

Assignment Title: Environmental and Social Impact Assessment Study Report for the Proposed Sultan Hamad – Loitoktok 132kV, 120km Transmission Line and Associated Substations



CLIENT



ESIA Study Report

SEPTEMBER. 2016



Nairobi
Nicholson Court, Nicholson Drive
Off Ngong Road
P.O. Box 10677
00100 – Nairobi, Kenya.

Tel: +254 788 712156
Fax :+254 202017254
E-mail: info@logassociates.com
Http: www.logassociates.com

Kisumu
Re-insurance Plaza, 1st Floor
Bank Street
P.O. Box 2592-
40100- Kisumu, Kenya.

Tel: +254 57-2021105
Fax :+254 57-2501826
E-mail: info@logassociates.com
Http: www.logassociates.com

Mombasa
Milfan Court, Shanzu
Off Mombasa – Malindi Road
Next to Pundamilia Apartments
80100- Mombasa, Kenya

Tel: +254 202712156
Fax :+254 202017254
E-mail: info@logassociates.com
Http: www.logassociates.com

DECLARATION

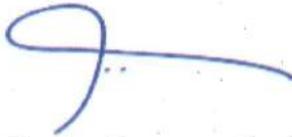
Project Title: Environmental and Social Impact Assessment Study Report for the Proposed Sultan Hamud – Loitoktok 132kV, 120km Transmission Line and Associated Substations

Declaration by the Consultant

I hereby certify that the information contained herein are true to the best of my knowledge and belief.

Signature of the EIA Registered Expert

NEMA Registration No (Lead Environmental Expert): 0831



Eng. Prof Lawrence Gumbe

Log Associates

Nicholson Court, Nicholson Drive

Off Ngong Road

P.O Box 10677 – 00100

Nairobi

Tel: +254 020 271 2156

Fax: +254 020 201 7254

NEMA Registration no (LOG Associates): 0203

Declaration by Proponent

I hereby certify that the information contained herein is true to the best of my knowledge and belief.

Signature of Proponent

**KENYA ELECTRICITY TRANSMISSION
COMPANY LIMITED**

for **Dr. (Eng.) John M. Mativo**

Chief Manager

Planning and Development

Kenya Electricity Transmission Company Limited (KETRACO)

Kawi Complex, 5th Floor, Block B, South C

Off Popo Rd Along Red Cross Rd

P.O. Box 34942-00800

Nairobi, Kenya

EXECUTIVE SUMMARY

I. Preamble

The Government of Kenya has contracted, through an EPC contract, **China Aerospace Construction Group Corporation Limited**, for the construction of a 120 km, 132kV electricity transmission line from Sultan Hamud to Loitoktok. The project involves the construction of the transmission line plus two associated substations. This report, prepared by **Log Associates** on behalf of **Kenya Electricity Transmission Company Limited (KETRACO)**, provides the background to the proposed project as well as an assessment of their likely environmental and social impacts, both beneficial and adverse. Proposed enhancement and mitigation measures are outlined where necessary together with an initial assessment of costs and responsibilities for their implementation.

II. Back ground

The Government of Kenya plans to increase access to electricity in Kenya tenfold from the current 4% in the rural areas to about 40% by 2020. To achieve this, more transmission lines are being considered for construction and upgrading and with it the communication system required for line protection and management purposes.

Kenya's development agenda is guided by the Vision 2030, whose aim is to drive the country into a globally competitive and prosperous economy with high quality of life. The Vision is founded on economic, social and political pillars

III. 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, operations 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.

IV. 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, county administration, opinion leaders and county 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.

V. Project Description

The Proposed Transmission Line commences at an existing substation in Sultan-Hamud, Makueni County. The line then crosses the Nairobi-Mombasa road, the old railway line and the standard gauge railway before cutting across Kajiado County. In Kajiado County, the transmission line traverses across two sub counties, i.e.;

1. **Mashuuru Sub-County.** In Mashuuru sub-county, the proposed transmission line passes through Nkama, Poka-Kenyewa and Imbuko locations respectively
2. **Loitoktok Sub-County.** From Mashuuru sub-county, the proposed transmission line traverses Merrueshi / Oldonyu, Imbirikani, Isinet and Kimana locations in Loitoktok sub-county

Three substations are proposed for this transmission line in Sultan-Hamud, Merrueshi (National Cement Substation) and Loitoktok.

A map of the project area is attached overleaf.

Environmental and Social Impact Assessment for Sultan-Hamud-Loitokitok 120KM, 132kV Transmission Line and its Associated Sub-Stations

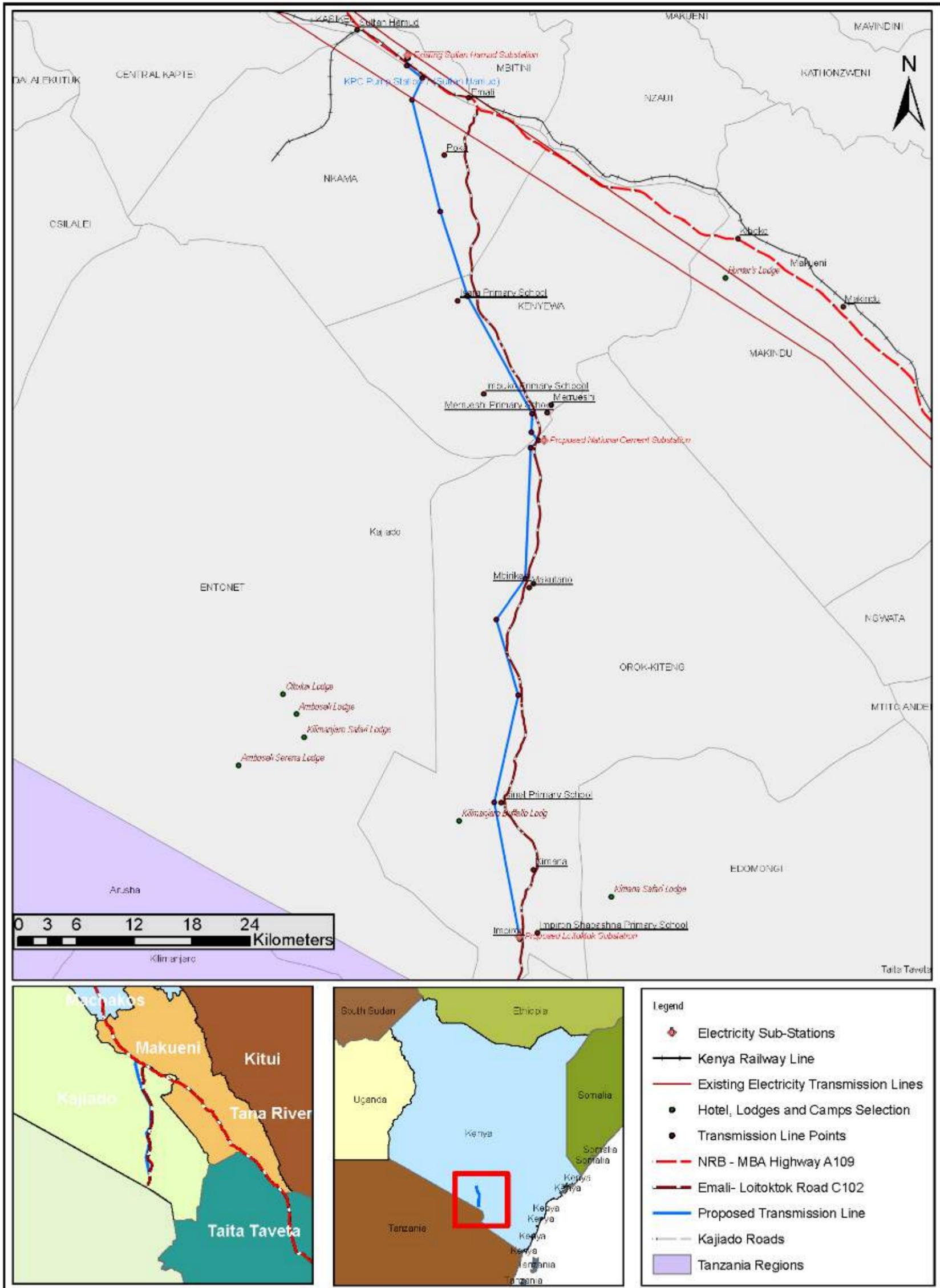


Figure 1.0: A map of the project area.

Source; Log Associates; ArcGIS® software by Esri.

VI. Policy, Legal and Institutional Framework

There are several laws, policies and guidelines that have been put in place in Kenya and Internationally. These laws are meant to help in environmental protection and conservation and also for peaceful co-existence in the ecosystem. We have reviewed a wide range of policy, institutional and legislative framework to address the major causes of environmental degradation and negative impacts on ecosystem emanating from industrial and economic development programmes.

Some of these laws, policies and guidelines reviewed for different categories include;

Table 1.0 List of Laws reviewed in their different categories.

Category	Relevance
International Environmental Policies	
African Development Bank Environmental Guidelines	<ul style="list-style-type: none"> Integrate environmental and social concerns into the life cycle of a project and also stipulate requirements for specific projects
EU Environmental Policy	<ul style="list-style-type: none"> For environmental management
Environmental protection policies of China funded development projects	<ul style="list-style-type: none"> Regulate environmental protection considerations in foreign investment and cooperation
World Bank Safeguard Policies	
Environmental Assessment (OP 4.01)	<ul style="list-style-type: none"> Describes an environmental assessment (EA) process for the proposed project
Natural Habitats (OP 4.04)	<ul style="list-style-type: none"> To ensure that Projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society
Involuntary Resettlement (OP 4.12)	<ul style="list-style-type: none"> To mitigate against impoverishment risks associated with Involuntary Resettlement and the restoration or improvement of income earning capacity of the Project Affected People (PAP)
Public Disclosure (OP 17.50)	<ul style="list-style-type: none"> Encourages Public Disclosure or Involvement as a means of improving the planning and implementation process of projects
United Nations Treaties	
United Nations Convention to Combat Desertification	<ul style="list-style-type: none"> It helps to combat desertification through integrated approaches to development, supported by international cooperation and partnership arrangements, in the affected areas
Convention on Biological Diversity	<ul style="list-style-type: none"> It requires Parties to the Convention to adopt national strategies, plans and programs for the conservation of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programs and policies
Convention on the Conservation of Migratory Species of Wild Animals	<ul style="list-style-type: none"> It aims to conserve terrestrial, aquatic and avian migratory species throughout their range
Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> It commits its Parties by setting internationally binding emission reduction targets
National laws and policies	
The Constitution of Kenya, 2010	<ul style="list-style-type: none"> Article 42 of the Constitution states that every person has the right to a clean and healthy environment which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures

Environmental Management & Coordination Act, 1999 (Cap 387)	<ul style="list-style-type: none"> Provides for the establishment of an appropriate legal and institutional framework for the management of the environment
The Energy Act, 2006	<ul style="list-style-type: none"> Provides the regulatory framework for the energy sector and, among other things, stresses the need for energy players in general and electrical energy players in particular to adopt environmentally friendly and sustainable practices in power generation, distribution and consumption
The Forests Act, 2005	<ul style="list-style-type: none"> The Act is important for the line routing where it may touch on forests of any type (not just protected forests). KFS will need to be kept informed of the impact on trees along the transmission line route, particularly at the construction stage
The Land Act, 2012 (Revised 2015)	<ul style="list-style-type: none"> It provides a legal framework for administration and management of public and private land, leases, charges, compulsory acquisition, easements and related rights
The Water Act, 2002	<ul style="list-style-type: none"> Provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya
National Environment Policy, 2013	<ul style="list-style-type: none"> Sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources, and recognizes that natural systems are under intense pressure from human activities
National Environmental Action Plan (NEAP), 1994 (Revised 2007)	<ul style="list-style-type: none"> Provides the framework for implementation of the Environment Policy and realisation of Development Goals and Vision 2030

These laws and policies are geared towards mitigating any social and environmental negative impacts that may result from a proposed project. Details are outlined in chapter 3 of this Report.

VII. Potential Project Impacts

Anticipated Project Impacts shall be both positive and negative impacts, this report outlines how the positive impacts will be enhanced while also highlighting how the negative impacts will be mitigated. Project Impacts will include:

Positive Impacts

- Increased electrical capacity, and reliability of supply to project area
- Corporate social responsibility (CSR) benefits
- Creation of employment opportunities enhancement of the socio-cultural and local leadership structures
- Increased economic activity in both the project areas and at the national level
- Benefits of engagement by both genders
- Enhancement of tree species diversity
- Improved road infrastructure
- Contribution to government revenue

Negative Impacts

- Relocation of project affected persons and property
- Impact on existing infrastructure
- Impact on KPC structures
- Impact on land use patterns
- Alteration of land ownership patterns

- Concerns over occupational safety and health
- Impact on flora and fauna
- Loss of crop land
- Soil erosion
- Interference with water resources and drainage
- Visual and aesthetic impacts
- Impacts on archaeology and cultural heritage
- Vehicular and human traffic impacts
- Impacts from solid and liquid wastes
- Noise and vibration impacts
- Impacts from rock blasting during project construction
- Emissions and air pollution
- Perceived danger of electrostatic and magnetic force
- Impacts on aircraft navigation
- Impacts on wildlife habitats and migratory birds
- Risk of fire outbreaks
- Impacts of decommissioning activities
- Increase in social vices

Summary of List of Mitigation Measures

Table 2.0 Summary of mitigation measures

Potential Impact	Mitigation and Enhancement Measures
Planning and Construction Phase	
Relocation of project affected persons and property	<ul style="list-style-type: none"> • Compensate all the affected property and also loss of Livelihood
Impact on existing infrastructure	<ul style="list-style-type: none"> • Where the line traverses above the existing railway line and the SGR, the proponent should adhere to Regulations for Power Line Crossings of Railway Tracks.
Impact of KPC structures	<ul style="list-style-type: none"> • Rerouting at the section where it traverses above KPC pump station in Sultan Hamud
Impact on land use patterns	<ul style="list-style-type: none"> • Continuous community sensitization and awareness creation regarding the project. • Compensation where necessary
Alteration of land ownership patterns	<ul style="list-style-type: none"> • Full acquisition of the land is to be done and the owners adequately compensated at the substation site locations
Occupational health and safety concerns	<ul style="list-style-type: none"> • Continuous supervision of occupational, health and safety management by the contractor to ensure compliance • Enlist a Health and Safety consultant to assist
Impact on flora and fauna	<ul style="list-style-type: none"> • Ensure that vegetation clearing is limited to the project area only • Ensure that transportation of construction materials is done through the existing road infrastructure. • Manual clearing such as slashing is encouraged and use of machinery should be limited to excavation of the substation sites only. • Wildlife and environmental preservation awareness campaigns should be conducted on the construction workers to ensure that they do not exploit

Potential Impact	Mitigation and Enhancement Measures
	<p>natural resources through hunting</p> <ul style="list-style-type: none"> On completion of the construction works, the area around the substation sites will be allowed to re-vegetate with indigenous species
Alteration of land ownership patterns	<ul style="list-style-type: none"> Full acquisition of the land is to be done and the owners adequately compensated at the substation site locations
Employment of local labour	<ul style="list-style-type: none"> Maximise use of local labour in execution of construction activities in which they are qualified for. Involvement of local leaders in recruitment process
Noise and vibration impacts	<ul style="list-style-type: none"> Use of noise protection devices when working with noisy equipment The construction should be done during daytime (from 6 am to 6 pm) near residential areas to minimize noise impacts
Soil erosion	<ul style="list-style-type: none"> Employ appropriate pollution control measures Where soils excavated for pylon/gantry tower foundations will be found to be suitable, the same will be used for backfilling excavations and will not be left exposed to wind or water for long periods. Construction traffic to follow defined temporary access routes to be established as part of the works so as to avoid damaging the soil structure in the wider area. Repairs to access roads will be undertaken to maintain the surfacing and prevent soil erosion Areas exposed due to the removal of vegetation are more susceptible to erosion during heavy rainfall, so areas will be reinstated as soon as possible to minimize this effect.
Impact on water resources and drainage	<ul style="list-style-type: none"> Storage and transportation of oil, fuel and other hazardous material to be done in appropriate containers Training of site workers on handling of spillages Availing spillage kits including suitable PPE in storage areas Proper management of waste containers, litter and other waste generated during construction in compliance with waste management regulations 2006 Adherence to EMCA Regulations on water quality Routine inspection Maintenance records
Visual and aesthetic impact	<ul style="list-style-type: none"> Extensive public consultation during the planning of the substation sites After construction, natural vegetation should be restored in non-operational areas of the site and/or additional landscape planting with local indigenous species used to improve views into the site
Impacts on archaeology and cultural heritage	<ul style="list-style-type: none"> Carefully look into such sites during the RAP and construction period, with community consultations at every stage to ensure inclusion of chance, find archaeological procedure in construction contract
Vehicular and human traffic impacts	<ul style="list-style-type: none"> Rehabilitation of roads Design of detours and diversions where necessary
Impacts from liquid and solid wastes	<ul style="list-style-type: none"> Sensitization of workers on environmental protection and safety Provision of solid waste management facilities for the temporary storage and segregation of waste prior to disposal Liaison with the local County authorities on suitable dumping site for generated waste. Excavated soil to be used for backfilling if suitable
Noise and vibration impacts	<ul style="list-style-type: none"> Use of noise reduction technologies such as silencers/mufflers Provision of hearing protection devices for workers.

Potential Impact	Mitigation and Enhancement Measures
	<ul style="list-style-type: none"> Careful selection and use of plant and hours of working
Rock blasting impacts (If applicable)	<ul style="list-style-type: none"> The contractor should create awareness to adjacent communities and work closely with the local administration The contractor should provide safety signage, humps, banksmen Watering to suppress dust Ensuring proper blast design and driller-blaster communication Carry out inspection prior to loading and firing of the blast Controlling access to the blast area, and using a blasting shelter Use of an experienced driller to detect potential problem areas such as voids, mud seams, incompetent rocks, and other irregularities by observing the progress of drilling
Emissions and air pollution	<ul style="list-style-type: none"> Sensitization of workers on environmental protection and safety Control speed of construction vehicles Water should be sprayed during the construction phase on dusty excavated areas Regular maintenance of plant and equipment Provision of dust masks for use when working in dusty conditions Use of serviceable vehicles and machinery to avoid excessive smoke emission
Increase in social vices	<ul style="list-style-type: none"> Continuous sensitization of community members and construction workers
Operation Phase	
Concerns over occupational safety and health	<ul style="list-style-type: none"> Ensuring physical integrity of structures is maintained Deactivating and proper grounding of live power distribution lines before work is performed on, or in close proximity to the lines Ensuring that live wire work is conducted by trained workers only Ensuring the workers are properly isolated and insulated from any conductive object (live – line work)
	<ul style="list-style-type: none"> Testing of structures for integrity prior to undertaking work Implement a fall protection program that includes training in climbing techniques and use of fall protection measures Inspection, maintenance and replacement of fall protection equipment Use of helmets and other protective devices Provision of first aid facilities at site
Rehabilitation of roads	<ul style="list-style-type: none"> Contractor Design of detours and diversions where necessary
Impacts from solid and liquid wastes	<ul style="list-style-type: none"> Waste generated during the day to day operation of the substations should be properly managed
Noise and vibration impacts	<ul style="list-style-type: none"> Nil
Perceived danger of electrostatic and magnetic force	<ul style="list-style-type: none"> There should be no potential health risks for people living outside of 30 m provided for the wayleave area
Impacts on aircraft navigation	<ul style="list-style-type: none"> The maximum height of the tower structures should be in accordance with the requirement of the Kenya Civil Aviation Authority (KCAA).
Impacts on wildlife habitats and migratory birds	<ul style="list-style-type: none"> Undertake wire marking to alert birds to the presence of power line Build raptors platforms on top of pylons for roosting and nesting
Risk of fire outbreaks	<ul style="list-style-type: none"> Carry out routine thinning, slashing, and other maintenance activities, within the substation sites No burning of any materials should be permitted at the site

Potential Impact	Mitigation and Enhancement Measures
Decommissioning Phase	
Concerns over occupational safety and health	<ul style="list-style-type: none"> • Use site barrier tapes to isolate the site and bar intruders from accessing the area in case of a dropping object • Test structures for integrity prior to undertaking work • Implement a fall protection program that includes training in climbing techniques and use of fall protection measures • Inspection, maintenance and replacement of fall protection equipment • Use of helmet and other protective devices • Provision of first aid facilities at the site
Vehicular and human traffic impacts	<ul style="list-style-type: none"> • Rehabilitation of roads • Design of detours and diversions where necessary
Impacts from solid and liquid wastes	<ul style="list-style-type: none"> • Sensitization of workers on environmental protection and safety • Provision of solid waste management facilities for the temporary storage and segregation of waste prior to disposal • Liaison with the local County authorities on suitable dumping site for generated waste. • Excavated soil to be used for backfilling if suitable
Noise and vibration impacts	<ul style="list-style-type: none"> • Provision of hearing protection devices when working with noisy equipment • Use of serviceable equipment with low noise emission • Instruction to truck and machine operators to avoid raving of engines
Emissions and air pollution	<ul style="list-style-type: none"> • Control speed of construction vehicles • Water shall be sprayed during the decommissioning phase to reduce dust emission • Provision of dust masks for use while working in dusty conditions • Use of serviceable vehicles and machinery to avoid excessive smoke emission
Increase in social vices	<ul style="list-style-type: none"> • Continuous sensitization of community members and construction workers
Decommissioning impacts	<ul style="list-style-type: none"> • Buildings to be demolished where reuse not appropriate • Re use materials where appropriate • Remove all plant and equipment • Remove all solid and liquid wastes • Remove all access roads; • Re-vegetate sites

VIII. Environmental and Social Management Plan

An Environmental and Social Management Plan (ESMP) has been developed for the proposed project. This plan provides a logical framework within which the negative environmental and social impacts identified during the ESIA study can be mitigated and the positive impacts enhanced. Monitoring and management practices as well as monetary compensation are considered and cost estimates included. Responsibilities and time frames for the implementation of the various aspects of the ESMP have been identified. This plan shall be followed at all times during project implementation.

IX. Conclusions

The construction of the 120km Sultan-Hamud to Loitoktok, 132kV Transmission line and the associated substations will enhance power supply to Merrueshi and Loitoktok towns and its environs. The current

line 33kV line providing power to the project area is not reliable. Other benefits of the project will include employment, increased revenue and improved livelihood. The negative impacts are of temporary nature majorly during the construction phase and can be managed by implementation of the recommended mitigation measures.

X. Recommendations

Licence: All the negative impacts identified can be mitigated, and will restore the ecosystem to near or original state. We thereby recommend that the proponent should be licenced by NEMA to continue with the construction of the Proposed project

Resettlement Action Plan (RAP): A comprehensive Resettlement Action Plan should be conducted by the proponent to identify those who will be affected by the proposed project and compensate them accordingly.

Mitigation Measures: Mitigation measures outlined in this report should be adhered to and the Environmental and Social Management Plan (ESMP) implemented to the letter. The implementation of this ESMP will be key in achieving the appropriate environmental management standards as detailed in this report

Annual environmental audits: China Aerospace Construction Group Company Limited should undertake annual environmental audits (EA) of the project after completion to confirm the efficiency and adequacy of ESMP

Monitoring: The impacts of the proposed project should be monitored closely by the Proponent in collaboration with NEMA and Environment and Health & Safety Department at China Aerospace Construction Group Company Limited and KETRACO

The Consultant recommends that an **independent consultant** be sourced to oversee environmental management throughout the construction phase and during the operational phase and decommissioning phase. He will provide Environmental audits in line with NEMA's requirement

China Aerospace Construction Group Company Limited should liaise with relevant agencies like NEMA and DOSH during project implementation to ensure compliance with various legal requirements

Re-routing of Transmission line at critical areas: The proposed transmission line should be relocated or redesigned to minimise negative impacts where it crosses the Kenya Railway Line and Standard Gauge Railway. The line also traverses overhead of the Kenya Pipeline Company (KPC) Pump Station 7 in Sultan Hamud. Re-routing at this area should be considered.

The proponent should work closely with community leaders, group ranches and KWS to ensure smooth implementation of the project

TABLE OF CONTENTS

DECLARATION	i
EXECUTIVE SUMMARY	ii
LIST OF TABLES	xix
LIST OF FIGURES	xx
LIST OF PLATES	xxii
LIST OF ACRONYMS	xxiv
1.0 INTRODUCTION	1
1.1 Preface	1
1.2 Background	1
1.3 Proposed project.....	2
1.4 Objective of the ESIA Study	2
1.5 Data Collection Approach	5
1.6 ESIA Report Format	5
1.7 Team Composition.....	5
2.0 PROJECT DESCRIPTION	6
2.1 Transmission Line Route and Sub-Station Locations	6
2.2 Project Area.....	9
2.2.1 Approximate population	9
2.2.2 Socio-Economics	9
2.2.3 Major land uses	10
2.2.4 Physical and Topographic Features	10
2.2.5 Climatic Conditions	10
2.2.6 Geologic and Ecological Conditions	10
2.3 Description of Transmission Line and Associated substations	11
2.4 Project Materials.....	13

2.5	Electricity Safety	14
2.6	Protected Areas traversed by the proposed transmission line	16
2.7	Project Activities	16
2.6.1	Pre-construction/Project Design	16
2.6.2	Construction.....	16
2.6.3	Operation.....	16
2.6.4	Decommissioning	17
2.8	Project Cost.....	17
3.0	LEGISLATIVE, POLICY AND INSTITUTIONAL FRAMEWORK.....	18
3.1	Introduction.....	18
3.2	Legislative Framework.....	18
3.2.1	The Constitution of Kenya, 2010.....	18
3.2.2	Environmental Management & Coordination Act, 1999 (Amended 2015).....	19
3.2.3	The Energy Act, 2006	24
3.2.4	The Forests Act, 2005	25
3.2.5	The Land Act, 2012 (Revised 2015)	25
3.2.6	The Agriculture, Fisheries and Food Authority Act, 2013.....	26
3.2.7	Wildlife Conservation and Management Act 2013	27
3.2.8	The Water Act, 2002.....	27
3.2.9	The Physical Planning Act (Cap 286)	28
3.2.10	The Occupational Safety and Health Act, 2007	29
3.2.11	Public Health Act, 1986 (Revised 2012)	29
3.2.12	County Government Act 2012.....	30
3.2.13	The Employment Act, 2007.....	30
3.2.14	The Traffic Act Cap 403 of 2013	31
3.2.15	The Penal Code (Cap 63).....	31
3.2.16	The Valuers Act, 1985 (Cap 532) (Revised 2012)	31

3.2.17	The Work Injury Benefits Act (2007	31
3.2.18	The Environment and Land Court Act, 2011.....	32
3.2.19	The National Land Commission Act, 2012.....	32
3.2.20	The HIV and AIDS Prevention and Control Act, 2006.....	32
3.2.21	The National Gender and Equality Commission Act, 2011	32
3.3	Policy Framework	33
3.3.1	Vision 2030.....	33
3.3.2	National Environment Policy, 2013	33
3.3.3	National Environmental Action Plan (NEAP), 1994 (Revised 2007)	34
3.3.4	Environment and Development Policy (Sessional Paper No.6 of 1999)	34
3.3.5	The National Bio-Diversity Strategy, 2000	35
3.3.6	KETRACOs' Environmental, Health and Safety Policy	35
3.4	Institutional Framework.....	36
3.4.1	Ministry of Environment and Natural Resources.....	36
3.4.2	National Environment Management Authority (NEMA).....	36
3.4.3	National Environmental Council (NEC).....	37
3.4.4	The National Environmental Action Plan Committee	38
3.4.5	National Environmental Complaints Committee.....	38
3.4.6	Standards and Enforcement Review Committee	38
3.4.7	National Environmental Tribunal (NET).....	38
3.4.8	County Environment Committees	39
3.5	International Environmental Policies.....	39
3.5.1	African Development Bank Environmental Guidelines.....	39
3.5.2	EU Environmental Policy	40
3.5.3	Environmental protection policies of China funded development projects	40
3.5.4	World Bank Safeguard Policies	41
3.6	United Nations Treaties	43

3.6.1	United Nations Convention to Combat Desertification	43
3.6.2	Convention on Biological Diversity.....	43
3.6.3	Convention on the Conservation of Migratory Species of Wild Animals	43
3.6.4	United Nations Framework Convention on Climate Change (UNFCCC)	44
4.0	BASELINE INFORMATION.....	45
4.1	Project Area Features.....	45
4.2	The Environmental Baseline	46
4.2.1	Forest Resources	46
4.2.2	Water Resources	47
4.2.3	Physical features	47
4.2.4	Climate	47
4.2.5	Geology and Soils.....	48
4.2.6	Vegetation	50
4.3	Ecological resources.....	50
4.3.1	Types of Ecosystems in the area and effects on the proposed project.....	50
4.3.2	Endangered Species	50
4.3.3	Estimated no of trees to be cleared within the way leave	50
4.3.4	Flora and fauna in the project area	50
4.3	Socio-Economic Baseline	53
4.3.1	Tourism.....	53
4.3.2	Major Development Challenges in Kajiado County.....	53
4.3.3	Demographics Data	55
4.3.4	Education Levels	58
4.3.5	Housing Structure	59
4.3.6	Health and Vulnerability.....	61
4.3.7	Land ownership	66
4.3.8	Economic Activities.....	68

4.3.9	Project Awareness.....	70
5.0	ANALYSIS OF PROJECT ALTERNATIVES.....	71
5.1	Introduction.....	71
5.2	The “No Action” Alternative.....	71
5.3	Line Routing Alternatives.....	71
5.4	Critical structures affected along the Transmission Line.....	72
5.4.1	Railway line.....	72
5.4.2	KPC Oil Pipeline	73
5.4.3	KPC Pump Station.....	74
5.4.4	Other Critical Structures Affected	74
6.0	CONSULTATIONS AND PUBLIC PARTICIPATION	76
6.1	Introduction.....	76
6.2	Objectives of Public Consultation	76
6.3	Common Issues from Public Participation	78
6.3.1	Knowledge of the Proposed Project and the relevant Power Agencies	78
6.3.2	Acceptance of the Project and anticipated benefits	78
6.3.3	Envisaged project negative impacts and proposed mitigation measures.....	79
6.3.4	Community views and complains regarding the proposed project.....	80
6.3.5	Anticipated challenges during project implementation	81
6.3.6	Literacy level.....	81
6.3.7	Community Social Responsibility (CSR) Activities.....	81
6.4	Key issues from Key Stakeholder Consultation	82
6.4.1	County Commissioner Kajiado County	82
6.4.2	Deputy County Commissioner (Loitoktok Sub County).....	82
6.4.3	County Environment Officer (Kajiado County)	83
6.4.4	Chief Officer Energy, Transport and Infrastructure (Kajiado County).....	83
6.4.5	County Agricultural Officer (Mashuuru Sub County)	83

6.4.6	Kenya Wildlife Service (KWS).....	83
6.4.7	Natural Resource Office; Department of Mines and Geology (Kajiado County).....	84
6.4.8	Kenya Forest Service	84
6.4.9	Kenya Pipeline Company (Sultan Hamud Pump House).....	84
7.0	POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS.....	86
7.1	Introduction.....	86
7.2	Planning and Construction Phase.....	86
7.2.1	Positive Impacts.....	86
7.2.2	Negative Impacts	87
7.3	Operation Phase.....	90
7.3.1	Positive Impacts.....	90
7.3.2	Negative Impacts	91
7.4	Decommissioning Phase	92
7.4.1	Positive Impacts.....	92
7.4.2	Negative Impacts	93
8.0	IMPACT MITIGATION AND ENHANCEMENT MEASURES	94
8.1	Introduction.....	94
8.2	Enhancement of Positive Impacts.....	94
8.3	Proposed Mitigation Measures for Negative Impacts.....	94
8.3.1	Planning and Construction Phase.....	94
8.3.2	Operation Phase.....	99
8.3.3	Decommissioning Phase	101
8.4	Impact Matrix	104
9.0	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	106
9.1	Introduction.....	106
9.2	Environmental and Social Management Plan	107
9.2.1	Planning and Construction Phase.....	107

9.2.2	Operation Phase.....	112
9.2.3	Decommissioning Phase	114
9.3	Monitoring.....	116
9.3.1	Internal Monitoring.....	116
9.3.2	External Monitoring.....	118
9.3.3	Environmental Audits (EA).....	118
10.0	CONCLUSIONS AND RECOMMENDATIONS.....	119
10.1	Conclusions.....	119
10.2	Recommendations.....	119
11.0	REFERENCES	120
12.0	APPENDICES	121
12.1	Key Informant Interview Guide.....	121
12.2	Public Participation Guide.....	125
12.3	Household Questionnaire	126
12.4	List of Key Stakeholders Consulted	132
12.5	Minutes of Consultative Meetings.....	137
12.5.1	Minutes of Poka Location Baraza - Game	137
12.5.2	Minutes of Imbuko Location Public Baraza - Isara	143
12.5.3	Minutes and Lists of Public Participation Merrueshi.....	148
12.5.4	Minutes and Lists of Public Participation- Imbirikani	153
12.5.5	Minutes of Kimana Location Baraza	156
12.5.6	Minutes of Isinet Location Baraza.....	161
12.5.7	Minutes of Merrueshi Location – Chief’s office	168

LIST OF TABLES

Table 2.1 Transmission Line Coordinates	9
Table 3.1 PTable 6.1 List of Attendance in Public Consultation Meetings	76
Table 6.2 Key Stakeholders consulted	77
Table 8.1 Impact Matrix	104
Table 9.1 Mitigation Measures at Planning and Construction Phase	107
Table 9.2 Mitigation Measures at Operation Phase	112
Table 9.3 Mitigation Measures at Decommissioning Phase	114
missible Noise Levels during Construction Phase of the Project	23
Table 3.2 Safeguard policies triggered by the Project	41
Table 4.1 Endangered Species in the project area	50
Table 4.2 Flora and Fauna in the Project Area	51

LIST OF FIGURES

Figure 1.1 Vision 2030 thematic overview	1
Figure 1.2 Map Showing the proposed Transmission Line and associated substations	8
Figure 1.3 Project Implementation Schedule	15
Figure 4.1 Map Showing the Soil Characteristics along the proposed line	49
Figure 4.2 Distribution of Respondents in Kajiado County	56
Figure 4.3 Respondents Gender Distribution	56
Figure 4.4 Respondents Age Distribution	57
Figure 4.5 Respondents Marital Status	57
Figure 4.6 Children under 18 years.....	58
Figure 4.7 Highest level of education attained by respondents.....	58
Figure 4.8 Distance to the nearest school.....	59
Figure 4.9 Type of houses in Kajiado County (Mashuuru and Loitoktok sub counties).....	60
Figure 4.10 Respondent's material on wall in Kajiado County	61
Figure 4.11 Respondent's roofing material in Project Area	61
Figure 4.12 Accessibility to health facilities	62
Figure 4.13 Disabled household members	62
Figure 4.14 Nature of disability	63
Figure 4.15 Record of illness within the last Four months.....	63
Figure 4.16 Types of diseases common in the project area.....	64
Figure 4.17 Types of diseases common in the project area.....	64
Figure 4.18 Distance to the nearest water source.....	65
Figure 4.19 Safety measures before drinking water.....	65
Figure 4.20 Presence of toilet within compound	66
Figure 4.21 Types of toilet common in the area.....	66
Figure 4.22 Land ownership pattern Kajiado County	67
Figure 4.23 Land ownership pattern in Project Area	67
Figure 4.24 Main source of income in Kajiado County.....	68

