. In addition, there are scattered deposits of various precious stones including aquamarine, ruby, blue sapphire; garnet and amethyst particular around Barsaoi, South Horr. The extent and amounts of these deposits are also yet to be determined. All these provide potential of industrial growth of the County. There are three Jua kali associations in the county although they are dormant and this need to be revieved so as to offer the youths with the tertiary skills to be registered enabling them to access to loans for expanding trade activities. A total of 200 artisans are operating in the County.

3.2.10; Road Network

The County has a total road length of 1,449 kilometres most of which are rural access roads whose management falls under the Kenya Rural Roads Authority. The road -C77 Rumuruti-Maralal-Baragoi which is considered the gateway to the county, and which falls under the management of the Kenya National Highways Authority is in a bad condition. Laying tarmac on this road, which at the time of assessment had already started, will not only improve accessibility to the County but will also play a role in improving the elusive security situation while at the same time open up the region to potential investors. Good road network will enable the vast resources of the county to be exploited for the benefit of resident communities and the nation at large. The County is expecting a total of 60 km of road network under tarmac planned as part of Lamu Port–Southern Sudan–Ethiopia Transport (LAPSSET) Corridor project. LAPSSET is a flagship project under Vision 2030. Once implemented, the road will unlock the development potential of Samburu County. The link to Juba

under this project is also expected to cut across the county covering a significant section thereby enhancing connectivity within the county and also between the county and the neighbouring counties.

3.2.11; Isiolo County

Isiolo County is located in the northern part of the former Eastern Province, 285 kilometers north of Nairobi. Covering an area of 25, 336.1 square kilometers, it is expansive when compared to other counties.

The county borders seven other counties: Samburu to the east, Garissa to the east, Tana River to the south east, Kitui and Meru to the south west, Marsabit to the North West and Wajir to the north east. Isiolo town came about after the First World War. The Somali ex- army officers who participated in the war settled in Isiolo, intermarrying with the local Samburu and Cushitic pastoralists.
Isiolo County constitutes two constituencies; Isiolo North and Isiolo South.The county's top leaders are Godana Doyo (Governor), Kuti Muhamed Abdi (Senator), Tiya Galgalo (Women Representative), Joseph Samal (MP-Isiolo North) and Bantisha Abdullah (MP-Isiolo South).

The population tally in the county according to the Kenya National Bureau of Statistics report of 2009 is 143,294. 51% of the population is male while 49% is female. Isiolo County is inhabited by the Turkana, Borana, Somali and Meru communities, with the Boranas forming the largest portion of the population.

Isiolo residents are either Muslims or Christians, with the highest percentage of the population being of the Muslim faith, something that is evident from the many mosques seen as one traverses the county. Most if not all the Somalis and a sizeable number of Boranas are Muslims while the Ameru practice Christianity.

Scarcity of arable land and pasture is a daily challenge for the people of Isiolo, a phenomena that is witnessed from the constant community conflicts that plague the county. The Borana are nomadic pastoralists, moving from one area to another - within the county and in neighboring counties in search of pasture and water for their goats, camels and cows.

Traditionally, men are entrusted with livestock rearing and securing against cattle rustlers, while the women stay home and perform all domestic duties including constructing the houses; mostly out of mud and taking care of the children. Among the Borana, Turkana, and Ameru, the younger boys normally take care of the goats while young men take care of the cows. As cattle raids are expected at any time, the young strong men go around armed, in search of pasture and water for livestock.

Cattle rustling is almost an acceptable tradition of the Turkanas, but one that consequently affects other tribes like the Borana and the Maasai who are then forced to protect their livestock from the cattle raiders.

Isiolo town serves as the county headquarters. The town is cosmopolitan with the Somalis, Boranas, and the Merus forming the largest chunk of the residents. Although the town is comparatively small in size, it is significant for hosting travellers as they commute between the towns of Marsabit and Moyale.

Isiolo airport, the only airport is currently under construction to expand and upgrade it to international standards, thereby enhancing trade with neighboring countries like Somalia and facilitating transport of goods, visitors and tourists who frequent the county. Isiolo town provides easy access to tourists visiting the Meru national park, Shaba, Samburu game reserves as well as Maasai Mara game reserve - all located in neighboring counties.

3.2.12; Climate of Isiolo and Economic activity

Most parts of Isiolo County are arid and receives less than 150 mm annually. Areas like Garbatulla are totally dry and no agricultural activity takes place.

Kinna region represents the semi-arid area that support pastoralism, but the residents are forced to move to neighboring counties often in search of water and pasture for their livestock especially during the dry season.

Generally, the county receives low rainfall of between 300-500 mm per year, and experiences temperatures ranging from 12°C to 28°C. The common vegetation is shrubs and acacia trees which thrive well in arid areas.

The county's average altitude is 200-300 meters above the sea level although other areas of the county go up to 1000 meters above sea level. Lorian swamp forms the lowest point of the county. The soil is mostly sandy and saline and has a low water holding capacity, making it difficult to engage in agricultural activities.

The Ameru community in the area practice agriculture and livestock keeping in small scale and this makes their lifestyle different from the other communities. They mainly grow vegetables like cabbages, tomatoes and carrots that they sell in Isiolo and Nanyuki town. Livestock keeping is practiced widely especially in Kinna and around Lorian Swamp where pasture and water is more available.

The livestock products are consumed within Isiolo town and the rest supplied to major towns like Nairobi. The Kenya Meat Commission is a major buyer of livestock from the farmers. Borana and Turkana women participate in jewelry making, crafting jewelry that they in turn sell to tourists who visit the town.

Past historical injustices and poor infrastructure that have hindered growth and development in this county will soon be a thing of the past as the current government works hard to elevate the county by improving education, infrastructure and general standards of living for the people of Isiolo County who live in abject poverty.

3.2.13; Conservation in the Project Area

Samburu National Park

Samburu is situated on the banks of the Ewaso Nyiro River, the life blood of this dust-dry desert region. This hot and arid area is characterized by a parched landscape of hills and plains. Ololokwe Mountain provides a stunning backdrop to this reserve and is a memorable feature of the breath taking views as you pass down the slopes of Mount Kenya into the low country of the NFD. The presence of the river and its shady trees attracts plenty of wildlife. Samburu is home to large herds of elephants, and the Reserve is well known for providing the opportunity to see wildlife unique to the dry north of Kenya such as Gerenuk (these distinguished looking gazelle have long necks and stand on their hind legs to feed), the endangered Grevy Zebra, Beisa Oryx, Reticulated Giraffe and the Somali Ostrich. The 3 big cats are also found here. For birders, around 365 species have been recorded and the River area is particularly rewarding.

There is a wide variety of animal and bird life seen at Samburu National Reserve. Several large game species common to Kenya's northern plains can be found in abundance here, including the following dry-country fauna: gerenuk, Grevy's zebra, oryx and reticulated giraffe. All three big cats known as the Masai lion, Tanzanian cheetah and leopard can also be found here, as well as the elephant, Cape buffalo and Hippopotamus.

Other mammals frequently seen in the park include olive baboon, warthogs, Grant's gazelle, Kirk's dik-dik, impala, and waterbuck. The rhinoceros population is no longer present in the park due to heavy poaching. There are over 350 species of bird. These include grey-headed kingfisher, sunbirds, bee-eaters, Marabou stork, tawny eagle, Verreaux's eagle, bateleur, vulturine guinea fowl, yellow-necked spurfowl, lilac-breasted roller, secretary bird, superb starling, northern red-billed hornbill, yellow-billed hornbill, and various vultures including the palm-nut vulture. The Ewaso Ng'iro river contains large numbers of crocodile basks.

Samburu, Buffalo Springs & Shaba

These three small adjoining national reserves lie on either side of the Northern Ewaso Nyiro River, 340km North, North East of Nairobi. They were established in 1948 as the Samburu Isiolo Game Reserve, part of the once extensive Marsabit National Reserve. The three individual Reserves were gazetted in the 1970’s and are

managed by their respective county councils, Samburu and Isiolo. This area of the region to this date is referred to as the Northern Frontier District. Culturally, Northern Kenya has always had a strong influence of Somali, Oromo and Borana communities and tribes, who have lived as nomads in the area for many centuries.

Namunyak Wildlife Conservancy in Samburu County of northern Kenya is to open the first community owned and managed elephant orphanage in Africa. The Reteti Elephant Sanctuary is situated in the remote Mathews Range, among Kenya's second largest elephant population. It will take in orphaned and abandoned elephant calves with an aim to release them back into the wild herds adjoining the Sanctuary. This is the result of a widely recognized and expanding grassroots movement of community-driven conservation across northern Kenya; a movement that is growing new economies, transforming lives and conserving natural resources.

Buffalo Springs

Buffalo Springs located on the other side of the river from Samburu. It takes its name from the pools and springs of fresh clear water, which bubble in its midst, and act as a magnet for congregations of wildlife, especially during the dry season. The springs also act as a draw to literally thousands of sand grouse and doves. The reserve is characterized by large tracts of bush land, open areas of lava rock with scattered grass and shrubs. This is also a narrow band of riverine forest along the Ewaso Nyiro River. Typical of a dry country ecosystem, wildlife watching varies greatly as the animals move about in search of water and pasture. Wildlife viewing is similar to that of Samburu. Large herds of Elephant also roam the reserve. Bird life is abundant and includes the blue-shanked Somali Ostrich.

Nakuprat- Gotu Conservancy

Nakuprat-Gotu borders Shaba National Reserve, a popular tourist destination rich in wildlife. The abundant grazing in the protected reserve frequently tempted pastoralists from the Borana and Turkana communities surrounding Shaba, and alongside this encroachment came many incidents of poaching and several high profile attacks on tourists.