Figure 4.25 Percentage of farmers rearing animals 68

Figure 4.26 Main type of livestock reared in the project area..... 69

Figure 4.27 Crops cultivated by respondents along the transmission line 70

Figure 4.28 Alternative routes that may be proposed during rerouting 72

LIST OF PLATES

Plate 2.1 Location of Sultan – Hamud Existing Substation	6
Plate 2.2 Location of the proposed National Cement Substation	7
Plate 2.3 Location of the proposed Loitoktok Substation	7
Plate 4.1 Direction of transmission line in Mashuuru Sub County.....	45
Plate 4.2 Direction of transmission line in Loitoktok Sub County	46
Plate 4.3 Tree species in the area	52
Plate 4. 4 Some wildlife species in the area.....	53
Plate 4.5 Main types of houses in Project Area	60
Plate 4.6 Main types of livestock in the area	69
Plate 5.1 Picture showing where the proposed transmission line traverses the railway lines	73
Plate 5.2 Section of KPC pipeline where transmission line crosses.....	73
Plate 5.3 Structures of KPC pump station traversed by the transmission line	74
Plate 5.4 Affected House in Poka Location.....	74
Plate 5.5 Affected homesteads in Loitoktok Location.....	74
Plate 5.6 Manyatta village along the Transmission Line	75
Plate 5.7 A.H.H.S Yerusalem Chapel in Impiron Village.....	75
Plate 6. 1 Vegetation in Kajiado County.....	80
Plate 6.2 Trees in Loitoktok Sub County.....	80
Plate 6.3 A temporary housing structure within the way leave of the proposed transmission line in at Loitoktok sub county.....	81
Plate 6.4 A permanent housing structure within the way leave of the proposed transmission line at Mashuuru sub county.	81
Plate 6.5 Representative addressing a public baraza in Merrueshi location	82
Plate 6.6 Public consultation in Kimana location.....	82
Plate 6.7 Poka (Gem) public baraza	82
Plate 6.8 Imbirikani public baraza.	82
Plate 6.9 Consultation with Agricultural Extension officer in Mashuuru Sub County.....	85
Plate 6.10 Consultation with KWS officer in Amboseli National Park (HQ).....	85

Plate 12.1 Poka Location Public Consultation Meeting.....	137
Plate 12.2 Imbuko Location Public Consultation Meeting.....	143
Plate 12.3 Merrueshi Center Public Consultation Meeting.....	148
Plate 12.4 Merrueshi Center Public Consultation Meeting.....	149
Plate 12.5 Imbirikani Location Public Consultation Meeting.....	153
Plate 12.6 Imbirikani Location Public Consultation Meeting.....	154
Plate 12.7 Kimana Location Public Consultation Meeting.....	156
Plate 12.8 Isinet Location Public Consultation Meeting.....	161
Plate 12.9 Merrueshi Location Public Consultation Meeting.....	168

LIST OF ACRONYMS

ACSR	Aluminium Conductor Steel-Reinforced Cable
CBD	Convention on Biological Diversity
DOSH	Directorate of Occupational Safety and Health
ESAP	Environmental and Social Assessment Procedures
EU	European Union
ERC	Energy Regulatory Commission
EIAs	Environmental Impact Assessments
EA	Environmental Audits
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GDP	Gross Domestic Product
HVAC	High Voltage Alternating Current
JICA	Japan International Cooperation Agency
UNFCCC	Kyoto Protocol to the United Nations Framework Convention on Climate Change
KETRACO	Kenya Electricity Transmission Company Limited
KURA	Kenya Urban Roads Authority
kV	kilo Volts
km	Kilometre
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
MEAs	Multilateral Environmental Agreements
MDGs	Millennium Development Goals

MTP	Medium Term Plans
NEAP	National Environmental Action Plan
NEC	National Environmental Council
NEAPC	National Environment Action Plan Committee
NEMA	National Environment Management Authority
SERC	Standards and Enforcement Review Committee
NET	National Environmental Tribunal
OSHA	Occupational Safety and Health Act
OPGW	Optical Ground Wire
OP	Operational Policies
PES	Payment for Environmental Services
PAPs	Project Affected Persons
PCC	Public Complaints Committee
PTO	Professional and Technology Officer
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RoW	Right of Way
SCADA	Supervisory control and data acquisition
SHE	Safety, Health and Environment
SEAs	Strategic Environmental Assessments
SDGs	Sustainable Development Goals
UNCCD	United Nations Convention to Combat Desertification
WB	World Bank
WRMA	Water Resource Management Authority

1.0 INTRODUCTION

1.1 Preface

Kenya Electricity Transmission Company Limited (KETRACO) engaged the services of **Log Associates Ltd**, to carry out Environmental and Social Impact Assessment (ESIA) Study for **Sultan Hamud – Loitoktok 132kV, 120km Transmission Line and Associated Substations**.

This study was undertaken to ensure that the significant environmental and social impacts of the proposed project at the preconstruction, construction, operation and decommissioning stages have been considered and assessed at the project planning phase.

1.2 Background

The Government of Kenya plans to increase access to electricity in Kenya tenfold from the current 4% in the rural areas to about 40% by 2020. To achieve this, more transmission lines are being considered for construction and upgrading and with it the communication system required for line protection and management purposes.

Kenya's development agenda is guided by the Vision 2030, whose aim is to drive the country into a globally competitive and prosperous economy with high quality of life. The Vision is founded on economic, social and political pillars as shown in Figure 1.1.



Figure 1.1 Vision 2030 thematic overview

Source: *The Kenyan Vision 2030*

The Vision 2030 has identified energy as a key driver of growth in supporting productive sectors of the economy and a key input to both the social and political pillars. The proposed 132 kV Transmission Lines will increase reliability and improve power quality in the project areas.

The Kenya Electricity Transmission Company Limited (KETRACO) is a state corporation fully owned by the government. It was incorporated in 2008 pursuant to Sessional paper No. 4 of 2004 on Energy. The Company was established to develop new high voltage electricity transmission infrastructure that will form the backbone of the National Transmission Grid, in line with Kenya Vision 2030.

KETRACO's mandate is to plan, design, construct, own, operate and maintain high voltage electricity transmission grid and regional power interconnectors that will form the backbone of the National Transmission Grid. These high voltage lines have capacities of 132kV, 220kV, 400kV and 500kV (HVDC).

The company's vision is *"To be a world-class electricity transmission company and the leading interconnector in Africa"* and mission is *"To provide reliable, efficient and effective electricity transmission and promote power trade for sustainable socio-economic development."*¹

1.3 Proposed project

The proposed project involves the construction of **132kV, 120km Transmission Line and Associated Substations**

1.4 Objective of the ESIA Study

The objective of the study was to carry out detailed Environmental and Social Impact Assessment for the proposed transmission line and associated substations.

The main objective of the ESIA was to identify significant environmental and social impacts associated with the proposed projects and recommend appropriate mitigation measures for integration in all phases of the projects cycle. The ESIA generated an Environmental and Social Management Plan that described in detail the mitigation measures to be carried out, costing, scheduling and responsibility of such measures, and a detailed monitoring process and its schedule.

Following issuance of a Notification to conduct full ESIA Study on this assignment by NEMA, the scope of the Consultants work would include:

Task 1. Literature Review

The Consultant was to undertake a desktop study analysis on the available literature on the proposed project and its potential impacts. Literature available to the client would be provided to the Consultant which served as a starting point for gathering environmental and social information pertaining the project.

Task 2. Description of the Baseline Environment

The Consultant would collect, collate and present the baseline information on the environmental characteristics of the existing situation with emphasis to the downstream environment. This description would involve:

¹ <http://www.ketraco.co.ke/about/vision-mission.html>

- a) *Physical environment* (topography, landforms, geology, soils, climate and meteorology, air quality, hydrology, etc.).
- b) *Biological environment* (i.e., flora and fauna types and diversity, endangered species, sensitive habitats, etc.)
- c) *Social and cultural environment*, including present and projected, where appropriate (i.e. population, land use, planned development activities, community structure, employment and labour market, sources and distribution of income, cultural properties, etc.).

Task 3. Detailed Description of the Proposed Project Baseline and/or Environmental Setting

The Consultant was to concisely describe the proposed project, its geographic location and areas (County and Sub counties) of traverse, general layout of facilities including maps at appropriate scale where necessary, raw materials, products and by-products, wastes to be generated and project alternatives.

Task 4. Legislative and Regulatory Framework

The Consultant would identify and describe all pertinent regulations and standards (both local and international) governing the environmental quality, solid and liquid waste management, health and safety, protection of sensitive areas, land use control, ecological and socio-economic issues at the local, national and international levels. Compliance issues would also be stated.

Task 5: Carry out Public Participation and Consultations on the positive and negative impacts of the proposed project

The Consultant was to carry out a detailed public consultation exercise to collect the views and opinions of stakeholders which were incorporated in the final report. The consultant would organise forums for public participation to enable interested and affected parties to present their concerns and opinions regarding the proposed project. The views of the public would be solicited and incorporated in the main ESIA report. Stakeholders consulted as identified at the scoping stage would include; County Executives, County Environmental Officers, KWS, KFS, KPC, Ministry of Environment and Natural Resources; Ministry of Environment & Natural Resources; Department of Mines and Geology (with regards to Imbirikani and Kimana locations) and communities.

Task 6. Identify potential environmental impacts that could result from the proposed project

The Consultant would analyse and describe all significant changes expected due to the proposed project. These would encompass environmental, ecological and social impacts, both positive and negative, as a result of interaction between the proposed project and the environment that are likely to bring about changes in the baseline environmental and social conditions discussed in Task 1. The Consultant would differentiate the short, medium and long-term impacts. During the analysis, the Consultant would consider both biophysical and socio-economic factors that included the impacts of: Population change and migration; Socio-economic characteristics of the difference target groups along the transmission line; Forms of social organization and co-operation; Physical and social infrastructure; Change in economic activities; Development resources; Vegetation clearance; Mechanical disturbance; Removal of structure /sites; Relocation and resettlement; Effects on flora and fauna; Air quality; Water quality; Improved access; Accident rates; and Visual/aesthetic change.

Task 7. Occupational Safety & Health concerns and Flight Security

The Consultant would analyse and describe all occupational health and safety concerns likely to arise as a result of construction and operations of the proposed facility. The Consultant would then make recommendations on corrective and remedial measures to be implemented under the environmental management plan.

Task 8. Propose Mitigation Measures to the identified environmental and social impacts

The Consultant was to come up with the feasible mitigation measures for the negative impacts that could result from the proposed electricity transmission line.

Task 9. Development of Environmental Management Plan to mitigate negative impacts

The Consultant was to develop a comprehensive Environmental Management Plan (EMP). The plan would recommend a set of mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of adverse environmental impacts and/or maximize socio-economic benefits. The Consultant would provide cost outlays for the proposed measures as well as their institutional and financial support.

Task 10. Development of Environmental Monitoring Plan

The Consultant would give specific descriptions and technical details of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, and definition of thresholds that would signal the need for corrective actions as well as deliver monitoring and reporting procedures. The Consultant would also provide time frames and implementation mechanisms, staffing requirements and cost outlays.

Task 11: Environmental & Social Impact Assessment Report

The main output would be an Environmental & Social Impact Assessment Report. The report would be in English Language and has to be clear and concise. The report would be in a format acceptable to NEMA and KETRACO. More specifically, it will be expected to include (but not limited to) the following, which are also indicative of the depth of the scope:

1. *Executive Summary*: This would include a concise description of the proposed project; environmental setting, highlight of key findings and recommended mitigation and monitoring procedures.
2. *Policy, Legal and Administrative/Institutional Framework*: This would include a detailed description of existing legislation, regulation and policy governing solid and liquid waste management, air emissions, environmental quality, health and safety among others. The level of compliance to the applicable laws and corporate environment, safety and health policy shall be clearly stated.
3. *Methodology*: A description of the methodology used to carry out the study would be well stated.
4. *Description of the proposed 132kV, 120km Transmission Line and Associated Substations and the biophysical environment of where the lines traverse*. The Consultant would give the proposed project an introduction covering a short description of the proposed project activities (construction, operations and decommissioning) – including the technology to be used for the project.

5. Environmental and Social Impacts identification, assessment and impact significance ranking.
6. *Public Consultation*: Provide a summary of steps taken to consult local interested parties, government agencies; with key concerns of each party being included.
7. *Impact mitigation measures and Environmental Management Plan*: This would include proposals of feasible mitigation measures, adequate EMP and the cost of impact mitigation. A monitoring plan would also be included.
8. Major Conclusions and Recommendations.
9. *References*: All sources of information would be clearly documented with clear names and proper locations under references.
10. Appendices.

1.5 Data Collection Approach

The data collection approach to be implemented during this exercise will be utilizing the following tools:

1. Key Informant Interviews
2. Public Consultations (Barazas)
3. Focus Group Discussions (FGDs)

Samples of each of the above the tools have been attached in the Appendices section below.

1.6 ESIA Report Format

This report follows the format prescribed in the Legal Notice No. 101 of 13th June 2003 which deals with the Environmental (Impact Assessment and Audit) Regulations.

The ESIA report looks at the background of the project; nature of the project; activities of the project; project design, materials and equipment to be used; potential environmental impacts; mitigation and enhancement measures; legislative and regulatory framework; prevention and management of possible accidents; health and safety issues; potential economic and social impacts; the budget; and proposes an environmental management plan for the proposed projects.

1.7 Team Composition

A multidisciplinary team of experts led by Lead Environmental Expert Prof. Lawrence Gumbe undertook the assignment

2.0 PROJECT DESCRIPTION

2.1 Transmission Line Route and Sub-Station Locations

The Proposed Transmission Line commences at an existing substation in Sultan-Hamud, Makueni County. The line then crosses the Nairobi-Mombasa road, the old railway line and the standard gauge railway before cutting across Kajiado County. In Kajiado County, the transmission line traverses across two sub counties:

1. **Mashuuru Sub-County.** In Mashuuru sub-county, the proposed transmission line passes through Nkama, Poka-Kenyewa and Imbuko locations respectively
2. **Loitoktok Sub-County.** From Mashuuru sub-county, the proposed transmission line traverses Merrueshi / Oldonyu, Imbirikani, Isinet and Kimana locations in Loitoktok sub-county

Three substations are proposed for this transmission line in various locations as follows;

- a) Sultan-Hamud Substation;

In Sultan- Hamud, we already have an existing substation. This substation is situated between Sultan-Hamud and Emali towns in Makueni County.



Plate 2.1 Location of Sultan – Hamud Existing Substation

- b) National Cement Substation;

This proposed substation will be constructed at Merrueshi Centre (also known as 35), behind Simba Cement Factory and in Loitoktok Sub County.



Plate 2.2 Location of the proposed National Cement Substation

c) Loitoktok Substation

The proposed 132 kV transmission line terminates at this substation. There is an existing 200m wildlife corridor a few metres before the proposed substation. This station will be situated next to the junction between Kilaguni-Tsavo 60 km 'C103' road and the new Emali – Loitoktok road 'C102'. The substation lies in a village called Impiron in Kimana location.



Plate 2.3 Location of the proposed Loitoktok Substation

Figure 2.1 shows a map of the proposed transmission line and its associated substations.

Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-Stations

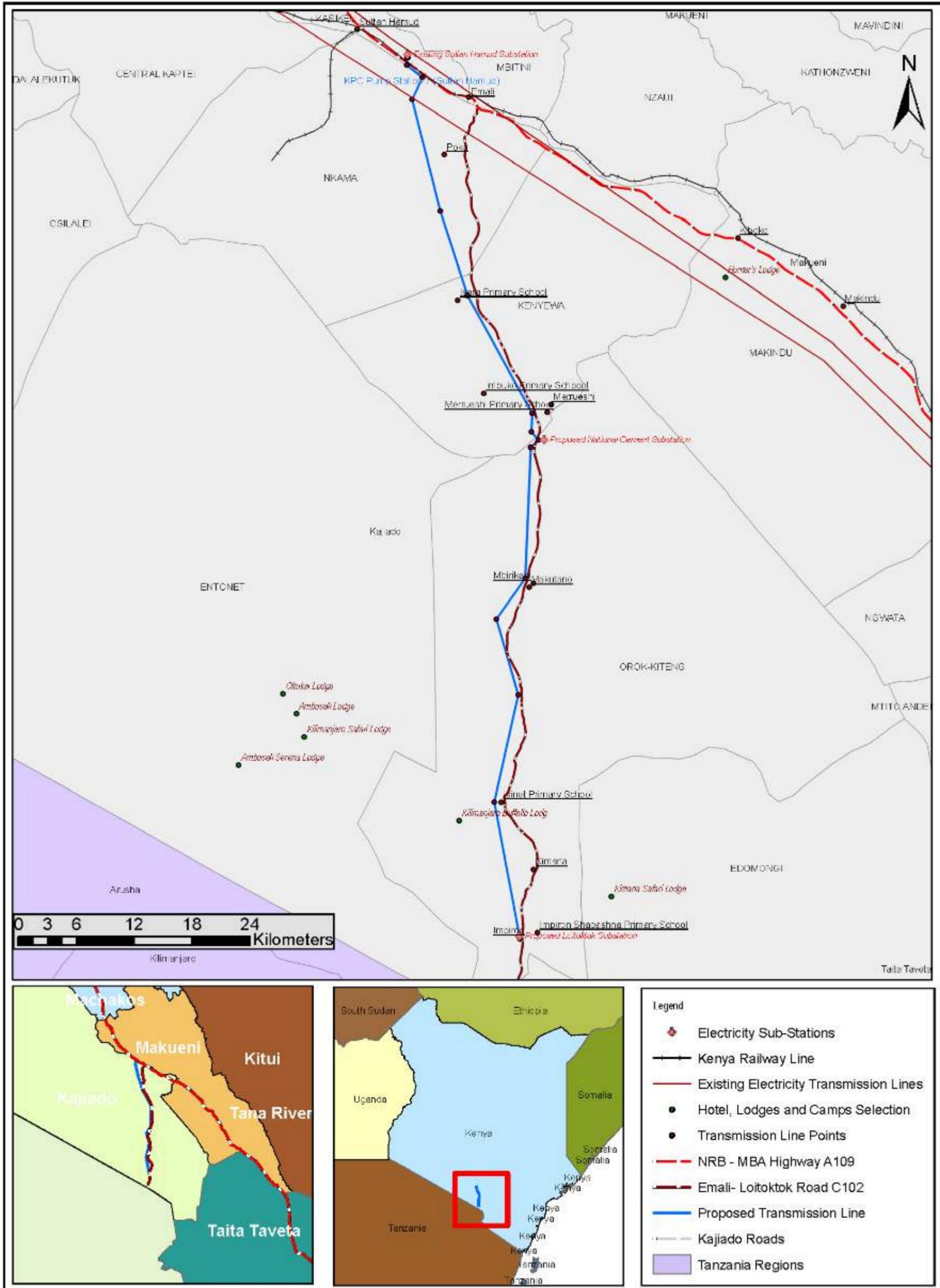


Figure 1.2 Map Showing the proposed Transmission Line and associated substations

Source: Log Associates; ArcGIS® software by Esri.

Table 2.1 Transmission Line Coordinates

No	Eastings	Northings	Description
1)	323908	9774130	Sultan-Hamud Substation
2)	323777	9774091	
3)	323769	9773298	
4)	325392	9772020	
5)	324315	9769776	
6)	327244	9758286	
7)	330071	9749569	
8)	336797	9737404	National Cement Substation
9)	336719	9735526	
10)	337432	9734659	
11)	336652	9733927	
12)	336091	9720434	
13)	333112	9716198	
14)	335383	9708409	
15)	332901	9697343	
16)	335581	9683244	Loitoktok Substation

2.2 Project Area

2.2.1 Approximate population

Loitoktok Sub County has an area of 6,411 sq.km. with a population of 137,496 people². Moreover, during the same year, *Mashuuru Sub County* had population of about 39,698 people with an annual growth rate of about 5.5 % with an area of about 2,903 sq.km. The proposed transmission line is however not likely to lead to massive displacements as the settlements in this areas are scattered.

2.2.2 Socio-Economics

Most parts of *Kajiado county* are Arid and Semi-Arid (ASAL) with pastoralism being the predominant economic activity. Like many other counties in Kenya, *Kajiado county* is mainly water stressed where community members sometimes find themselves covering an average of 10km in search of water.

The main economic activities practiced the proposed project area include;

- **Livestock Farming;** Livestock production, dairy, beef production, hides and skins, poultry farming and bee keeping.
- **Tourism;** Amboseli National park and the unique Maasai culture form the basis of tourist attraction.
- **Crop Farming;** Horticulture, food crop farming including onions and tomatoes among others.

² GoK, Kenya National Bureau of Statistics(KNBS). *Statistical Abstract 2015*.

2.2.3 Major land uses

Land is mainly used for livestock rearing and crop growing. Nomadic pastoralism is predominant throughout the county. There is a significant change in land use in the urban areas where industrial and commercial use is gaining momentum. These places include Merrueshi and Kimana along the transmission line.

Kajiado County has forestry cover of about 6,866.88 ha. However, there are no gazetted forests along the proposed transmission corridor. Tree farming as an economic activity is being encouraged.

2.2.4 Physical and Topographic Features

The main physical features of the project area are plains, valleys and occasional volcanic hills ranging from an altitude of 1220 metres above sea level to 2073 metres above sea level. Topographically, the area lies on the Central Broken Ground. They consist of scarps and structural plains.

2.2.5 Climatic Conditions

The project area has a bi-modal rainfall pattern. The short rains fall between October and December while the long rains fall between March and May. There is a general rainfall gradient that increases with altitude. The bimodal rainfall pattern is not uniform across project area. The long (March to May) rains are more pronounced in the western part of the County while the short (October to December) rains are heavier in the eastern part. The rainfall amount ranges are as low as 300mm in the Amboseli basin. Temperatures vary both with altitude and season. The highest temperatures is about 34°C, while the lowest temperature of about 10°C is experienced at Loitoktok on the eastern slopes of Mt. Kilimanjaro. The coolest period is between July and August, while the hottest months are from November to April.

2.2.6 Geologic and Ecological Conditions

The project area consists of three geological regions: quaternary volcanic, Pleistocene and basement rock soils. Alluvia soils are also found in some areas. Quaternary Volcanic soil is found in the Rift Valley. Basement System Rocks which comprise various gneisses, cists, quartzite and crystalline limestone, are found mainly along the river valleys and some parts of the plains. Pleistocene soils are found in the inland drainage lake system around Lake Amboseli. Quarrying of building materials is also done within the county. Most rivers in the eastern part of the Rift Valley drain toward the east while those within the floor of the valley are restricted to the small depressions and lakes that have no major outlets. It is within this region that lake Magadi is found.

The occurrence of ground water depends on climate, topography as well as origin of the underlying rocks. Ground water yields vary throughout the county from 0.01 to 35.77 cubic metres per hour. Average ground water is reported as good quality and is used for domestic, livestock and irrigation purposes. High yielding springs are found on the slopes of Mt. Kilimanjaro with an average yield of 20m³/hr to 50m³/hr. Other sources of water for domestic and livestock use are sub surface sources such as water pans, dams and shallow wells.

The amount of surface water varies from area to area. Vegetation type in the county is determined by altitude, soil type and rainfall. In many instances it has been modified by animal and human activity. Grazing, browsing, charcoal burning, extraction of fuel wood and cultivation are the major causes of

vegetation reduction. In the lower parts of Mt. Kilimanjaro, indigenous trees have been cleared to create room for agriculture. Vegetation is scarce in low altitude areas and increases with altitude. Ground cover throughout the county varies seasonally with rainfall and grazing intensity. Canopy cover ranges from less than 1% on heavily settled areas to about 30% on steep hills. The county boasts of a wide range diverse fauna and flora.

The animals include Wild Beasts, Gazelles, Zebras, Warthogs, Hyenas, Giraffes, Elephants, Lions, Leopards and Elands and diverse bird species. Areas designed for game reserves are; Amboseli National Park which covers a total of 3992km² and Chyulu conservation area which is 445km². These areas fall within range lands.

2.3 Description of Transmission Line and Associated substations

All 132 kV overhead single circuit transmission lines are assumed designed with one ACSR conductor of type "Wolf" per phase and with one overrunning optical ground wire (OPGW). Lattice steel towers with a triangular conductor configuration founded on concrete pad and chimney foundations and are assumed permanently grounded using copper rods and or counterpoise wires. The right of way (RoW) width for all lines is set to 30 metres.

I. 132kV Substations

a) General

All 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 (complex switching schemes to be avoided)
- b) Enable easy maintenance and repair
- c) Enabling future modifications and expansions
- d) The importance of the respective substations

The substations would include 132 kV switchgear and step-down transformers. The switchgear in the substations would be conventional outdoor air-insulated switchgear. Equipment for control, protection and auxiliary power will be housed in a small control building.

b) Substation concept

The 132 kV lines are assumed individually disconnectable with circuit-breakers and protection for each line into the substation. This principle has been applied for all of the new substations. A system with merely a tee-off to the substation from the transmission line is considered to reduce the supply reliability for the substation, and may cause complications if there will be more transmission lines coming into the substation in the future. This concept has therefore been abandoned.

The 132 kV switchgear is assumed arranged with a single bus and no bus-sectionalizer is included. The substation should be located such that it is possible to introduce a double-bus system in the future. For this purpose there should be free space of 9 m outside the fence of the switchyard. It should also be possible to extend with more bays. One additional bay will need 11 m outside the fence in the length direction.

No space has been foreseen for any auxiliary-bus. It is considered that a double-bus concept will include most of the benefits provided by an auxiliary-bus, and the costs will be fairly the same. A double-bus concept provides more freedom with respect to extensions that an auxiliary-bus does not provide.

For new 132 kV bay(s) in existing substations the new bay(s) will follow the existing concept. For the new substations the following switchgear will be included:

The line bays include:

a) Circuit-breaker with single-pole operation	1 pc
b) Isolators (one on each side of the circuit-breaker)	2 pcs
c) Earthing switch for the line	1 pc
d) Current transformers (one per phase)	3 pcs
e) Voltage transformers (one per phase)	3 pcs

The transformer bays include:

a) Circuit-breaker with three-pole operation	1 pc
b) Isolators (one on bus side of the circuit-breaker)	1 pc
c) Earthing switch for the transformer	0 pc
d) Current transformers (one per phase)	3 pcs
e) Voltage transformers (one per phase)	0 pcs
f) Lightning arrestors (one per phase)	3 pcs

No bus-metering or bus earthing-switch are included. The bus must accordingly include a facility for earthing by portable earthing apparatus. (Option with bus earthing-switch may be considered during detailed design.)

The draw-back with the single-bus concept is that the service (line or transformer) will be interrupted each time the circuit-breaker for the particular service needs to be maintained. This could have been avoided by a double-bus system with bus-tie circuit-breaker. However, to keep the costs down such system is not applied at this stage. All 132 kV switching devices are assumed motor-operated.

II. Transformers

Outdoor transformers are assumed. Space should be foreseen so that the transformer can be replaced with bigger transformer in the future. Also there will be space for up till two transformers in parallel.

The transformers are assumed air-cooled. With no fire extinguishing system installed, as experience show that such system has minimal effect on the damages in case of a transformer fire. Transformers would be two-winding type with on-load tap-changers and automatic regulation of the voltage on the 33 kV side.

III. Control and protection

The control system will be computerised. It will include remote operation from and parameter transmission (SCADA) to the applicable control Centre. 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 schemes will include:

IV. 132 kV lines:

- a) Distance protection
- b) Directional over-current protection
- c) Directional earth-fault protection
- d) Sensitive earth-fault protection
- e) Auto-reclosing function
- f) Synch-check blocking of circuit-breaker closing

V. Transformer 132 kV bay

- a) Differential protection
- b) Directional over-current protection
- c) Directional earth-fault protection
- d) Buchholz relay for transformer tank
- e) Buchholz relay for on-load tap-changer
- f) Temperature protection
- g) Oil level protection
- h) Trip if pressure relief is activated

2.4 Project Materials

The Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations will be constructed using conventional construction materials and construction procedures that are not expected to compromise the safety of the neighbouring communities as well as the general environment. The following inputs will be required for construction:

Substation

- Electrical Power transformers
- Instrument transformers
- Conductors& Insulators
- Isolators
- Bus bars
- Power control equipment
- Lightning arresters
- Circuit breakers
- Relays
- Capacitor banks and miscellaneous equipment

Transmission Line

- Transmission tower
- Circuits
- Insulators

- Conductors
- Bundled conductors
- Ground wires
- Insulated conductors and cable
- Ministry of Environment & Natural Resources

General

- Raw construction materials e.g. sand, cement, natural building stone blocks, hard core, gravel, concrete among others
- Timber (e.g. doors and frames, fixed furniture, etc.) for substations,
- Paints, solvents, white wash, etc.,
- A construction labour force (of both skilled and unskilled workers).

The proposed transmission line development will be constructed using modern, locally and internationally accepted materials to achieve public health, Occupational health and safety and environmental aesthetic requirements. The steel structures will be bought from local companies that have been approved by the proponent and that meet the Kenya Bureau of Standards requirements.

2.5 Electricity Safety

Electrical Safety is important in ensuring Occupational Safety and Communities' Safety during both phases of the project cycle. The contractor should check the design layouts for conformity with electrical safety clearance, access for maintenance and repair, lightning protection and sound engineering practice. Particular care will be needed to ensure adequate provisions are made for the new substation with regards to plant interfaces and safety of staff working in a live substation.

The substation and equipment used shall be designed to limit environmental impacts to a minimum and all statutory requirements applicable in the territory complied with. Particular care will be applied in the design of the substation to prevent the contamination of the ground and surface water sources by oil or other liquid contaminants. Where gases are used in equipment or for other purposes, care will be taken to limit the release of greenhouse gases to a minimum. In particular SF₆ (Sulphur Hexafluoride) shall not be deliberately released to atmosphere during construction, testing or maintenance.

Where equipment contains large amounts of flammable material, care will be taken to limit the spread of fire to adjacent equipment or buildings. Where specified in the schedules, large power transformers will be fitted with fire protection systems designed to suppress and extinguish fires in transformer compounds, limit the damage to the transformers and ensure that adjacent transformers are protected against the spread of fire.

The substation structures, buildings and primary equipment shall have a design life of 40 years, while secondary systems such as protection and control equipment shall have a minimum of 15 years.

Figure 1.3 below shows the project implementation schedule;

2.6 Protected Areas traversed by the proposed transmission line

Protected areas comprise of both terrestrial and marine environments. This includes, forests, national parks, conservancies, territorial waters among others. It was however observed that there were no protected areas along the proposed transmission line corridor.

2.7 Project Activities

The proposed projects' activities can generally be divided into four stages, namely: preconstruction/project design; construction; operation; and eventual decommissioning of the transmission line and substations as described below.

2.6.1 Pre-construction/Project Design

KETRACO is currently applying for various permits and licenses including procurement of land for the associated substation. The procurement of the various goods and services and contracting of the construction firm and other consultants will begin after the completion of the ESIA process.

2.6.2 Construction

The construction of the transmissions line will require the creation of some temporary access roads to the construction sites. The construction will require some localised vegetation clearance. Materials arising from ground excavation will either be spread in appropriate areas surrounding the line or removed to another site as agreed.

The construction of the substation will require the creation of permanent access roads connecting to the local / national road network. The new substation site will first need to be cleared of vegetation and levelled. Civil works would then start including creation of on-site roads, drainage, digging of foundations, pouring of concrete and creation of areas of hard standing. Substation buildings for housing instrumentation and for storage would then be erected. During the commissioning stage, the substation equipment including electrical switchgear and transformers would be installed and connections made into the substation from the new and existing transmission lines.

2.6.3 Operation

Once constructed, the transmission line will require minimal maintenance which may entail occasional bush clearing and repair of damaged pylons and conductors. After a period of many years, the entire system would need a detailed survey and overhaul. There may be a requirement for occasional visits to ensure nothing goes wrong. Access rights may need to be retained to allow for maintenance works in the future.

The substation will require periodic maintenance of the transformer equipment and of the site infrastructure (buildings, roadways etc.) resulting in the generation of industrial waste including hazardous wastes such as used transformer oil. The day-to-day operation of substations will generate domestic waste and sewage and will require the supply of water and energy to the site.

2.6.4 Decommissioning

The transmission line and substation are likely to remain in place for many years and therefore any decommissioning works would be a long time in the future. The transmission line and substation would be dismantled and removed and materials recycled/re-used as far as possible. Any areas disturbed would be restored to pre-project conditions and/or to conditions acceptable to NEMA. Environmental impacts associated with the decommissioning process would be minimised through the implementation of an environmental management plan (ESMP).

2.8 Project Cost

The estimated cost for construction of the 120km, 132kV Sultan Hamud – Loitoktok amounts to **USD 24,000,000**

3.0 LEGISLATIVE, POLICY AND INSTITUTIONAL FRAMEWORK

3.1 Introduction

There are several environmental challenges in Kenya today. These problems have been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. In addition, there is limited local communities' involvement in participatory planning and management of environmental and natural resources. The cardinal environmental problems include:

- Loss of biodiversity,
- Land degradation,
- Poor water management
- Environmental pollution.

Recognizing the importance of natural resources and the environment in general, the Kenya Government has put in place a wide range of legislative, policy and institutional framework to address the major causes of environmental degradation and negative impacts on ecosystem emanating from industrial and economic development programmes. These laws and policies are geared towards mitigating any social and environmental negative impacts that may result from a proposed project. As such, this Section presents various legislations, policies and international agreements to which the proposed transmission line project must comply with at all phases of implementation.

3.2 Legislative Framework

The Government of Kenya has enacted several laws to govern operations in different sectors. The following laws have been triggered by the construction of this transmission line:

3.2.1 The Constitution of Kenya, 2010

The Constitution of Kenya, 2010 provides a detailed framework for dealing with environmental issues. Article 42 of the Constitution states that every person has the right to a clean and healthy environment which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures. According to Article 69 of the same Constitution, the State shall:

- Ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits
- Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities
- Encourage public participation in the management, protection and conservation of the environment

- Protect genetic resources and biological diversity
- Establish systems of environmental impact assessment, environmental audit and monitoring of the environment
- Eliminate processes and activities that are likely to endanger the environment
- Utilise the environment and natural resources for the benefit of the people of Kenya

The Constitution of Kenya is applicable to this project as every person living in the country is entitled to a clean and health environment and the principle of public participation is a bill of right

3.2.2 Environmental Management & Coordination Act, 1999 (Amended 2015)

The Environmental Management and Coordination Act of 1999, (principle Act) together with the Environmental Management and Coordination (amendment) act of 2015 provides for the establishment of an appropriate legal and institutional framework for the management of the environment. EMCA was established as a framework law and this is due to the fact that so far this is the only single piece of legislation that contains the most comprehensive system of environmental management in the country.