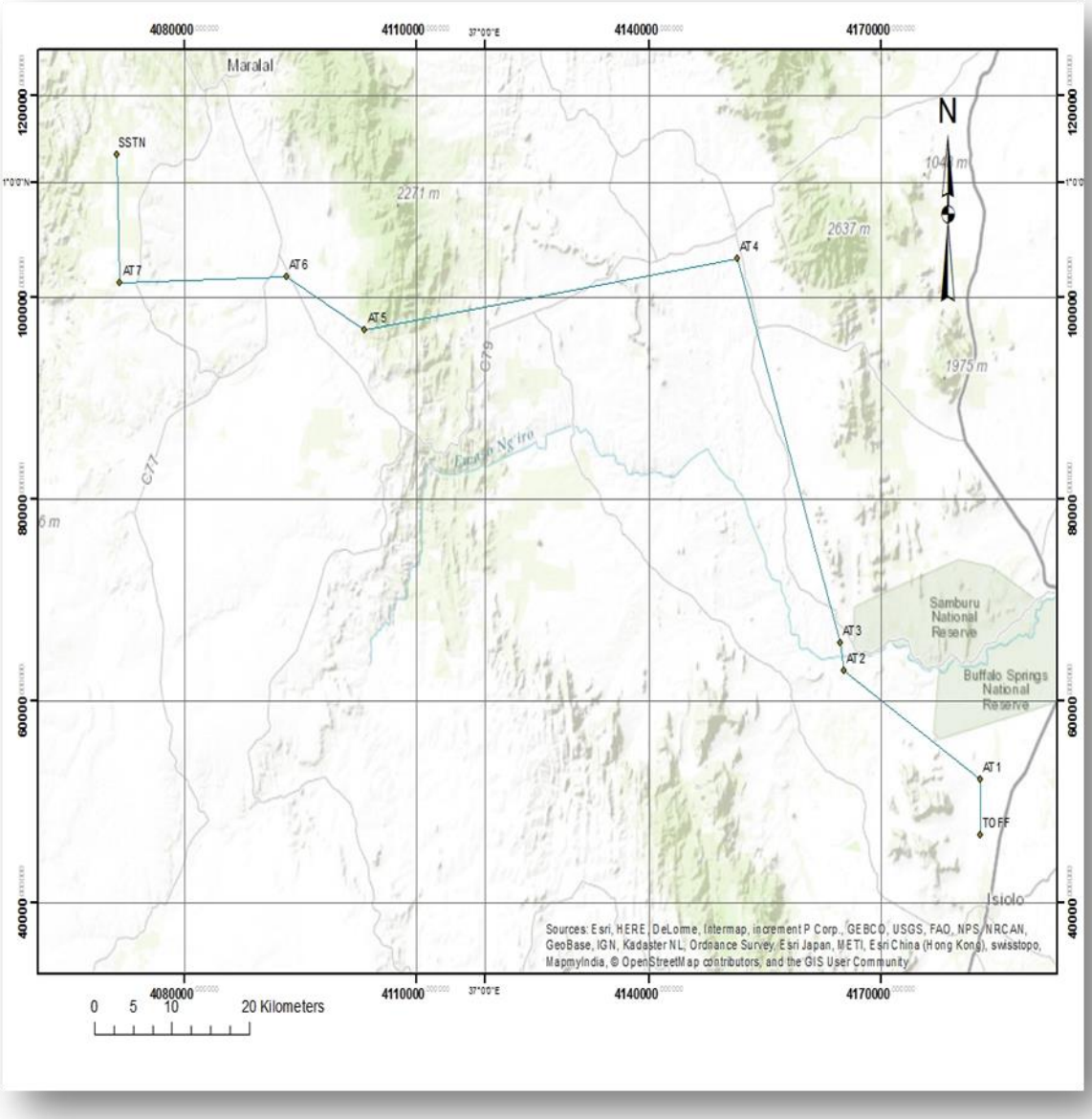
As Shaba's reputation became increasingly tarnished, Isiolo county council was under pressure to intervene, and theKenya Wildlife Service were searching for a solution to the depleting wildlife numbers. At the same time, the Turkana community approached NRT with an application for a conservancy they named "Ngare West" but it was not deemed inclusive enough of the neighboring Borana community and was denied. With backing from KWS and Isiolo County Council, Nakuprat-Gotu Community Conservancy was eventually set up to include both the Borana and the Turkana, who are equally represented in employment and the governance of the conservancy.

Nakuprat-Gotu acts as a buffer for Sera community conservancy, and Shaba, Samburu and Buffalo Springs National Reserves, as it is the last protected area before Meru North district. Parts of it border the Ewaso Nyiro River, Kenya's third largest water course, which provides a vital and constant water supply for communities and wildlife.

Its eastern flank supports vast plains, home to one of the largest herds of Beisa oryx remaining in the region. In the last count in 2012, 100 oryx were counted. The continuing support of the community and the focus on security by the scouts are vital if this species is to be protected.

Nakuprat-Gotu benefits from the many wildlife species that use it as a corridor between reserves and conservancies. This, coupled with the fact that it stretches over stunning landscape, gives it huge potential to develop successful tourism ventures in the future. There is an established campsite at Boji Dera by the Ewaso River, which provides a beautiful setting for self-sufficient campers.

3.3: PROJECT DESCRIPTION



Transmission Line

KETRACO's Isiolo Substation

Proposed Substation site in Maralal

3.3.1; Review Results of Landscape Visual Impact within the Project Site

Landscape impacts have been described according to their significance (severity). The significance of the impact is determined through the magnitude of landscape change/impact by visual sensitivity. These impacts have been assessed using the matrix below. Only impacts judged to be of major significance (adverse) or highly significant (adverse) have been considered

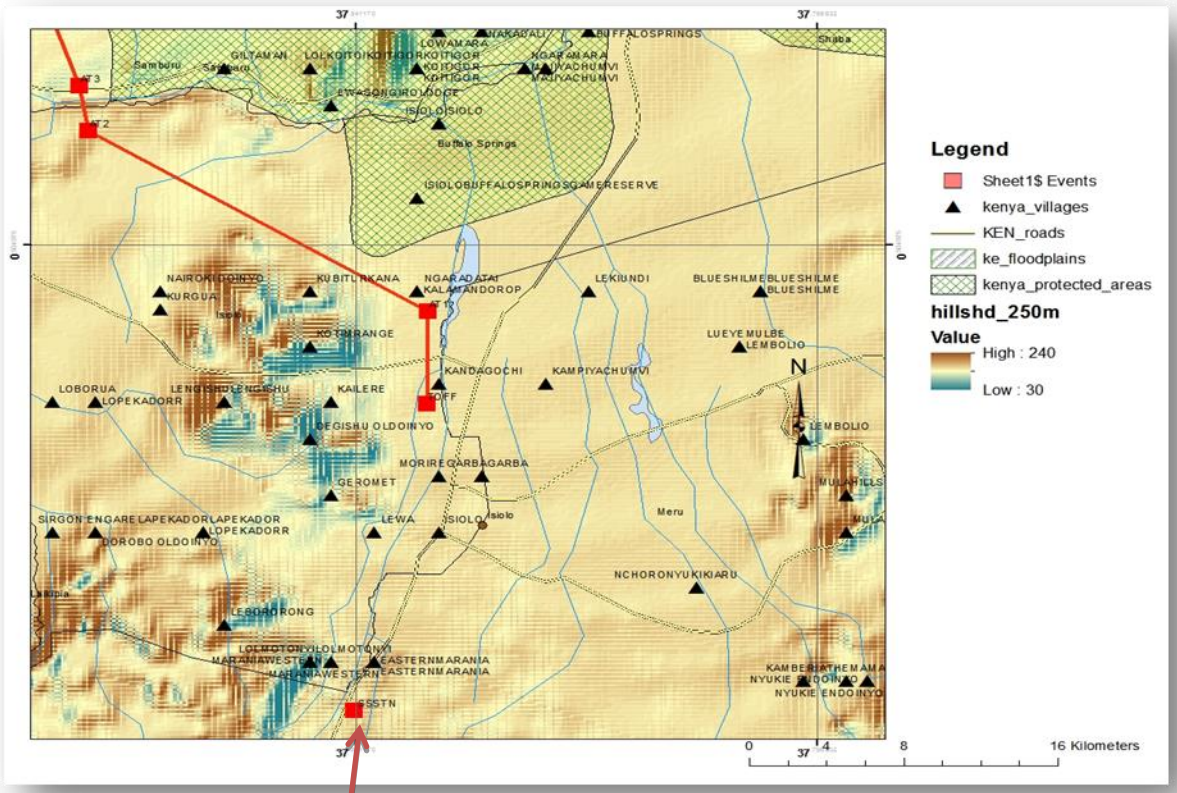
Table 3.1; Landscape Impact Review Matrix

		LANDSCAPE IMPACT			
		Large	Moderate	Small	Negligible
VISUAL SENSITIVITY	High	Major Significance	Highly significant	Moderately significant	Minor significance
	Medium	Highly Significant	Moderately significant	Minor significance	Not significant
	Low	Moderately significant	Minor significance	Not significant	Not significant
	Negligible	Minor significance	Not significant	Not significant	Not significant

3.3.2; Areas within and around Isiolo Town

Project Elements	The proposed transmission line will run in a north-eastern direction from Isiolo substation within an area dominated by shrubs, few trees and little undergrowth. On the western side of Isiolo, the landscape is hilly and rolling to the East but the TL has purposed to pass through relatively flat terrain. At AT2, (0.469N 37.577E) the TL deviates further west passing near a conservation Biosphere i.e. Samburu National Reserve and Buffalo Springs national reserve. Hills to the west rise to about 1400 m a.s.l. However, the landscape is generally undulating. The landscape cover is typically Savanna. The substation is approx. 18 km from the T-Off, we recommend the 18 km stretch to run on the western side of the town, where there are no major development. The TL passes approximately 1.3 km from the southernmost boundary of the Buffalo Springs National reserve and 1.4km from Samburu National park.
Landscape	At the substation and Isiolo environs, the TL will not be a prominent feature as

Impact	there is an already existing TL West of the town terminating at a KETRACO substation, from the substation, there are 33Kv lines that run by the roadside towards Isiolo. In terms of landscape impact, there will be minimal loss of vegetation cover since the proposed route will not result in the significant clearing of vegetation. The area is not luxuriant and the soils are characteristically sandy with stones. The impacts are not significant.
Visual Impact	The impact will be of low sensitivity since this is not a new development on the landscape.
Significance	Not significant.



The substation will be the take off of the TL

Substation at Isiolo (located about 7.8km from Isiolo town)

There line will pass through a shrubland, no tall trees and no undergrowth. Therefore no clearing of vegetation is necessary

The new transmission Line is not new to the landscape

Proposed take-off point.

An existing TLin Isiolo county. There is High voltage TL in Isiolo with a substation, the proposed development will link Maralal to the Isiolo substation.

Settlements near the substation.

The introduction of the transmission line will have insignificant impact on the visual sensitivity.