The act establishes an appropriate institutional framework for environmental management in Kenya and for matters connected therewith and incidental hereto.

The act is based on the fact that improved environmental management structures is necessary in order to improve national capacity for the management of the environment and accepts the basic principle that the environment constitutes the foundation of our national, social and cultural advancement.

Section 1-3 of part two of the EMCA Cap 387 underscores the general principles which entitle every Kenyan to a clean and healthy environment. Section forty-three takes cognizance of the traditional interests of local communities customarily resident within or around the subject resource. These sections of the act make environmental monitoring a universal responsibility of every citizen in Kenya.

Part VII, section 68 of the same Act requires operators of projects or undertakings to carry out environmental audits in order to determine level of conformance with statements made during the EIA. The audit report should be submitted to NEMA.

Part VIII section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing mailer, radioactive or any other' pollutants into aquatic environment. Section 73 requires that operators of projects which discharges effluent or other pollutants to submit to NEMA accurate information about the quantity and quality of the effluent. Section 74 requires that all effluent generated from point sources are discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities.

Section 87 sub-section 1 states that no person shall discharge or dispose off any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility.

According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a license.

Sections 90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides.

Section 102 states that subject to provisions of the civil aviation Act, any person who emits noise in excess of the noise emission standards established under this Act commits an offence.

China Aerospace Construction Group Corporation Limited carried out an Environmental Impact Assessment (EIA) as per the second schedule of the Environmental Management and Co-ordination Act, 1999, the legislation that governs Environmental Impact Assessment (EIA) studies. This schedule lists the projects required to undergo EIA studies in accordance with section 58 (1-4) of the Act. Electrical infrastructure is covered in part 10 of this schedule and this includes electrical transmission lines; and electrical sub-stations. The proposed Sultan Hamud - Loitoktok 120 km 132kV Transmission Line and its associated substations falls in this category of projects which ESIA is mandatory. The Act provides for the National Environmental Management Authority (NEMA) whose objective and purpose is to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government in the implementation of all policies relating to the environment.

After the introduction of Environmental Impact Assessment and Audit Regulations, (2003) through Kenya Gazette Supplement No. 56 of 13 June 2003, the submission of environmental reports became mandatory. According to these regulations no proponent shall implement a project likely to have a negative environmental impact or for which an Environmental Impact Assessment has not been concluded and approved in accordance with these regulation.

The authority (NEMA) has gazetted several regulations aimed at achieving the above mandate. Some of the relevant regulations with respect to the proposed transmission line project are:

1. Environmental (Impact Assessment) and Audit Regulations, 2003

These regulations provide for conducting Environmental Impact Assessment and Environmental Audits.

Part 6 of the EMCA (1999) under the Second Schedule provides a list of projects that must undergo screening for EIA. As such, an EIA study was conducted for the proposed Sultan-Hamud - Loitoktok transmission line and associated substations and was submitted to the National Environment Management Authority (NEMA) for approval. The National Environment Management Authority recommended that a full Environmental and Social Impact Assessment (ESIA) be carried out before commencement of any project activities. The proposed project is subject to relevant provisions of these regulations and subsequently, this ESIA has been undertaken in accordance with the requirements.

2. Environmental Management and Co-ordination (Water Quality) Regulations 2006

The Water Quality Regulations provide for the protection of lakes, rivers, streams, springs, wells, and other water sources. The regulations also stipulate that all industries should refrain from any actions, which may directly or indirectly cause water pollution. All industries are therefore required to refrain from discharging effluent into water bodies. For effluent discharges into the environment and aquatic

environment, a Proponent needs to apply directly to the NEMA. For discharges into public sewers, a Proponent needs to apply for the license to the relevant county. The regulation contains discharge limits for various environmental parameters into public sewers and the environment.

This regulation gives a minimum distance from a water body for which any development may be undertaken. These regulations will apply to the proposed project during the construction and operational phases. Each contractor will be required to ensure that all effluent from construction activities is treated in accordance with the above regulations prior to discharge into the environment.

3. Environmental Management and Co-ordination (Waste Management) Regulations 2006

The Waste Management Regulations sets out standards for handling, transportation and disposal of various types of wastes. The regulations stipulate the need for facilities to undertake, in order of preference, waste minimization or cleaner production, waste segregation, recycling or composting.

These regulations provide guidelines on how to store, transport and dispose any wastes generated during the construction and maintenance phases of the transmission lines. Some of these wastes may fall under the hazardous wastes category and thus require particular disposal arrangements.

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. Environmental Management and Coordination Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements.

Under these regulations, NEMA will be publishing a list of controlled substances and the quantities of all controlled substances imported or exported within a particular. The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations.

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."

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The

licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

5. Environmental Management and Coordination (Conservation of Biodiversity regulations 2006)

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection.

The country has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning

The Proponent has commissioned this environmental assessment study and seeks to obtain an EIA License from the Authority (NEMA) in compliance with the Act; the environmental management plan included in this report provides guidelines for the mitigation of potentially adverse impacts on natural resources.

6. Environmental Management and Coordination (Air Quality) Regulations, 2008)

The objective of this regulation is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

- Back-burning to control or suppress wildfires;
- Firefighting rehearsals or drills conducted by the Fire Service Agencies
- Traditional and cultural burning of savanna grasslands;
- Burning for purposes of public health protection;

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.

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

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

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

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

Rules 13 and 14 of the regulations define the permissible noise levels for construction sites and are reproduced below. These noise limits will be applicable to the proposed project.

Table 3.1 Permissible Noise Levels during Construction Phase of the Project

Facility		Maximum noise level permitted (L_{eq}) in dB(A)	
		Day	Night
i).	Health facilities, educational institutions, homes for the disabled	60	35
ii).	Residential	60	35
iii).	Areas other than those in (i) and (ii) above	75	65

Time frame:

Day: 6:01 am – 8:00 pm (Leq, 14 hours)

Night: 8:01 pm – 6:00 am (Leq, 10 hours)

Failure to comply with these regulations attracts a fine of KES 350,000 or 18 months jail term or both.

The Proponent shall observe policy and regulatory requirements and will comply with the provisions of the Regulations.

8. Environmental Management and Coordination (Conservation of Biodiversity, Access to Genetic Resources and Benefit Sharing) Regulations 2006

The Conservation of Biodiversity Act Sections 5-9 provides for the protection of endangered species, creation of an inventory, and monitoring of their status, protection of environmentally significant areas, provision of access permits, material transfer agreements and benefit sharing. These regulations will guide the routing of the transmission line citing with a view to avoiding areas of environmental significance and protection of endangered species.

9. Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations 2006

The Fossil Fuel Emission Control Regulations provide for acceptable emission standards in Kenya. Section 4 of the regulations states that any internal combustion engine for motor vehicles and generators must comply with the emission standards provided for in the First Schedule of those regulations. Hence anyone who operates such engines whether on the road, street, public highway or any premises, which emits smoke in excess of the emissions standard in the First Schedule, contravenes the regulations and is liable to prosecution. Section 8 provides that any person intending to use any fuel catalysts other than those permitted by the authority to disclose it and seek prior approval.

Establishments (including construction sites and operational sites) that use generators as alternative sources of energy must take account of the regulation on the emission standards.

3.2.3 The Energy Act, 2006

The Energy Act 2006 was enacted to amend and consolidate the laws relating to energy, to provide for the establishment, powers and functions of the Energy Regulatory Commission and the Rural Electrification Authority, and for connected purposes. The Act provides the regulatory framework for the energy sector and, among other things, stresses the need for energy players in general and electrical energy players in particular to adopt environmentally friendly and sustainable practices in power generation, distribution and consumption. It sets standards for proper environmental management in the sector. Section 27 of the Act requires a license for generation, importation, transmission and distribution of electrical energy. Subsection (2) under this Section specifies that permits are required for installation with a generating plant exceeding 1000 kW. Section 30 (1) part (b) of the Act states compliance with the EMCA, 1999 as an important criterion to be considered by the ERC during the registration and supervision of sector players.

Under Section 164 of the Energy Bill, 2015, a person issued with a transmission license should build, maintain and operate an efficient, co-ordinated and economical transmission system. It further requires that the transmission system is operated with enough capacity to provide network services to persons authorized to connect to the power grid.

The ESIA Study has partly been undertaken in fulfilment of requirements of the Energy Act. This Act is relevant to the project since permit for power transmission will be issued upon receipt of a NEMA license

3.2.4 The Forests Act, 2005

The Forests Act, 2005 provides for the establishment, control and regulation of Forests. The Act created a new semi-autonomous body, the Kenya Forest Service (KFS) and supportive institutions for management and conservation of all types of forests. This Act mandates the KFS to conserve and manage all forests. It also sets out the roles and responsibilities of communities in managing forests. KFS is also responsible for formulating policies regarding the management, conservation and use of all types of forest areas in the country. The Act embraces the concept of participatory forest management and gives particular consideration to formation of forest community associations, which are recognized as partners in management. It enables members of forest communities to enter into partnership with KFS through registered Community Forest Associations. It also allows lease arrangements by interested groups to supplement government efforts in plantation forest.

The Act is important for the line routing where it may touch on forests of any type (not just protected forests). KFS will need to be kept informed of the impact on trees along the transmission line route, particularly at the construction stage.

The Forest Conservation and Management Bill, 2015 was enacted to give effect to Article 69 of the Constitution with regard to forest resources to make provision for the conservation and management of forests. The Kenya Forest Service may recommend acquisition of forest land if the proposed project has been subjected to an independent EIA and public consultations in accordance with the Second Schedule has been undertaken and completed.

Even though the proposed transmission line does not pass through any gazetted forest, the Proponent will enhance conservation efforts in the area by planting indigenous trees to compensate for lost vegetation during construction phase.

3.2.5 The Land Act, 2012 (Revised 2015)

The lands Act was enacted in May 2012 and revised in 2015 to provide for the review, consolidation and rationalization of land laws and to provide a framework for sustainable management and utilization of all categories of land. It provides a legal framework for administration and management of public and private land, leases, charges, compulsory acquisition, easements and related rights.

Section 61 of Kenyan constitution recognizes three classification of land; public, community or private.

- **Public land:** It includes all un-alienated government land held and occupied by government agencies, territorial sea and sea bed, all public roads whether gazetted or not and any land not

classified as private or community land under the Constitution; and any other land declared to be public land by an Act of Parliament.

- **Community land:** This is all land vested in and held by communities identified on the basis of ethnicity, culture or similar community of interest. Any unregistered community land shall be held in trust by county governments on behalf of the communities.
- **Private land:** This is land which is registered and held by any person under freehold tenure; or land held by any person under leasehold tenure; and any other land declared private land under an Act of Parliament.

The Act is triggered since there are several land tenure systems along the proposed transmission line. The Act provides for compensation for any damage or loss resulting from the entry onto the land.

Section 17 of the Act states that to acquire public land for development, the Proponent shall submit a plan to the Land Commission and that the plan should have considered any conservation, environment or heritage issues relevant to the development. The Proponent should have submitted an EIA in line with EMCA.

The Community Land Bill, 2014 was enacted to provide for the recognition, protection, management and administration of community land. Under Section 10 of the Bill, community land is liable to prompt payment of just compensation upon acquisition by the State for public purposes. Acquisition of the land is made through application to the Community Land Committee. The Committee deliberates the application including consultations with its members then they offer a certificate of occupancy.

The Proponent will commission a RAP study to identify land whether public, community or private that may be affected by the construction of the transmission line. The Proponent shall comply with the provisions of the Act and the Land Bill in acquiring land from the community.

3.2.6 The Agriculture, Fisheries and Food Authority Act, 2013

The Agriculture, Fisheries and Food Authority Act is the principle land use statute covering, among others, soil conservation and general land use. Two major parts of the acts deal with general conservation issues i.e. preservation of soil fertility and prevention or control of soil erosion.

The Agriculture (Basic Land Use) rules issued in 1965 prohibit certain land use practices likely to enhance soil erosion. It prohibits cutting down or destroying vegetation or de-pasturing of livestock on any land of which the slope is 0.35, except if the activity is done within the conditions sanctioned by an Agricultural officer.

The rules stipulate strict regulation on the cultivation of any land whose slope is between 0.12 and 0.35 when the soil is not properly protected from soil erosion.

Watercourse and land abutting on these are also protected under the rules. Cultivation, destruction of soil cutting down of vegetation, or de-pasturing livestock land on land within two metres of a watercourse are permissible only if done with a written consent of an authorized officer. The transmission line will necessitate destruction of agricultural plants during construction. Provisions of this Act need to be followed during that process.

3.2.7 Wildlife Conservation and Management Act 2013

This Act was enacted to consolidate and amend the law relating to the protection, conservation and management of wildlife in Kenya, and for purposes connected therewith and thereto. Section 9 of the Act states that ‘the Director of Wildlife Conservation shall, through the officers of the service, control, manage and maintain all national parks’. It also states that within the National Park, the Director may:

- Reserve or set aside any portion of the park as a breeding place for animals or as nurseries for vegetation;
- Authorize the construction of such roads, bridges, airfields, buildings and fences, the provision of such water supplies, and the carrying out of such other works, as may be necessary for the purposes of the park;
- With the approval of the Minister, let sites for the erection of hotels, or other accommodation for the visitors to the park provided that nothing in any document connected with the letting shall be construed as in any manner abridging the overall control of the Park by the Service, or as preventing the Director from giving directions as to the manner in which the premises concerned shall be managed.

The proposed transmission Line traverses through Mbirikani and Kimana Group Ranches, these ranges are part of Amboseli National Park, there is dense presence of the wildlife. The Kenya Wildlife Service shall approve and give consent for development in the Park where:

- *The area does not contain endangered species*
- *The area is not a critical habitat and ecosystem for wildlife*
- *The area is not an important catchment area*
- *An EIA has been carried out in accordance with EMCA*

3.2.8 The Water Act, 2002

The Water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 5 (4) of the Act states that the national water services strategy shall contain details of:

- Existing water services
- The number and location of persons who are not being provided with basic water supply and basic sewerage
- Plans for the extension of water services to underserved areas
- The time frame for the plan; and

- An investment programme

Part II section 18 of this Act provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these circumstances unless, specific records may require to be kept by a site operator and the information thereof furnished the authority on demand.

Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains, sewers and works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

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

Water Act, 2002, Part 4 Section 94 also states that:-

- 1) No person shall, without authority under this act:
 - a) Willfully obstruct, interfere with, divert or abstract water from any water course or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or
 - b) Through or convey, or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to any water resource in such a manner as to cause, or be likely to cause, pollution or the water resource,
- 2) A person who contravenes this section shall be guilty of an offence.

The proposed projects shall have no adverse impact on the local water supply during operations as there are no requirements for the installation of water supply and sanitation facilities on-site.

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

3.2.9 The Physical Planning Act (Cap 286)

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes enacted by the Parliament of Kenya Under this Act, no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. If on the expiry of the ninety days notice given to the developer such restoration has not been effected the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

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

3.2.10 The Occupational Safety and Health Act, 2007

Occupational safety and health Act, 2007 is an act of parliament that provides for safety, health and welfare of workers and all people who are present at workplaces.

Part II of the act provides several duties of occupiers as far as the safety and health of workers is concerned. The following are the obligations of occupier according to this Act:

- The provision and maintenance of plant and systems and procedures of work that are safe and without risks to health.
- Arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
- The provision of necessary information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed
- maintenance of any workplace under the occupier's control, in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks to health
- provision and maintenance of a working environment for every person employed that is, safe, without risks to health, and adequate as regards facilities and arrangements for the employee's welfare

Section 9 of the act requires occupiers to establish committees consisting of about twenty people in order to discuss safety and health issues of the workers

Section 11 of the Act requires occupiers to ensure a thorough safety and health audit of workplace to be carried out by a safety health officer on annual basis. The health and safety officer is supposed to write a report and send it to the director place The Occupational Safety and health officer

In Section 13 of the act, employees are required to abide by the safety procedures that have been put in place. Each employee is supposed to wear the protective gear that is provided by the employer. This section also requires employee to be responsible for safety of fellow employees and report incidences of that could lead to accidents to their supervisor.

This 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.

3.2.11 Public Health Act, 1986 (Revised 2012)

The Public Health Act regulates activities detrimental to human Health. An environmental nuisance is one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. Although the Act is primarily concerned with domestic water supplies and sources of water used for human consumption, its regime may be extended to cover rivers, streams, lakes and

underground water resources since these are the basic water sources for the majority of Kenya's population.

It also outlines the standards of construction of various facilities of any place. In terms of air pollution thermal plants are said to emit a variety of gases, volatile organic compounds and particulate matter depending on the amount and type of fuel used and method used for burning. It is therefore necessary to monitor the air pollution. The Act prohibits activities (nuisances) that may be injurious to health. The primary purpose of the Act is to secure and maintain public health. It defines nuisances on land and premises and empowers public health authorities to deal with such conditions.

Part IX, section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local.

Authorities to take all lawful, necessary and reasonably practicable measures to maintain areas under their jurisdiction clean, to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.

On the responsibility of local authorities, Part XI section 129 of the Act states in part "It shall be the duty of every County government to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes...". Section 130 provides for making and imposing regulations by the local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 17(9)

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and oilier fluids which permits or facilitate the breeding of pests shall be deemed nuisances and are liable to be dealt with in the manner provided by this Act.

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

3.2.12 County Government Act 2012

The Act empowers county governments to control or prohibit all businesses, factories and workshops that, by reason of smoke, fumes, chemical gases, dust, smell, noise or vibration or other cause may be a source of danger, discomfort or annoyance to the neighbourhood and to prescribe the conditions subject to which business, factories and workshops shall be carried on.

3.2.13 The Employment Act, 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. Its purpose is to promote sound labour relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute for the protection and promotion of settlement conducive to social justice and economic development for

connected purposes. This Act is important since it provides for employer –employee relationship that is important for the activities that would promote management of the environment within the project area.

3.2.14 The Traffic Act Cap 403 of 2013

This Act specifies that motor vehicles use proper fuel. The Traffic regulations promulgated under the Act specifies that every vehicle is required to be so constructed, maintained and used so as not to emit any smoke or visible vapour. This Act will apply to the project during the construction and operation phases. The Proponent will adhere to the provisions of this Act.

3.2.15 The Penal Code (Cap 63)

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence. Section 193 states that any person who, for the purposes of trade or otherwise, makes loud noises or offensive or unwholesome smells in such places and circumstances as to annoy any considerable number of persons in the exercise of their common rights commits an offence and is liable to be punished as for a common nuisance.

Construction of the transmission line will in one way or another affect the atmosphere, water resources and will make some level of noise. The Proponent shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation/ minimization/ avoidance of adverse impacts arising from the project activities.

3.2.16 The Valuers Act, 1985 (Cap 532) (Revised 2012)

It is an Act of Parliament to provide for the registration of valuers and for connected purposes. The Act established the Valuers Registration Board, which have the responsibility of regulating the activities and conduct of registered valuers. Section 21 of the Act states that valuation of property shall be performed by registered valuers only.

The project will affect land, structures and vegetation that will need to be valued for compensation. The Proponent will therefore adhere to the provisions of this Act to engage a valuer.

3.2.17 The Work Injury Benefits Act (2007)

The Work Injury Benefits Act (2007) provides for compensation to employees for work related injuries and diseases contracted in the course of employment. Section 7 directs all employers to obtain and maintain an insurance policy in respect of any liability that the employer may incur under this Act to any of his employees. Section 10 gives direction on compensation for work related injuries. Part (1) of the Section states that an employee who is involved in an accident resulting in the employee's disablement or death is entitled to compensation. The Proponent will need to observe the provisions of this Act during the course of the project.

3.2.18 The Environment and Land Court Act, 2011

This is an Act of Parliament to give effect to Article 162(2)(b) of the Constitution; to establish disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes. All land disputes encountered in the course of the Project will be handled in adherence to this Act.

3.2.19 The National Land Commission Act, 2012

It is an Act of Parliament to make further provision as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the Commission; to give effect to the objects and principles of devolved government in land management and administration. Section 5 (2) of the Act mandates the National Land Commission to:

- i. On behalf of, and with the consent of the national and county governments, alienate public land
- ii. Monitor the registration of all rights and interests in land
- iii. Ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations
- iv. Develop and maintain an effective land information management system at national and county levels
- v. Manage and administer all unregistered trust land and unregistered community land on behalf of the county government
- vi. Develop and encourage alternative dispute resolution mechanisms in land dispute handling and management.

The Proponent will therefore consult with the Commission when necessary in all matters of land acquisition.

3.2.20 The HIV and AIDS Prevention and Control Act, 2006

This Act prohibits discrimination in all its forms and subtleties against persons with or persons perceived or suspected of having HIV and AIDS. Without prejudice to the generality of subsection (1), no person shall compel another to undergo an HIV test as a precondition to, or for continued enjoyment of employment. All employees during this project will therefore be treated fairly and in accordance to the provisions of this Act.

3.2.21 The National Gender and Equality Commission Act, 2011

The National Gender and Equality Commission Act, 2011 established the National Gender and Equality Commission (NGEC). The functions of the commission are stipulated in Section 8 of the Act which include, inter alia, promoting gender equality and freedom from discrimination. It inherits the status and powers of its parent Commission (the Kenya National Human Rights and Equality Commission) as outlined in Chapter 15 –Commissions and Independent Offices of the 2010 Constitution, Article 59 of Chapter 4. The NGEC is empowered by Article 252 to initiate investigations based on suspicions or claims of discrimination, and have the authority of a Court to summon a witness in the course of such investigations. The Proponent is therefore advised to refrain from discrimination on ground of gender and equality in the course of this project. Should such matters arise, provisions of this Act should be adhered to.

3.3 Policy Framework

Some of the policies that are likely to be triggered by the proposed transmission line project shall include:

3.3.1 Vision 2030

Kenya aims to be an industrialized country by the year 2030. The Vision 2030 describes three pillars that are crucial for industrialization, they include Economic, Social and Political pillar. Proposed development projects under Vision 2030 will increase demand on Kenya's energy supply. The Kenyan Government is committed to continue institutional reforms in the energy sector including a strong regulatory framework to encourage public-private partnerships that will help generate more energy at a lower cost and increase efficiency in energy consumption.

Environment has to be considered in the development projects in order to achieve sustainable development. The country aims to be a state that has clean secure and sustainable environment by the year 2030. The short term goals are to decrease diseases that are environmentally related and to increase the percentage of forest cover over the entire period. Strategies have been put in place to ensure environmental conservation in order to enhance sustainable economic development. Environmental & Social Impact Assessment (ESIA) entails identifying the actual and probable impacts of projects on the environment and recommending alternative and mitigating measures. The assessment is required at all stages of project development. The main purpose of ESIA is to ensure that both existing and proposed public and private sector development projects are environmentally sustainable.

3.3.2 National Environment Policy, 2013

The National Environmental Policy, 2013 sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources, and recognizes that natural systems are under intense pressure from human activities particularly for critical ecosystems including forests, grasslands and arid and semi-arid lands. Section 5.9.1 of the Policy identifies energy as essential for socio-economic development. The Government has made deliberate efforts to provide power to remote areas in Kenya in order to spur development and improve livelihoods. Energy policies in the Country must ensure a robust and efficient system that is secure and efficient. The Policy has given the following provisions for environmental management of projects in the energy sector:

- Provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and natural resources
- Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources
- Ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods
- Promote and support research and capacity development as well as use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, Strategic Environmental Assessments (SEAs), Environmental Impact Assessments (EIAs), Environmental Audits (EA) and Payment for Environmental Services (PES)

- Promote and enhance cooperation, collaboration, synergy, partnerships and participation in the protection, conservation, sustainable management of the environment and natural resources
- Promote domestication, coordination and maximisation of benefit from Strategic Multilateral Environmental Agreements (MEAs)

3.3.3 National Environmental Action Plan (NEAP), 1994 (Revised 2007)

The National Environmental Action Plan provides the framework for implementation of the Environment Policy and realisation of Development Goals and Vision 2030. The integration process involves a multi-sectoral approach in developing a comprehensive framework for environmental management and conservation of natural resources. The main objectives of NEAP are:

- Identifying environmental problems and issues;
- Raising environmental awareness;
- Building national consensus;
- Defining policies, legislation and institutional needs;
- Planning environmental projects.

3.3.4 Environment and Development Policy (Sessional Paper No.6 of 1999)

Environment and Development Policy aims to harmonize environmental and developmental goals for sustainability. Furthermore, it provides comprehensive guidelines and strategies for government action on the environment and development. With regard to wildlife, it re-emphasizes the goals of the Wildlife Policy of 1976 and especially the government's commitment towards involving local communities and other stakeholders in wildlife conservation and management. It also provides mechanisms that allow them to benefit from the resources. The policy advocates for the establishment of zones that allow for the multiple use and management of wildlife.

This policy aims to harmonize environmental and developmental goals for sustainability. Furthermore, it provides comprehensive guidelines and strategies for government action on the environment and development. With regard to wildlife, it reemphasizes the goals of the Wildlife Policy of 1976 and especially the government's commitment towards involving local communities and other stakeholders in wildlife conservation and management. It also provides mechanisms that allow them to benefit from the resource. The policy advocates for the establishment of zones that allow for the multiple use and management of wildlife.

The paper derives its authority from the World Commission on Environment (The Brundtland Commission of 1987) and The United Nation conference on Environment (The Earth Summit, 1990). The Brundtland Commission recommends sustainable development which is defined as development that meets the needs of today's generation without compromising those of future generations.

The Earth Summit, on the other hand, established a number of international agreements, declarations and commitments. The four cornerstones of the Earth Summit are:

- The Rio declaration on Environment and Development;
- Framework Convention on Climate Change
- Convention on Biological Diversity

- Agenda 21

Agenda 21 is a “comprehensive” blueprint for the global actions to affect transition to sustainable development to which Kenya is a signatory. Twenty-seven principles were outlined in the Agenda 21 document during the United Nations conference for Environment and Development (UNCED) held in June 1992. Those relevant to this project to which Kenya is obligated to follow are outlined below:

- Principle 1 – Human beings are at the centre of sustainable development. They are entitled to a healthy and productive life in harmony with nature.
- Principle 3 – The right to development must be fulfilled to equitably meet developmental and environmental needs of present and future generations (intergenerational equity)
- Principle 10 – Environmental issues are best handled with the participation of all concerned citizens, at the relevant level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in the decision making process.
- Principle 11 – States shall enact effective environmental legislation, environmental standards, management objectives and priorities should reflect the environmental and developmental concepts to which they apply.
- Principle 15 – In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious damage or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation

3.3.5 The National Bio-Diversity Strategy, 2000

The overall objective of the National Bio-diversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings with elaborated upon in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed, and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve the Kenya's biodiversity; to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biodiversity resources among the stakeholders; and to enhance the technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

3.3.6 KETRACOs' Environmental, Health and Safety Policy

Kenya Electricity Transmission Company Limited (KETRACO), through their Environmental, Health and Safety Policy is committed to implement and maintain a sound Safety, Health and Environment (SHE) Management System to ensure that SHE concerns are managed in a comprehensive and effective manner. The SHE Management System was prepared with the specific aim of complying with Occupational Safety and Health Act (OSHA), 2007; Environmental Management & Coordination Act, 1999; Energy Regulatory Board's Environment, Health and Safety Policy Framework for the Electric Power sub-sector, 2005; its internal SHE Policy and donor requirements.

China Aerospace Construction Group Corporation Limited has been contracted by KETRACO, It is therefore mandated to conduct all its operations in a healthy and safe manner and in Compliance with OSHA, 2007 and other relevant legislations

3.4 Institutional Framework

The EMCA Act established a number of institutions for the management of the environment in Kenya. The Apex is the parent ministry which is currently the ministry of Environment, Water and Natural Resources. Below the ministry is the National Environment Council. These key institutions and government departments are responsible for the environmental protection and natural resource management in Kenya forms the key stakeholders in the project implementation.

3.4.1 Ministry of Environment and Natural Resources

The mandate of the ministry is to monitor, protect, conserve and manage the environment and natural resources through sustainable exploitation for socio-economic development aimed at eradication of poverty, improving living standards and ensuring that a clean environment is sustained now and in the future. The ministry comprises of various divisions at the headquarters and the following parastatals and departments.

- National Environment Management Authority
- Kenya Meteorological Department
- Mines and Geology Department
- Department of Resource Surveys and Remote Sensing (DRSRS)

The functions of the ministry include but not limited to the following:

- Environment and Natural Resources Policy formulation, analysis and review
- Sustainable management of Mineral resources and conservation of environment
- Continuous development of geo-database for integrated natural resources and environmental management systems
- Promote, monitor and coordinate environmental activities and enforce compliance of environmental regulations and guidelines

3.4.2 National Environment Management Authority (NEMA)

National Environment Management Authority (NEMA) is the institution with the legal authority to exercise general supervision and coordination over all matters relating to the environment. It is the principal instrument of the government charged with the implementation of all policies relating to the environment. NEMA's functions are more particularly set out in section 9(2) of the EMCA act, 1999.

According to section 68 of the environmental management and coordination Act (EMCA) 1999, The Authority shall be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

Environmental Auditing (EA) is a tool for environmental conservation and has been identified as a key requirement for existing facilities to ensure sustainable operations with respect to environmental resources and socio-economic activities in the neighbourhood of the facilities.

The government has established regulations to facilitate the process on Environmental Impact Assessments and Audits. The regulations are contained in the Kenya Gazette Supplement No. 56, legislative supplement No. 31; legal notice No. 101 of 13th June 2003.

The authority core functions are:

- Coordinating the various environmental management activities being undertaken by the lead agencies
- Promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya.
- To take stock of the natural resources in Kenya and their utilization and conservation.
- Carry out surveys, which will assist in the proper management and conservation of the environment.
- Advise the Government on legislative and other measures for the management of the environment or the implementation of relevant international conventions, treaties and agreements.
- Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys.
- Mobilize and monitor the use of financial and human resources for environmental management.
- Identify projects and programmes for which environmental audit or environmental monitoring must be conducted under this Act.
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur e.g. floods, landslides and oil spills.
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities. Management objectives must be adhered to and adequate early warning on impending environmental emergencies is given.

3.4.3 National Environmental Council (NEC)

The National Environment Council established under section 4 of part 3 of the EMCA act consists a board which comprises the Chairman (Minister), PS of the relevant ministry, representatives from public universities, representatives from research institutions, NGO representatives, Director General (Secretary) and such number of members as may, from time to time, be co-opted by the minister to be members of the council.

3.4.4 The National Environmental Action Plan Committee

The National Environment Action Plan Committee (NEAPC) is established under Section 37 of EMCA. This cross-sectoral committee is responsible inter alia, for the development of a five-year national environment action plan. The national environment action plan shall contain among other aspects analysis of the natural resources of Kenya and their distribution, quantity and various uses. It shall also recommend legal and fiscal incentives for business that incorporate environmental requirements into their planning and operational processes as well set out guidelines for the planning and management of the environment and natural resources. The national environment action plan shall upon adoption by Parliament be binding on all organs of government. Provincial and district environmental committees are also required to develop their own

3.4.5 National Environmental Complaints Committee

The National Environmental Complaints Committee (NECC) is the body charged with the task of investigating complaints or allegations regarding the condition of the environment in Kenya and suspected cases of environmental degradation. The NECC also undertakes public interest litigation on behalf of the citizens in environmental matters. It is composed of seven members appointed by the Cabinet Secretary for Environment and Natural Resources headed by a chairman who is a person qualified to be appointed as a judge of the High Court of Kenya and members nominated by the Attorney-General, the Council of County Governors (Secretary), the Law Society of Kenya and the business community.

3.4.6 Standards and Enforcement Review Committee

The Standards and Enforcement Review Committee (SERC) is a committee of NEMA and is established under Section 70 of EMCA. This is a technical Committee responsible for formulation of environmental standards, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. The Permanent Secretary under the Minister is the Chairman of the Standard and Enforcement Review Committee.

The members of the SERC are set out in the third schedule to EMCA. They consist of representatives of various relevant government ministries and parastatals that are Lead Agencies as well as those responsible for matters such as economic planning and national development, finance, labour, public works, law and law enforcement.

3.4.7 National Environmental Tribunal (NET)

The NET is established under Section 125 of EMCA for the purpose of hearing appeals from administrative decisions by organs responsible for enforcement of environmental standards. An appeal may be lodged by a project proponent upon denial of an EIA licence or by a local community upon the grant of an EIA licence to a project proponent. NEMA may also refer any matter that involves a point of law or is of unusual importance or complexity to NET for direction. The proceedings of NET are not as stringent as those in a court of law and NET shall not be bound by the rules of evidence as set out in the Evidence Act. Upon the making of an award, NET's mandate ends there as it does not have the power to enforce its awards. EMCA provides that any person aggrieved by a decision or award of NET may within 30 days appeal to the High Court.

3.4.8 County Environment Committees

Under section 29 (1) of EMCA, the Cabinet Secretary shall by notice in the gazette appoint County Environment Committees of NEMA in respect of every County. These committees assist NEMA in effectively carrying out its function of proper management of the environment at these level. It is instructive to note that the membership of these committees include inter alia representatives of farmers or pastoralists, business community, women and youth.

3.5 International Environmental Policies

International environmental policies have been established to coordinate environmental practices in the world. They are geared towards protecting the environment.

3.5.1 African Development Bank Environmental Guidelines

The Bank has Integrated Environmental and Social Impact Assessment Guidelines and Environmental and Social Assessment Procedures (ESAP). The guidelines integrate environmental and social concerns into the life cycle of a project and also stipulate requirements for specific projects. Built upon the three previous safeguard policies on the Involuntary Resettlement Policy (1995), the Policy on Indigenous Peoples (1998) and the Environment Policy (2002), the Safeguard Policy Statement was approved in 2009. The safeguard policies are operational policies that seek to avoid, minimize or mitigate adverse environmental and social impacts including protecting the rights of those likely to be affected or marginalized by the developmental process. ADB's safeguard policy framework consists of three operational policies on the environment, indigenous peoples and involuntary resettlement.

1. Environmental Safeguard

This safeguard is meant to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision making process.

2. Involuntary Resettlement Safeguard

This safeguard has been placed in order to avoid involuntary resettlement whenever possible; to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre- project levels; and to improve the standards of living of the displaced poor and other vulnerable groups.

3. Indigenous Peoples Safeguard

This safeguard looks at designing and implementing projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, livelihood systems and cultural uniqueness as defined by the Indigenous Peoples themselves so that they receive culturally appropriate social and economic benefits; do not suffer adverse impacts as a result of projects; and participate actively in projects that affect them.

Under the ESAP, the Borrower is responsible for integrating environmental and social considerations sponsored projects according to the Bank's requirements.