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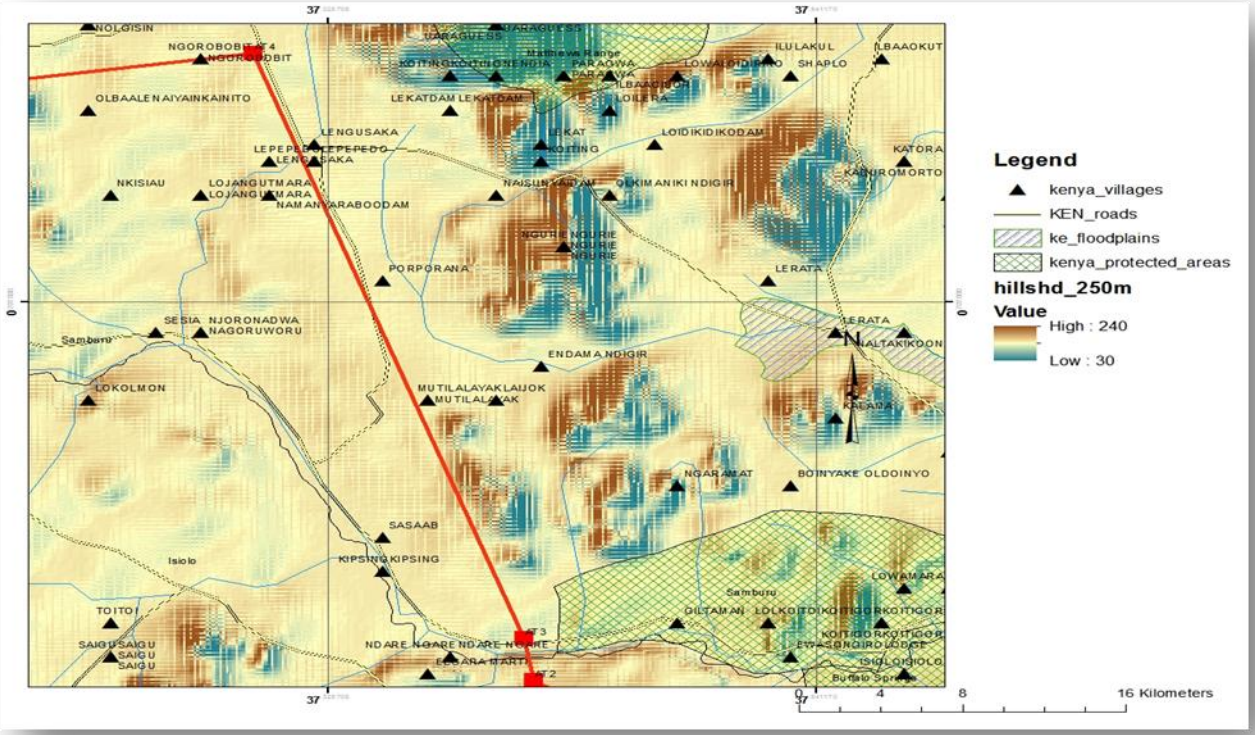
The landscape is characterized by short trees (2-3m). There is no undergrowth and the soil are poorly developed (Sandy)

3.3.3; Landscape impacts between Buffalo Springs National Reserve and West Gate in Samburu

Project Elements	The proposed transmission line will run in a north-western direction from T-off section (0.469N 37.577E) and passes next to Samburu and Buffalo Springs National Reserves. Northwards it passes through West Gate Community Conservancy which is a plateau on wards towards Wamba town where land rises gently about 3800 ft and rises upto 4500ft where it makes a sharp turn Westwards.
Landscape Impact	The land is generally a Savanna, with a number of community conservancies and National reserves. This area supports a vital ecosystem central to the economy of the region. Tourism and Pastoralism are the key activities in this area.
Visual Impact	The impact will be of high sensitivity since there few developments and settlements in the area. The proposed project will not have significant visual intrusion on the landscape in the reserve due to its relative distance from the boundary of the two Parks. Its impact will be felt on the neighboring group ranches and conservancies The transmission line will be a prominent new feature to the landscape. However, the landscape impact will be less significant since the transmission Line avoids cutting through the plateau which is not luxuriant. Therefore, vegetation clearance between the conductors and the vegetation will not be necessary. The impacts will be of moderate significance
Significance	Moderately significant.



The transmission line is located is located distance from the park i.e. 1.3 km therefore having no impact on the landscape.

The area is a savanna supporting Wild life and pastoralism

A view of Samburu National Park

West Gate community conservancy

The area is sparsely populated and the proposed TL will not come to view along the Isiolo- Marsabit road. The line come to about 330 m from the road at Legusaka town which is at the junction to West Gate Community Conservancy. Some of the villages that lay close the route are; Mutilalalyak 600m from the TL, Porporana, 900m from the TL, Legusaka 500m grom the TL and Lepepedo 800m from the TL

3.3.4; Vegetation patterns

The bushes observed comprise the *Acacia drepanolobium* and *Acacia mellifera* (Figures…). These are generally woody species but short (less than 3m tall) with canopy spreading near the ground. The species sometimes occur as singles or clusters forming bushy shapes.

The rocky outcrop vegetation of the site was highly distinct from the adjacent grasslands. This was characterized by the presence of large shrubs and small trees such as *Diospyros lycioides, Aloe broomi* and *Rhus erosa*. Due to the restricted nature and the presence of the low trees and various succulents within this habitat type, it is ecologically sensitive from a flora perspective and should be avoided.

Proposed substation site near Maralal Town

Olea europaea

An image of *Ficus sycomorus* in riverine habitat of Khwai

Acacia melifera along the TL

Image of *Acacia tortilis*

Acacia woodland in the project area

Acacia dichogamus dominating near Maralal

Euphorbia bussei

3.3.4; Faunal communities

The site is in Isiolo and Samburu counties of Kenya. The areas are communally owned and the nomadic Samburu pastoralists, their livestock and wild animals live in close proximity. The Isiolo – Maralal landscape is characterized by diverse animal species. The conspicuous mammals that were observed during the faunal survey include Gravy's Zebra and Kirk's dik-dik. The area is also rich in other mammals which includes Elephants, various antelopes, gerenuks, cheetahs, lions, leopards, hyenas, birds, wild dogs and an array of invertebrates. There are no fences to keep wildlife within certain areas, and human-wildlife conflict contributes to a greater dispersal of wildlife. However, there are also several wildlife reserves and conservation areas in the vicinity such as: Buffalo springs, Samburu National Reserve, Namunyak Wildlife Conservation Trust, Kalama Community Conservancy and West Gate Community Conservancy.

The landscape within the proposed transmission line is mainly characterized by wooded grassland and rock outcrops that opens up to dwarf *Acacia drepanolobium* habitat. The majority of these habitat is regarded as suitable for terrestrial bird species for foraging, roosting and as passage for migrating birds. It must be emphasized that birds will, by virtue of their mobility, utilize almost any areas in the landscape from time to time. Unique species found in the woodland include vulturine guinea fowl, wheaters, pipits, larks etc. The

disturbance associated with clearing of woodland for the transmission line servitude will potentially impact on such species.

Gravy's Zebra observed in the area

Vulturine guinea fowl

Ostrich in the project area

CHAPTER 4: RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

4.1: INTRODUCTION

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

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

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

4.2: THE CONSTITUTION

The Kenyan Constitution states that every person has the right to a clean and healthy environment, which includes the right –

a) to have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69 and
b) to have obligations relating to the environment fulfilled under Article 70.

Article 69 observes that;

(1) The State shall—

a) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

b) Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
c) Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
d) Encourage public participation in the management, protection and conservation of the environment;
e) Protect genetic resources and biological diversity;
f) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
g) Eliminate processes and activities that are likely to endanger the environment; and
h) Utilize the environment and natural resources for the benefit of the people of Kenya.

(2) Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

4.3: POLICY

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

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

4.4: LEGAL FRAMEWORK

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

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

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

4.4.1; The Environment Management and Co-ordination Act, 1999

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

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

4.4.2; The Environmental (Impact Assessment and Audit) Regulations, 2003

The regulations observe that; No proponent shall implement a project -

a) likely to have a negative environmental impact; or
b) for which an environmental impact assessment is required under the Act or these Regulations;

Unless an environmental Impact Assessment has been concluded and approved in accordance with the Regulations.

This Study is aimed at ensuring compliance of these regulations. The study has collected information on project design, the relevant baseline data, conducted an elaborate public consultation process and created an Environmental and Social Management Plan(ESMP) and a monitoring plan (ESMoP) that if implemented will ensure conservation and protection of environment and improved livelihoods.

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

The regulations observe that, except as otherwise provided in the Regulations, no person shall make or cause 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.

In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

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

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

4.4.4; Environmental Management and Coordination, (Water Quality) Regulations 2006

The Regulations observe that, every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act. It further observes that, no person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.

It goes on to state that, no person shall:

a) discharge, any effluent from sewage treatment works, industry or other point sources into the aquatic environment without a valid effluent discharge license issued in accordance with the provisions of the Act.
b) abstract ground water or carry out any activity near any lakes, rivers, streams, springs and wells that is likely to have any adverse impact on the quantity and quality of the water, without an Environmental Impact Assessment license issued in accordance with the provisions of the Act; or
c) cultivate or undertake any development activity within a minimum of six meters and a maximum of thirty meters from the highest ever recorded flood level, on either side of a river or stream, and as may be determined by the Authority from time to time.

The Proponent will observe the requirements of these regulations especially during the construction phase.

4.4.4; Environmental Management and Co-ordination (Waste Management) Regulations, 2006.

The regulation observes that;

1. No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.
2. Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations.
3. Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose off such waste in a designated waste disposal facility.
4. Any person whose activities generate waste, shall segregate such waste by separating hazardous waste from non-hazardous waste and shall dispose of such wastes in such facility as is provided for by the relevant Local Authority.
5. Any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the cleaner production principles.

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

4.4.5; Environmental Management and Co-ordination (Air Quality) Regulations, 2009.

The objective of these Regulations is to provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The regulations observe that;

1. No person shall-

a) act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution; or
b) emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the First Schedule.
c) No person shall cause emission of the priority air pollutants prescribed in the Second Schedule to exceed the ambient air quality limits prescribed in the First Schedule.

2. No person shall cause emission of the priority air pollutants prescribed in the Second Schedule to exceed the ambient air quality limits prescribed in the First Schedule.
3. No person shall cause the Ambient Air Quality levels specified in the First Schedule of these Regulations to be exceeded.
4. No person shall cause or allow particulate emissions into the atmosphere from any facility listed under the Fourth Schedule to these Regulations in excess of those limits stipulated under the Third Schedule.
5. Any person, being an owner of premises, who causes or allows the generation, from any source, of any odour which unreasonably interferes, or is likely to unreasonably interfere, with any other person's lawful use or enjoyment of his property shall use recognised good practices and procedures to reduce such odours to a level determined by the odour panel, including any guidelines published by the Authority for reducing odours.

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

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

The Objectives of these Regulations include-

a) to provide for the conservation and sustainable use of wetlands and their resources in Kenya;
b) to promote the integration of sustainable use of resources in wetlands into the local and national management of natural resources for socio-economic development;
c) to ensure the conservation of water catchments and the control of floods;
d) to ensure the sustainable use of wetlands for ecological and aesthetic purposes for the common good o all citizens;
e) to ensure the protection of wetlands as habitats for species of fauna and flora;
f) provide a framework for public participation in the management of wetlands;

g) to enhance education research and related activities; and

h) to prevent and control pollution and siltation.

The Proponent shall comply with the provisions of these regulations

4.4.7; Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006.

The regulations observe that;

(1) A person shall not engage in any activity that may-

a. have an adverse impact on any ecosystem;

b. lead to the introduction of any exotic species;

c. lead to unsustainable use of natural resources,

Without an Environmental Impact Assessment Licence issued by the Authority under the Act.

The Proponent shall comply with the provisions of these regulations

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

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

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

4.4.9; The Occupational Health and Safety Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act has the following functions among others:

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

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

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

4.4.10; The Public Health Act (Cap. 242)

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

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

4.4.11; Physical Planning Act (Cap286)

The Act provides for the preparation and implementation of physical development plans and for related purposes. It gives provisions for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land.

The Proponent shall secure all mandatory approvals and permits as required by the law.

4.4.12; Occupiers Liability Act (Cap. 34)

Rules of Common Law regulates the duty which an occupier of premises owes to his visitors in respect of danger and risk due to the state of the premises or to things omitted or attributes an affliction on his/her health to a toxic materials in the premises.