3.5.2 EU Environmental Policy

The European Union has an elaborate policy statement on environmental management covering a wide range of issues. EU-supported projects and programmes worldwide are expected to observe the relevant policy issues. These policy statements also apply to projects/programmes supported by member states of the EU.

3.5.3 Environmental protection policies of China funded development projects

The Ministry of Commerce of the People's Republic of China and Ministry of Environmental Protection of the People's Republic of China issued policies on environmental protection in February 2013 for foreign investment and cooperation. These policies were formulated to regulate environmental protection considerations in foreign investment and cooperation, provide guidance to actively perform social responsibilities of environmental protection, and promote the sustainable development of foreign investment and cooperation by Chinese institutions domestically and abroad. These Guidelines are applicable to all Chinese enterprises engaged in foreign investment and cooperation activities.

The Guidelines for Environmental Protection in Foreign Investment and Cooperation are to:

- Regularize the environment related behaviors of Chinese companies in foreign investment and cooperation activities (Article 1)
- Guide for the performance in social responsibilities for environment protection (Article 1)
- Advocate to respect religious belief, cultural traditions, local customs of the community, safeguard legitimate rights and interest of labours (Article 3)
- Understand and observe host country's provisions of law and regulations related to environment protection. (Article 5)
- Conduct environmental impact assessment, take measures to reduce possible adverse impacts based on impact assessment (Article 8)
- Develop environmental monitoring and evaluation based on the background situation of project surrounding areas (Article 11)
- Formulate contingency plans for environmental accidents and other emergencies and set up reporting and communication system for local government, environmental regulatory authority, general public and company headquarters. (Article 14)
- Post their environmental information on a regular basis, and publish their plans on implementation of laws and regulations on environmental protection, measures taken, and environmental performance achieved (Article 18)
- Establish communication and dialogue mechanism to strengthen their communications with their communities and relevant social groups, take opinions and suggestions with respect to environmental impacts of their construction projects according to requirements of laws and regulations of the host country. (Article 20)

- Encourage enterprises to research and learn from the environment protection related principles, standards and practices adopted by international organizations and multilateral financial institutions. (Article 22)

The proponent shall perform its mandate in the proposed project adhering to the above guidelines

3.5.4 World Bank Safeguard Policies

This group of Operational Policies have been identified by World Bank management as being particularly important in ensuring that World Bank funded projects do not cause harm to people and the environment. These safeguard policies triggered by the proposed Project are presented in Table 3.1 and discussed below.

Table 3.2 Safeguard policies triggered by the Project

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP 4.01)	[X]	[]
Natural Habitats (OP 4.04)	[X]	[]
Cultural Property (OP 4.11)	[X]	[]
Involuntary Resettlement (OP 4.12)	[X]	[]
Indigenous Peoples (OP 4.10)	[]	[X]
Forests (OP 4.36)	[]	[X]
Safety of Dams (OP 4.37)	[]	[X]
Projects in Disputed Areas (OP 7.60)	[]	[X]
Projects on International Waterways (OP 7.50)	[]	[X]

1. Environmental Assessment (OP 4.01)

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

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

- Evaluate adequacy of existing legal and institution framework including applicable international environmental agreements. This policy aims to ensure that projects contravening the agreements are not financed.

- Stakeholder consultation before and during project implementation
- Engage service of independent experts to undertake the environmental assessment
- Provide measures to link the environmental process and findings with studies of economics, financial, institutional, social and technical analysis of the proposed project
- Develop programmes for strengthening of institutional capacity in environmental management

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

2. Natural Habitats (OP 4.04)

This safeguard policy seeks to ensure that Projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Project can damage natural habitats. The erection of the proposed transmission line is likely to interfere with biodiversity at construction phase but measures to ensure minimal interference have been proposed in the ESMP provided. The negative impact of the transmission line on flora and fauna is however limited since as indicated in Section 8.1.4 of this Report, the way leave will be cleared of vegetation manually and as such, the use of herbicides is not envisaged. At construction phase, selective clearance by removing tall woody species leaving samplings for quick regeneration of vegetation along the way leave is recommended. Reseeding degraded areas with local species common in the area at decommissioning phase will improve vegetation degeneration.

3. Involuntary Resettlement (OP 4.12)

This policy was designed to mitigate against impoverishment risks associated with Involuntary Resettlement and the restoration or improvement of income earning capacity of the Project Affected People (PAP). Implementation of the proposed project will cause displacements of people and the Proponent, China Aerospace Construction Group Corporation Limited will adhere to the requirements of this policy by commissioning a Resettlement Action Plan (RAP) to identify all Project Affected Persons (PAPs) upon which they will be adequately compensated prior to project implementation.

4. Public Disclosure (OP 17.50)

This policy encourages Public Disclosure or Involvement as a means of improving the planning and implementation process of projects. This procedure gives governmental agencies responsibility of monitoring and managing the environmental and social impacts of development projects particularly those impacting on natural resources and local communities. The policy provides information that ensures that effective public disclosure is carried out by project proponents and their representatives. The BP requires that Public Involvement should be integrated with resettlement and compensation. Monitoring and grievances address mechanism should also be incorporated in the project plan.

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

3.6 United Nations Treaties

Kenya subscribes to some of the international laws and agreements on environmental management. As such, the consultant reviewed the following relevant international conventions and treaties which must be complied with during project implementation.

3.6.1 United Nations Convention to Combat Desertification

The objective of the United Nations Convention to Combat Desertification (UNCCD) is to combat desertification and to mitigate the effects of drought in seriously affected countries, especially those in Africa. It seeks to achieve this objective through integrated approaches to development, supported by international cooperation and partnership arrangements, in the affected areas. It lays emphasis on long-term strategies that focus on improved productivity of land and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. The proposed project will adhere to the requirements of the UNCCD.

3.6.2 Convention on Biological Diversity

The Convention on Biological Diversity adopts a broad approach to conservation. It requires Parties to the Convention to adopt national strategies, plans and programs for the conservation of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programs and policies. The proposed project is expected to interfere with biodiversity in the project area during construction phase. Adequate measures have been recommended to conserve biodiversity.

3.6.3 Convention on the Conservation of Migratory Species of Wild Animals

The Convention on the Conservation of Migratory Species of Wild Animals also referred to as Bonn Convention aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. This Convention strive towards strictly protecting migratory species categorized as being in danger of extinction, conserving or restoring the habitats in which they live, mitigating obstacles to migration and controlling other factors that might endanger them.

The wild animals likely to be found in the project area include bird species, baboons, velvet monkeys, Elephants, Wild beasts, snakes, giraffes, zebras, lions and cheetahs. Even though, these species are not threatened with extinction, it's highly unlikely that construction of the transmission line will lead to interference of wildlife in the area. However, relevant mitigation measures including design of proper height of towers to reduce instances of electrocution and use of noise abatement measures in wildlife sensitive areas have been recommended in this report.

3.6.4 United Nations Framework Convention on Climate Change (UNFCCC)

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets.

Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention enjoys near universal membership.

Under the Convention, governments:

- gather and share information on greenhouse gas emissions, national policies and best practices
- launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries
- cooperate in preparing for adaptation to the impacts of climate change

The Convention entered into force on 21 March 1994.

4.0 BASELINE INFORMATION

The Consultant was able to collect, collate, analyse and present the baseline information of the environmental characteristics for the bio-physical and socio-economic information for the project area. The main features for this chapter are as follows:

4.1 Project Area Features

The proposed Sultan-Hamud-Loitoktok, 132 kV Transmission Line commences at an existing substation in Makueni County, Kasikeu sub location. The line then traverses two sub counties in Kajiado namely;

- a) **Mashuuru Sub-County;** the proposed transmission line passes through Nkama, Poka-Kenyewa and Imbuko locations

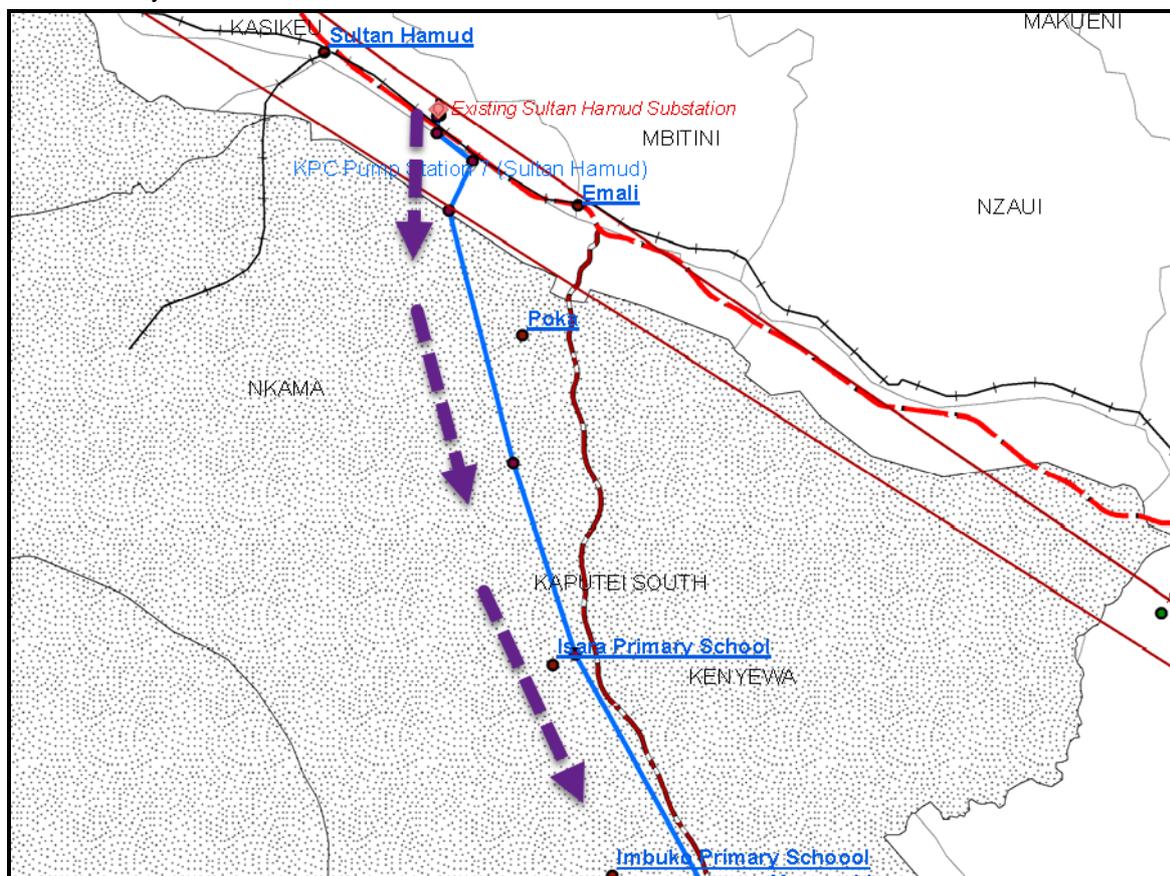


Plate 4.1 Direction of transmission line in Mashuuru Sub County

Source: ArcGIS® software by Esri.

- b) **Loitoktok Sub-County;** the proposed transmission line traverses Merrueshi / Oldonyu, Imbirikani, Isinet and Kimana locations

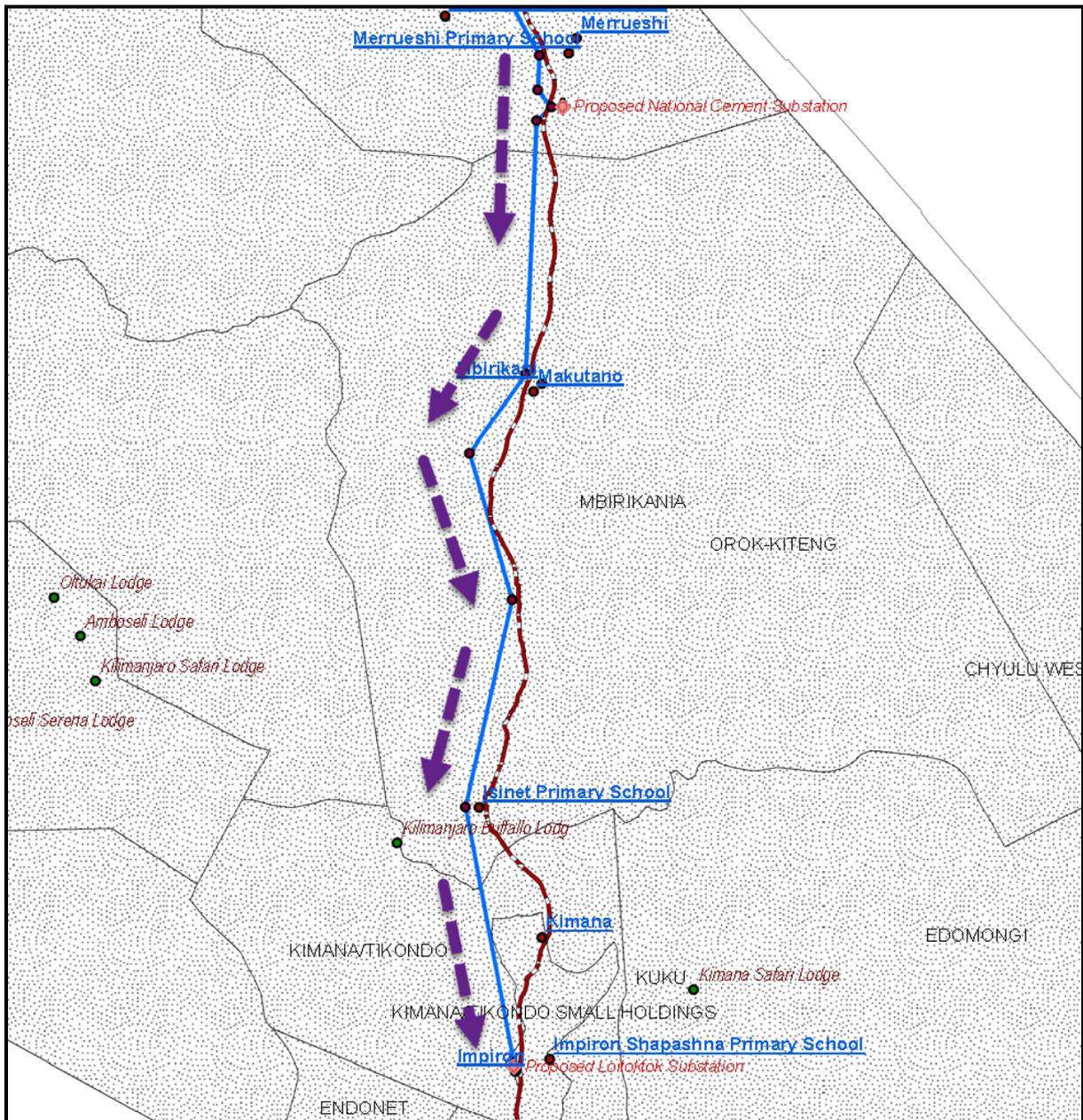


Plate 4.2 Direction of transmission line in Loitoktok Sub County

Source: ArcGIS® software by Esri.

4.2 The Environmental Baseline

Some of the environmental baseline information include;

4.2.1 Forest Resources

Kajiado County has a forest cover of about 16,866.88 ha. Conservation efforts have been laid down to improve the forest cover as the issue is a serious matter in the hearts of the people of Kajiado. Tree farming as an economic activity is being encouraged. A total of 15,626.8 ha of the forest land is gazetted forest while 1,240 ha is Trust land. Gazetted forest areas are found at the border areas of the county, mainly Ngong hills (3,077 Ha), Loitoktok (765.8 Ha), and Namanga (11,784 Ha). Forest in trust land includes Embakasi (573 Ha) and Ooloolua (667 Ha). The local forest area has been diminishing

rapidly because of excessive logging for firewood and also heavy destruction by wild animals congested in the parks and animal conservation centres. It was however observed that the transmission line does not traverse any forest.

4.2.2 Water Resources

There are various sources of water in the county, namely, rivers, shallow wells, protected/unprotected springs, dams, water pans, and boreholes. The water is used for domestic, livestock and commercial use. Most of the rivers are seasonal hence not reliable and ground water is available although it contains high salt levels in some parts of the county.

Tanathi Water Services Board is charged with the responsibility of developing water resources and maintaining infrastructure. Water Services Providers are in charge of direct provision of water and sewerage services to customers and ensuring efficient and economical provision of water and sewerage services in the county.

The average distance people travel in search of water is approximately 10km from the homesteads. Water access in urban centres is better than in rural areas because of high water connectivity by the service providers.

4.2.3 Physical features

The main physical features of Kajiado County are plains, valleys and occasional volcanic hills ranging from an altitude of 500 m above sea level at Lake Magadi to 2500 metres above sea level in Ngong Hills. Topographically, the county is divided into three different areas namely; Rift Valley, Athi Kapiti plains and Central Broken Ground.

The Rift Valley is a low depression on the western side of the county running from north to south. It is made up of steep faults giving rise to plateau, scarps and structural plains. The depression has important physical features such as Mount Suswa and Lake Magadi. The lake has substantial deposits of soda ash and it is commercially exploited. The altitude ranges between 600 and 1740 metres above sea level.

The Athi Kapiti Plains consist mainly of gently undulating slopes, which become rolling and hilly towards the Ngong hills. The altitude ranges from 1580 to 2460 metres above sea level. The hills are the catchment areas for Athi River, which is fed by Mbagathi and Kiserian tributaries.

The Central Broken Ground is an area stretching 20-70 kilometres wide from the north-eastern boarder across the county to the southwest where altitude ranges from 1220 to 2073 metres above sea level. It is in this region that lies the proposed transmission line.

4.2.4 Climate

The County is characterized by erratic rains, extreme temperatures and cyclic and prolonged droughts. The variations in intensity and frequency of the above conditions may be manifestations of climatic changes whose full impacts are yet to be understood. Traditionally, the county has had a bi-modal rainfall pattern whose integrity could be changing as seen in recent shifts mainly occasioned by increased unpredictability and unreliability. This has had devastating effects on people's livelihoods.

Crop failure in the county was reported at more than 90 percent in the drought year of 2009 while livestock losses were in the excess of 70 per cent in most areas.

Green house farming is gaining momentum with the sinking of boreholes, but this still poses a great challenge especially to underground water since it may not be sustainable in the long run. Strong winds are also experienced during the dry spells, accompanied by very high temperatures and flush floods during the short and long rains.

4.2.5 Geology and Soils

The county consists of three geological regions: quaternary volcanic, Pleistocene and basement rock soils. Alluvia soils are also found in some areas. Quaternary Volcanic soil is found in the Rift Valley. Basement System Rocks which comprise various gneisses, cists, quartzite and crystalline limestone, are found mainly along the river valleys and some parts of the plains. Pleistocene soils are found in the inland drainage lake system around Lake Amboseli. Quarrying of building materials is also done within the county. This is the reason why a cement factory is located near the proposed National Cement Substation in Merrueshi. Figure 4.2 shows the soil characteristics in the project area.

Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-Stations

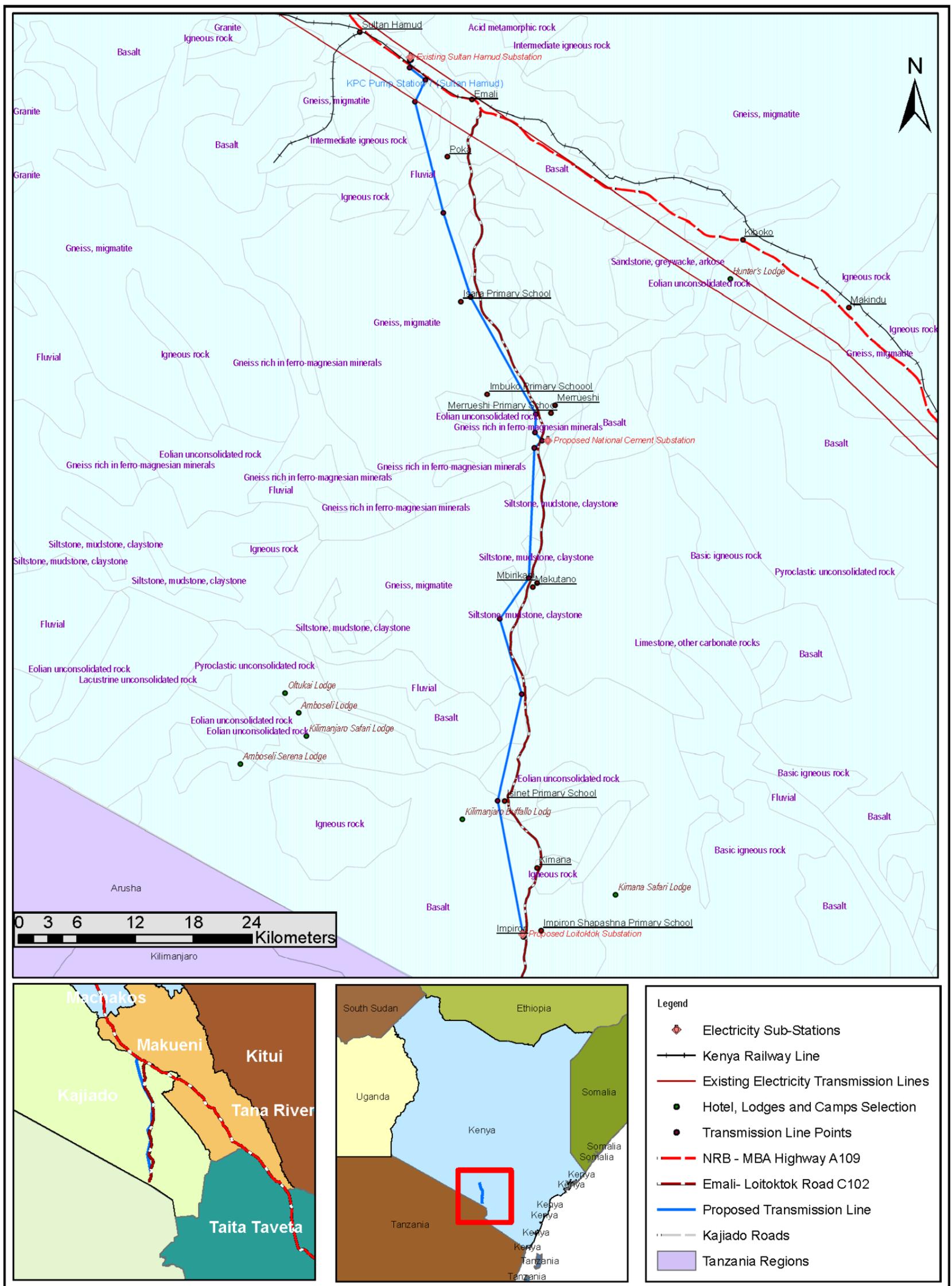


Figure 4.1 Map Showing the Soil Characteristics along the proposed line

Source; Log Associates; ArcGIS® software by Esri.

4.2.6 Vegetation

Vegetation type in the county is determined by altitude, soil type and rainfall. In many instances it has been modified by animal and human activity. Grazing, browsing, charcoal burning, extraction of fuel wood and cultivation are the major causes of vegetation reduction. In the lower parts of Mt. Kilimanjaro, indigenous trees have been cleared to create room for agriculture. Vegetation is scarce in low altitude areas and increases with altitude. Ground cover throughout the county varies seasonally with rainfall and grazing intensity. Canopy cover ranges from less than 1% on heavily settled areas to about 30% on steep hills.

4.3 Ecological resources

4.3.1 Types of Ecosystems in the area and effects on the proposed project

Terrestrial ecosystem (Urban ecosystem); It is common for a transmission line to traverse across a given urban location within a project area. The proponent has however ensured minimal displacement in such places by using optimal routes to minimise displacement in this area. However, a significant number of PAPs in urban areas is likely to be witnessed in Kimana location since land has been subdivided into smaller units. Even though displacements of PAPs will be unavoidable, compensation of the affected PAPs would ensure minimal effect to living standards for those affected.

4.3.2 Endangered Species

Table 4.1 below indicates the Endangered Species in the project area

Table 4.1 Endangered Species in the project area

Species	English Name	Scientific Name
Flora	Wild Olive	<i>Olea africana</i>
Fauna	Elephants	<i>Loxodonta africana</i>

Source: Flora – KFS Official

Fauna – KWS Official

4.3.3 Estimated no of trees to be cleared within the way leave

An estimate of 7,560 trees is likely to be affected by the project these trees are majorly tall trees above 12 feet. Shrubs and small trees were not included in this analysis

Note: The RAP team will be able to identify the type and number of trees per given area.

4.3.4 Flora and fauna in the project area

The flora and fauna in the area is summarized in Table 4.2.

Table 4.2 Flora and Fauna in the Project Area

Category		Type
Flora		Indigenous trees such as: <ul style="list-style-type: none"> • <i>Balanites aegyptiaca</i> • <i>Euphorbia tirucalli</i> • <i>Acacia xanthophloea</i> • <i>Acacia tortilis</i> • <i>Acacia seyal</i>
Fauna	Domestic	<ul style="list-style-type: none"> • <i>Cattle (local breeds)</i> • <i>Goats</i> • <i>Sheep</i> • <i>Camels</i> • <i>Poultry</i> • <i>Donkeys</i> • <i>Bee</i>
	Wild	<ul style="list-style-type: none"> • <i>Wild Beasts</i> • <i>Gazelles</i> • <i>Zebra</i> • <i>Warthogs</i> • <i>Hyenas</i> • <i>Giraffes</i> • <i>Elephants</i> • <i>Lions</i> • <i>Leopards</i> • <i>Elands</i> • <i>Bird Species E.g. Flamingo</i> • <i>Baboon</i> • <i>Monkeys</i>

		<ul style="list-style-type: none"> • Snakes e.g. pythons, cobras • Squirrel • Antelopes • Dikdik • Hare • Impala • Jackal
<p>Agricultural resources</p>		<ul style="list-style-type: none"> • Tomatoes • Onions • Cabbage • Brinjals • Hot and Sweet paper • Maize • Beans • Water melon • Vegetables e.g. Kales and Spinach

Plate 4.1 show some of the tree and animal species found in the area, while Plate 4.2 shows some wildlife species found in the same area.



Plate 4.3 Tree species in the area



Plate 4. 4 Some wildlife species in the area

4.3 Socio-Economic Baseline

4.3.1 Tourism

Tourism represents one of the major national development sectors in Kenya. The vision 2030 economic pillar of tourism envisaged to quadruple the sector's contribution to the GDP as targeted in the (Medium Term Plans) MTP. Tourism is one of the major economic pillars for Kajiado County. The major tourist attraction features in the area County include; the Amboseli National Park, Maasai Culture and the beautiful Scenery and landscapes.

Amboseli National park consists of huge herds of elephants located adjacent to Africa's highest mountain (Mt. Kilimanjaro). Beautiful sceneries and game reserves are easily accessible as you traverse the park. Amboseli National Park is considered one of Kenya's smaller game parks whose ecosystem is primarily savannah with low-lying vegetation that offer excellent view as wildlife is easy to spot.

Maasai villages and cattle ranches surround the park, offering an opportunity for tourists to visit the Maasai communities and get an insight into their local culture.

Although Mount Kilimanjaro is in the neighboring Tanzania, Amboseli national park (Kenya) offers some of the best and most dramatic views of Africa's highest mountain, and birds view which are best seen around the months of October to January.

Amboseli National park lies adjacent to Tsavo West National Park which gives a wide variety of landscapes to spot wildlife. The proposed transmission line lies between the two parks (Tsavo West and Amboseli national parks) along the Emali - Loitoktok Road. Significant impacts to wildlife and tourism are envisaged during the construction phase.

4.3.2 Major Development Challenges in Kajiado County

Sustainable development is paramount to ensure the county achieves its full potential and contributes to the achievement of the country's economic blue print –Kenya Vision 2030 – goals and aspirations. This requires concerted efforts from all stakeholders in the county in order to reduce high poverty and unemployment levels that affects majority of the population. The major challenges that impede achievement of these goals are: *inadequate water supply; poor physical infrastructure; high illiteracy*

level; low level of diversification; inadequate marketing channels; poor coordination of development activities and inaccessibility to health services.

- **Infrastructure**

Even though the new Emali-Loitoktok road was properly designed, the county still lags in terms of infrastructure development. Accessibility to places like Mashuuru Sub County is limiting. However, there are ongoing plans by KURA to upgrade infrastructure facilities within the county.

- **Illiteracy**

The county has a high illiteracy rate of 35 percent compared to the national illiteracy rate of 28.6 percent. This can be attributed to a combination of factors which include high drop outs rate, low transition rate and socio-cultural practices among others. The negative cultural practices such as early marriages and Female Genital Mutilation (FGM) are a major impediment to girl-child education and empowerment. In addition, young men embrace moranism while young boys take part in herding at the expense of education.

- **Low level of diversification**

In some parts of the county, the economic mainstay of the population is predominantly livestock rearing/herding. This over-reliance on livestock usually exposes them to vulnerability due to recurrent drought caused by erratic weather conditions. Farmers have not been able to diversify fully into cash crop growing. Subsistence farming is mostly practiced in the medium potential areas.

- **Inaccessibility of Health Services**

There are a few health facilities in the rural areas which are poorly equipped and under staffed. The average distance to the nearest health centre is 14km. Majority of the people cannot access basic health care and this affects their productivity. Most people in rural areas rely on traditional methods of treatment as they are cheap and readily available. There are also high occurrences of nutrition related ailments in children due to lack of food variety and adequate quantity as a result of frequent droughts.

- **Poor coordination of development activities**

There is poor coordination of development activities in the county leading to duplication of effort and wastage of resources. This is caused by lack of or poor communication among various development stakeholders in the county.

In addition to the above challenges, the county has other cross-cutting issues that need to be addressed. These include: high population growth rate, high levels of poverty, HIV/AIDS, gender inequality, disaster management, environment and sustainable development.

- **High Population growth rate**

The annual population growth rate in the county is estimated at 5.5 percent which is higher than the national average of 2.9 percent. Challenges posed by high population growth rate include rapid

urbanization, pressure on land, human/wildlife conflict, increased crime rate due to unemployment and mushrooming of informal settlements.

- **High Poverty levels**

There are high levels of poverty in the county with more than 47 percent of the population living below the poverty line. Major causes of poverty include illiteracy, frequent droughts, poor infrastructure and inadequate water resources. A major effect of poverty is high rate of school dropouts as parents are unable to raise school fees. The high dropouts subsequently result to child labour as the school going children work to supplement family income. In addition, the poor often experience nutrition related conditions that contribute to high morbidity rate among children and women. Poverty has also forced some people into commercial sex work thus exposing them to HIV/AIDS especially in the urban areas. This may result to increased number of orphaned and vulnerable children and high dependency rates.

- **HIV/AIDS prevalence**

HIV prevalence in the county stands at 6.1 percent compared to the national prevalence of 6.3 percent. The contributing factors to the high prevalence rate are alcohol and drug abuse, rapid urbanization and cross border movements. Preventive activities and support for those infected and affected should be focused at the family unit.

- **Gender Inequality**

Women's ability to make economic decision is constrained by the fact that they are not the owners of productive resources like land and livestock. Wealth in the form of livestock and land are often owned by men.

- **Disaster Management**

Disasters induced by natural and anthropogenic hazards have effects on development. The disaster concerns the county faces include: drought and famine, flash floods and winds, environmental pollution and degradation, accidents, spread of communicable diseases, population displacement, climate exposure, damage to physical infrastructures, poor sanitation and human-wildlife conflict. Strategic interventions will be instituted to mainstream disaster risk reduction in all sectors.

- **Environment and Sustainable Development**

The County is endowed with natural resources comprising of land, wildlife, forest and minerals. These resources in turn support social and economic development aspirations of the people in the county through agriculture, tourism, environmental conservation, mining and quarrying activities and human settlements.

4.3.3 Demographics Data

a) Population

Upon compilation and analysis of the data, it was revalidated in the field. Key results of the research are as follows:

Majority 67% of the respondents were from Mashuuru sub county where as 33% came from Loitokitok. The latter therefore signifies that the major part of the transmission line traverses across Mashuuru sub county.

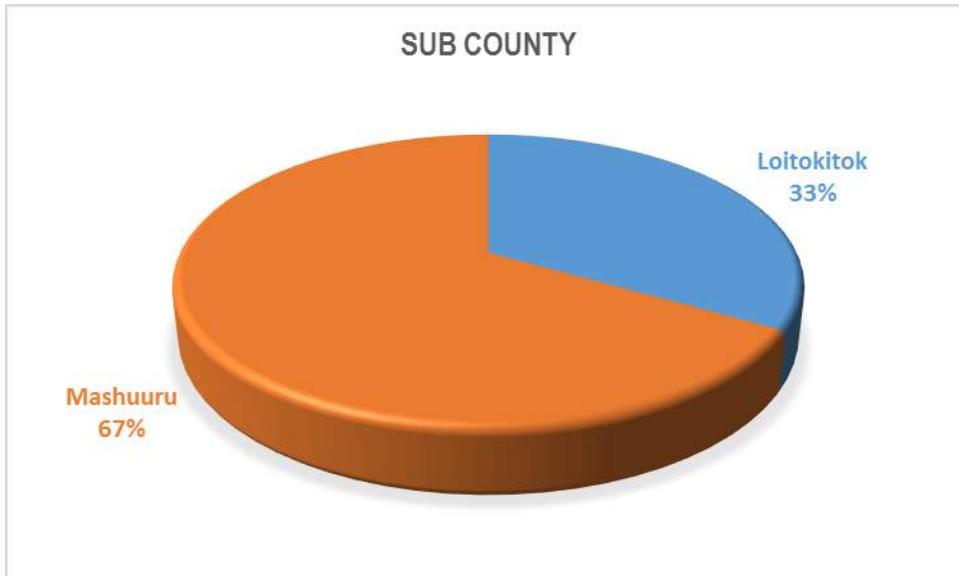


Figure 4.2 Distribution of Respondents in Kajiado County

Source: Log Associates - Household Socio-Economic Questionnaire

b) Gender

Majority (80%) of the respondents interviewed were male whereas 20% were females. In terms of age, most respondents 38% were aged between 46-60yrs followed by 36-45 years who were 33%. Those aged between 26 -35 were 14% while those above 60 years were 10%. Only 5% of the respondents were aged between 18 -25 years. Figure 4.2 and 4.3 below shows gender and age distribution respectively.

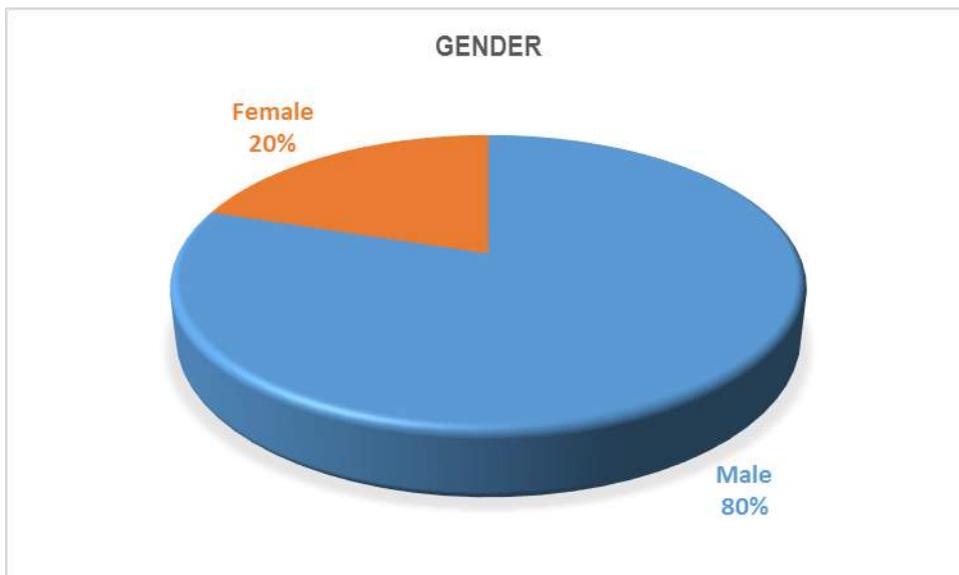


Figure 4.3 Respondents Gender Distribution

Source: Log Associates - Household Socio-Economic Questionnaire

c) Age

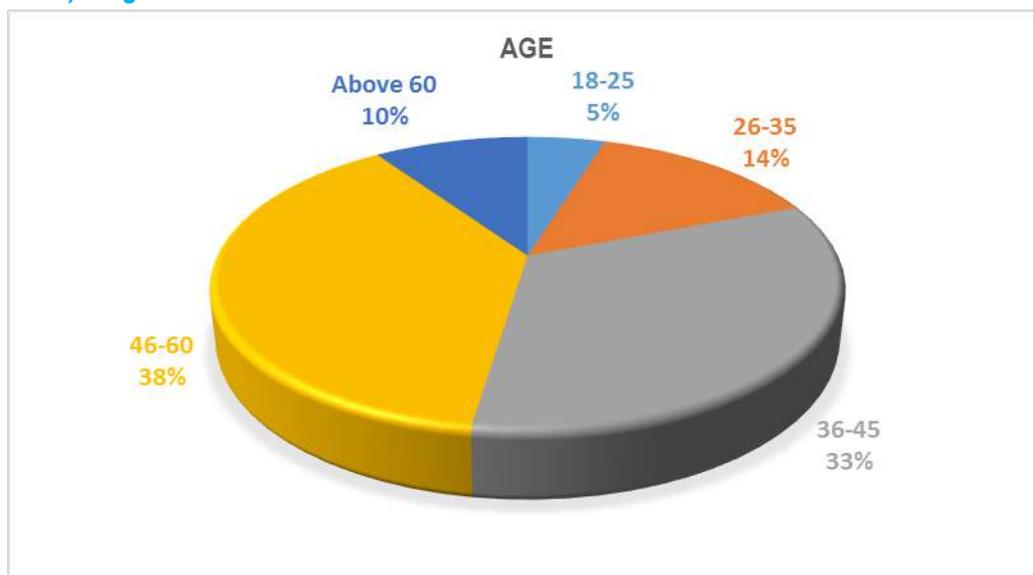


Figure 4.4 Respondents Age Distribution

Source: Log Associates - Household Socio-Economic Questionnaire

d) Marital Status

When the respondents were asked to state their marital status, majority of the respondents 85% stated married, 10% of the remaining respondents had never married while the rest 5% had were divorced. None of the respondents indicated having been separated or widowed.



Figure 4.5 Respondents Marital Status

Source: Log Associates - Household Socio-Economic Questionnaire

From socio-economic data analysis, majority of the married respondents (75%) had children below 18 years while the rest 25% had no children in the bracket of age. Figure 4.5 below shows the percentage of those with children below 18 years.

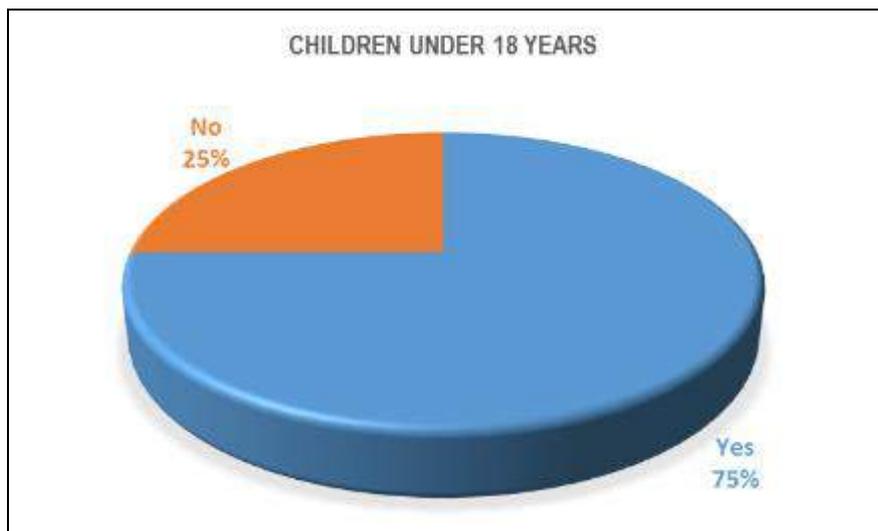


Figure 4.6 Children under 18 years

Source: Log Associates - Household Socio-Economic Questionnaire

4.3.4 Education Levels

Education is essential for development and plays a key role in the realization of our national goals. Our findings on education levels of the people are presented in figure 4.6. Majority of respondents 30% do not have any form of basic education or training, 25% had attained basic primary education followed by 20% attaining secondary education. It was also observed that 15% had attended college where the rest 5% had attended pre-primary education and adult's education.

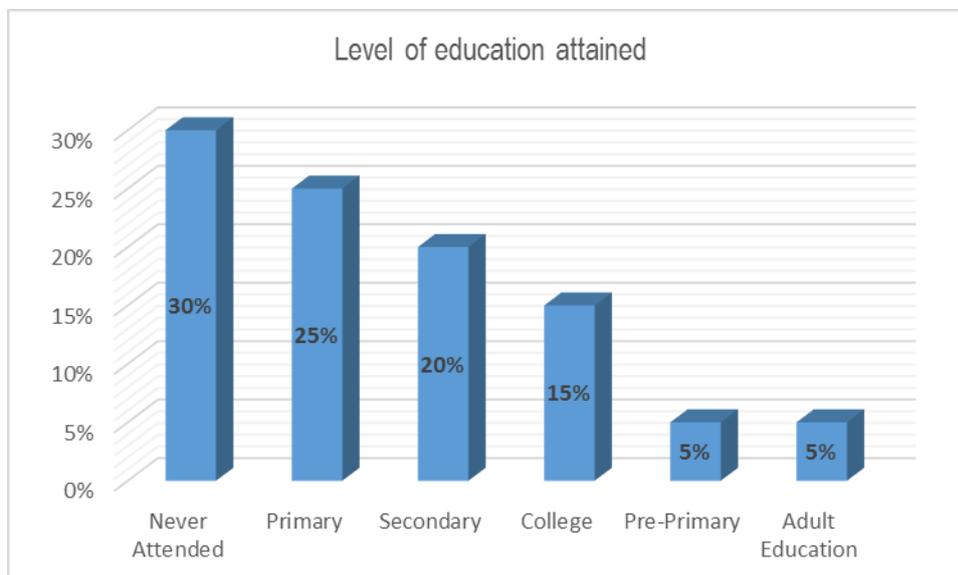


Figure 4.7 Highest level of education attained by respondents

Source: Log Associates - Household Socio-Economic Questionnaire

When the respondents were asked to state how much time they take to access the nearest school from their homesteads, a majority 60% indicated less than 20 mins. This indicates that the schools were less than a kilometre away. It was however observed that 30% of the respondents took between 21 to 40

mins while the remaining 10 % took between 41-60 mins to get to the nearest school. This is presented in Figure 4.7.

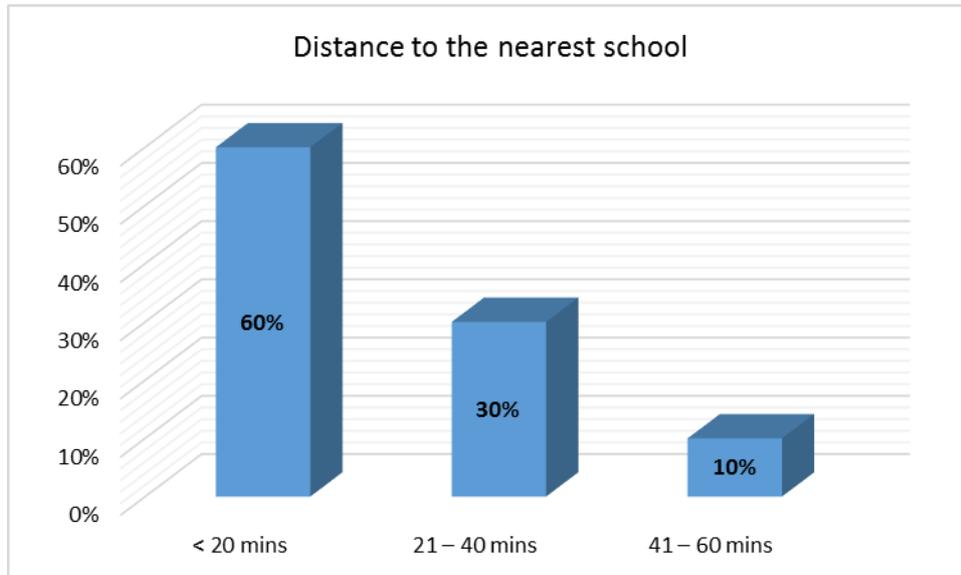


Figure 4.8 Distance to the nearest school

Source: Log Associates - Household Socio-Economic Questionnaire

.3.5 Housing Structure

The standard and quality of dwelling places are manifestations of economic growth and development. The types of houses in the project area comprised of temporary/semi-permanent houses mostly wooden poles, grass thatched houses including manyattas and some made from iron sheets. Figure 4.8 illustrates the types of the houses found in the project area.



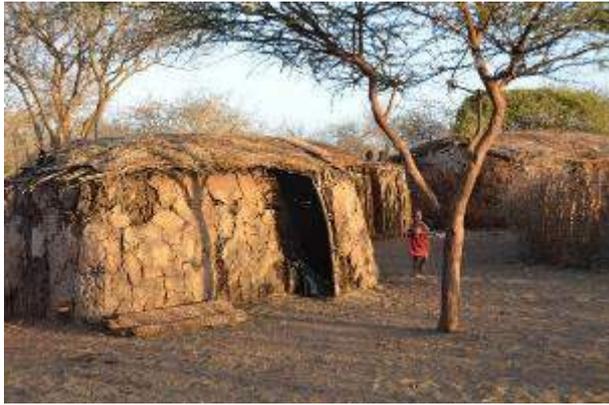


Plate 4.5 Main types of houses in Project Area

It was observed that the majority 50% of the respondents lived in semi-permanent houses followed closely with 45% of the residents living in permanent houses. Only 5% of the respondents lived in temporary houses. Figure 4.12 and 4.13 below indicates the respondents housing structure distribution in the two sub counties.

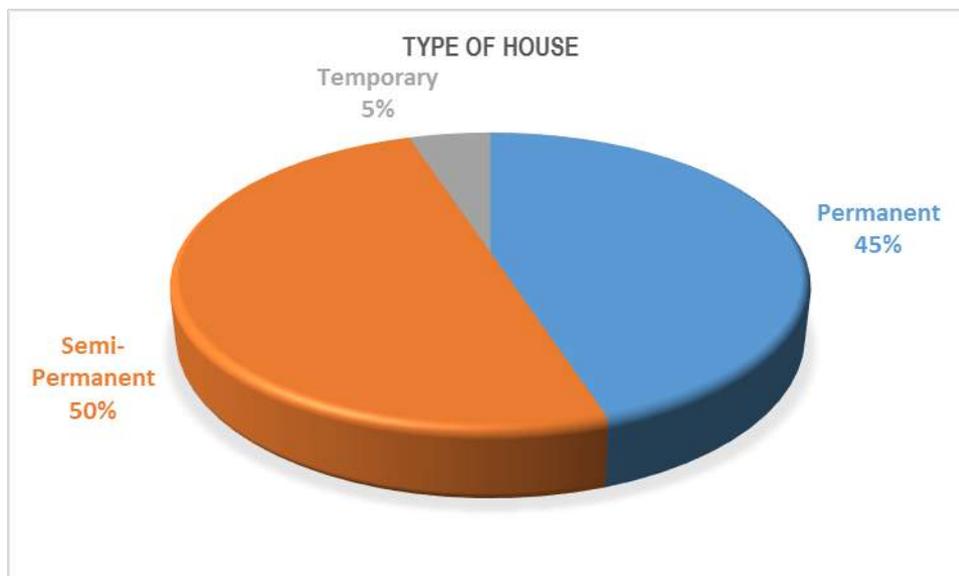


Figure 4.9 Type of houses in Kajiado County (Mashuuru and Loitoktok sub counties)

Source: Log Associates - Household Socio-Economic Questionnaire

In terms of housing materials, majority (30%) of respondents had iron sheet walls, 15% had walls done on tin and cement blocks, while 10% had done their walls on bricks, wood & mud, stones & mud and stones & cement. This figure indicates why most houses were semi-permanent.

Figure 4.10 below indicated the material on wall used for construction in the two sub counties.

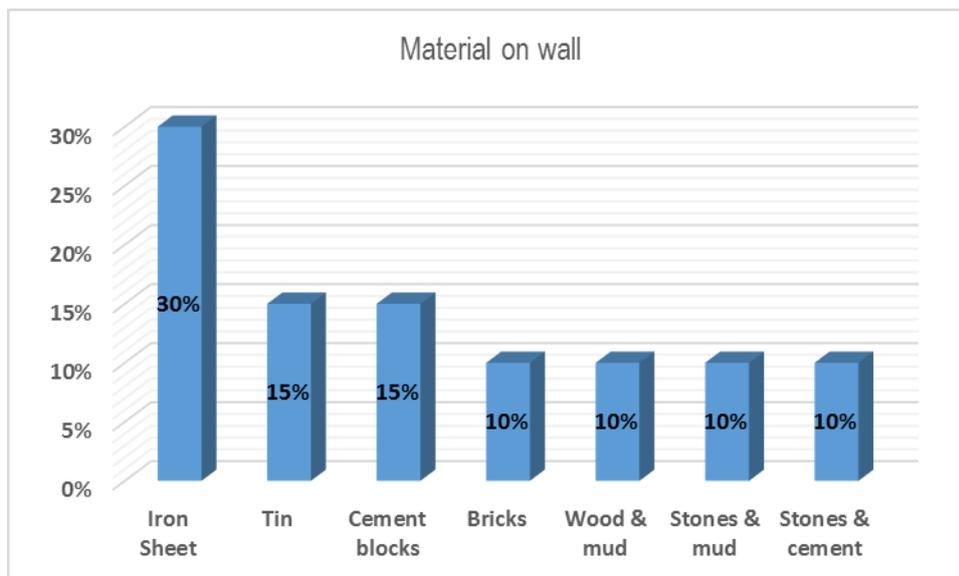


Figure 4.10 Respondent's material on wall in Kajiado County

Source: Log Associates - Household Socio-Economic Questionnaire

Under roofing materials, majority 69% of the respondents used iron sheets, 19% had roofed their houses with mud while the rest 12% had thatch on their roofs. Figure 4.11 below shows the diagrammatic representation on the two counties in terms of roofing structure.

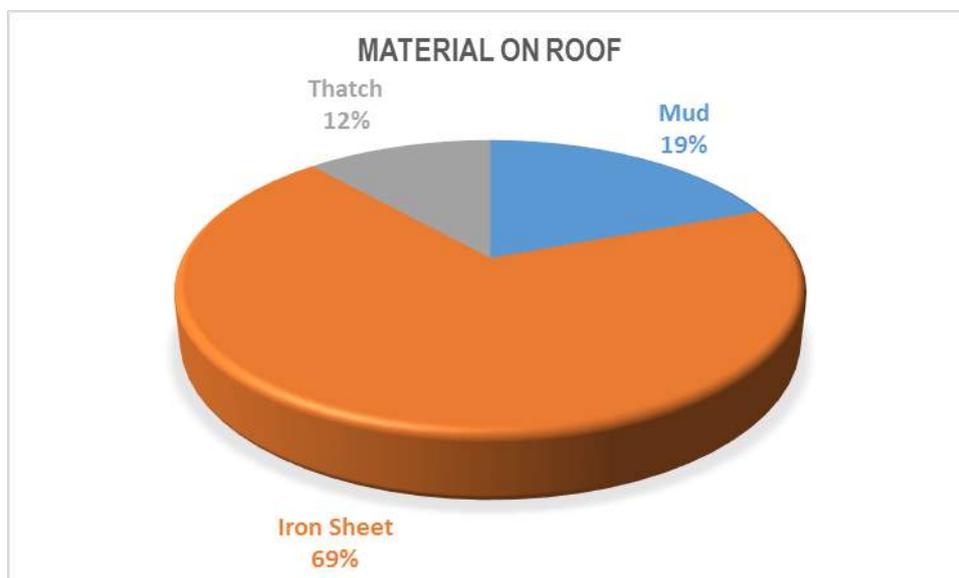


Figure 4.11 Respondent's roofing material in Project Area

Source: Log Associates - Household Socio-Economic Questionnaire

4.3.6 Health and Vulnerability

According to the socio economic survey conducted within the project area, 45% of the respondents take between 41-60 mins to access the nearest health care facility, followed by 25 % who took 21 – 40 mins.

20% took less than 20 mins while the remaining 10% took more than an hour. Figure 4.12 represents the outcome of the survey regarding accessibility to health facilities.

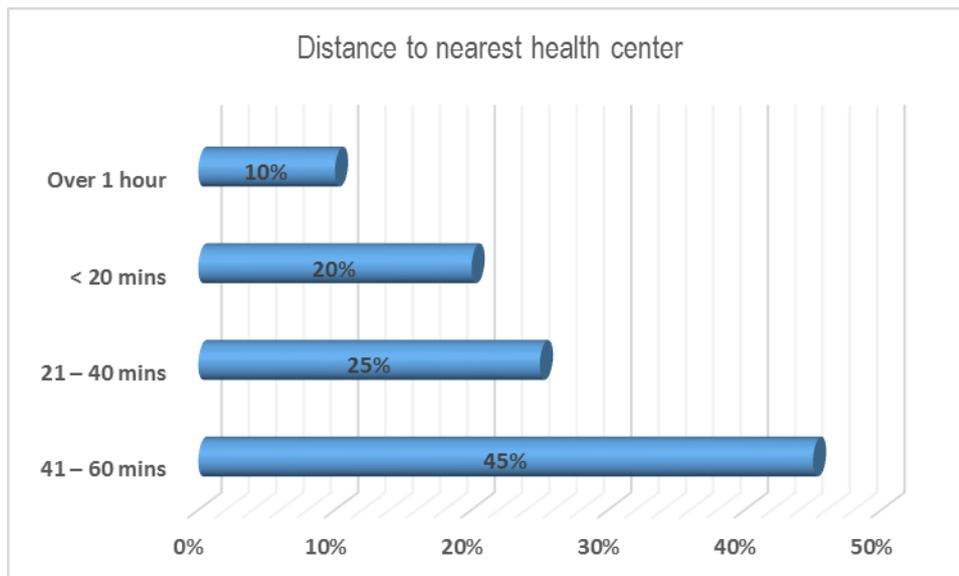


Figure 4.12 Accessibility to health facilities

Source: Log Associates - Household Socio-Economic Questionnaire

The analyses from the household socio-economic data indicated 35% of the respondents are disabled indicating a significant number of vulnerable persons within the area.

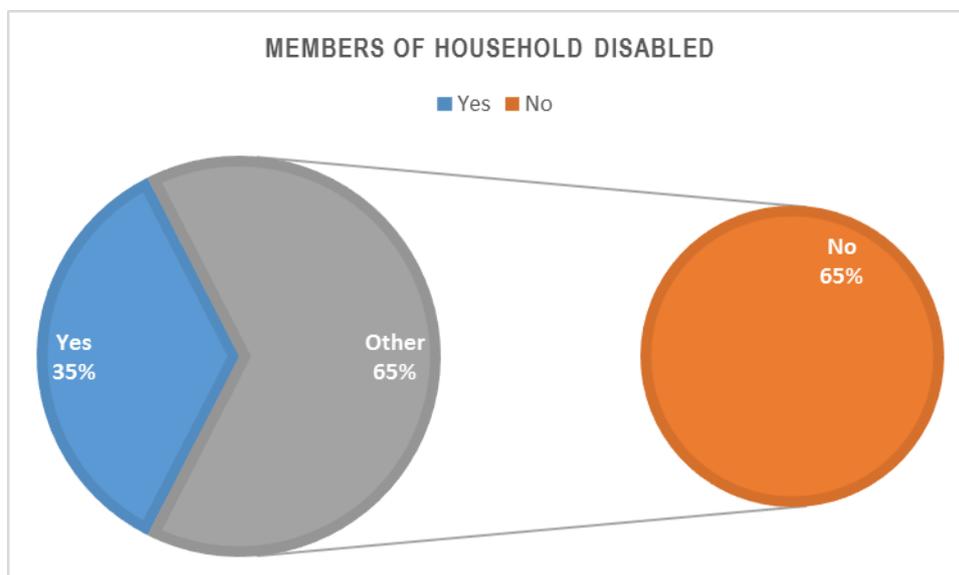


Figure 4.13 Disabled household members

Source: Log Associates - Household Socio-Economic Questionnaire

The nature of disability among respondents varied among the interviewed respondents; for those who reported having disabled members, 38% reported having lame members, 29% stated blind followed by 17% who indicated having deaf members and 13% had crippled members. It was however noted that few 4% of the respondents had other forms of disabilities.

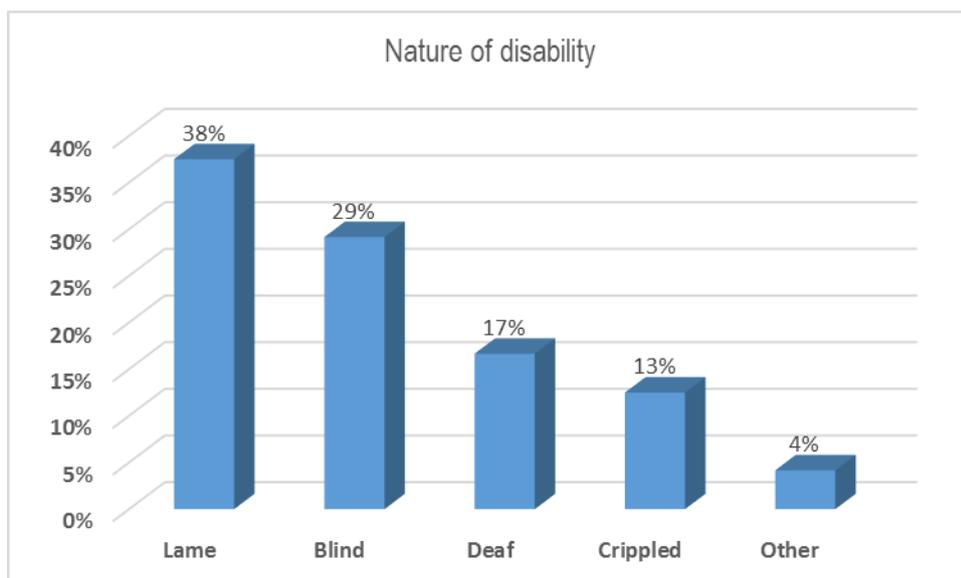


Figure 4.14 Nature of disability

Source: Log Associates - Household Socio-Economic Questionnaire

When the respondents were asked if they had ill members within the past four months; 70% of the respondents agreed while the rest 30% had none of their members' sick within the four months.

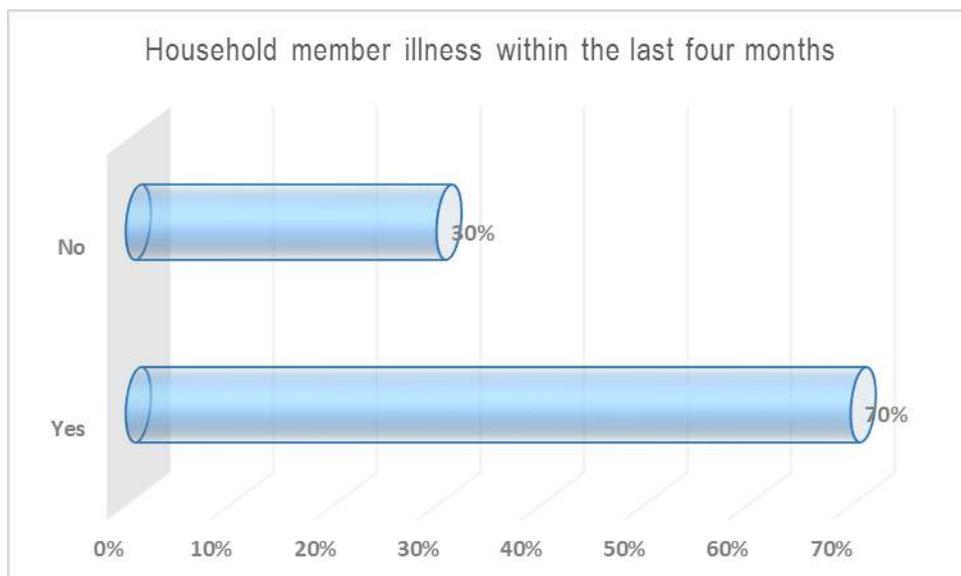


Figure 4.15 Record of illness within the last Four months

Source: Log Associates - Household Socio-Economic Questionnaire

Common diseases within the project area at the time of survey included malaria accounting for 32 % of the diseases, Flu/Cough with 29%, headaches 18%, stomach disorders at 11%, followed by 7% who reported having diarrhoea. The rest 4% indicated having other forms of illnesses.

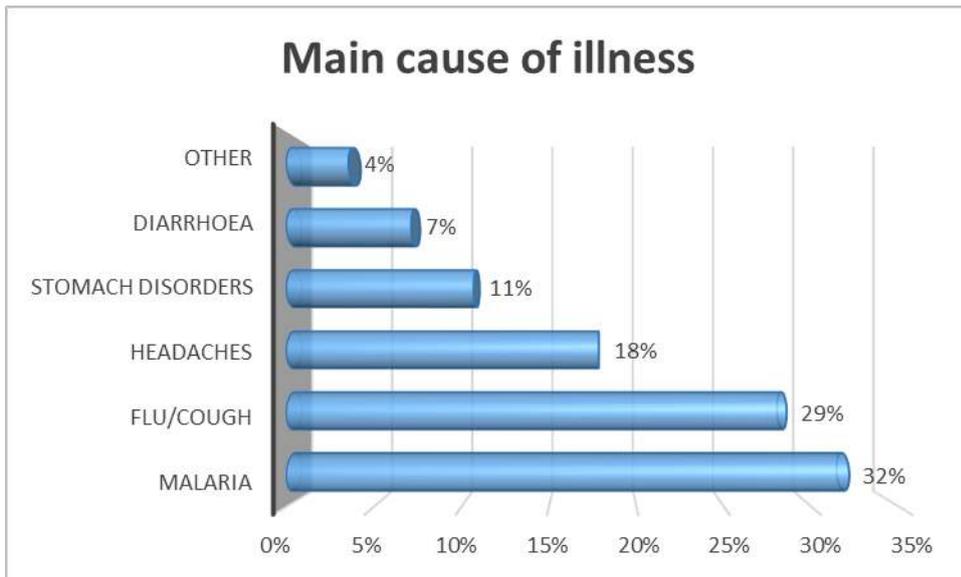


Figure 4.16 Types of diseases common in the project area

Source: Log Associates - Household Socio-Economic Questionnaire

It was also observed that majority (57%) of respondents residing within the two sub counties have access to piped water. For this reason, accessibility to water was within a very short interval of time; majority 60% of respondents said it took them less than 20 minutes to get access to domestic water.

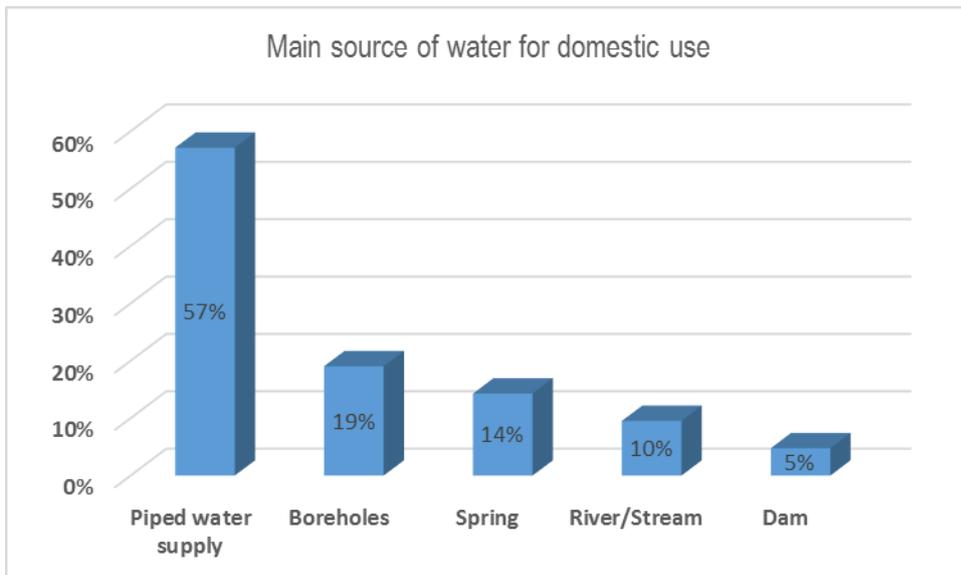


Figure 4.17 Types of diseases common in the project area

Source: Log Associates - Household Socio-Economic Questionnaire

Figure 4.18 below indicates the time taken to access the nearest domestic water source.

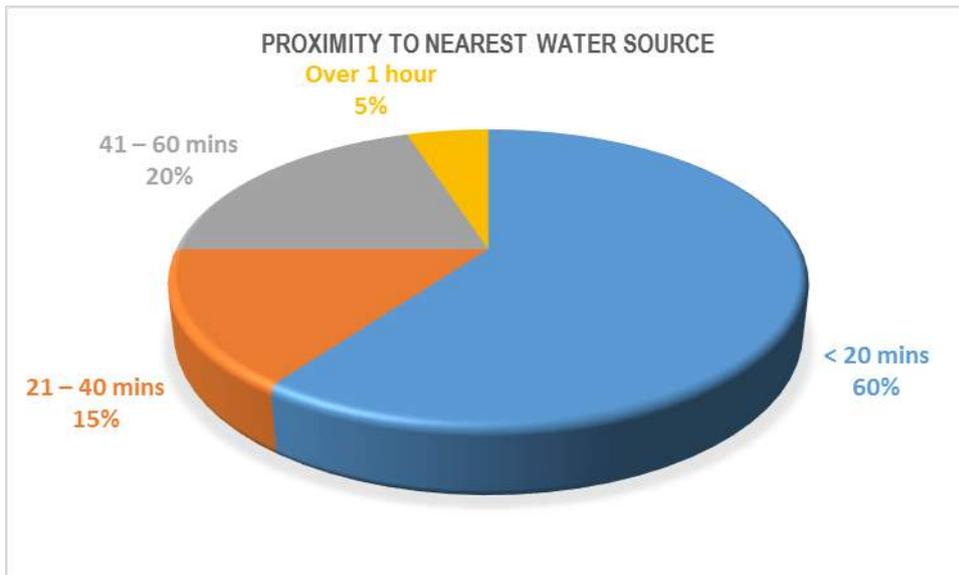


Figure 4.18 Distance to the nearest water source

Source: Log Associates - Household Socio-Economic Questionnaire

In terms of safety measures considered before drinking water, majority 82% said they drink directly without boiling, using chemicals, filtering or decanting. This factor is mainly attributed to the fact that piped water is usually considered safe for drinking since it is already treated.

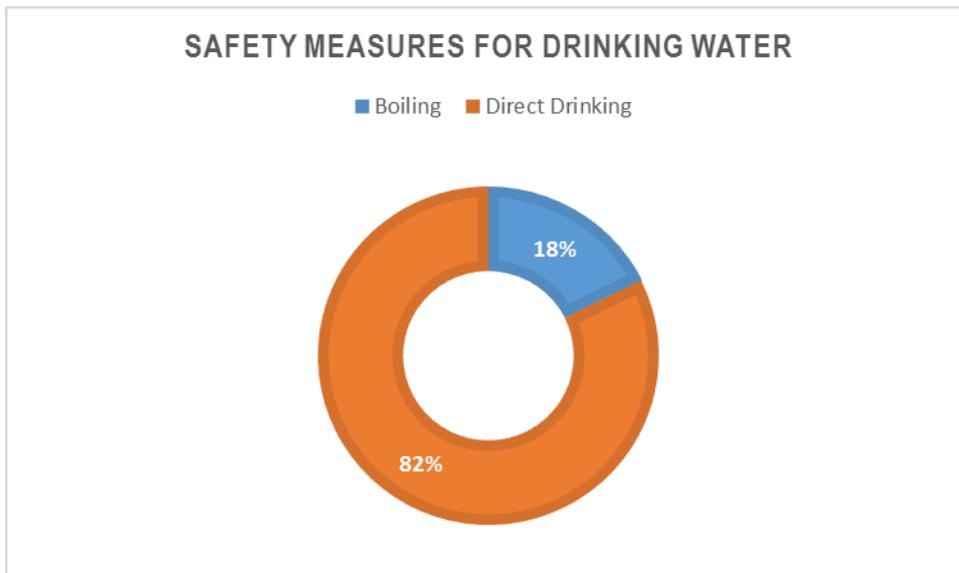


Figure 4.19 Safety measures before drinking water

Source: Log Associates - Household Socio-Economic Questionnaire

It was also important to analyse the waste sanitation facilities available in the respondent's vicinity. As evident from the questionnaires answered, majority 95% of the respondents had toilet facilities within their compound. Of these with toilets, 90% of the respondents had simple latrines.