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

4.4.13; The Standards Act Cap 496

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

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

4.4.14; Energy Act, 2006

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

The Proponent shall observe the guidelines as set out in the Energy Act

4.4.15; Land Acquisition Act (Cap. 295)

This Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. Section 3 states that when the Minister is satisfied on the need for acquisition, notice will be issued through the Kenya Gazette and copies delivered to all the persons affected. Full compensation for any damage resulting from the entry onto land to things such as survey upon necessary authorization will be undertaken in accordance with section 5 of the Act. Likewise where land is acquired compulsorily, full compensation shall be paid promptly to all persons affected in accordance to sections 8 and 10 along the following parameters:

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

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

4.4.16; The Registered Land Act Chapter 300 Laws of Kenya:

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

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

4.4.17; The Land Adjudication Act Chapter 95 Laws of Kenya

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

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

4.4.18; The Antiquities and Monuments Act, 1983 Cap 215

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

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

4.4.19; The Civil Aviation Act, Cap 394

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

The Proponent shall comply with the provisions of the Act in seeking authorization from KCAA.

4.5: INTERNATIONAL OBLIGATIONS

4.5.1; World Bank's Safeguard Policies

Relevant World Bank Safeguard policies for this project include;

1. OP 4.01; Environmental Assessment
2. OP 4.04 - Natural Habitats
3. OP 4.10 - Indigenous Peoples
4. OP 4.11 - Physical Cultural Resources
5. OP 4.12 - Involuntary Resettlement

The Proponent shall comply with the provisions of the safeguard policies

4.5.2; United Nations Framework Convention on Climate Change, 1992

The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The Proponent shall comply with the provisions of this convention

4.5.3; United Nations Convention on Biological Diversity, 2000

The objectives of this Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

The Proponent shall comply with the provisions of this convention

4.5.4; Ramsar Convention – on Wetlands of International Importance especially as a Waterfowl Habitat

The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

The Proponent shall comply with the provisions of this convention

CHAPTER 5: STAKEHOLDER CONSULTATION

5.1: INTRODUCTION

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

The specific objectives for consultation process were to:

- Create public awareness about the proposed project
- Seek public opinion and concerns relating to the project and more specifically problems they anticipate and ways of overcoming them.
- Obtain professional advice from sector heads including departmental heads and local administration
- Consultatively and in a participatory way identify potential positive and negative impacts of the project and seek remedial measures
- Sell the project to the public for their acceptance and ownership

These meetings enabled interested and affected parties to contribute their concerns (views and opinions on the proposed project) which might have been overlooked during the scoping exercise. Findings of stakeholder analysis were very important in predicting impacts and development of ESMP. Public consultations for the proposed project followed several steps as described below:

5.2: IDENTIFICATION OF STAKEHOLDERS

The proposed project will typically involve land acquisition for construction of permanent structures and/or infrastructure including steel pylons, transformers, towers, bus bars, among other infrastructure. Of necessity, land for the location of these permanent structures must be acquired. Communities living within the environs of the proposed site were identified as Project Affected Persons (PAPs).

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

5.3: APPROACH TO STAKEHOLDER CONSULTATIONS

A detailed stakeholder's consultation for this study was undertaken from the 22nd to 27th September 2016. These consultations were conducted in the form of:

5.3. Key Informant oral Interviews:

The following people were consulted:

Isiolo

- Senior Warden, Kenya Wildlife Service, Isiolo County
- Chief, Isiolo/ Maili Saba
- Village elders, Maili Saba Location

Archer's Post

- Chief, Waso East Location
- Chief, Waso West Location
- Village Administrators, Laresoro, Lerata, Waso East and Waso West

Wamba

- Deputy county Commissioners, Samburu East Sub-County
- Chief, Wamba Location
- Village Elders, Wamba location

Kisima

- Chief, Kisima Location
- Chief, Suguta-Marmar Location
- Elders Kisima Location

Maralal

- County Commissioner, Samburu County
- Assistant county Commissioners, Samburu Central Sub-County
- Chief, Maralal Location
- Village Elders, Maralal Location
- Community Development Officer, Gender, Culture and Social Services Department

- Public Health Officer, County Ministry of Health
- Assistant Deputy Director of Agriculture/ Agribusiness, Department of Agriculture
- Physical Planner, Physical Planning Department, County Ministry of Lands
- County Labour Officer, County Labour Office
- Ecosystem Conservator, Kenya Forest Service
- Regional Manager, Kerio Valley Development Authority
- County Drought Coordinator-Samburu, National Drought Management Authority
- Chief Officer, Transport and Public Works, Samburu County
- County Director of Livestock Production and Fisheries, Department of Agriculture, Livestock and Fisheries
- Statistical Assistant, Kenya National Bureau of Statistics, Samburu County
- Managing Director, Samburu Water and Sanitation Company
- Senior Warden, Kenya Wildlife Service, Samburu Area
- Head of Economic Planning, County Treasury, Samburu
- Director, County Ministry of Energy, Environment and Natural Resources
- Team Leader, World Vision

5.3.2; Key Informant Questionnaires:

Open-ended questionnaires were administered to stakeholders comprised of GOK officers and civil society groups in charge of diverse sectors which are likely to be impacted by the project. Concerns, views and opinions from a total of 15 respondents were received.

5.3.3; Community Questionnaires:

Open-ended questionnaires were administered to households, and small business enterprises neighboring the site. Concerns, views and opinions from a total of 143 respondents were received.

5.3.4; Public Baraza

Public barazas were held in Isiolo, Archer's Post, Wamba, Kisima, and Maral with the assistant of the local administration and leaders. In the Barazas, the team introduced themselves, their consultancy and the proponent; explained to the communities the proposed project; highlighted the advantages of the project; informed the participants that, they had been contracted among others to help develop an environmental management plan that would ensure any negative impacts of the project are mitigated and that the participants had been identified as an important stakeholder who would assist in developing the management plan and

therefore the reason for the visit; they then gave the participants a chance to ask questions which were then answered.

The issues and benefits as identified by the participants are highlighted below;

Isiolo; Chief's office; 26th September, 2016; at 9:00am

ISSUES	BENEFITS
If the line passes through private property, the owner should be compensated without delays as per the damages caused.	There will be improved livelihoods among the locals
When constructed along roads, this may expose community members to radiation.	Increase in employment opportunities
When the transmission line will start distribution.	

Archer's Post; at the Market stalls; on 24th September, 2016; at 10:00 am)

ISSUES	BENEFITS
The valuation of land to be compensated should be done satisfactorily	It will promote business activities
70% of labour offered should include the youth and skilled personnel within the community members	It will reduce insecurity in the county through efficient lighting
The electric power line should not cause harm to the surrounding environment	Human-wildlife conflicts will be controlled

Conservancies and other reserves should be considered during compensation.	Employment opportunities will be created
Cost of installation for the ordinary and low-income citizens.	Improved water supply
Amount of remuneration for people engaged in the project.	Increased times spent in schools to study

Wamba; at the Town Center; on 23rd September, 2016; at 2:00pm)

ISSUES	BENEFITS
The project should be implemented in an environmentally and socially sound manner	Enhance security in the county through efficient street lighting
Properties of the community that will be negatively affected by the proposed project should be compensated	Increase in business opportunities

The difference between the current power and the transmission line power.	It will create employment opportunities in the region
The proposed project should be implemented and be a deception to the community members.	It will increase time spent in schools during studies
Whether the proposed project is a political campaign strategy.	The cost of power related opportunities will reduce
	Communication in the county will be enhanced
	The proposed project will improve the living standards of the people of Samburu County

Kisima; at the Chief's Camp; on 27th September, 2016; at 2:00pm)

ISSUES	BENEFITS
There should be minimum damage to the environment	There will be reduced power outages
The properties of the community members that will be negatively affected by the proposed project should be compensated	Enhance security in the county through efficient street lighting
Difference between KENGEN, KETRACO and Kenya Power	Increase in business opportunities
The difference between the existing power and the proposed power.	It will create employment opportunities in the region
Employment opportunities to the community members.	Communication in the county will be enhanced
High voltage power being a risk to people and livestock.	Human-wildlife conflicts will be controlled.


Maralal; at Chief's camp; on 27th September, 2016; at 10:00am)

ISSUES	BENEFITS
The project should start immediately after being implemented.	It will improve the livelihoods of the people of Samburu
Locals in the project areas should be employed.	Employment opportunities will be created
The kind of power the transmission line carries.	It will be efficient and reliable
Compensation of properties affected by the transmission line.	It will boost urbanization of the town.
Availability of the power to all community members.	Help in wildlife conservation.
Costs of installation	


5.4: Outcome of the Stakeholder Consultations:

5.4.1; Important Issues as raised by key informant

- Public participation is the key component as enshrined in the Constitution of Kenya
- For the proper acceptance of the project, and successful completion, the community along the project construction must be properly consulted. And this includes opinion leaders, elected leaders for the proper sustainability of the project.
- Insecurity is a key concern along the project line hence the county national security team must be informed for the protection of the workers and equipment.
- The issue of compensation to the affected parties should be addressed adequately before the project kicks off.
- Disruption and sustainability of the project should be well documented so that the communities accept the usability of the project.
- The proposed power transmission line is likely to pass through conservancies in Isiolo and Samburu counties and hence the proponent should discuss with the conservancy members to minimize negative impacts.
- Samburu County is a wildlife area and migratory route especially for elephants. The project should take care of these corridors could increase human-wildlife conflicts which is already a serious problem.

- As much as possible, the transmission line should avoid forested areas (areas covered with a lot of trees).
- KETRACO should obtain a license and pay for electricity way-leave in case the line passes through state forest.
- Laying of power lines should take care of existing water works such as pipelines, pump houses and other water conveyance structures.
- It should also consider road structures within the project area.
- It would be prudent to identify the routes earlier and map out proposed beneficiaries to avoid people migrating to the proposed line for compensation purposes.
- If possible, overlay the proposed line with administrative boundaries and registered parcel boundaries (group ranches).
- For care of development control after approval and completion, it would be prudent to share the routes for protection of way-leave by the physical planning office and the National Land Commission.
- There should be minimal disruption of human settlement and perhaps this could be supplemented by Corporate Social Responsibility (CSR) such as drilling of boreholes or creation of water pans. This is equally critical in allowing the local communities own the project. This approach could be used to light up schools in conjunction with Kenya Power.
- Conduct continued public participation until completion of the project. This would vary in intensity and focus depending on the stages of the project.
- There will be no obstructions whatsoever to farming activities by the power line except where one is doing agroforestry whereby the trees should not be too tall as to affect the electricity lines.
- Despite the great development, the majority surrounding the project area from Isiolo to Maralal are pastoralists and the proposed project may not be of major positive impacts to them.

5.4.2; Some of the benefits as identified by key informant

- The project will alleviate poverty and increase income to the Samburu community
- The achievement of the Kenya Vision 2030 is through such projects and the Medium Term Plan- 2
- The project will provide power that will support development in parts of Isiolo and Samburu Counties.
- Additional power will mitigate power outages.
- The entire project is viable and a good venture for the parties that are going to be affected by it.
- The project will improve and accelerate livestock production
- The project will aid water projects in terms of power required by prime movers.
- The project will spur development in the project area
- The economic prosperity of the local community will be enhanced and hence reduction of poverty.