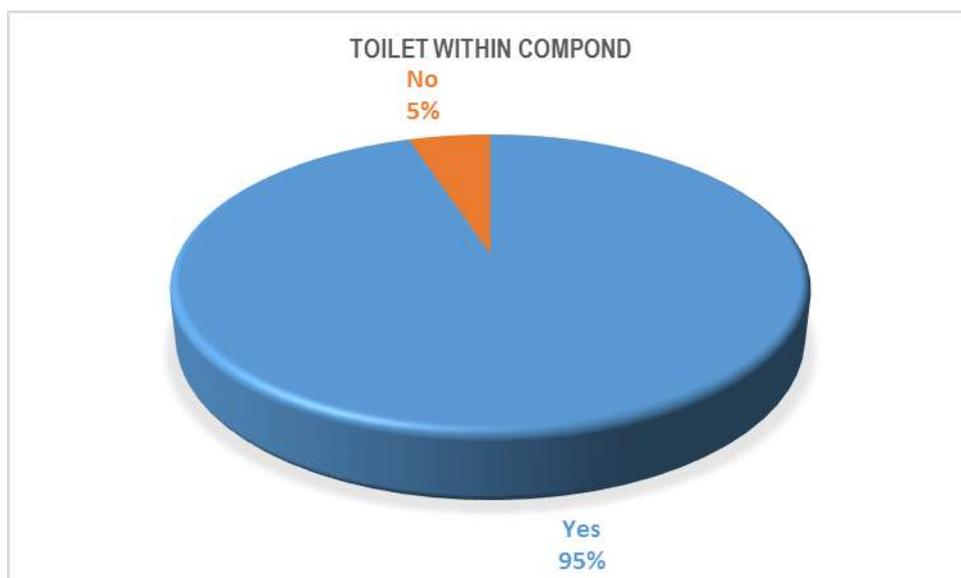


Figure 4.20 Presence of toilet within compound

Source: Log Associates - Household Socio-Economic Questionnaire

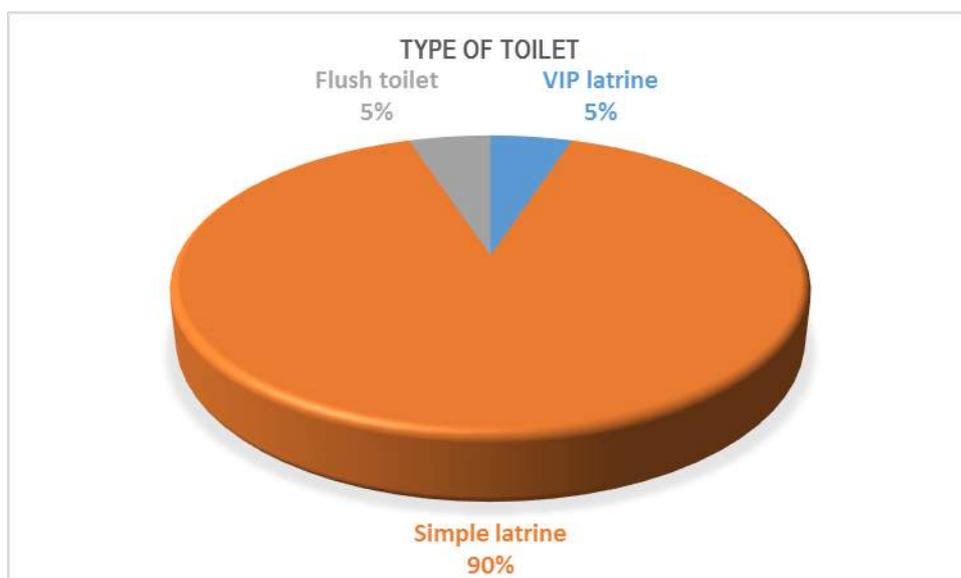


Figure 4.21 Types of toilet common in the area

Source: Log Associates - Household Socio-Economic Questionnaire

4.3.7 Land ownership

The proposed transmission line passes through the two counties namely Kajiado County in Mashuuru and Loitoktok sub counties. Land is mainly used for livestock rearing and crop growing. Nomadic pastoralism is predominant throughout the county. There is a significant change in land use in the urban areas where industrial and commercial use is gaining momentum.

In general, Kajiado County has few individual land owners with a considerable number of group ranches. The number of ranches has greatly reduced following major sub-divisions and the sale of land

for human settlement. The county has a total of 38 group ranches that are completely adjudicated and 16 un-adjudicated group ranches.

From observations and focused group discussions, majority 85% of the respondents said they either owned land or have a form of ownership attaching them to a particular land or a group ranch. Majority 68% of those with land have over 5 acres. Figure 4.22 and 4.23 shows the distribution of respondents in terms of land ownership and acreage in the two sub counties.

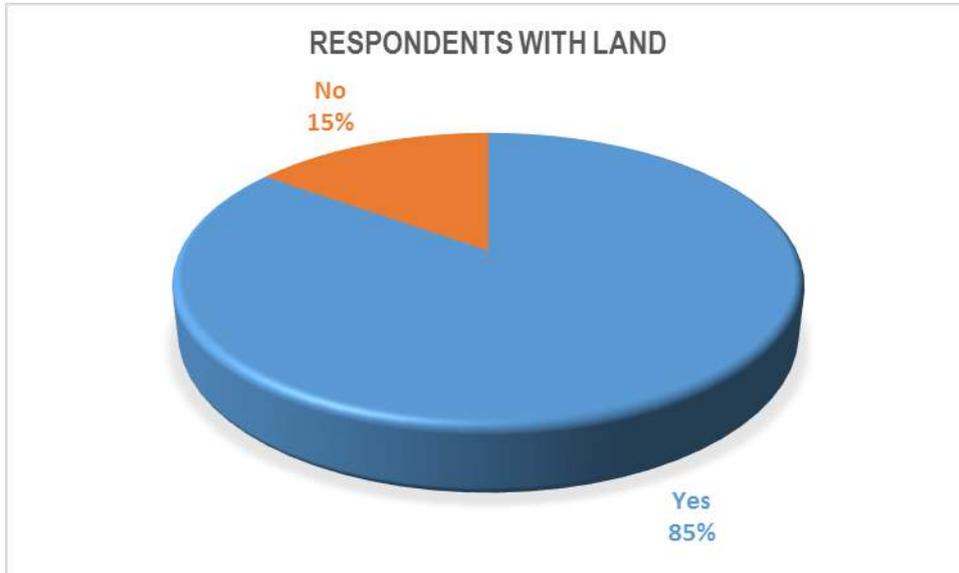


Figure 4.22 Land ownership pattern Kajiado County

Source: Log Associates - Household Socio-Economic Questionnaire

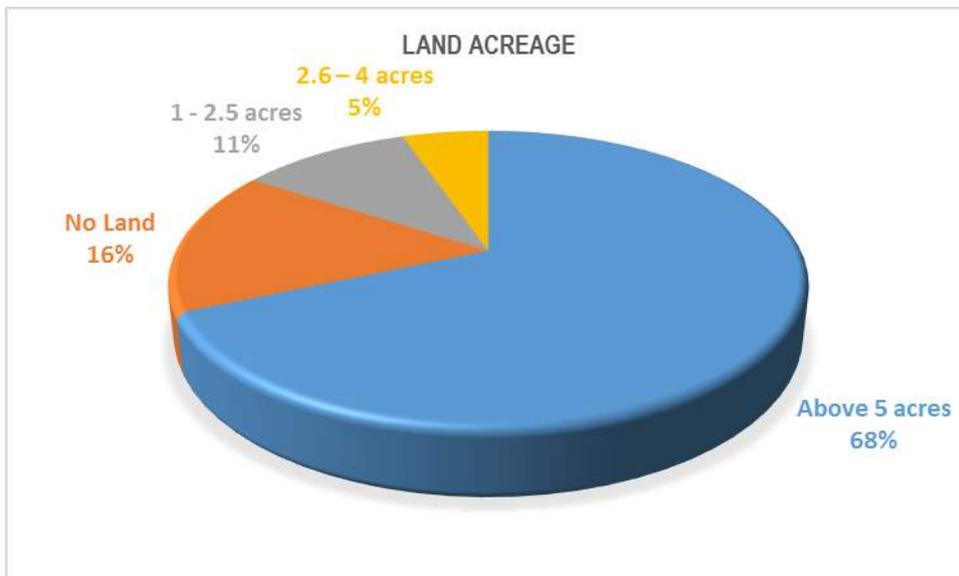


Figure 4.23 Land ownership pattern in Project Area

Source: Log Associates - Household Socio-Economic Questionnaire

4.3.8 Economic Activities

Our survey revealed that majority 80% of the respondent's practices animal farming as the main source of farming. Even though some respondents 20% indicated practicing crop farming as main source of income, some crop farmer still kept livestock as secondary source of income. The later indicated that the majority 95% reared animals.

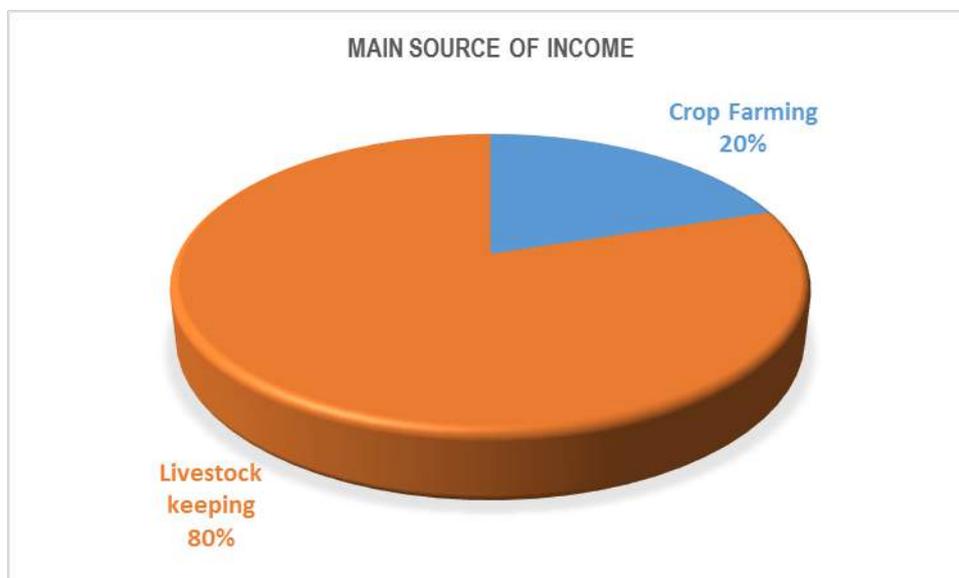


Figure 4.24 Main source of income in Kajiado County

Source: Log Associates - Household Socio-Economic Questionnaire

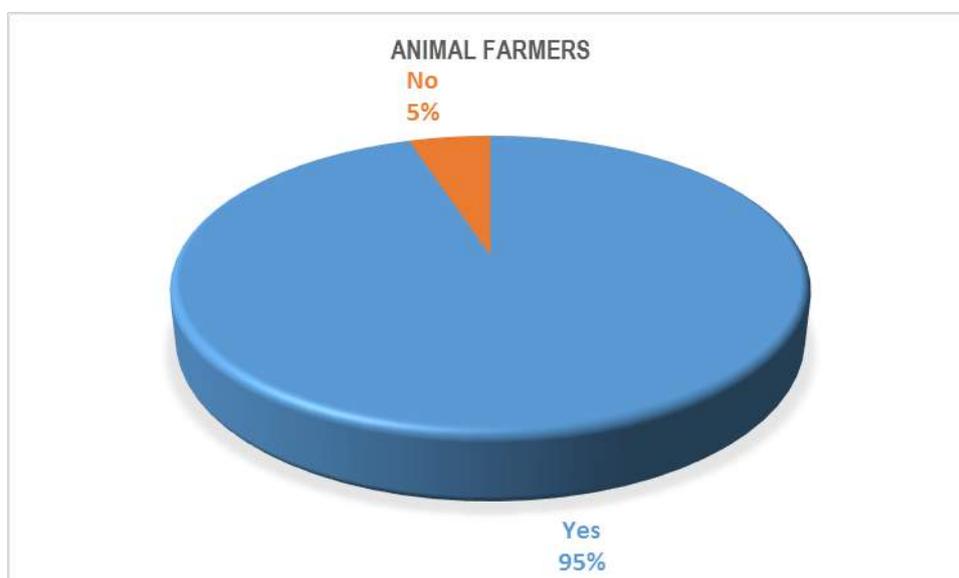


Figure 4.25 Percentage of farmers rearing animals

Source: Log Associates - Household Socio-Economic Questionnaire

Even though livestock keeping is not the dominant economic activity in Kajiado County, a considerable number of respondents indicated relying on this activity as a source of income. Majority 32% of the respondents interviewed reared cattle, 26% had goats, 22% reared sheep, 10% did poultry farming, 8%

had donkeys while the rest kept camels. Figure 4.26 shows the main types of livestock reared in the project area.

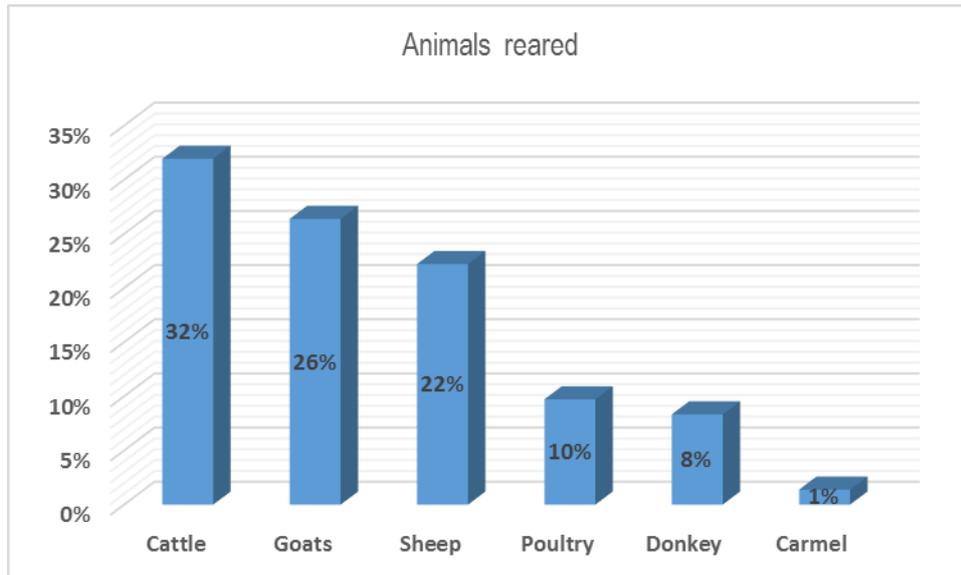


Figure 4.26 Main type of livestock reared in the project area

Source: Log Associates - Household Socio-Economic Questionnaire



Plate 4.6 Main types of livestock in the area

Farming is mainly considered a part time activity in Kajiado County; however, a notable significant number of respondents did farming. The majority 34% of respondents cultivated tomatoes, 24% cultivated maize, 21% cultivated beans, 10% onions, 7% did vegetable farming while the rest 3% did other crop cultivation i.e. capsicum. Figure 4.32 indicates the crops cultivated in the two sub counties.

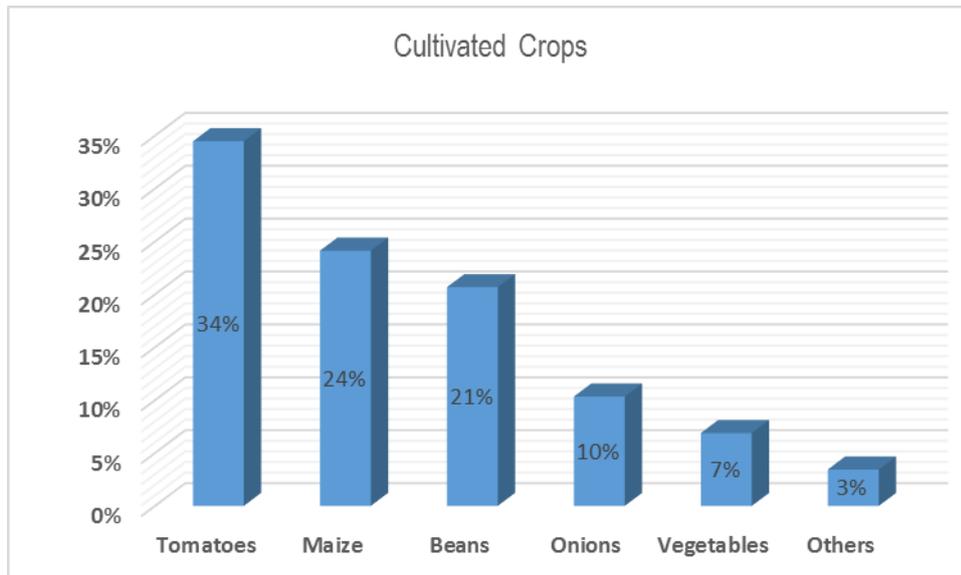


Figure 4.27 Crops cultivated by respondents along the transmission line

Source: Log Associates - Household Socio-Economic Questionnaire

4.3.9 Project Awareness

One of the ultimate factors for conducting a full ESIA study was to enhance project awareness. Building up from the previous studies; awareness was created for the project potential impacts and on how mitigation measures will be implemented (including compensation payment and handling of relocation). Majority of the respondents were now aware of the proposed project ESIA study.

5.0 ANALYSIS OF PROJECT ALTERNATIVES

5.1 Introduction

Several alternatives were considered to ensure that the most feasible option of project development was adopted. The project alternatives considered include the following:

5.2 The “No Action” Alternative

The “No Action” alternative is often defined by the baseline information and is crucial in the assessment of impact because other alternatives are weighed with reference to it.

Qualitative analysis indicates that there will be no significant negative effect on either the bio-physical or the socio-cultural environment of the proposed project. Without the project, we cannot say the environmental situation will either improve nor can we say that it will necessarily deteriorate.

The “No Action” Alternative is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The proponent will not benefit from the revenue expected from the facility
- The government kitty will not benefit from the revenue to be earned due to the establishment of the proposed project
- Generation of employment opportunities through expansion of business activities that would have been spurred by availability of electric power will not occur
- Information flow and public education awareness through electronic media, especially the television will be hampered
- The economic status of the Kenyans and the local people would remain unchanged
- The local skills would remain under utilized

5.3 Line Routing Alternatives

In proposing the above concept, consideration was given to social and environmental impacts of the projects. The numbers of transmission lines have been limited to those that are technically required whilst complying with KETRACO’s planning criteria.

The concept developed largely avoids built up areas, thus minimising the need for land acquisition and resettlement. The Sultan-Hamud-Loitoktok line route in itself has been chosen to avoid settlements and their associated infrastructure as well as tourist areas. The proposed route avoids settlements, heritage and forest areas, thus minimising any adverse impacts.

However, the line may need re-routing in some sections since it may cause adverse impacts to critical facilities such as the standard gauge railway line and KPC pump station in Sultan Hamud. The figure below indicates the alternative routes that may be proposed during rerouting;

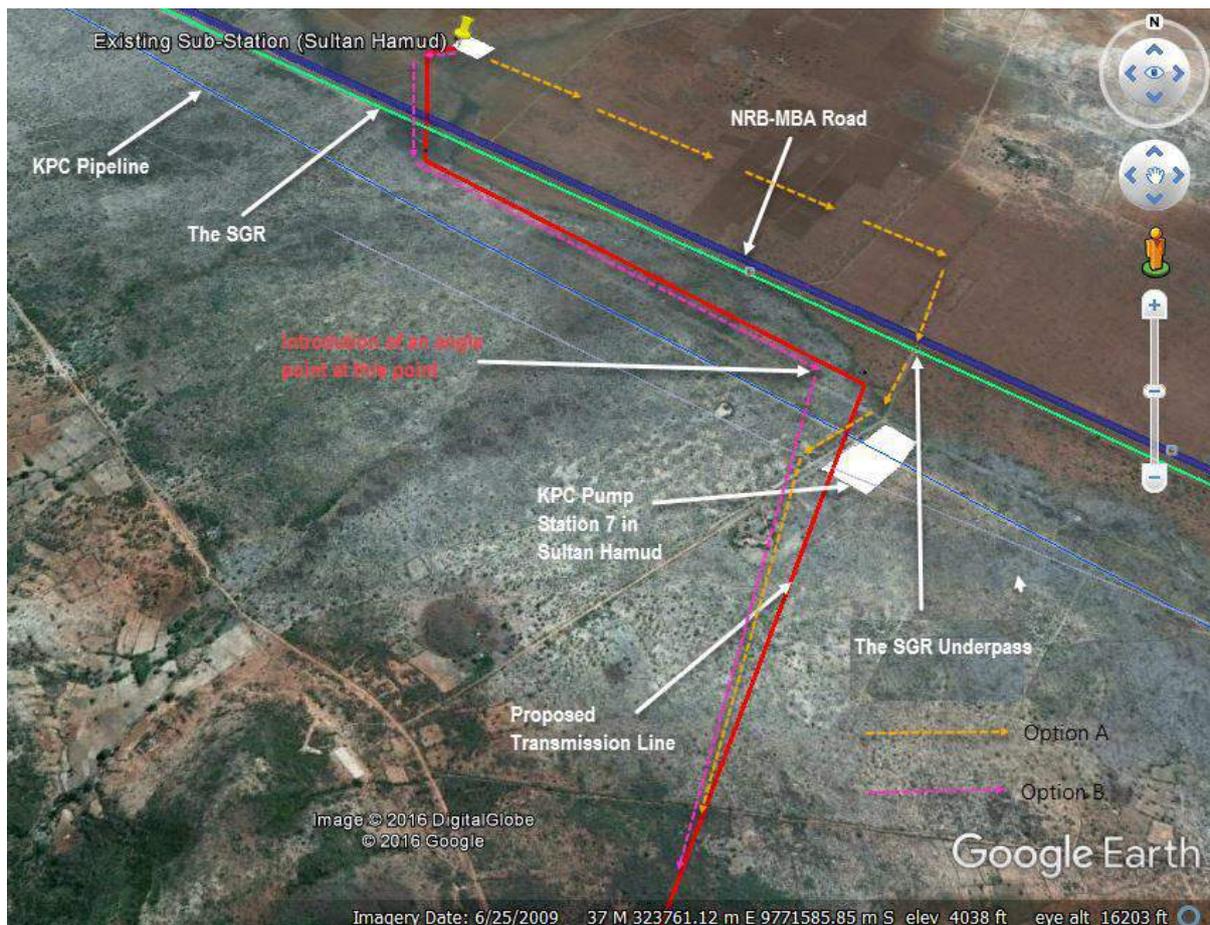


Figure 4.28 Alternative routes that may be proposed during rerouting

Source: Google Earth Map

5.4 Critical structures affected along the Transmission Line

5.4.1 Railway line

The proposed transmission line cuts across the old railway line and the new standard gauge railway in Sultan-Hamud adjacent to the existing substation.

During construction, the power line should adhere to **Regulations for Power Line Crossings of Railway Tracks**. These regulations will not be limited to Wind pressure, Temperature, Factor of Safety, Clearance between the overhead line & railway track, Minimum clearances between crossing conductors and any railway structure, Minimum vertical clearance between power line crossings, Clearance between power line & communication line, Relaxation by the electrical inspector, Insulators, Guarding, Protection from Moving Road Vehicles, Communications Lines, Earthing, Anti-Climbing Devices and Warning Notices.

Provision of an underground cable to the extent possible would reduce the impacts considerably.



Plate 5.1 Picture showing where the proposed transmission line traverses the railway lines

5.4.2 KPC Oil Pipeline

Collocated pipelines, sharing, paralleling, or crossing high voltage power line rights-of-way (ROW) may be subject to electrical interference from electrostatic coupling, electromagnetic inductive, and conductive effects. If the interference effects are high enough, they may pose a safety hazard to personnel or the public, or may compromise the integrity of the pipeline.

Predicting HVAC interference on pipelines is a complex problem, with multiple interacting variables affecting the influence and consequences. In some cases, detailed modeling and field monitoring is used to estimate a collocated pipeline's susceptibility to HVAC interference, identify locations of possible AC current discharge, and design appropriate mitigation systems to reduce the effects of AC interference.

Because of increased opposition to pipeline and power line siting, the advanced designs may be carried out at the points where the two cross.



Plate 5.2 Section of KPC pipeline where transmission line crosses

5.4.3 KPC Pump Station

Part of the proposed transmission line traverses across KPC pump station 7 located in Sultan- Hamud. Plate 2.6 below shows the structures traversed by the transmission line. Here alternative route may be proposed to reroute the transmission line.



Plate 5.3 Structures of KPC pump station traversed by the transmission line

5.4.4 Other Critical Structures Affected

The figures below show the other critical facilities where line re-routing in various sections is recommended.



Plate 5.4 Affected House in Poka Location



Plate 5.5 Affected homesteads in Loitoktok Location



Plate 5.6 Manyatta village along the Transmission Line



Plate 5.7 A.H.H.S Yerusalem Chapel in Impiron Village

6.0 CONSULTATIONS AND PUBLIC PARTICIPATION

6.1 Introduction

One of the major ways of obtaining information from community members and key stakeholders is through public consultation. Several meetings (**Barazas**) were held and key stakeholders consulted to discuss the proposed project in project area and its environs. The aim of consultation is to ensure that stakeholder and community interests are identified during the ESIA study and that stakeholder and community views, are taken into account.

With the help of both the County administration, Ranch Chairmen and the Provisional administration (local chiefs, sub chiefs and village headmen) community members were mobilized. The Barazas brought together representatives from the larger community including women, youth and persons with disabilities.

This chapter summarizes the findings of consultations undertaken with other governmental and non-governmental organizations including : Kenya Wildlife Service, Kenya Forest Service (KFS), County administration, Kenya Agricultural and Livestock Research organization, National Environment Management Authority (NEMA), District Development Officers, Ministries of Agriculture, Environment, Energy and Natural Resources – Kajiado Counties, County Agriculture Officers, Livestock Production Officers, and Farm managers.

6.2 Objectives of Public Consultation

The objective of the public consultation was to ensure that stakeholder and community interests are identified during the ESIA study and that stakeholder and community views, are taken into account.

The key objectives of such consultations were to.

- Inform the community members and key stakeholders on the project activities and progress.
- Receive community and key stakeholders' comments/ feedbacks/ questions about the project.

Table 6.1 List of Attendance in Public Consultation Meetings

SNo.	Location	Male	Female	Total
1	Poka	39	3	34
2	Imbuko	27	1	18
3	Imbirikani	36	6	21
4	Isineti	37	10	37
5	Kimana	20	1	21
6	Merrueshi (National Cement)	34	26	59
7	Impiron	8	4	6
TOTAL		201	51	196

Table 6.2 Key Stakeholders consulted

No.	Name	Designation	County/Department
1.	Abdirizak Jalo Esa	DCC	Interior Ministry
2.	Shadrack Aludonyang	ACC	Interior
3.	Edwin S. Okemwa	ACC	Interior
4.	Stephen Nyakunoh	A/Comm	Mashuuru
5.	Richard Ole Peino	Chief	Emali
6.	Julius Suiyanku	Chief	Imbuko
7.	Paul L. Kisemei	Ass. Chief	Kunchli
8.	Timothy K. Saigilu	Chief	Isineti
9.	Samuel N. Mayon	Chief	Merrueshi
10.	Joseph Ntoipo	Chief	Imbirikani
11.	John Lalaito	SNR Chief	Kimana
12.	Jonathan Oseur	N.R.O	Environment
13.	Fredrick O. Ndiga	Forester	KFS, Kajiado
14.	Pareno B. K.	Forester	KFS, Loitoktok
15.	Mary Meljo	Education Officer	Education
16.	Susuan Kinuthia	AET Officer	AET
17.	Cecilia N. Melubo	Adult Staff	Directorate
18.	L. Ole Lapan	Business Man	
19.	Ntauwasa Ole Lebuko	Business Man	
20.	Joseph Ole Tisho	Business Man	
21.	Kirapash Lepau	Treasurer, Community	Kimana
22.	Kilelo Ole Simama	Chief	Kimana Location
23.	John Mbaa	Chairman, Kimana	Kimana

		Division	
24.	Raphael Kaleyia	Chairman, Kimana	Chief Advisory Committee
25.	O. N. Ngecha	Ag Pto Pst	KPC

6.3 Common Issues from Public Participation

6.3.1 Knowledge of the Proposed Project and the relevant Power Agencies

From focus group discussions (FGD) and public consultations, it was observed that majority of the community members consulted were now aware of the proposed construction of the transmission line as opposed to previous consultations held during the feasibility study. The community members were also made aware of the different agencies dealing with power and the roles they play especially KENGEN, KETRACO, REA and KPLC.

6.3.2 Acceptance of the Project and anticipated benefits

During public consultation forums, majority of members of public expressed their support for the proposed project since they felt it would directly and indirectly benefit all the residents within the project area. The following were the key anticipated benefits as a result of the proposed project.

- **Improvement of rural roads**

Due to the bad state of rural roads in the areas along the proposed transmission line, the local communities felt that the Implementation of the project will result to improvement of roads in the project area which will be of great benefit to the local communities. They felt that the contractor should prioritise the improvement of access roads before starting the construction works.

- **Increase of business activities**

The local communities were optimistic that the project would stimulate economic growth in the region through business activities such as catering at construction sites and selling of various local products to construction workers.

- **Creation of employment opportunities**

The communities living along the proposed project route were optimistic that the project will bring about short term and long term employment opportunities to the local communities during its implementation. They said that the contractor should consider employing the local communities during project implementation in activities like site clearance, excavation, driving and security services. Any other relevant activity that could be done by the locals should be left for the locals within the project area. The employment opportunities will generate income and improve the living standards of the local population.

- **Gender based benefits**

Short term local employment opportunities that will be created during the construction phase of the proposed project will benefit women as well as men. It is anticipated that there will be income generating activities for women in catering/restaurants for workers on the construction sites and from the selling of local products to construction camp workers. Men will also have job opportunities such as site clearance and security services.

- **Access to electricity**

The local communities were optimistic that they will be connected to power for domestic use once the projects are complete. Most of the resident along the transmission line were now optimistic for connection since most of them had not been connected due high installation cost escalated by the scattered nature of settlement in the area. However, the consultant explained that connection to electricity for domestic purpose will be done via the distribution lines but not the proposed transmission line.

6.3.3 Envisaged project negative impacts and proposed mitigation measures

The following were the negative impacts anticipated upon implementation of the proposed project as observed during discussions that were held with the local communities:

- Livestock accidents
- Loss of vegetation and animal folder
- Reduction of irrigation of farm land
- Loss of structures along the way leave and change in land use
- Dust emission during construction
- Health problems as result of dust and emissions from the machines that will be used during construction.
- Soil erosion.
- Surface water pollution
- HIV/AIDS as a result of population influx
- Noise pollution during construction.

The community members proposed the following mitigation measures to mitigate the above impacts.

- Employing security guards to man the excavated areas in order to avoid animal accidents
- Construction of necessary structures to control soil erosion
- Avoiding pollution of water resources during construction
- Sprinkling of water to combat dust emission
- Provision of medical services to those who suffer from illnesses as a result of dust and emissions from the construction machines.
- Ensuring proper maintenance of machines to minimize noise pollution during construction
- Community sensitization and provision of condoms to workers to prevent spread of HIV/AIDS
- Compensation for land affected, trees cut and structures that will be demolished

6.3.4 Community views and complains regarding the proposed project

The following community concerns were raised during the focus group discussions with local community members and local leaders:

- **Loss of vegetation and trees**

Construction of the proposed transmission line will lead to loss of trees during clearing of the way leave. This will lead to loss of nesting grounds for avifauna, bees and dry season fodder for pastoralists and dairy farmers. The community felt that China Aerospace Construction Group Corporation Limited / KETRACO should consider replanting de-graded areas with indigenous trees endemic to the area after construction of the proposed transmission line. The figures below show vegetation and trees along the proposed transmission line.



Plate 6.1 *Vegetation in Kajiado County*



Plate 6.2 *Trees in Loitoktok Sub County*

- **Compensation**

Implementation of the proposed project is expected to cause loss of land and property in some sections and the Project Affected Persons felt that China Aerospace Construction Group Corporation Limited should consider compensating them adequately for the loss prior to project implementation.

The community members also recommended that the compensation of trees lost should be based on type, age and beneficial value. The figures below show some of the affected structures within the way leave of the proposed transmission line



Plate 6.3 *A temporary housing structure within the way leave of the proposed transmission line in at Loitoktok sub county* **Plate 6.4** *A permanent housing structure within the way leave of the proposed transmission line at Mashuuru sub county.*

- **Size of way leave and access to land**

Community members were concerned about the amount of land required for the way-leave. The consultant explained that a 30 metre way-leave was necessary for a high voltage transmission line. In addition, the consultant made it clear that the affected persons would be expected **not** to erect any permanent structures under the way leave nor grow trees or crops with heights above 12 feet. Compensation due to this loss of use would be discussed with the communities during the Resettlement Action Plan (RAP) which would be conducted prior to project implementation.

6.3.5 Anticipated challenges during project implementation

The members of public mentioned the following as being the challenges that the proposed project may be faced with during implementation:

- Poor road network
- Inadequate skilled manpower
- Insecurity (vandalism, breakages and theft of cables/wires)
- Land disputes in the acquisition process
- Language barrier

6.3.6 Literacy level

From the discussions with the key stakeholders such as county commissioners, assistant county commissioners and the area chiefs the consultant noted that literacy levels among members of the local communities was low. Majority 30% of the respondents interviewed had never attended any school.

6.3.7 Community Social Responsibility (CSR) Activities

The local communities within the project area felt that the project proponent should consider supporting community projects as part of their corporate social responsibility. The priority community projects included upgrading school infrastructure, building dispensaries, sinking water pans and drilling boreholes to increase access to water which is a major concern in some areas such as Loitoktok sub-county. It was recommended that the communities should be consulted by the project proponent to give their priority issues of concern.

The pictures below shows some of public barazas held with the local communities



Plate 6.5 Representative addressing a public baraza in Merrueshi location



Plate 6.6 Public consultation in Kimana location



Plate 6.7 Poka (Gem) public baraza



Plate 6.8 Imbirikani public baraza.

6.4 Key issues from Key Stakeholder Consultation

The consultant conducted key informant interviews with various key stakeholders. All the key stakeholders consulted were optimistic that the proposed transmission line would boost power supply and spur industrial development in the country.

6.4.1 County Commissioner Kajiado County

The County Commissioner welcomed the project and promised full support to the last stage. He assisted the consultants with introductory letters to the respective Deputy County Commissioners in Mashuuru and Loitoktok sub counties.

6.4.2 Deputy County Commissioner (Loitoktok Sub County)

The Deputy County Commissioner acknowledged that the proposed transmission line traverses several Group ranges i.e. Kimana, Imbirikani where there exist very powerful and influential chairmen, treasurer and other members who ought to be consulted during the entire process. There exists an ongoing issue

in Imbirikani pertaining to land with National (Simba) cement which could be avoided with proper channelled communications. He however welcomed the project and offered to assist if any problem would arise.

6.4.3 County Environment Officer (Kajiado County)

The officer welcomed the project in the county. He later mentioned major drawback he anticipated from the project i.e. the line will traverse a limestone rich area which is currently eyed by National Cement (Simba Cement) and proposed that serious consultations be done to enhance smooth process in land acquisition.

He later added that several groups have joined forces to conserve environment including KWS and Kimana Group ranch with an aim of conserving the environment. He recommended that KETRACO should borrow from the latter with an aim for sustainable environment.

The officer concluded that the proposed transmission line is however not seen as a threat to the environment.

6.4.4 Chief Officer Energy, Transport and Infrastructure (Kajiado County)

In his remarks, the officer was concern about the people especially around Nkama and Kenyewa location, whom he sympathised with for lack of power over a considerable duration of time. Amid the proponent having constructed other transmission lines around the area, the local still lag behind in terms of power distribution and therefore hoped that KETRACO will put pressure on its sister companies to fast-track power distribution in the area. He was mainly concern about the scarce population in the area that has constantly scared electricity investments (distribution) due to the high costs incurred.

The officer was also concern about the poor road infrastructure in the area and requested that KETRACO in doing its cooperate social responsibilities consider upgrading some.

During construction of pylons, the proponent should build galleys to help reduce soil erosion which is rampant in the area.

6.4.5 County Agricultural Officer (Mashuuru Sub County)

According to the offer, the main cash crops likely to be found within the area include; *Tomatoes, Onions, Cabbage, Brinjals, Hot and Sweet paper, Maize, Beans, Water melon, Kales and Spinach.*

He was concern about the limited irrigation applied in the area which has always raised issues with the water pipeline company when some residents decide to irrigate or avail to animals. His optimism was boosted with the coming of electricity which will help farmers indulge in a more sophisticated fashion of farming.

The main farming methods in the area include; mixed cropping and mono cropping.

6.4.6 Kenya Wildlife Service (KWS)

According to the KWS warden (Mr. Rono) the proposed transmission line will limit the use of land along that wayleave. Compensation should cater for future use and should be done on a yearly basis. The

consultant / proponent should also offer conclusive education for proper understanding to the community before signing any document.

In his additional remarks, the officer was concerned about the wildlife corridors which he requested that the proponent ensure no animals are blocked from using their normal routes. He was also concerned with the coming of electricity and transmission lines sighting a good example from Meru in 2008 where people used electricity to electrocute wild animals. Birds have also been reported either electrocuted or killed by impacts with the transmission line.

“Every development is affecting the space of wildlife, today, what is killing the animals is development” remarked Mr Rono. He was very passionate about the welfare of wild animals. The officer compared Kenya to the neighbouring South Sudan and Tanzania who have more wildlife and if this trend continues, then it would be worrying. He added that Kenyans should also be trained to treat wildlife not only as a property for KWS but them as individuals. This was followed by his quick remarks on those manning transmission sub stations in game reserves to adhere to stipulated norms and codes for not killing the beautiful animals for food. He wished that the country should balance development and human conservation to prevent power diversity loss in the long term. In mitigating this effect, a proper resource valuation should be done before any project to see the cost lost and what can never be recovered after the project. All animals form part of the natural ecosystem and hence part of a food chain hence the importance of each.

6.4.7 Natural Resource Office; Department of Mines and Geology (Kajiado County)

Mr. Jonathan welcomed the consultants to the county. He complimented the consultants for visiting their office. In his remarks, Jonathan asserted that mining is a private owned entity in Kenya and the office’s mandate was to approve mining within the county by giving mining consent where due process had been followed. He also added that the Mining docket was still not devolved and most decisions still fell on the National Government. The N.R.O officer later added that their office was new in the county but were optimistic about plans for having a survey done in the whole county in terms of mine deposits.

6.4.8 Kenya Forest Service

The officer in charge Mr. Ndiga gave the consultants a list of endangered tree species in the area. He also listed a variety of dominant tree species found along the project area. In his final remarks, the officer asserted that there were no gazetted forests along the proposed transmission corridor.

6.4.9 Kenya Pipeline Company (Sultan Hamud Pump House)

The Acting Professional and Technology Officer (PTO) Mr. O.N Ngecha welcomed the consultants to the pump station. After a briefing about the proposed transmission line, Mr. Ngecha was optimistic that the proposed transmission line would boost power supply in the area. The consultants later requested to do a walk through inspecting at sites where they anticipated the transmission line would cross. Ngecha then called one of his support personnel who later went around with the consultants to verify the exact location of the proposed line in the pump station. It was later observed that part of the line was cutting across some of their KPC’s structures. Mr. Ngecha was however categorical to mention that any case of land acquisition could only be discussed at higher managerial grounds in their Head Quarters in Nairobi.

The pictures below show some consultations meetings that were held with the key stakeholders within

the project area.



Plate 6.9 Consultation with Agricultural Extension officer in Mashuuru Sub County

Plate 6.10 Consultation with KWS officer in Amboseli National Park (HQ)

7.0 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

7.1 Introduction

This section discusses in detail the environmental and social impacts, both positive and negative, that are expected to arise from the implementation of the proposed project. They will be experienced at various stages of the project such as the design phase, construction, operation and decommissioning phases. The impacts have been established through detailed predictions methods, key informant interviews, focus group discussions and public consultations held at the community level.

7.2 Planning and Construction Phase

7.2.1 Positive Impacts

1. Creation of Employment Opportunities

Both skilled and unskilled labour will be required during the construction and maintenance of the 132kV line. Some short term employment opportunities during the construction phase include: Right of way (ROW) clearance, pit dressing, loading and offloading of construction materials and deliveries, record keeping and provision of security at active sites and temporary campsites and stores. Also, there will be some indirect job opportunities such as catering, kiosks, barber shops, etc., to service the crew.

Long term employment opportunities resulting from the project include maintenance works which may require skilled labour. Some maintenance activities such as clearing of vegetation clearance along the way-leave will still provide seasonal jobs or the community members.

2. Increased economic activity in both the project areas and at the national level

During construction, the workers will need basic amenities such as food, shelter and clothing. They will as well need recreation for time off. All these goods and services will be sourced from providers in the projects are thus increasing the economic activity around the same area.

At the national level, indirect economic gains will be realised too. Construction materials and services locally available will be put into use. These include: materials such cement, sand ballast, reinforcement steel personal protective equipment and services such as transportation of materials and warehousing and logistics.

3. Contribution to Government Revenue

The Government of Kenya currently charges Value Added Tax (VAT) on electricity consumed for both domestic and industrial use. Construction of the 132kV Sultan Hamud – Loitoktok 120KM Transmission Line, it will attract this levy and other charges such as pay as you earn (P.A.Y.E) tax from construction workers, and NEMA licence fee paid by the proponent to NEMA. Consultants and construction companies that will be engaged in the project are subject to local taxes.

5. Improved road infrastructure

Implementation of the proposed project will require a road network to facilitate ferrying of materials and equipment to the construction sites. A favourable road network will allow for easy movement of machinery and delivery of construction material to the sites. The contractor will rehabilitate existing roads and/or create new roads which may end up being used in the long term by the residents.

6. Benefits of Engagement by Both Genders

The proponent encourages involvement of both Women and men in realisation of the proposed project. Local employment opportunities that will be available during the construction phase anticipate generation of income for both women through activities such as providing food for construction crew and the other such activities.

6. Enhancement of the Socio-cultural and Local Leadership Structures

Leadership in most part of the project area is characterized by authority from the area chiefs at the community level. The proposed project could reinforce the authority of the community leaders as most of the residents entrust them with information and property dealings. It is suggested that the proponent utilises them in every undertaking. This will act both ways in ensuring the project runs smoothly and at the same the proponent would be reinforcing the authority of the chiefs as the community observes how they have been involved.

7. Corporate Social Responsibility (CSR) Benefits

The proponent conducts community social responsibility initiatives for the project affected communities. This is done as a way of giving back to the community in any development project. Communities living in the project affected areas may benefit from water projects, bursaries or schools depending on what they would agree with the proponent to be undertaken as a CSR activity.

7.2.2 Negative Impacts

1. Relocation of Project Affected Persons and Property

Locating the transmission line by the proponent and has been done in a way such that it avoids extensive relocation of individuals. However, where it is unavoidable, implementation of the project will lead to displacement of persons, relocation of structures including houses and social amenities and clearance/cutting down of trees and other vegetation. This necessitates compensation and resettlement of the affected persons and property.

2. Impact on Land Use Patterns

The land affected by the transmission line route will lead to displacement of the land owners, clearance of vegetation, restricted agricultural activities, and other social-economic activities that will be hindered.

3. Alteration of land ownership patterns

Half the line distance crosses through individual plots while the other half traverses through group ranches. Although for the transmission line no adverse effects are anticipated with regards to land ownership patterns, where the substations will be built will have such effects. The areas of interest here would be the National Cement substation at Merrueshi and the Loitoktok substation.

4. Concerns over Occupational Safety and Health

Excavation, tower erection and conductor stringing may pose hazards to workers at construction sites and locals where safety measures are not put in place. Unmarked excavations pose a risk to livestock, wild animals and children. Poor sanitation and waste disposal at the active sites and camp sites also pose health risks to livestock and the residents living in the project area. The risk of HIV/AIDS exposure may also be increased as a result of sexual engagement between the construction crew and the locals.

5. Impact on Flora and Fauna

The impacts on Flora would be clearance of vegetation on excavation sites. The overhead cables would not affect shrubs and trees but tall trees exceeding a height of 12 feet will have to be cut down. This will lead to environmental degradation.

Impacts on Fauna would be risk to livestock falling into the excavation pits during the construction phase (short term) and bird-flight-patterns being affected in the long run.

6. Loss of crop land

The proposed Transmission Line is located and designed to minimize the impacts on the available crop land. However, there will be a small, permanent loss of some cropland especially from Merrueshi all the way to Loitoktok on the points where the pylons would be constructed. Where transmission line traverses agricultural may be temporarily disrupted during the construction phase.

On completion of the transmission line construction, the way-leave will still be available to the PAPs for grazing and for growing crops such as maize, beans, tomatoes, watermelons and sunflower – which do not grow taller than 12 feet.

7. Soil erosion

Soil erosion along the wayleave is expected during the construction phase. Movement of machinery and equipment in the project area will lead to interference of soil structure hence causing soil erosion that may lead to siltation of water ways. However, these activities can be constrained to the wayleave area to minimise extent of soil erosion

8. Interference With Water Resources and Drainage

Construction works may affect water resources both in the short-term and in the long-term. Earth movements can result in loose soil particles that are consequently carried by surface water into water sources. In addition, oil/fuel spillages from machinery and water used for cleaning cement off machinery may contaminate ground/surface water. Moreover, where the transmission line crosses over water resources, relocation of small dams and water pans may be effected to provide room for pylon foundations. However, measures should be put into place to ensure, the transmission line construction and operation will not deter access to or use of resources such as water ways, water pans and small dams. Water used for cleaning equipment, concrete mixing, sanitation and drinking will be sourced locally thereby increasing the area's water demand

9. Visual and Aesthetic Impacts

The physical presence and profile of the proposed project will alter the visual and aesthetic effects of the surrounding area. In addition, some level of undesired visual impact will arise during the construction of the proposed project. The construction works and completed works will be visible from the project area residents or pastoralists in these areas. However, this effect will be short term and site specific

10. Impacts on Archaeology and Cultural Heritage

There are two major cultural sites in the project area. The Sultan Hamud - Loitoktok transmission line though, does not pass through them. However, there may be few and small sacred areas close by the proposed route which may be carefully looked into during the RAP and construction period. This will ensure that the few cultural/sacred sites within the community areas are preserved.

11. Vehicular and Human Traffic Impacts

Movement of heavy machinery and equipment during the construction phase is expected. These machineries will be used for ferrying workers and materials to the active site while equipment will be used for construction activities at the sites. This may lead to traffic diversions/ congestions in some instances

12. Impacts from Solid and Liquid Wastes

Construction activities will generate both solid and liquid wastes in all phases of the project. These may include: papers, cable drums, oil drums, spilt oil, planks of wood, glass, paints, adhesives, sealants, fasteners, and other domestic wastes. These wastes are hazardous to people, soil and water within the project area if adequate mitigation measures are not enforced throughout the project.

13. Noise and Vibration Impacts

The construction phase will cause noise and vibration impacts in the short term from moving machinery, row clearing using chain saws, excavation activities and rock breaking. Majority of those that will be affected is mainly workers and immediate neighbours to the transmission line

14. Impacts from Rock Blasting

During construction process, rock blasting to create foundation for the pylons in rocky sections will most likely be necessary. Flying rocks will be a major concern for the blaster. Flying rocks from surface blasting operations can cause serious injury and death to employees and people living within the project area. The process of stone blasting/crushing may be lead to loss of vegetation cover, excessive noise, vibrations and dust. It is a contractual obligation for the contractor and the proponent to protect the communities from these impacts and restore/borrow the sites upon closure This may also pose accident risk to road users, children or animals, dust contaminating goods in roadside markets/homesteads and noise at sensitive receptors (schools and health centres).

15. Emissions and air pollution

Construction phase activities of the proposed line will give generation to dust and exhaust fumes from vehicles and machinery. Dust emissions will emanate from pit excavation activities and movement of machinery in the project area. This directly affects the air quality of the project area.

16. Increase in Social Vices

Overall population of the project area is expected to increase due to an influx of construction workers. This will directly affect the normal social set up of communities living in the project area thereby possible decay of morality, increase in school drop-outs due to available unskilled labour, possible child labour, petty thieves and increased HIV/AIDS incidence and communicable diseases

7.3 Operation Phase

7.3.1 Positive Impacts

1. Increased Electrical Capacity, and Reliability of Supply to Project area

The construction of the 132kV Sultan Hamud – Loitoktok 120KM Transmission Line will be a step forward towards achieving the goals of Vision 2030 with regards to enhancement of electrical capacity. The town has been experiencing inadequate and reliable power supply from the current 33kV line supplying from Taveta. An immediate impact would be the cost of electricity gradually going down and frequency of power outages minimised.

Other notable impacts include:

- Increased industrial activity due to the availability of a steadier and higher capacity power supply in comparison to the existing one.
- Increased establishment of economic and social sectors such as agriculture, hospitals and educational centres resulting from increased availability of electricity
- Boost to the tourism industry that is currently booming in Loitoktok and other neighbouring towns as access to electricity will make development and maintenance of lodges much more bearable and able to provide this utility.

2. Creation of Employment Opportunities

Both skilled and unskilled labour will be required during the maintenance of the 132kV line. Some maintenance activities such as clearing of vegetation clearance along the way-leave will still provide seasonal jobs or the community members.

3. Contribution to Government Revenue

Similar to the planning and construction phase, the operation phase will also attract VAT on electricity consumed for both domestic and industrial use. P.A.Y.E tax from maintenance employees, and NEMA licence fee paid by the proponent to NEMA, and taxable professional fees to the consultants, after conducting annual environmental audits, are also other avenues for the government to get revenue.

4. Enhancement of Tree Species Diversity

Environmental management good practices demand that the proponent ensures environmental restoration on construction completion. Through afforestation with non-invasive indigenous species and landscaping activities – which would involve the local community –China Aerospace Construction Group Company Limited could improve the biodiversity of the project area. Continuous audit of this activity would ensure sustainability of the initiative

7.3.2 Negative Impacts

1. Concerns over Occupational Safety and Health

Regular maintenance of the transmission line: During the operational phase, annual clearance of the wayleave area is necessary. Bush and tree growth near the transmission line will necessitate bush and vegetation clearing from time to time. Hazards of these activity include physical harm resulting injuries sustained from tools and equipment, ergonomic problems such as poor working posture, dust inhalation, attacks from wild animals etc.

Accidental failure of pylon structures or breakage of conductor cable: Incase a conductor cable breaks or a pylon structure collapses, it may lead to electrocution or loss of property that may be as a result of fires. Electrocution may also occur in the event tools such as ladders, motor vehicles or other equipment comes in direct contact with live conductor cables during maintenance works

2. Vehicular and Human Traffic Impacts

Movement of heavy machinery and equipment during the operational phase is expected. These machineries will be used for ferrying workers.

3. Impacts from Solid and Liquid Wastes

During the operation phase, there will obviously be staff stationed at the sub-stations, meaning both solid and liquid waste will be generated. Additionally, the day to day operations of the substation are bound to generate waste such as oil spills, plastic containers, metal containers, paper, et cetera.

4. Noise and Vibration Impacts

Noise during the operation phase will only be realized from corona effect - acoustic noise produced by transmission lines which are greater with high voltage power lines ranging from 400 - 800kV which generate discharges. This being a 132kV line, such an effect will not be experienced.

5. Perceived Danger of Electrostatic and Magnetic force

Electric transmission 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 transmission line 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 provided for the wayleave area

6. Impacts on Aircraft Navigation

There exists two airstrips along the project area – Amboseli and Loitoktok airstrips. The proposed line will not have major impacts on the air traffic for either airstrip. However, the maximum height of the tower structures will be in accordance with the requirement of the Kenya Civil Aviation Authority (KCAA).

7. Impacts on Wildlife Habitats and Migratory Birds

Birds nesting in the towers pose a danger both to themselves and to the safe operation of the power line. Large nests eventually fill with droppings that can reach the conductors and cause electric shocks or burns to birds. These will need to be regularly removed as part of routine maintenance. Previous studies suggest that climbing animals, such as baboons and monkeys learn to keep away from conductors.

The impact of a transmission line on other fauna is limited as most areas are sparsely populated and the way-leave will be cleared manually of vegetation and as such the use of herbicides is not envisaged.

8. Risk of Fire Outbreaks

During the entire operational phase of the proposed line, electric faults on the transmission line may pose a fire risk. This may be caused by bird collisions or high growing vegetation is not managed along the wayleave. Considering that most of the project area lays in the semi-arid climatic regions, this may lead to forest fires in such an event

7.4 Decommissioning Phase

7.2.1 Positive Impacts

1. Creation of Employment Opportunities

Both skilled and unskilled labour will be required during the decommissioning exercise – direct opportunities for labourers site and indirect opportunities for community members such as catering, kiosks, barber shops, etc., to service the crew.

2. Benefits of Engagement by Both Genders

The proponent encourages involvement of both Women and men in the decommissioning exercise. Specifically, generation of income for women through activities such as providing food for construction crew and the other such activities since as women are generally a marginalised group in the project area.

3. Enhancement of the Socio-cultural and Local Leadership Structures

Just as in the construction phase, the proponent could reinforce the authority of the community leaders by utilising them in every step of the decommissioning exercise. This will act both ways in ensuring it runs smoothly and at the same the proponent would be reinforcing the authority of the chiefs as the community observes how they have been involved.

4. Increased economic activity in the project area

The on-site workers will need basic amenities such as food, shelter and clothing. They will as well need recreation for time off. All these goods and services will be sourced from providers in the projects area thus increasing the economic activity around the same area.

7.2.1 Negative Impacts

1. Concerns over Occupational Safety and Health

Hazards that the high voltage transmission line may pose to workers and residents during the decommissioning phase are similar to those discussed in the construction phase above

2. Vehicular and Human Traffic Impacts

Movement of heavy machinery and equipment during the decommissioning is expected. These machineries will be used for ferrying workers and materials from the active site while equipment will be used for dismantling of the substations.

3. Impacts from Solid and Liquid Wastes

Decommissioning activities will generate both solid and liquid wastes such as: papers, cable drums, oil drums, spilt oil, planks of wood, glass, paints, adhesives, sealants, fasteners, and other domestic wastes. These wastes are hazardous to people, soil and water within the project area if adequate mitigation measures are not enforced during the decommissioning exercise.

4. Noise and Vibration Impacts

The decommissioning activities will be similar in nature as those during the construction phase. The impacts will be as a result of moving machines, communication of workers and outgoing vehicles transporting project materials and workers to and out of the proposed sites.

5. Emissions and air pollution

Decommissioning phase activities of the proposed line will give generation to dust and exhaust fumes from vehicles and machinery. Dust emissions will emanate from pit excavation activities and movement of machinery in the project area. This directly affects the air quality of the project area

6. Increase in Social Vices

Just as in the construction phase, population of the project area is expected to increase due to an influx of workers during the decommissioning phase. This will directly affect the normal social set up of communities living in the project area thereby possible decay of morality, increase in school drop-outs due to available unskilled labour, possible child labour, petty thieves and increased HIV/AIDS incidence and communicable diseases

8.0 IMPACT MITIGATION AND ENHANCEMENT MEASURES

8.1 Introduction

This section provides for a detailed analysis of the impact enhancement and mitigation measures necessary during the implementation of the project. The proposed mitigation measures are intended to eliminate or minimise the negative impacts while enhancing the positive ones.

8.2 Enhancement of Positive Impacts

The proponent will ensure effective enhancement of all the possible positive impacts of the project. This will be done through effective enforcement of the project's Environmental and Social Management Plan at all phases of the project. Mitigation of all adverse impacts will be ensured as addressed in the Environmental and Social Management Plans. Unforeseen impacts will also be addressed through the Monitoring and Evaluation Plan

The proponent shall also maximize the use of local labour where possible to ensure maximum participation of the community in the project. Capacity enhancement will also be realized through training of the employed locals and community sensitization activities. Gender issues will be catered for through provision of equal opportunities for women in recruitment and acquisition of local products and services.

Public sensitization will need to continue throughout the project implementation stages. In line with the findings from the consultation, this should be organized with the involvement of local chiefs and administrators.

Sensitization forums should be held to address the issues raised during the public consultation: expectations regarding the proposed project, health and safety in the vicinity of the worksites; employment opportunities for local people and the findings of this ESIA report. This will help reduce conflicts with local communities as the project is rolled out.

8.3 Proposed Mitigation Measures for Negative Impacts

8.3.1 Planning and Construction Phase

1. Relocation of Project Affected Persons and Property

Line should be routing be done in a way such that it avoids extensive relocation of individuals. However, where this is unavoidable, compensation and resettlement of the affected persons and property should be done.

2. Impact on Land Use Patterns

Similar to the point above, where this is unavoidable, resettlement should be done such that the affected persons will be able to enjoy at least the same uses they previously had n their land, or receive adequate compensation to cover for their loss.

3. Alteration of land ownership patterns

Only two locations within the proposed line will experience this because of substations being built there. These are Merrueshi and the Loitoktok. For these two instances, full acquisition of the land is to be done and the owners adequately compensated in accordance with the prevailing regulations on displacement of persons.

4. Concerns over Occupational Safety and Health

Occupational Safety and Health impacts are anticipated during the construction phase of the project. Management of onsite safety and health shall be in line with the Occupational Safety and Health Act (OSHA) 2007. The envisaged impacts can be lessened through;

- A trained occupational health and safety supervisor shall be stationed at each site
- Toolbox talks meetings should be held on a daily basis before commencement of work at the sites
- Ensuring that both active sites are well marked and secured with the appropriate tape at all times to prevent injury to both outsiders and animals – both domestic and wild- as a result of falling from heights
- Continuous sensitization of the community on possible hazards associated with works before and during the construction works
- The contractors shall put up appropriate safety signage at active sites at all times. Signage may be displayed in local language to address the issue of language barrier where local workforce is used
- The proponent will ensure that no minors are employed at the work sites at all times. A register of all the workers shall be maintained together with their ID/ Passport numbers
- All workers and visitors to active sites shall put on necessary personal protective equipment at all times. This will include a helmet, reflective jacket, safety boots, hand gloves and overalls. Body harnesses shall be worn whenever working on heights is involved.
- Hoisting equipment shall be provided at sites where erection activities are to be carried out. This equipment shall be properly rated and maintained. The equipment shall be used in uplifting of loads which are beyond sensible weights that can be lifted by human labour
- Stock piling shall be done in the confinement of the substation sites boundaries.
- First aid equipment and a qualified first aider shall be provided at each substation site.
- Workers together with community members shall be provided with HIV/AIDS sensitization forums and campaigns. The construction crew shall also be provided with appropriate sanitary facilities and HIV/AIDS prevention and management facilities such as testing, counselling and condoms.

- Appropriate road signs shall be strategically placed in the project area to serve as warning to motorists and pedestrians during the construction activities. This will include speed limit signage of 40KM per hour and diversion signage
- Appropriate waste management equipment shall be provided at active site to aid in waste segregation and disposal. The separate bins shall be marked with the different categories of waste
- Piled earth material shall be well levelled off on completion of construction works at every site

5. Impact on Flora and Fauna

Impacts on Flora and Fauna should be kept to the minimum. The proponent shall ensure that vegetation clearing is limited to the project area only and that transportation of construction materials is done through the existing road infrastructure. The areas to be cleared for workers camps/material storage shall be marked out prior to the clearing process. Manual clearing such as slashing is encouraged and use of machinery should be limited to excavation of the substation sites only.

Wildlife and environmental preservation awareness campaigns should be conducted on the construction workers to ensure that they do not exploit natural resources through hunting or destruction of forest resources. On completion of the construction works, the area around the substation sites will be allowed to re-vegetate with indigenous species.

6. Loss of crop land

Loss of land and crops will be compensated by the proponent. A Resettlement Action Plan (RAP) study has been recommended to identify and document all Project Affected Persons. The RAP will be carried out in accordance with the legal framework of the Government of Kenya, and in line with the requirements of the World Bank's OP 4.12 (Involuntary Resettlement) and the IFC Performance Standard 5 on Land Acquisition and Involuntary Resettlement as required. If relocation of PAPs will be necessary, potential sites for their relocation will be identified, and an estimation of the total cost for the RAP obtained. The resettlement plan or resettlement policy framework shall include measures to ensure that the displaced persons are:

- Informed about their options and rights pertaining to resettlement
- Consulted on, offered choices, and provided with technically and economically feasible resettlement alternatives; and
- Provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project

Compensation will be undertaken as per the rates prescribed by Ministry of Lands and Ministry of Agriculture.

7. Soil erosion

The project area is generally arid and semi-arid. Unsuitable soils will be excavated and stockpiled until a suitable formation is reached. Appropriate pollution control measures will be used as determined by the civil contractor. Where soils excavated for pylon/gantry tower foundations will be found to be

suitable, the same will be used for backfilling excavations and will not be left exposed to wind or water for long periods.

Construction traffic will follow defined temporary access routes to be established as part of the works so as to avoid damaging the soil structure in the wider area. Repairs to access roads will be undertaken to maintain the surfacing and prevent soil erosion. Areas exposed due to the removal of vegetation are more susceptible to erosion during heavy rainfall, so areas will be reinstated as soon as possible to minimize this effect.

8. Interference With Water Resources and Drainage

Site workers will be trained in clearing up spillages and spillage kits including suitable PPE will be available in storage areas. Effluents containing soil, cement or oil will not be allowed to flow into any water drainage or water courses. Water from washing out of equipment will also not be discharged into drains to water drains to roads or water sources. Temporary stockpiles shall be located away from drainage and surface run off shall be directed away from stockpiles to prevent erosion.

Control of water is of great importance during construction to prevent exposed soils eroding and silting up surrounding watercourses. It is essential that the works have little or no impact on the existing hydrology due to the ecology surrounding the substations. While the water demand for the project at this stage is unknown, it could be satisfied in one of three ways namely:

- Abstraction of water from the existing boreholes in the local area after getting formal consent from the borehole owner; or
- Use of water bowsers and storage of water in tanks in the laydown area and camp sites; or
- Sinking new boreholes or abstracting water from suitable water bodies in accordance with the Water Resource Management Authority (WRMA) requirements.).

Wastewater from sanitation on the worker camps will be collected in mobile containers and discharged into pit latrines which will be decommissioned on completion. It will be necessary to locate such disposal sites such that the effluent does not contaminate water resources such as boreholes used by the local community.

The discharge of any effluents will be carefully managed with agreement of NEMA with regard to the detailed methods of disposal. Standard good working practices should ensure that any impacts due to the quality of water discharging from the project are insignificant

9. Visual and Aesthetic Impacts

It is general practice to restore the substation site after construction, although the replacement of tall vegetation is not a part of restoration directly within the substation site. Vegetation within the substation can create ground-fault hazards, including the risk of fire. Plants consistent with native species are selected, although with consideration of their growth rates and prevention of introduction of invasive species. The contractor should consult with the KWS environmental team, together with the representatives of the group ranches, and the community chiefs before commencing site restoration work at the National Cement and Loitoktok substation sites

The proponent shall undertake continuous awareness creation along the proposed substation sites at National Cement and Loitoktok through public consultation. This will ensure that the community is

receptive to the project. The community should also be involved in environmental restoration process through planting of trees and other landscaping activities and as a result improve the vegetation cover and appearance of the affected project area

Excavated top soils in the proposed Sub-stations will require backfilling with suitable soils. We anticipate that such soils will be obtained from quarries/burrow pits. Borrow pits may be required for extraction of suitable material for the access road construction to substations and backfilling excavated top soils for substation foundations. Borrow pits and/or quarries will be identified during the detailed engineering design stage of the project.

A borrow pit design and restoration plan should be produced prior to commencement of the work. In general, borrow pits are usually worked in strips to ensure that only enough material for the project is obtained, and to limit the impacts of the borrow pit to as small an area as possible. Any top soils and sub-soils will be separated and progressively stored in a temporary storage area. The storage mound should also be terraced, where possible, to ensure stability. All temporarily stored materials shall be utilized in the restoration of the borrow pit.

10. Impacts on Archaeology and Cultural Heritage

There are two major cultural sites in the project area. The Sultan Hamud - Loitoktok transmission line though, does not pass through them. However, there may be few and small sacred areas close by the proposed route which may be carefully looked into during the RAP and construction period, with community consultations at every stage. This will ensure that the few cultural/sacred sites within the community areas are preserved.

11. Vehicular and Human Traffic Impacts

Transportation of construction material to specific sites should be done through existing road infrastructure where possible. Rehabilitation of roads that have dilapidated as a result of such transportation should be done by the proponent. In addition, design of detours and diversions where necessary should be done with consultations with the local communities.

12. Impacts from Solid and Liquid Wastes

Generation of both liquid and solid waste is anticipated as discussed above. Mitigation of this impact shall be effected through:

- Continuous sensitization of construction workers on issues of environmental protection and health
- Provision of adequate waste management facilities at both the construction sites and workers' camps. These shall include separate waste bins for the hazardous, biodegradable and non-biodegradable waste disposal
- Waste collected at site shall be disposed offsite in approved waste dumping facilities in the project area
- Excavated soil material shall be used for backfilling if found suitable and any excess of it shall be properly evened off on site

Appropriate sanitation facilities shall be provided at active sites for human waste disposal

13. Noise and Vibration Impacts

Noise emitted during the construction phase will be minimised through use of noise reduction technologies such as silencers/mufflers and provision of hearing protection devices for workers. Additional noise abatement measures may need to be implemented e.g. close to residential and sensitive wildlife areas, including careful selection and use of plant and hours of working.

14. Impacts from Rock Blasting

In case there will be need for rock blasting during excavations, the contractor should create awareness to adjacent communities through the local administration. He should also provide safety signage, humps, banksmen and watering to suppress dust. Proper blast design, driller-blaster communication, inspection prior to loading and firing the blast, removing employees from the blast area, controlling access to the blast area, and using a blasting shelter should also be observed.

An experienced driller should be used to detect potential problem areas such as voids, mud seams, incompetent rocks, and other irregularities by observing the progress of drilling. The drill log should include the details of any unusual or exceptional circumstances noticed during drilling. A blaster may need to alter the loading configuration to alleviate potential problems

15. Emissions and air pollution

The proponent shall put in place appropriate dust mitigation measures at active sites during the construction phase. This will include covering up of stock piles of dusty materials, limiting of speed limits of vehicles within the project area and sprinkling of water. Emissions from machinery and equipment shall be minimized through adequate servicing and maintenance

16. Increase in Social Vices

Continuous sensitization of community members and construction workers will help in curbing social vices that may arise. For the community members, this could be done through the chiefs and village elders, while for the construction workers during the daily toolbox talks.

Other measures would be encouraging community policing to deter any would be perpetrators from engaging in these vices.

8.3.2 Operation Phase

1. Concerns over Occupational Safety and Health

Regular maintenance of the transmission line: This can be mitigated against by ensuring proper use of PPEs during such activities and sensitization of the workers on the importance of using PPEs.

Accidental failure of pylon structures or breakage of conductor cable: Provision of fire extinguisher, fire safety training for workers, and making sure that a Safety officer is always present on site are mitigation measures that may be implemented.

2. Vehicular and Human Traffic Impacts

Locating of access roads to the two substations should be decided upon earlier on in the construction phase in consultation with the local community to avoid disagreements or conflicts that may arise later, long after the construction work is finished for example, a community member claiming that traffic to the stations is cutting through his/her land as has been the case in other similar projects.

3. Impacts from Solid and Liquid Wastes

Any waste generated during the day to day operation of the substations should carefully managed with agreement of NEMA, the county departments of environment, and other relevant bodies, with regard to the detailed methods of disposal. Standard good working practices should ensure that any impacts due to the quality of water discharging from the project are insignificant

4. Noise and Vibration Impacts

As discussed earlier, noise during the operation phase will only be realized from corona effect and this being a 132kV line, such an effect will not be experienced.

5. Perceived Danger of Electrostatic and Magnetic force

Electric transmission 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 transmission line 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 provided for the wayleave area

6. Impacts on Aircraft Navigation

There exists two airstrips along the project area – Amboseli and Loitoktok airstrips. The proposed line will not have major impacts on the air traffic for either airstrip. However, the maximum height of the tower structures should be in accordance with the requirement of the Kenya Civil Aviation Authority (KCAA).

7. Impacts on Wildlife Habitats and Migratory Birds

Regularly removal large nests as part of routine maintenance will prevent them from getting electrocuted. As for wildlife habitats, climbing animals, such as baboons and monkeys learn to keep away from conductors so the impact on them is limited.

The impact of a transmission line on other fauna is also limited as most areas are sparsely populated and the way-leave will be cleared manually of vegetation and as such the use of herbicides is not envisaged.

8. Risk of Fire Outbreaks

Setting up of fire assembly points and placing fire extinguishers at strategic locations throughout the substations will ease the management of fire outbreaks, if any. Also, there should at least be a trained fire fighter on site, and all operators should be briefed on emergency first aid for such outbreaks.

8.3.3 Decommissioning Phase

1. Concerns over Occupational Safety and Health

Occupational Safety and Health impacts are anticipated during the decommissioning phase of the project. Management of onsite safety and health shall be in line with the Occupational Safety and Health Act (OSHA) 2007. The envisaged impacts can be lessened through;

- A trained occupational health and safety supervisor shall be stationed at sites being decommissioned
- Toolbox talks meetings should be held on a daily basis before commencement of work at the sites
- Ensuring that both active sites are well marked and secured with the appropriate tape at all times to prevent injury to both outsiders and animals – both domestic and wild- as a result of falling from heights
- Continuous sensitization of the community on possible hazards associated with works before and during the decommissioning works
- The contractors shall put up appropriate safety signage at active sites at all times. Signage may be displayed in local language to address the issue of language barrier where local workforce is used
- The proponent will ensure that no minors are employed at the work sites at all times. A register of all the workers shall be maintained together with their ID/ Passport numbers
- All workers and visitors to active sites shall put on necessary personal protective equipment at all times. This will include a helmet, reflective jacket, safety boots, hand gloves and overalls. Body harnesses shall be worn whenever working on heights is involved.
- Hoisting equipment shall be provided at sites where erection activities are to be carried out. This equipment shall be properly rated and maintained. The equipment shall be used in uplifting of loads which are beyond sensible weights that can be lifted by human labour
- Stock piling shall be done in the confinement of the substation sites boundaries.
- First aid equipment and a qualified first aider shall be provided at each substation site.
- Workers together with community members shall be provided with HIV/AIDS sensitization forums and campaigns. The construction crew shall also be provided with appropriate sanitary facilities and HIV/AIDS prevention and management facilities such as testing, counselling and condoms.