- Rural electrification will be enhanced.
- More towns within and around the project area will be opened up.
- The health and education sectors will work efficiently with reliable power.

5.4.3; Important Issues as raised by the community

- If the line passes through private property, the owner should be compensated without delays as per the damages caused.
- When constructed along roads, this may expose community members to radiation
- The valuation of land to be compensated should be done satisfactorily
- 70% of labour offered should include the youth and skilled personnel within the community members
- The electric power line should not cause harm to the surrounding environment
- Conservancies and other reserves should be considered during compensation
- The project should be implemented in an environmentally and socially sound manner
- Properties of the community that will be negatively affected by the proposed project should be compensated
- The project should start immediately after being implemented
- Locals in the project areas should be employed

5.4.4; Some of the benefits as identified by the community

- There will be improved livelihoods among the locals
- Increase in employment opportunities
- It will promote business activities
- It will reduce insecurity in the county through efficient lighting
- Human-wildlife conflicts will be controlled
- More study times in schools due to efficient and reliable power for lighting
- Enhance water supply and availability due to reliable power to pump water within the area
- The cost of power related opportunities will reduce
- Communication in the county will be enhanced
- There will be reduced power outages
- It will be efficient and reliable

5.5: Overall picture from the stakeholder consultations.

The overall picture emergent from the stakeholder consultations is that their attitude towards the project is positive and desirous.

In addition, the project is seen as being strategic to stabilising power supply which is crucial to sustained economic growth. In order to sustain this overwhelming public support, the project development should proceed simultaneously with resolution of stakeholder concerns.

CHAPTER 6: RESETTLEMENT ACTION PLAN (RAP)

6.1: INTRODUCTION

A Resettlement Action Plan (RAP) is a document drafted by a project proponent (where there is a likelihood of people being resettled due to the project) or an appointee of the project proponent, specifying the procedures to be followed and the actions to be taken to properly resettle and compensate affected people and communities.

A RAP must identify the full range of people affected by the project and justify their displacement after consideration of alternatives that would minimize or avoid displacement. The RAP outlines eligibility criteria for affected parties, establishes rates of compensation for lost assets, and describes levels of assistance for relocation and reconstruction of affected households.

The Isiolo - Maralal high voltage transmission line is a linear project and will lead to Linear resettlement. Linear resettlement describes projects having linear patterns of land acquisition (highways, railways, canals, and power transmission lines). In sparsely populated rural areas, a linear project such as an electric transmission line may have minimal impact on any single landholder. Compensation is characterized by a large number of small payments for the temporary loss of assets such structures, crops and land. If well designed, linear projects can easily avoid or minimize the demolition of permanent structures. Conversely, in a densely populated urban area, a linear project such as a road upgrading may require the demolition of structures along the project right-of-way, thereby significantly affecting large numbers of people. Linear resettlement contrasts with site specific resettlement because of the problems that frequently arise when resettlement actions have to be coordinated across multiple administrative jurisdictions and/or different cultural and linguistic areas.

6.2: OBJECTIVES OF RAP

The main objectives of a RAP is to;

- To avoid or minimise involuntary resettlement;
- To ensure that affected individuals and households and/or displaced communities are meaningfully consulted, have participated in the planning process, and are adequately compensated to the extent that at least their pre-displacement incomes have been restored and that the process has been a fair and transparent one to ensure that people and enterprises affected by the project are compensated for any loss of property and/or socio-economic displacement as a result of the project;

- To provide project affected people (PAPs) with the opportunities to restore or improve their living standards and income earnings capacity to at least pre-project levels; and
- To provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project, including rehabilitation/ resettlement operations in order to ensure that PAPs will not be impoverished by the adverse social impacts of the project.

6.3: COMPONENTS OF RAP

An effective RAP will have the following essential components;

- identification of project impacts and affected populations;
- a legal framework for land acquisition and compensation;
- a compensation framework;
- a description of resettlement assistance and restoration of livelihood activities;
- a detailed budget;
- an implementation schedule;
- a description of organizational responsibilities;
- a framework for public consultation, participation, and development planning;
- a description of provisions for redress of grievances; and
- a framework for monitoring, evaluation, and reporting.

6.4: METHODOLOGY AND SCOPE

For the preparation of this RAP, a census survey was carried out to identify the Project Affected Persons (PAPs), and their structures which will be affected. A valuation of the structures to be affected was done and an estimate of the amount of money to be compensated for each structure provided. The census was, however, limited to the 40m way – leave corridor.

It is imperative to note here that, the processes preceding the construction phase of the project, which include EIA License approval, mobilization of project funds, and sourcing for a contractor, may take a considerable duration of time (on average KETRACO projects take 18 months to reach construction phase) and that by the time of construction;

1. More people may have resettled on the way-leave corridor and
2. Property prices may have escalated

Conducting an elaborate RAP at this time may not be the most appropriate. An effective RAP is done immediately before the construction phase of the project.

This RAP report, therefore, is an indicative Resettlement Action Plan and should form a guide to a more elaborate RAP to be conducted by the project proponent immediately before project construction phase. It comprises the findings of the site visit carried out and the census survey against the background of the national legal and institutional frameworks, and the World Bank Involuntary Resettlement Policy (OP/BP 4.12). The report provides an overview of the affected households and communities, structures on the way-leave at the time of the study, and an estimate budget to be used by the proponent for the purposes of compensating structures. The report also contains a comprehensive Terms of Reference (TOR) to be used by the project proponent for an elaborate RAP immediately before the construction phase.

6.5: RESULTS

From the census results, the 40m corridor of the transmission line will affect a total of 88 households with a total of 271 PAPs. A total of 115 different types of structures will have to be relocated and this will cost KETRACO approximately Ksh. 47,300,000. With alternative one, an extra 9 households, with a total of 33 PAPs will be affected. For this alternative, 11 different types of structures valued at Ksh.21, 100, 00 will be affected. With alternative 2, an extra 8 households holding a total of 21 PAPs will be affected. For alternative 2, ten (10) different types of structures valued at Ksh. 5,450,000 wil be relocated.

The tables below give details of the census.

Table 6.1; RAP census results

Location	PAPs		Structures		Valuation (Ksh.)
	Households	Total PAPs	Type	Number	
T-OFF – AT1	5	21	Manyatta	0	0
			Small structure[1]	6	1,000,000
			Temporary structure[2]	1	900,000
			Permanent structure[3]	0	0
AT1 – AT2	3	3	Manyatta	3	150,000
			Small structure[1]	0	0
			Temporary	0	0

			structure[2]		
			Permanent structure[3]	0	0
AT2 – AT3	0	0	Manyatta	0	0
			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
AT3 – AT4	9	33	Manyatta	0	0
			Small structure[1]	7	950,000
			Temporary structure[2]	4	1,500,000
			Permanent structure[3]	0	0
AT4 – AT5	37	115	Manyatta	10	500,000
			Small structure[1]	16	2,200,000
			Temporary structure[2]	23	16,750,000
			Permanent structure[3]	2	5,000,000
AT5 – AT6	10	28	Manyatta	0	0
			Small structure[1]	8	800,000
			Temporary structure[2]	4	2,600,000
			Permanent structure[3]	0	0
AT6 – AT7	19	64	Manyatta	0	0
			Small	15	2,450,000

			structure[1]		
			Temporary structure[2]	8	1,350,000
			Permanent structure[3]	3	11,000,000
AT7 - SSTN	5	7	Manyatta	5	150,000
			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
SSTN	0	0	None	0	0
Total	88	271		115	47,300,000

Small structure[1] - include; huts, toilets, animal sheds, stores/granaries etc

Temporary structure[2] - include; mud and timber walled houses with iron-sheet roofing, etc

Permanent structure[3] – include stone, brick, and block walled structures

Table 6.2; RAP census results for alternative 1

Location	PAPs		Structures		Valuation (Ksh.)
	Households	Total PAPs	Type	Number	
SSTN – AT1.1	0	0	Manyatta	0	0
			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
AT1.1 – AT1.2	4	13	Manyatta		
			Small structure[1]	1	50,000
			Temporary structure[2]		

			Permanent structure[3]	4	12,000,000
AT1.2 – AT1.3	0	0	Manyatta	0	0
			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
AT1.3 – AT1.4	5	20	Manyatta		
			Small structure[1]	1	50,000
			Temporary structure[2]	4	4,000,000
			Permanent structure[3]	1	5,000,000
AT1.4 – T-OFF	0	0	Manyatta	0	0
			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
Total	9	33		11	21,100,000

Small structure[1] - include; huts, toilets, animal sheds, stores/granaries etc

Temporary structure[2] - include; mud and timber walled houses with iron-sheet roofing, etc

Permanent structure[3] – include stone, brick, and block walled structures

Table 6.3; RAP census results for alternative 2

Location	PAPs		Structures		Valuation (Ksh.)
	Households	Total PAPs	Type	Number	
SSTN – AT1.1	0	0	Manyatta	0	0

			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
AT1.1 – AT1.2	8	21	Manyatta	0	0
			Small structure[1]	4	650,000
			Temporary structure[2]	6	4,800,000
			Permanent structure[3]	0	0
AT1.2 – AT2	0	0	Manyatta	0	0
			Small structure[1]	0	0
			Temporary structure[2]	0	0
			Permanent structure[3]	0	0
Total	8	21		10	5,450,000

Small structure[1] - include; huts, toilets, animal sheds, stores/granaries etc

Temporary structure[2] - include; mud and timber walled houses with iron-sheet roofing, etc

Permanent structure[3] – include stone, brick, and block walled structures

6.6: TERMS OF REFERENCE (TORS)

KETRACO will be required to conduct an elaborate RAP immediately before the project construction phase. The following Terms of Reference (TORs) will be useful to ensure the RAP is elaborate enough, effective, and contain all important components in line with local legislations and the World Bank Safeguard policies.

6.6.1; Objective of the Study

The objective of the study is to carry out a detailed Resettlement Action Plan (RAP).

6.6.2; Scope of Study

The Project Scope will include carrying out a baseline Socio-Economic Survey on the people affected, valuation of structures, land, crops and trees, Compensation Mechanism, Conflict Redress Mechanism and a report detailing all these variables.

The valuation of structures and land must be done by a registered and licensed valuer.

6.6.3; Study Tasks

Task 1: Carry out a detailed survey on the actual number of people to be affected by the proposed line

- A concise description of project area including location of the project area and the number of people to be affected by the project in each location or district
- Undertake a socio-economic baseline survey of the people affected by the project
- Description of categories of people to be affected; partially or wholly taking into account gender, vulnerability and other diversity concerns.
- Identify all the people to be affected (PAPs) on the entire trace of the line providing their names with their official identification as in the National Identity card, phone contacts and physical contacts (street/estate, village, sub-location, location, District and County).

Task 2: Carry out a detailed evaluation of the amount of land to affected by the project

- Description of the total land that will be affected by the way leave access
- Baseline description of land tenure, land use patterns and transfer systems
- Evaluation of farmland; commercial and subsistence farm land that will be affected by the proposed line and give a rough estimate of land values
- Provide a report on the type of effect for every parcel of land affected in terms of partial or entire parcel.
- For each PAP whose land is affected, provide 1)actual acreage of land to be taken by the transmission line way leave 2)total acreage of PAPs land
- For each PAP whose land is affected, conduct valuation of the affected strip and compute compensation values. Provide type and methodology of compensation, preferred method of valuation with justification and the compensation framework including country laws and regulations.
- Provide details of the land affected in terms of type of tenure and land use patterns
- For each PAP whose land is affected, provide the following information on the status of land ownership documents 1)title deed LR No. and name of the registered owner 2)information on

whether the current land occupant is the registered land owner 3)placed caveats 4)disputes involving the land parcel

- Provide actual values of the percentage parts of the parcels affected basing the values between a scale of 30 – 95% of the total market value of land ,where : 30% or less is for the large parcels with very minimal impact /effect while up to 95% being for the parcels that are severely or totally affected. (The valuation estimates should be based on locational registration areas)
- Provide maps of affected areas showing strips of affected areas.
- For each parcel of land affected, plot the transmission line wayleave on its cadastral map.

Note that eligibility of affected land must be confirmed by legal documents of ownership (squatters are not eligible for land compensation, but will be compensated for structures they may have put up and /or crops and trees they may have planted)

Task 3: Carry out a detailed survey on the structures to be affected by the proposed line

- Total number of structures to be affected by the proposed line
- Baseline description of structures affected including permanent and semi-permanent structures
- For each parcel of land affected, provide the total number and type of structures to be affected by the proposed transmission line
- Provide total number of public institutions/community structures to be affected by the proposed line
- Provide description of structures affected – Plinth area and construction materials
- Provide detailed values/estimation of structures to be affected accompanied by pictures of the affected structures and measurements
- Provide detailed values/estimation of structures to be affected accompanied by pictures, measurements and geographical positions (inscribed as a foot note of the pictures) of the structures affected. (using coordinates)
- Establish names of true owners of structures and include the names in each caption of picture taken for each structure
- Provide type and methodology of compensation, preferred method of valuation with justification and the compensation framework including country laws and regulations.
- Prepare an inventory of loses and a detailed Entitlement Matrix that will be used for compensation

Note that all owners of structures are considered eligible including squatters

Task 4: Carry out a detailed census/count of trees affected by the proposed line

- Provide the 1) number 2)type 3)breast-height diameter of mature trees affected per each parcel affected
- Provide assessment of trees /crop damage estimate values of the trees/crops affected

  Note that the rates of computation should be based current rates as guided by on Kenya Forestry Service and Ministry of Agriculture

Task 5: Prepare an inventory of losses and a detailed Entitlement Matrix that will be used or compensation

Task 6: Prepare livelihood restoration strategies and measures necessary to assist people affected by the project improve or restore their living standards

Task 7: Prepare a detailed organizational arrangement for delivery of entitlements, including; Livelihood restoration measures, preparation and review of cost estimates, the flow of funds; and contingency arrangements

Task 8: Prepare a detailed description of the implementation process, linking resettlement implementation to civil works

- Initiate stakeholder involvement and come up with specific stakeholder committees either locational or sub-locational in areas affected that will ensure smooth implementation of the RAP

Task 9: Prepare a detailed grievance redress mechanism including concise procedures for dispute resolution taking into account traditional dispute settlement measures and judicial recourse

Task 10: Prepare a detailed description of mechanisms for consulting with, and participation of, displaced persons in planning, implementation and monitoring

Task 11: Prepare a detailed description of arrangements for monitoring by the implementing agency and if required, by independent monitors

Task 12: Prepare a detailed estimated budget cost for the whole resettlement action plan inclusive of costs of structures, land, contingencies and monitoring of the project

6.6.4; Staffing

The team proposed for the assignment shall comprise of the following key experts but not limited to:

Team leader
Socio-Economist
Valuation expert
Environmental Expert
GIS Expert/Surveyor

The consultant shall also submit the list of any other staff proposed for the assignment; with their CV's as follows:

Team Leader

General Qualification

Minimum requirement:

- Master's degree in Sociology/Social Sciences or any related field
- 10 years' experience in studies of this nature
- 5 years in inter-disciplinary team management
- Experience of at least two projects of similar scope and nature

Socio-Economist

General Qualification
Minimum requirements

- MA Degree in Sociology/Community Development or any social science discipline
- 5 years' experience in socio-economic surveys in similar scope and nature.
- Experience of at least two projects of similar scope and nature

Land Economist

General Qualification
Minimum requirement:

- Degree in land economy/valuation from a recognized University
- 10 years' experience in valuation
- Certificate of registration/professional certificate
- Registration and/or membership of professional field and valid annual operating licence will be an added advantage

Environmental Expert

General Qualification
Minimum requirements

- B.Sc. Degree in Environmental Studies/Planning and Management/Science/ or Natural Resource Management
- 5 years' experience in ESIA studies
- Experience of at least two projects of similar scope and nature
- Registration and/or membership of professional field and valid annual operating licence will be an added advantage

GIS Expert/Surveyor

General Qualification
Minimum requirements

- B.SC Degree Survey
- At least 5 years' experience in survey works / mapping exercises.
- Registration and/or membership of professional field and valid annual operating licence will be an added advantage

CHAPTER 7: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROPOSED PROJECT

7.1: INTRODUCTION

A summary of the main potential impacts of the proposed project based on stakeholders' views; Assessment of the project area and evaluation of project processes, JBIC Environmental Checklist 15: Power Transmission and Distribution Lines; World Bank Project/Site Screening Criteria Worksheet; KETRACO ESIA Screening Form; ADB Guidelines; and consultants' previous experience in undertaking ESIAs is discussed below.

7.2: POSITIVE IMPACTS

Broadly, the identified positive impacts associated with the proposed transmission line project include;.

7.2.1; Reliable and Secure Electricity Power Supply

The project will enhance the adequacy, reliability, and security of electricity power supply in Maralal County. The County at the moment is fed by a 33kV distribution line, and can not host heavy industries that are power intensive. With a potential for heavy industries in the county due to its proximity to the LAPSET project, the need for adequate, reliable, and secure power can not be overemphasized. The project will also help meet the increasing demand for power supply and minimize the frequency of power outages.

7.2.2; Contribute towards reduction in Greenhouse Gas emission

Current electricity power transmission mode in Maralal County is through 33kV distribution lines. Studies show that, the 33kV distribution lines loose upto 30 per cent of the power they transmit. High voltage transmission lines on the other hand are efficient and hardly loose any power they are transmitting. The project therefore, will contribute towards saving power loses which translates to reduced generation of excess power (lost during transmission) and therefore a reduction in the generation of greenhouse gasses. The project will further eliminate the need for diesel generated power and reduce dependence on fuel-wood. This will again help reduce emission of greenhouse gasses.

7.2.3; Employment Opportunities

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

7.2.4; Contribution towards reduction of environmental pollution

Studies show that, the dominant energy source in the county is fuel-wood. The project will provide alternative energy source and thus reduce reliance on fuel-wood thereby contributing towards among others, the national goal of meeting the minimum forest cover

7.2.5; Gains in the Local and National Economy

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

7.2.6; Informal Sector Benefits

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

7.2.7; Development of Other Sectors

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

7.2.8; Security

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

7.3: NEGATIVE IMPACTS

The following negative impacts are also associated with the proposed project.

7.3.1; Noise Pollution

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

7.3.2; Generation of Exhaust Emissions

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

7.3.3; Dust Emissions

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

7.3.4; Solid and Liquid Waste Generation

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

7.3.5; Oil Spill Hazards

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

7.3.6; Destruction of Existing Vegetation and Habitats

The project will require a way-leave of 30 meters width for the 310km. Within the way-leave, selective clearing of vegetation will be necessary to (1) remove any tall trees that pose a risk to the transmission line, (2) give way for the construction of the towers; and (3) give room for workers to do survey work and stringing of the transmission line. Also vegetation within sections of the substations that will hold the power lines and buildings will be cleared.

7.3.7; Disturbance of Faunal Species

The potential impacts to faunal species are restricted to disturbance of their habitats, their feeding, breeding and general movements. Disturbance could also be caused by presence of labour force, poaching, noise and vibration. Overall, the impact on wildlife during construction is considered low to insignificant.

7.3.8; Avifauna Mortalities

During the assessment, various types of avifauna were recorded. The transmission line therefore, is quite likely to the birds. Avifauna mortality by power lines can either be due to bird electrocution or bird strikes by the conductors. The separation between the conductors of the transmission line shall be a minimum of 30m and therefore, bird electrocution will be highly unlikely. Bird strike by the conductors is however, likely and in a few circumstances may lead to mortality.

7.3.9; Impacts on Workers' and Community Health and Safety

Workers and community members in the project area may be exposed to various risks and hazards including falling from height during construction of towers (may lead to fatality), falling objects, collapsing of excavations, road accidents, slips and trips, flammable and explosive substance, electrical shocks, dust, noise and vibrations, poor hygiene, fire, bruises and cuts, etc

7.3.10; Soil Erosion

There are possibilities of soil erosion occurring during the construction stage of the project especially during rainy and windy seasons. Where the transmission line pass near wetlands, soil erosion may lead to deposition in the watercourses and other wetlands causing siltation.

7.3.11; Visual and Aesthetic Impacts

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

6.3.12; Incidences of Electrocution

Various stakeholders were concerned by the fact that, the project may lead to members of the community being electrocuted. Some were even worried that, touching the pylons may lead to electrocution. While it is true that the proposed project will be dealing with electricity, the safety design of the project leaves very little chance of electrocution. The conductors are 30m high, the towers at some height are surrounded by barbed wire and have clear danger warnings to deter people from climbing, and should a tower collapse or a conductor snap, a signal is sent in seconds which results in an immediate shut down.

7.3.13; Perceived Danger of Electrostatic and Magnetic force

Electric power lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived health effect. The strength of both electric and magnetic fields is a function of the voltage and the lateral distance from the power lines to the receptor. Many studies published during the last decade on

occupational exposure to Electro-Magnetic Fields (EMF) have exhibited a number of inconsistencies and no clear, convincing evidence exists to show that residential exposures to electric and magnetic fields are a threat to human health. However, the EMF decrease very rapidly with distance from source and there should be no potential health risks for people living outside of 30 m corridor.

7.3.14; Increase in Social Vices

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

7.3.15; Cultural Heritage and Archaeological Finds

Though not identified during the EIA assessment, the transmission line may traverse through cultural heritage areas. Further, during excavations for the tower bases, workers may come across Archaeological finds.

7.3.16; Land take – Resettlement and Loss of Use

As mentioned earlier, the proposed project will require a corridor of 30m width. Within the 30m corridor, no structures or tall trees are allowed. All other forms of land use including grazing and farming are allowed. Resettlement for this particular project will not be extensive since the project area is sparsely populated and the way of live in this region is nomadic pastoralism.

7.4: PROPOSED MITIGATION MEASURES

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

7.4.1; Noise Pollution

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

7.4.2; Generation of Exhaust Emissions

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

7.4.3; Dust Emissions

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

7.4.4; Solid and Liquid Waste Generation

To avoid waste generation or to minimize the amount of waste generated, the following measures are recommended;

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

- audits waste generation and develop Waste Reduction Action Plans (WRAP).

7.4.5; Oil Spill Hazards

The proponent will endeavour to prevent petroleum products used in the substations which include bitumen, oils, lubricants and gasoline from contaminating soils and water resources (ground and surface water). To accomplish this, the proponent will;

- install oil trapping equipment in areas where there is a likelihood of oil spillage;
- collect the used oils and re-use, re-sell, or dispose of appropriately using expertise from licenced waste handlers;
- prepare a written substations response plan and display it on strategic areas and train workers on specific procedures to be followed in the event of a spill;
- immediately institute clean up measures in case of an oil spill;
- design the substations to have spill prevention and detection systems to protect the environment especially where the transformers will be located;
- design appropriate protection devices against accidental discharge of transformer oil substances;
- route drains through an oil/water separator;
- ensure regular inspection and maintenance of the transformers to minimize spillage;
- ensure that all waste oils from maintenance of transformers and other associated equipment should be segregated and disposed properly by a reputable/registered waste handler in accordance with the waste disposal plan.

7.4.6; Destruction of Existing Vegetation and Habitats

To minimize destruction of existing vegetation and habitats, the proponent will;

- conduct selective clearing of vegetation on the way-leave corridor. Avoid unnecessary vegetation clearing; only tall trees that pose a danger to the transmission line and vegetation on the foot plinth of the tower to be removed.
- specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage;
- with assistance from community, KFS and KWS, KETRACO to initiate a tree planting exercise. School Greening Programmes in schools that are along the transmission line would be very useful.
- On the un-used portions of the acquired substations land; design and implement an appropriate landscaping programme for the substations site;

7.4.7; Disturbance of Faunal Species

To minimize effects on faunal species

- Ensure no worker engage in acts of poaching
- Restrict construction to day time

- Observe applicable Game Reserve regulations
- Bush clearing to be selective. Only tall trees on the wayleave corridor or vegetation on the footprints of the towers to be removed
- Consult the local KWS officer and conservancy owners to advice on construction timings to avoid disturbing wildlife.

7.4.8; Avifauna Mortalities

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

7.4.9; Impacts on Workers' and Community Health and Safety

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

7.4.10; Soil Erosion

To reduce soil erosion, the proponent will;

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

7.4.11; Visual and Aesthetic Impacts

To reduce impacts on visual and aesthetic values of the area, the project proponent will;

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

7.4.12; Incidences of Electrocution

To reduce incidences of electrocution, the proponent will;

- ensure strict adherence to the safety designs established;
- put in place a maintenance system to ensure physical integrity of project components;
- ensure that access to the live sections of the project should only be by authorization and trained personnel;
- erect a perimeter fence on substations to deny unauthorized people access the substations;
- place warning signs on strategic places;
- conduct periodic awareness and sensitization campaigns for the neighbouring communities.

7.4.13; Perceived Danger of Electrostatic and Magnetic force

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

7.4.14; Increase in Social Vices

To minimize project effects on local social set up, the proponent will;

- conduct periodic sensitization forums for employees on ethics, morals, general good behavior and the need for the project to co-exist with the neighbours;
- offer guidance and counseling on HIV/AIDS and other STDs to employees;
- provide condoms to employees; and
- ensure enforcement of KETRACO's policy on sexual harassment and abuse of office.

7.4.15; Cultural Heritage and Archaeological Finds

Upon discovery of a heritage site or an Archaeological find, the construction site will be stopped, the site if possible will be restricted using tapes or local materials, and relevant authorities including local administration officers and the museums of Kenya informed for further instructions.

7.4.16; Land take – Resettlement and Loss of Use

- Conduct a detailed and elaborate RAP
- Conduct consultation meetings with Project Affected Persons
- Ensure timely compensation for loss of property and land use.
- Ensure adherence to country legal legislations and World Bank Safeguard Policy 4.12 on Involuntary Resettlement

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1: ESMP FOR THE CONSTRUCTION PHASE

Table 8.1: ESMP for the construction phase of the proposed project

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Minimization of Noise and Vibration				
Noise and vibration	**1.** Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	KETRACO & Contractor	Entire construction period	0
	2. Sensitise construction drivers to avoid running of vehicle engines or hooting	KETRACO & Contractor	Entire construction period	0
	3. Regular servicing of engines and machine parts to reduce noise generation	KETRACO & Contractor	Entire construction period	0
	4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures (containers) to minimize ambient noise levels.	KETRACO & Contractor	Entire construction period	Design cost
	5. Trees to be planted around the site to provide some buffer against noise propagation	KETRACO & Contractor	Entire construction period	40,000
	6. The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.	KETRACO & Contractor	Entire construction period	0

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	7. Provide necessary PPE to workers who may be exposed to high levels of noise and ensure proper and constant use	KETRACO & Contractor	Entire construction period	Ear plugs and ear muff @1000 each
	8. All construction equipment and machinery to be used must be tested to verify if they are compliant with Kenya and the internationally acceptable standards of noise.	KETRACO & Contractor	Entire construction period	
2. Abate Air Pollution				
Dust emission	**1.** Ensure strict enforcement of on-site speed limit regulations	KETRACO & Contractor	Entire construction period	0
	2. Avoid excavation works in extremely dry weather			0
	3. Sprinkle water on graded access routes when necessary to reduce dust generation by construction and vehicles			10,000
	4. Stockpiles of earth should be enclosed / covered / watered during dry or windy conditions to reduce dust emissions			0
	5. PPE to be provided to employees and ensure proper and constant use			Dust coats and dust masks@5000 per employee
Exhaust emission	**1.** Sensitise truck drivers and machine operators to switch off engines when not in use			0
	2. Regular servicing of engines and machine parts to reduce exhaust emission generation			0
	3. Alternative non-fuel construction equipment shall be used where feasible			0

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
3. Minimize solid and liquid waste generation and ensure efficient waste management during construction				
Increased solid waste generation	**1.** Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle	KETRACO and Contractor	Entire construction period	0
	2. Accurate estimation of the dimensions and quantities of materials required.			0
	3. Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time			0
	4.Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage			Design cost
	5. Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste			0
	6. Reuse packaging materials such as Removed wooden poles,cartons, cement bags, empty metal and plastic containers to reduce waste at site			0
	7. Waste collection bins to be provided at designated points on site			20,000
	8. Dispose waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.			20,000/month
Generation of wastewater	**1.** Provide means for handling sewage generated at the construction site	KETRACO and	One-off	30,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	Contractor	Entire construction period	0
	3. Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated			10,000 - quarterly
4. Minimize Oil Spills				
Oil spills Hazards	**1**. Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of vehicles.	KETRACO and Contractor	Continuous	0
	2. In case of an oil spill, immediate clean up measures will be instituted			
	3. Storage and liquid impoundment areas for fuels, raw and in-process material solvents, wastes and finished products should be designed with secondary containment to prevent spills and the contamination of soil, ground and surface water		One-off	10,000
	4. A written substations response plan should be prepared and retained on the site and the workers should be trained to follow specific procedures in the event of a spill.		One-off	0
	5. Collected used oils should be re-used, disposed of appropriately by licenced waste handlers, or be sold for reuse to licensed firms		Continuous	5,000 per month
5. Minimize vegetation disturbance at and or around construction site				

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Destruction of existing vegetation and habitat	**1.** Conduct selective clearing of vegetation on the way-leave corridor. Avoid unnecessary vegetation clearing; only tall trees that pose a danger to the transmission line and vegetation on the foot plinth of the tower to be removed.	KETRACO and Contractor	Continuous	0
	2. Ensure proper demarcation and delineation of the project area to be affected by construction works.			0
	3. Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.			0
	3. Designate access routes and parking within the site.			0
	4. With Assistant from community, KWS and KFS, initiate a tree planting exercise		Entire construction period	50,000
	5. Design and implement an appropriate landscaping programme for the substations site.			50,000
	6.Support community initiatives in tree planting	KETRACO and community	Entire project period	50,000
6. Minimize Disturbance on faunal species				
Disturbance on wildlife	**1.** Ensure no worker engage in acts of poaching	KETRACO, and Contractor	Entire construction period	0
	2. Restrict construction to day time			
	3. Observe applicable Game Reserve regulations			
	4. Bush clearing to be selective. Only tall trees on the wayleave corridor or vegetation on the footprints of the towers to be removed			

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	5. Consult the local KWS officer and conservancy owners to advice on construction timings to avoid disturbing wildlife.			
7. Minimize occupational health and safety risks				
Impacts on workers' and community health and safety	**1**. Ensure strict compliance with the Occupational Safety and Health Act (OSHA) 2007	KETRACO, DOHSS and Contractor	Entire construction period	100,000
	2. Prohibit access by unauthorized personnel into the construction site			0
	3. Train all employees and regularly sensitize them on safe working procedures			30,000
	4. Periodic community sensitization of the dangers posed by the project		Quarterly during the entire construction period	50,000
	5. Place warning signs where necessary		Whenever necessary	20,000
	6. Provide necessary PPEs to workers		Continuous	20,000
	7. Erect a perimeter fence to enclose the substations		One-time off	Design cost
8. Reduce soil erosion and storm-water runoff				
Soil erosion and storm-water runoff	**1.** Surface runoff and roof water shall be harvested and stored in tanks so that it can be used for cleaning purposes.	KETRACO and Contractor	Entire construction period	20,000
	2. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.		First quarter	

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.			
	4. Ensure that construction vehicles are restricted to use existing graded roads		Entire construction period	
	5. Ensure that any compacted areas are ripped to reduce run-off.			
	8. Roof catchments will be used to collect the storm water for some substations uses			40,000
	9. Construction of water pans to collect storm water for substations use, tree planting and landscaping.			5,000 per unit
9. Visual and aesthetic impacts				
Visual and aesthetic impacts	**1.**Extensive public consultation during project planning	KETRACO and community	Planning phase	50,000
	2. Structures at the site should be designed in such a way that they will improve the beauty of the surroundings.			
	3. Restore site area through backfilling, landscaping and planting of trees, shrubs and grass on the open spaces to re-introduce visual barriers,		Continuous	50,000
	4. Design and implement an appropriate landscaping programme		Quarter one	20,000
10. Increase in social vices				
Increase in social vices including HIV/AIDS	**1**. Periodic sensitization forums for employees on ethics, morals; general good behaviour and the need for the project to co-exist with the neighbours	Contractor	Entire construction period	50,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Guidance and counselling on HIV/AIDS and other STDs to employees	KETRACO and contractor		10,000
	3. Provision of condoms			10,000
	4. Contractor to have a strong policy on sexual harassment and abuse of office guided by proponent's policy on the same	Contractor	Quarter one	0
11. Cultural Heritage and Archaeological Finds				
Cultural Heritage and Archaeological Finds	**1.** Upon discovery of a heritage site or an Archaeological find, the construction site will be stopped, the site if possible will be restricted using tapes or local materials, and relevant authorities including local administration officers and the museums of Kenya informed for further instructions.	Contractor and KETRACO	Entire construction period	0
12. Land take – Resettlement and loss of use				
Resettlement and loss of use	Conduct consultation meetings with Project Affected Persons and ensure timely compensation for loss of property and land use. Ensure adherence to country legal legislations and World Bank Safeguard Policy 4.12 on Involuntary Resettlement	KETRACO	Continuous	To be determined

8.2: ESMP FOR THE OPERATION PHASE

Table 8.2: ESMP for the operation phase of the proposed project

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Abate Air Pollution				
Generation of exhaust emission	**1.** Vehicle idling time shall be minimised	KETRACO	Entire implementation time	0
	2. Regular servicing of engines and machine parts to reduce exhaust emission generation			
2. Minimization of solid and liquid waste generation and ensuring more efficient waste management				
Solid waste generation	**1.** Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle	KETRACO	Continuous	0
	2. Provide solid waste handling facilities such as rubbish bags and skips		One-off	20,000
	3. Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures.		Continuous	0
	4. A private licensed company to be contracted to collect and dispose solid waste on regular intervals			30,000 /year
	5. Place in strategic places signs against littering and dumping of wastes			10,000 /year
	6. Audits on waste generation and			

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	development of Waste Reduction Action Plans (WRAP)			To be determined
Liquid waste generation	**1.** Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	KETRACO	Continuous	20,000 / annum
	2. Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated			
	3. Audits on liquid waste generation and development of liquid Waste Reduction Action Plans			
Release of sewage into the environment	**1.** Provide adequate and safe means of handling sewage generated at the substations	KETRACO	One-off	40,000
	2. Conduct regular inspections for sewage pipe blockages or damages and fix appropriately		Continuous	0
	3. Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated			0
3. Minimize Oil Spills				
Oil spills Hazards	**1**. Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of vehicles	KETRACO	Continuous	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. In case of an oil spill, immediate clean up measures will be instituted			
	3. The substations should be designed with spill prevention and detection systems to protect the environment especially where the transformers will be located.		One-off	Part of construction cost
	4. Design appropriate protection devices against accidental discharge of transformer oil substances.			
	5. The substations design should provide adequate storage areas for the transformer oil			
	6. Drains should be routed through an oil/water separator		One-off	Part of construction cost
	7. Frequent inspection and maintenance of the transformers should be done to minimize spilling		Continuous	0
	8. A written substations response plan should be prepared and retained on the site and the workers should be trained to follow specific procedures in the event of a spill.		One-off	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	9. The substations operator should ensure the proper containment or collection and disposal for the waste oil or used oil		Continuous	0
	10. All waste oils from maintenance of transformers and other associated equipment should be segregated and disposed properly by a reputable/registered waste handler in accordance with the waste disposal plan			20,000/year
	11. Storage and liquid impoundment areas for fuels, raw and in-process material solvents, wastes and finished products should be designed with secondary containment to prevent spills and the contamination of soil, ground and surface water		One-off	Project construction cost
4. Avifauna mortality				
Avifauna mortalities	**1.** To minimize collisions, undertake wire marking to alert birds to the presence of power lines, allowing them time to avoid the collision	KETRACO	One-off	Part of construction cost
	2. Build raptors platforms for bird roosting and nesting			
5. Minimize occupational health and safety risks				

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Impacts on workers' and community health and safety	Implement all necessary measures to ensure health and safety of the substations workers and the general public during operation of the proposed substations as stipulated in the Occupational Safety and Health Act, 2007	KETRACO	Continuous	50,000/month
6. Minimize Electrocution Incidents				
Electrocution from live power lines or electric equipment	**1.** Put in place a maintenance system to ensure physical integrity of project equipment is maintained	KETRACO	Planning stage	0
	2 Access to the substations should only be by authorization and trained personnel		Continuous	
	3. Erect a perimeter fence to deny unauthorized people access the substations			
	4.. Clear warning signs to be placed on strategic places			
	5. Conduct periodic awareness and sensitization campaigns for the neighbouring communities		Continuous	20,000/session
7. Electrostatic and magnetic forces				
Perceived danger of Electrostatic and Magnetic force	**1.** Conduct education and awareness campaigns to dispel fear among community on the effects of electrostatic and magnetic forces	KETRACO	Continuous	20,000 / annum

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
8. Increase in social vices				
Increase in social vices including HIV/AIDS	**1**. Periodic sensitization forums for employees on ethics, morals; general good behaviour and the need for the project to co-exist with the neighbours	KETRACO	Continuous	30,000/year
	2. Guidance and counselling on HIV/AIDS and other STDs to employees			
	3. Provision of condoms			
	4. enforcement of KETRACO's policy on sexual harassment and abuse of office			

8.3: ESMP FOR DECOMMISSIONING PHASE

Table 8.3: ESMP for decommissioning phase of the proposed project

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

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.	KETRACO and Contractor		
	3. Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at demolition sites.		One-off	10,000
	4. Provide appropriate PPE to all workers		Continuous	Dust coats and dust masks@5000 per employee
Generation of exhaust emission	**1.** Vehicle idling time shall be minimised	KETRACO and Contractor	Continuous	0
	2. Regular servicing of engines and machine parts to reduce exhaust emission generation			
3. Waste management				
Demolition waste	**1.** Use of an integrated solid waste management system i.e. through a hierarchy of options: 1.Source reduction 2.Reusing 3. Recycling 4.Incineration 5. Sanitary land filling.	KETRACO and Contractor	Continuous	0
	2. All machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible or they be taken to a licensed waste disposal site	KETRACO and Contractor	One-off	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	3. Dispose waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.	KETRACO and Contractor	Continuous	Cost borne by the contractor
4. Oil spills				
Oil spills Hazards	**1**. Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of construction facility and vehicles.	KETRACO and Contractor	Continuous	0
	2. In case of an oil spill, immediate clean up measures will be instituted			
	3. Close surveillance of the fuel and cooling oil store			
5. Impacts on workers' and community health and safety				
Health and Safety for workers' and community members	**1**. Ensure strict compliance with the Occupational Safety and Health Act (OSHA) 2007	KETRACO DOHSS and Contractor	Continuous	To be determined
	2. Prohibit access by unauthorized personnel into the demolition site			
	3. Place warning signs where necessary			
6. Rehabilitation of project site				
Vegetation disturbance	**1.** Implement an appropriate re-vegetation programme to restore the site to its original status	KETRACO and community	One-off	20,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	2. Consider use of indigenous plant species in re-vegetation			
	3. Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development.			

CHAPTER 9: ENVIRONMENTAL MONITORING PLAN (EMoP)

9.1: ENVIRONMENTAL MONITORING PLAN

Table 9.1: Environmental Monitoring Plan for the proposed project

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

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
3. Solid and liquid waste generation	Monthly	Monthly	Monthly	Reports on waste management plans developed; amounts of waste generated; facility provided for handling and storage of waste; methods employed for waste disposal; training meetings held, Waste water quality analysis; Reports on liquid waste management plans developed; number of inspections held to identify leaking or blocked pipes	KETRACO and Contractor
4. Oil spills	Daily	Monthly	Daily	Reports of oil trapping equipment installed; number of oil spill incidents and corrective measures taken	KETRACO and Contractor
5. Destruction of existing vegetation and habitats	Daily			Reports on site zoning program; community initiatives held on tree planting; landscaping programme on re-vegetation implemented	KETRACO and Contractor
6. Disturbance of faunal species	Monthly			Reports on wildlife sighted, meetings with KWS and conservancy owners, bush clearing	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
7. Avifauna mortalities		Quarterly		Reports on wire marking and raptor platforms build; incidents of bird strikes	KETRACO and Contractor
8. Health and Safety issues	Daily	Monthly	Daily	Quarterly reports on health and safety plans; SHE training programs; records of any incident, accident; investigation and corrective actions; PPE provided; progress of perimeter wall construction; warnings posted;	KETRACO and Contractor
9. Soil erosion	Daily			Reports on storm water management and soil erosion control plans developed; amounts of run-off and roof water harvested; water harvesting and storage facilities installed	KETRACO and Contractor
10. Visual and aesthetic impacts	Quarterly			Reports on public consultation held; landscaping programme designed and implemented	KETRACO and Contractor

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
11. Electrocution incidences		Quarterly		Reports on maintenance system developed; electrocution accidents occurrence and corrective measures taken; visitors and employees access to the substations log; progress on construction of the perimeter wall; warning signs posted; sensitization workshops held	KETRACO and Contractor
12. Perceived danger of Electrostatic and Magnetic force		Quarterly		Reports on education and awareness campaigns held	KETRACO and Contractor
13. Increase in social vices	Monthly	Monthly		Reports on sensitization forums held; sessions held on guidance and counselling on HIV/AIDS and other STDs; number of condoms issued	KETRACO and Contractor
14. Cultural Heritage and Archaeological Finds	Monthly			Reports on heritage areas and archaeological finds found	KETRACO
15. Land take - Resettlement and Loss of use	Monthly			Reports on RAP implementation including compensation for land, structures and crop/trees damage	KETRACO

Monitoring scope	Frequency			Methodology	Responsible entity
	Construction	Implementation	Decommissioning		
16. Rehabilitation of project site			Monthly	Reports on re-vegetation programme developed and implemented; number and species of trees planted	KETRACO and Contractor

CHAPTER 10: RECOMMENDATIONS AND CONCLUSION

10.1: INTRODUCTION

An Environmental Management Plan (EMP) for the project has been developed to ensure sustainability of the site activities from construction through operation to decommissioning. The plan provides a general outlay of the activities, associated impacts, and mitigation action plans. Implementation timeframes and responsibilities are defined, and where practicable, the cost estimates for recommended measures are also provided.

A monitoring plan has also been developed and highlights some of the environmental performance indicators that should be monitored. Monitoring creates possibilities to call to attention changes and problems in environmental quality. It involves the continuous or periodic review of operational and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted.

It is strongly recommended that a concerted effort is made by the site management in particular, to implement the Environmental Management and Monitoring Plan provided herein. Following the commissioning of the 132Kv transmission line and 132/33 kV transmission substations, statutory Environmental and Safety Audits must be carried out in compliance with the national legal requirements, and the environmental performance of the site operations should be evaluated against the recommended measures and targets laid out in this report.

It is quite evident from this study that the construction and operation of the proposed transmission line project will bring positive effects in the project area including improved supply of electricity, cleaner environment, creation of employment opportunities, gains in the local and national economy, provision of market for supply of building materials, Informal sectors benefits, Increase in revenue, Improvement in the quality of life for the workers and community members, and Improved security.

Considering the proposed location, construction, management, mitigation and monitoring plan that will be put in place, the project is considered important, strategic and beneficial and given that no immitigable negative impacts were encountered and that no community objection was received, the project may be allowed to proceed.

10.2: RECOMMENDATIONS

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

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

10.3: CONCLUSION

From the foregoing, it is noted that;

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

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

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