- Appropriate road signs shall be strategically placed in the project area to serve as warning to motorists and pedestrians during the decommissioning exercise. This will include speed limit signage of 40KM per hour and diversion signage
- Appropriate waste management equipment shall be provided at active site to aid in waste segregation and disposal. The separate bins shall be marked with the different categories of waste

2. Vehicular and Human Traffic Impacts

Transportation of materials from the sites being decommissioned should be done through existing road infrastructure where possible. Rehabilitation of roads that have dilapidated as a result of such transportation should be done by the proponent. In addition, design of detours and diversions where necessary should be done with consultations with the local communities

3. Impacts from Solid and Liquid Wastes

As in the construction phase, mitigation against impacts resulting from generation of solid and liquid wastes can be managed in the following ways:

- Continuous sensitization of workers on issues of environmental protection and health
- Provision of adequate waste management facilities at both the sites and workers' camps. These shall include separate waste bins for the hazardous, biodegradable and non-biodegradable waste disposal
- Waste collected at site shall be disposed offsite in approved waste dumping facilities in the project area
- Excavated soil material shall be used for backfilling if found suitable and any excess of it shall be properly evened off on site

4. Noise and Vibration Impacts

The decommissioning activities will be similar in nature as those during the construction phase. Noise emitted will be minimised through use of noise reduction technologies such as silencers/mufflers and provision of hearing protection devices for workers. Additional noise abatement measures may need to be implemented e.g. close to residential and sensitive wildlife areas, including careful selection and use of plant and hours of working

5. Emissions and air pollution

The proponent shall put in place appropriate dust mitigation measures at active sites during the construction phase. This will include covering up of stock piles of dusty materials, limiting of speed limits of vehicles within the project area and sprinkling of water. Emissions from machinery and equipment shall be minimized through adequate servicing and maintenance

6. Increase in Social Vices

Just as in the construction phase, population of the project area is expected to increase due to an influx of workers during the decommissioning phase. Continuous sensitization of community members and

workers will help in curbing social vices that may arise. For the community members, this could be done through the chiefs and village elders, while for the workers on site during the daily toolbox talks.

Other measures would be encouraging community policing to deter any would be perpetrators from engaging in these vices

8.4 Impact Matrix

Table 8.1 below provides identified Impact Matrix for the proposed National Cement and Loitoktok 132kV substations

Table 8.1 Impact Matrix

Impact	Positive	Negative	Direct/ Indirect	Temporary/ permanent	Significance level (High, Moderate, Low)	Occurrence Preconstruction	Construction	Operation	Decommissioning
1. Reliable power supply to Loitoktok town	Positive		Direct	Permanent	High			✓	
2. Creation of employment opportunities	Positive		Direct	Both	High	✓	✓	✓	✓
3. Increased economic activity in both the project areas and at the national level	Positive		Both	Both	High	✓	✓	✓	✓
4. Contribution to government revenue	Positive		Both	Both	High		✓	✓	
5. Improved road infrastructure	Positive		Indirect	Permanent	Moderate		✓	✓	
7. Capacity building and awareness campaigns benefits	Positive		Indirect	Temporary	Moderate		✓		
8. Benefits of engagement by both genders	Positive		Indirect	Temporary	Low		✓	✓	✓
9. Strengthening of local leadership structures	Positive		Direct	Permanent	Moderate	✓	✓		
10. Corporate Social Responsibility (CSR) benefits	Positive		Direct	Permanent	Moderate		✓	✓	
11. Relocation of project affected persons and property		Negative	Direct	Permanent	High	✓	✓		

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

12.	Reduction in farm land and loss of land use	Negative	Direct	Permanent	High	✓	✓	✓
14.	Concerns over Occupational Safety and Health	Negative	Direct	Permanent	High	✓	✓	
15.	Impact on flora and fauna	Negative	Direct	Permanent	High	✓	✓	✓
17.	Impact on soils	Negative	Direct	Temporary	Moderate	✓		
18.	Impact on drainage and water resources	Negative	Direct	Temporary	Low	✓		
19.	Visual and aesthetic impacts	Negative	Indirect	Temporary	Moderate	✓		✓
21.	Vehicular and human traffic impacts	Negative	Direct	Temporary	Moderate	✓	✓	✓
22.	Impacts from solid and liquid wastes	Negative	Direct	Temporary	Moderate	✓		✓
23.	Noise and vibration impacts	Negative	Direct	Temporary	Moderate	✓	✓	✓
24.	Rock blasting impacts	Negative	Direct	Temporary	High	✓		
25.	Emissions and air pollution	Negative	Direct	Temporary	High	✓		✓
26.	Perceived danger of electrostatic and magnetic force	Negative	Direct	Permanent	Low		✓	
28.	Impacts on wildlife habitats and migratory birds	Negative	Direct	Permanent	High	✓	✓	✓
29.	Risk of fire outbreaks	Negative	Direct	Permanent	Low	✓	✓	✓
30.	Impacts of decommissioning activities	Negative	Direct	Temporary	High			✓
31.	Increase in social vices	Negative	Direct	Permanent	Moderate	✓		✓

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Introduction

This Environmental and Social Management Plan (ESMP) provides a logical framework within which the negative environmental and social impacts identified during the ESIA study can be mitigated and the positive impacts enhanced. Monitoring and management practices as well as monetary compensation are considered and cost estimates included. Responsibilities and time frames for the implementation of the various aspects of the ESMP have been identified.

This ESMP shall be made available to the contractor to ensure that the environmental and social costs are factored into their costing. The contractor shall be required to come up with his own specific ESMP and work methods that will ensure safe construction of the project ensuring compliance to applicable HSE legislations and standards

The project proponent, China Aerospace Construction Group Company Limited, will be mandated with the task of ensuring full compliance to the ESMP's provisions

9.2 Environmental and Social Management Plan

9.2.1 Planning and Construction Phase

Table 9.1 Mitigation Measures at Planning and Construction Phase

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
Relocation of project affected persons and property	Compensate all the affected property and also loss of Livelihood	China Aerospace Construction Group Company Limited	Throughout the project implementation		
Impact on existing infrastructure	Where the line traverses above the existing railway line and the SGR, the proponent should adhere to Regulations for Power Line Crossings of Railway Tracks.	China Aerospace Construction Group Company Limited	Prior to project implementation	<ul style="list-style-type: none"> No. calamities throughout the existence of the railway lines 	
Impact of KPC structures	Rerouting at the section where it traverses above KPC pump station in Sultan Hamud	China Aerospace Construction Group Company Limited	Prior to project implementation	<ul style="list-style-type: none"> No. of complaints from the KPC station 	
Impact on land use patterns	<ul style="list-style-type: none"> Continuous community sensitization and awareness creation regarding the project. Compensation where necessary 	China Aerospace Construction Group Company Limited	Periodically, prior to project implementation	<ul style="list-style-type: none"> No. of complaints from the local community No. and minutes of consultative meetings held 	
Alteration of land ownership patterns	Full acquisition of the land is to be done and the owners adequately compensated at the substation site locations	China Aerospace Construction Group Company Limited	Prior to project implementation		
Occupational Health and Safety concerns	<ul style="list-style-type: none"> Continuous supervision of occupational, health and safety management by the contractor to ensure compliance Enlist a Health and Safety consultant to assist 	China Aerospace Construction Group Company Limited	Prior to and periodically throughout construction	Field Reports	Internal costs
Impact on flora and fauna	<ul style="list-style-type: none"> Ensure that vegetation clearing is 	China Aerospace	Routine inspection	<ul style="list-style-type: none"> Area of land (ha) 	

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
	<p>limited to the project area only</p> <ul style="list-style-type: none"> • Ensure that transportation of construction materials is done through the existing road infrastructure. • Manual clearing such as slashing is encouraged and use of machinery should be limited to excavation of the substation sites only. • Wildlife and environmental preservation awareness campaigns should be conducted on the construction workers to ensure that they do not exploit natural resources through hunting • On completion of the construction works, the area around the substation sites will be allowed to re-vegetate with indigenous species 	Construction Group Company Limited		<p>cleared</p> <ul style="list-style-type: none"> • Number and type of trees cut down • Number of indigenous trees planted • Species used to re-vegetate 	
Alteration of land ownership patterns	Full acquisition of the land is to be done and the owners adequately compensated at the substation site locations	China Aerospace Construction Group Company Limited	Prior to project implementation		
Employment of local labour	<ul style="list-style-type: none"> • Maximise use of local labour in execution of construction activities in which they are qualified for. • Involvement of local leaders in recruitment process 	China Aerospace Construction Group Company Limited	Throughout the construction phase	Percentage local workers employed as a percentage of total workforce	Contractors cost
Noise and vibration impacts	<p>Use of noise protection devices when working with noisy equipment</p> <p>The construction should be done during daytime (from 6 am to 6 pm) near residential areas to minimize noise impacts</p>	China Aerospace Construction Group Company Limited		Noise and vibration impacts	
Soil Erosion	<ul style="list-style-type: none"> • Employ appropriate pollution control measures 	China Aerospace Construction Group Company Limited	Daily Inspection	Status of ground cover in constructed areas	Contractor's cost

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
	<ul style="list-style-type: none"> Where soils excavated for pylon/gantry tower foundations will be found to be suitable, the same will be used for backfilling excavations and will not be left exposed to wind or water for long periods. Construction traffic to follow defined temporary access routes to be established as part of the works so as to avoid damaging the soil structure in the wider area. Repairs to access roads will be undertaken to maintain the surfacing and prevent soil erosion Areas exposed due to the removal of vegetation are more susceptible to erosion during heavy rainfall, so areas will be reinstated as soon as possible to minimize this effect. 				
Impact on water resources and drainage	<ul style="list-style-type: none"> Storage and transportation of oil, fuel and other hazardous material to be done in appropriate containers Training of site workers on handling of spillages Availing spillage kits including suitable PPE in storage areas Proper management of waste containers, litter and other waste generated during construction in compliance with waste management regulations 2006 Adherence to EMCA Regulations on water quality Routine inspection Maintenance records 	China Aerospace Construction Group Company Limited	Routine Inspection	Water quality tests Lack of spillages at active sites	Contractors at cost
Visual and aesthetic Impact	<ul style="list-style-type: none"> Extensive public consultation during the 	China Aerospace	Frequently	Minutes of public	

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
	<ul style="list-style-type: none"> planning of the substation sites After construction, natural vegetation should be restored in non-operational areas of the site and/or additional landscape planting with local indigenous species used to improve views into the site 	Construction Group Company Limited		<ul style="list-style-type: none"> consultations Number of trees planted 	
Impacts on Archaeology and Cultural Heritage	Carefully look into such sites during the RAP and construction period, with community consultations at every stage to ensure their preservation	China Aerospace Construction Group Company Limited	Prior to, and during construction	Information acquired from community consultations	
Vehicular and Human Traffic Impacts	<ul style="list-style-type: none"> Rehabilitation of roads Design of detours and diversions where necessary 	Contractor	Frequently	Status of access roads being used	
Impacts from Liquid and Solid wastes	<ul style="list-style-type: none"> Sensitization of workers on environmental protection and safety Provision of solid waste management facilities for the temporary storage and segregation of waste prior to disposal Liaison with the local County authorities on suitable dumping site for generated waste. Excavated soil to be used for backfilling if suitable 	China Aerospace Construction Group Company Limited	Daily Inspection	<ul style="list-style-type: none"> Site neatness Presence of waste collection receptors 	Contractor's cost
Noise and Vibration Impacts	<ul style="list-style-type: none"> Use of noise reduction technologies such as silencers/mufflers Provision of hearing protection devices for workers. Careful selection and use of plant and hours of working 	Contractor	Daily Inspection	<ul style="list-style-type: none"> Level of noise being generated Complaints received 	
Rock blasting impacts (If applicable)	<ul style="list-style-type: none"> The contractor should create awareness to adjacent communities and work closely with the local administration The contractor should provide safety signage, humps, banksmen Watering to suppress dust 	China Aerospace Construction Group Company Limited	As need arises	Records of successfully blasted areas without incidences, accidents or near misses	Contractors cost

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
	<ul style="list-style-type: none"> Ensuring proper blast design and driller-blaster communication Carry out inspection prior to loading and firing of the blast Controlling access to the blast area, and using a blasting shelter Use of an experienced driller to detect potential problem areas such as voids, mud seams, incompetent rocks, and other irregularities by observing the progress of drilling 				
Emissions and air pollution	<ul style="list-style-type: none"> Sensitization of workers on environmental protection and safety Control speed of construction vehicles Water should be sprayed during the construction phase on dusty excavated areas Regular maintenance of plant and equipment Provision of dust masks for use when working in dusty conditions Use of serviceable vehicles and machinery to avoid excessive smoke emission 	China Aerospace Construction Group Company Limited	Daily monitoring	<ul style="list-style-type: none"> Records of water sprinkling Records of machine and vehicle service 	Contractors cost
Increase in Social Vices	Continuous sensitization of community members and construction workers	China Aerospace Construction Group Company Limited	Frequently	Complaints from the community	

9.2.2 Operation Phase

Table 9.2 Mitigation Measures at Operation Phase

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
Concerns over Occupational Safety and Health	<ul style="list-style-type: none"> Ensuring physical integrity of structures is maintained Deactivating and proper grounding of live power distribution lines before work is performed on, or in close proximity to the lines Ensuring that live wire work is conducted by trained workers only Ensuring the workers are properly isolated and insulated from any conductive object (live – line work) 	China Aerospace Construction Group Company Limited	Project period	Accidental statistics	Operation cost
	<ul style="list-style-type: none"> Testing of structures for integrity prior to undertaking work Implement a fall protection program that includes training in climbing techniques and use of fall protection measures Inspection, maintenance and replacement of fall protection equipment Use of helmets and other protective devices Provision of first aid facilities at site 	China Aerospace Construction Group Company Limited	Frequently	<ul style="list-style-type: none"> PPE records Use of proper PPE 	Contractors cost
<ul style="list-style-type: none"> Rehabilitation of roads Design of detours and diversions where necessary 	Contractor	Frequently	Status of access roads being used		<ul style="list-style-type: none"> Rehabilitation of roads Design of detours and diversions where necessary
Impacts from Solid and Liquid Wastes	Waste generated during the day to day operation of the substations should be properly managed	China Aerospace Construction Group Company			

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
		Limited			
Noise and Vibration Impacts	Nil	China Aerospace Construction Group Company Limited			
Perceived Danger of Electrostatic and Magnetic force	There should be no potential health risks for people living outside of 30 m provided for the wayleave area	China Aerospace Construction Group Company Limited	During RAP		
Impacts on Aircraft Navigation	The maximum height of the tower structures should be in accordance with the requirement of the Kenya Civil Aviation Authority (KCAA).	Contractor/ China Aerospace Construction Group Company Limited	During design		Nil additional cost – part of basic design requirement
Impacts on Wildlife Habitats and Migratory Birds	<ul style="list-style-type: none"> Undertake wire marking to alert birds to the presence of power line Build raptors platforms on top of pylons for roosting and nesting 	China Aerospace Construction Group Company Limited	Prior to final commissioning or as appropriate	Cases of bird mortalities	Nil additional cost – part of basic design requirement
Risk of Fire Outbreaks	<ul style="list-style-type: none"> Carry out routine thinning, slashing, and other maintenance activities, within the substation sites No burning of any materials should be permitted at the site 	China Aerospace Construction Group Company Limited	Project life time	Accident statistics	Operation cost

9.2.3 Decommissioning Phase

Table 9.3 Mitigation Measures at Decommissioning Phase

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
Concerns over Occupational Safety and Health	<ul style="list-style-type: none"> Use site barrier tapes to isolate the site and bar intruders from accessing the area in case of a dropping object Test structures for integrity prior to undertaking work Implement a fall protection program that includes training in climbing techniques and use of fall protection measures Inspection, maintenance and replacement of fall protection equipment Use of helmet and other protective devices Provision of first aid facilities at the site 	China Aerospace Construction Group Company Limited	Daily Inspection	<ul style="list-style-type: none"> Medical records and training records Use of proper PPE 	Contractors cost
Vehicular and Human Traffic Impacts	<ul style="list-style-type: none"> Rehabilitation of roads Design of detours and diversions where necessary 	Contractor	Frequently	Status of access roads being used	
Impacts from Solid and Liquid Wastes	<ul style="list-style-type: none"> Sensitization of workers on environmental protection and safety Provision of solid waste management facilities for the temporary storage and segregation of waste prior to disposal Liaison with the local County authorities on suitable dumping site for generated waste. Excavated soil to be used for backfilling if suitable 	China Aerospace Construction Group Company Limited	Daily Inspection	<ul style="list-style-type: none"> Site neatness Presence of waste collection receptors 	Contractor's cost
Noise and Vibration Impacts	<ul style="list-style-type: none"> Provision of hearing protection devices when working with noisy equipment Use of serviceable equipment with low noise emission Instruction to truck and machine operators to avoid 	China Aerospace Construction Group Company Limited	Regular inspection	Records	Contractors cost

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Potential Impact	Mitigation and Enhancement Measures	Responsibility	Implementation Timeline	Verifiable Indicators	Estimated Costs (KSh)
	raving of engines				
Emissions and air pollution	<ul style="list-style-type: none"> Control speed of construction vehicles Water shall be sprayed during the decommissioning phase to reduce dust emission Provision of dust masks for use while working in dusty conditions Use of serviceable vehicles and machinery to avoid excessive smoke emission 	China Aerospace Construction Group Company Limited	Periodic inventory of personal protective equipment	Decommissioning plan Records	Contractors cost
Increase in social vices	Continuous sensitization of community members and construction workers	China Aerospace Construction Group Company Limited	Frequently	Complaints from the community	
Decommissioning Impacts	<ul style="list-style-type: none"> Buildings to be demolished where reuse not appropriate Re use materials where appropriate Remove all plant and equipment Remove all solid and liquid wastes Remove all access roads; Re-vegetate sites 	China Aerospace Construction Group Company Limited	Daily inspection	<ul style="list-style-type: none"> Demolition records Rehabilitated project area 	Contractors cost

9.3 Monitoring

Environmental monitoring is an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measures, as they are required. It helps to anticipate possible environmental hazards and/or detect unpredicted impacts over time.

Monitoring includes:

- Visual observations;
- Selection of environmental parameters;
- Sampling and regular testing of these parameters

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that they are effective. Environmental and social monitoring will also enable response to new and developing issues of concern. The activities and indicators that have been recommended for monitoring are presented in the ESMP.

Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The contractor shall employ an officer responsible for implementation of social/environmental requirements. This person will maintain regular contact with China Aerospace Construction Group Company Limited's Environmental Officers and the County Environmental Officers and KETRACO. The contractor and the proponent have the responsibility to ensure that the proposed mitigation measures are properly implemented during all phases of the project.

The environmental monitoring program will operate through the construction, operation and decommissioning phases of the project. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment.

Periodic ongoing monitoring will be required during the life of the Project and the level can be determined once the proposed substation projects are operational.

9.3.1 Internal Monitoring

The responsibility to conduct time to time internal monitoring of the proposed projects on ESMP management and HSE clauses provided in the contract lays with the proponent. The evaluation of compliance level to HSE management will be guided by a detailed ESMP programme approved by China Aerospace Construction Group Company Limited.

The objective of internal monitoring and audit will be:

- To identify gaps in implementation of the ESMP by the contractor
- Ensure compliance to legal requirements provided in EMCA 1999
- Guide the contractor's management of HSE requirements from time to time where unforeseen impacts are encountered

The proponent will continue the monitoring process during the operation and decommissioning phases of the projects ensuring that the minimum allowable Environmental parameters are maintained. These parameters include,

1. Workforce Training

The contractor shall monitor induction of workers to ensure they are adequately trained on HSE management on top of the specific skills required for their job description. The proponent should monitor induction training and tool box talks records regularly. The contractor shall also train site specific HSE supervisors to enforce the trainings.

2. Monitoring of Accidents Prevention/ Health Management

The Proponent will procure services of an independent environmental, health and safety (HSE) consultant to undertake frequent audits on the contractor during project implementation. The consultant will undertake regular site inspection visits (frequency shall be agreed upon with China Aerospace Construction Group Company Limited) to monitor how the contractor is managing his work force and activities with regard to accident prevention and health management.

The contractor's safety manager on the other hand shall ensure that appropriate safety signage and personal protective equipment is availed to the construction workers at all times.

Indicators that will be used in evaluation of accident prevention and health risks management includes;

- Provision of adequate personal protective equipment to workers at all phases of the project
- Presence of displayed safety warning signs and markings at active sites and on tower structures on completion
- Adequate human waste disposal and sanitation facilities are present at active sites
- Community awareness on safety risks associated with the project
- Compiled records of actual accidents/ incidences that have been encountered
- Report health cases that are related to the project

3. Soil Erosion and Conservation Monitoring

Construction activities such excavations and transportation of construction materials within the project areas may lead to loosen soil structure thereby resulting in erosion. The contractor will be responsible for ensuring that appropriate soil conservation and erosion prevention measures are practiced throughout the construction phase.

4. Noise Levels Monitoring

Emission of noise is expected during the construction phase. Major sources of noise will be from machinery such as excavators. However, the noise levels may not be an issue as emission is site specific and low Regular monitoring of these noise levels should be conducted to ensure that they

recommended limits are not exceeded. Consultation with the PAPs will aid in establishing the extent of this impact

5. Air Quality Protection

Dust and emissions from machinery should be monitored by the contractor and adequate measures employed in ensuring air quality. This will include watering down of active sites/ roads and other areas generating the dust or maintenance of machinery with excessive smoke emissions. In addition, where excessive wind is observed, dust generating activities can be halted for some time.

6. Solid and Liquid Waste Management Monitoring

Monitoring of waste generated at both the site and workers campsite during the construction phase shall be done by the contractor's HSE manager. He will ensure that;

- Records of the type and waste amounts generated at the sites is kept
- Adequate and separate waste management facilities are provided at each site. The equipment shall be such that it aids in waste segregation
- All generated waste is bound to the specific sites boundary and littering of the environment is discouraged
- Human waste disposal facilities are provided at each site
- Collected waste is properly disposed away from site at dumping sites approved by the local county government

9.3.2 External Monitoring

The Kenyan government's environment management body NEMA shall issue approval for the implementation of the proposed project. Moreover, it shall ensure that the provided mitigation measures are implemented in implementation of the project. NEMA shall offer oversight of the implementing bodies through review of monitoring reports. The proponent shall therefore provide the agency with annual progress reports on environment, health and safety management

9.3.3 Environmental Audits (EA)

Environmental audits during all phases of the project implementation are key in ensuring full compliance to ESMP requirements. The goal of EA will be to establish if the proponent are complying with environmental requirements and enforcing the existing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. The Consultant recommends that an independent consultant will be sourced to oversee environmental management throughout the construction phase and during the operational phase and decommissioning phase. He will provide Environmental audits in line with NEMA's requirement.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The construction of the 120km Sultan-Hamud to Loitoktok, 132kV Transmission line and the associated substations will enhance power supply to Merrueshi and Loitoktok towns and its environs. The current line 33kV line providing power to the project area is not reliable. Other benefits of the project will include employment, increased revenue and improved livelihood. The negative impacts are of temporary nature majorly during the construction phase and can be managed by implementation of the recommended mitigation measures.

10.2 Recommendations

Licence: All the negative impacts identified can be mitigated, and will restore the ecosystem to near or original state. We thereby recommend that the proponent should be licenced by NEMA to continue with the construction of the Proposed project

Resettlement Action Plan (RAP): A comprehensive Resettlement Action Plan should be conducted by the proponent to identify those who will be affected by the proposed project and compensate them accordingly.

Mitigation Measures: Mitigation measures outlined in this report should be adhered to and the Environmental and Social Management Plan (ESMP) implemented to the letter. The implementation of this ESMP will be key in achieving the appropriate environmental management standards as detailed in this report

Annual environmental audits: China Aerospace Construction Group Company Limited should undertake annual environmental audits (EA) of the project after completion to confirm the efficiency and adequacy of ESMP

Monitoring: The impacts of the proposed project should be monitored closely by the Proponent in collaboration with NEMA and Environment and Health & Safety Department at China Aerospace Construction Group Company Limited and KETRACO

The Consultant recommends that an **independent consultant** will be sourced to oversee environmental management throughout the construction phase and during the operational phase and decommissioning phase. He will provide Environmental audits in line with NEMA's requirement

Re-routing of Transmission line at critical areas: The proposed transmission line should be relocated or redesigned to minimise negative impacts where it crosses the Kenya Railway Line and Standard Gauge Railway. The line also traverses overhead of the Kenya Pipeline Company (KPC) Pump Station 7 in Sultan Hamud. Re-routing at this area should be considered.

The proponent should work closely with community leaders, group ranches and KWS to ensure smooth implementation of the project

11.0 REFERENCES

- Callaway, R., & Aschehou, E. (2000). Invasive plants versus their new and old neighbors: a mechanism for exotic invasion. *Science*, 521-523.
- Chesson, P. (2000). Mechanism for maintenance of species diversity. *Annual Review of Ecological System*, 13:343-366.
- Chesson, P., & Huntly, N. (1997). The roles of harsh and fluctuating conditions in the dynamics of ecological communities. *American Naturalist*, 519-553.
- GoK. (2010). *The Kenyan Constitution*. Nairobi: Government Printer.
- Kajiado County Government. (2013). *Kajiado County Integrated Development Plan, 2013-2017*.
- Kenya Gazette Supplement Acts. (2000). *Environmental Management and Coordination Act Number 8 of 1999*. Nairobi: Government Printer.
- Kenya National Bureau of Statistics. (2009). *Kenya Population and Housing Census*. Nairobi: Government Printer.
- Kenya National Bureau of Statistics(KNBS). (2015). *Statistical Abstract 2015*. Nairobi: Government Printer.
- KETRACO. (2012). *Feasibility Study for Kenya Power Transmission Improvement Project, Assignment III*. Nairobi: Norconsult.
- Norconsult. (2012). *Feasibility Study Report: Kenya Power Transmission Improvement Project*.

12.0 APPENDICES

12.1 Key Informant Interview Guide

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok, 132kV Transmission Line and Associated Sub-stations (120km)

SECTION A: INTRODUCTION

Thank you for consenting to the Interview. We are a team from Log Associates. We have been contracted by the **Kenya Electricity Transmission Company Limited (KETRACO)** to conduct an **Environmental & Social Impact Assessment of the Proposed Sultan-Hamud-Loitoktok, 132kV Transmission Line and Associated Sub-stations (120km)**. Your contribution will help us identify direct and indirect potential project impacts (negative and positive) expected from project implementation.

SECTION B: KEY QUESTIONS FOR EACH STAKEHOLDER

a) Kenya Wildlife Service

- i). Animal species in the project area
- ii). Bird species in the project area
- iii). Anticipated impacts of the project on the animal/bird species in the area
- iv). Possible projects impacts
- v). Proposed mitigation measures

b) Kenya Civil Aviation Authority (KCAA)

- i). Airstrips within the project area
- ii). Security concerns in civil aviation
- iii). Key concerns as a result of construction and operation of the proposed Transmission Line and Associated Substations.

c) Kenya Forest Services

- i). Tree species in the project area
- ii). Endangered species in the area
- iii). Likely impacts of the project on the tree species in the project area
- iv). Possible project impacts
- v). Mitigation measures for the impacts

d) Department of Mines and Geology Kenya

- i). What is your mandate in relation to Mines and Geology in Kenya?
- ii). Types of minerals available in the proposed project area
- iii). Specific areas where minerals deposits are likely to be found within the proposed project area
- iv). Challenges associated with mineral deposits during construction of transmission lines
- v). What measures are you taking to ensure protection of mines and minerals in this area

e) County Administration

- i). Project area background
- ii). Area social economic activities
- iii). Viable alternatives of economic activities in the area
- iv). Level of security in the project area
- v). Proposed project impacts on the socioeconomic activities in the area
- vi). Institutions within the project area (socio amenities, schools, business premises)
- vii). Proposed mitigation measures

f) County Agricultural Officer (Ministry of Environment, Water and Natural Resources)

- i). Types of crops grown (subsistence and cash crops)
- ii). Methods of farming used
- iii). Likely impacts of the proposed project on farming in the area
- iv). Proposed mitigation measures

g) County Livestock Officer (Ministry of Agriculture, Livestock and Fisheries)

- i). Livestock found in the area
- ii). Possible impacts of the project on livestock production
- iii). Likely impacts of the project on meat production
- iv). Likely impacts of the project on dairy production
- v). Likely impacts of the project on range management
- vi). Proposed mitigation measures

h) County Officer for Sports, Culture and the Arts

- i). Areas of heritage likely to be affected by the project

- ii). Likely impacts on those areas
- iii). Proposed mitigation measures
- i) County Environmental Officer (National Environment Management Authority)**
 - i). Level of environmental conservation in the area
 - ii). Extent of environmental degradation in the area
 - iii). Impacts of the proposed project on environment
 - iv). Proposed mitigation measures
- j) Ministry of Devolution and Planning**
 - i). How the project is likely to affect the following?
 - Tourism
 - Agriculture
 - Health
 - Environment
 - Housing and urbanization
 - Energy
 - ii). Proposed mitigation measures for the likely impacts
- k) Kenya Agriculture and Livestock Research Organization (KALRO)**
 - i). Types of crops are cultivated in the area
 - ii). Likely impacts of the project on the following:
 - Animal health
 - Animal production
 - Food crops
 - Horticultural crops
 - Natural Resource management
 - Range management
 - iii). Proposed mitigation measures
- l) Water Resources Management Authority (WRMA)**
 - vi). Water sources are available in the area
 - Groundwater sources
 - Surface water sources
 - vii). Likely impacts of the project on
 - Groundwater sources
 - Surface water sources
 - viii). Likely impacts of the project on water quality in the area

- ix). Proposed mitigation measures
- m) National Environment Management Authority (NEMA)**
 - i). Level of environmental conservation in the area
 - ii). Extent of environmental degradation in the area
 - iii). Impacts of the proposed project on environment
- n) Non-Governmental Organizations**
 - i). Social, political and economic challenges in the project area
 - ii). Impacts of the project in the area
 - iii). Proposed mitigation measures for those impacts

12.2 Public Participation Guide

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok, 132kV Transmission Line and Associated Sub-stations (120km)

Public Consultation Guideline

SECTION A: INTRODUCTION

Thank you for consenting to the meeting. We are a team from Log Associates. We have been contracted by the **Kenya Electricity Transmission Company Limited (KETRACO)** to conduct an **Environmental & Social Impact Assessment of the Proposed Sultan-Hamud-Loitoktok, 132kV Transmission Line and Associated Sub-stations (120km)**. Your contribution will help us identify direct and indirect potential project impacts (negative and positive) expected from project implementation.

SECTION B: KEY QUESTIONS

1. Extent of knowledge about the project
2. Concerns or reservations they have about the project on: -
 - Land
 - Livestock
 - Forests
 - Wildlife
 - Water sources
 - Natural Habitats
 - Local communities
 - Others (Specify)
3. Socio-economic activities in the region
4. Anticipated project benefits to the community/viable economic activities on the affected area
5. Physical and Social amenities in the area likely to be affected by the project implementation
6. Community views and complaints regarding the project
7. Envisaged projects impacts (On Environment)
8. Proposed mitigation measures
9. Suggestions on a way forward for the smooth implementation of the project

SECTION C: VOTE OF THANKS

Vote of thanks to the participants by the consultant

12.3 Household Questionnaire

Household Socio-Economic Questionnaire

Questionnaire No.

--	--	--

SECTION A INTRODUCTION

Hello. My name is []. I am working with Log Associates. We have been subcontracted by the **China Aerospace Construction Group Corporation Limited (CACGA)** who have been contracted by **Kenya Electricity Transmission Company Limited (KETRACO)** to conduct an **Environmental and Social Impact Assessment Study for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and its Associated Sub-stations**. This study will help us obtain information that will be used to identify potential socioeconomic impacts of the proposed project.

Name of Respondent	_____	County	_____
Respondent Contact	_____	Sub-county	_____
Respondent ID No.	_____	Division	_____
Date of Interview	_____	Location	_____
Name of Interviewer	_____	Sub Location	_____
Supervisor	_____	Village	_____

(NOTE: This questionnaire shall be administered only to the household head or any other responsible adult person in the household at the time of the survey)

SECTION B DEMOGRAPHIC DATA

B1	B2	B3	B4	B5	B6
Sex of respondent 1. Male 2. Female	How old are you (yrs)? 1. < 18 yrs 2. 18 – 25 yrs 3. 26 – 35 yrs 4. 36 – 45 yrs 5. 46 – 60yrs 6. Above 60 yrs	What is your marital status? 1. Married (No. of Spouses) 2. Widowed 3. Divorced 4. Separated 5. Never Married (99) Others(Specify)	Do you have any children under the age of 18 yrs? 1. Yes 2. No >> B6	If yes, how many?	What is the highest level of education you attained? 1. Pre-primary 2. Primary 3. Secondary 4. College 5. University 6. Never Attended (99) Others (Specify)
B7		B8	B9		
How long does it take to get to the nearest school? 1. < 20 mins 2. 21 – 40 mins 3. 41 – 60 mins 4. Over 1 hour		What type of house you dwell in? 1. Permanent 2. Semi-Permanent 3. Temporary	What materials have you used to build the house?		
			Walls 1. Wood & mud 2. Stones & mud 3. Stones & cement 4. Cement blocks 5. Wood poles 6. Bricks (99) Others (Specify)	Roof 1. Mud 2. Thatch 3. Iron Sheet 4. Tin 5. Poles 6. Polythene 7. No roof (99) Others (Specify)	

SECTION C HEALTH AND VULNERABILITY

C1	C2	C3	C4	C5
How long does it take to get to the nearest health centre? 1. < 20 mins 2. 21 – 40 mins 3. 41 – 60 mins 4. Over 1 hour	Do you have any member of your household who is disabled? 1. Yes 2. No	What is the nature of disability? 1. Lame 2. Blind 3. Deaf 4. Dumb 5. Crippled 6. Crossed eyes 99. Others	Has any member of your household been ill within the last four months? 1. Yes 2. No	If yes, what is/was the member suffering from? 1. Malaria 2. Flu/Cough 3. Stomach disorders 4. Diarrhoea 5. Cholera 6. Headaches 7. Chronic Illness 8. Other (Specify)

NB:-Chronic illnesses include Ulcers, Sickle Cells, Cancer, Diabetes, Asthma, High Blood Pressure, Tuberculosis, and HIV/AIDS.

SECTION D WATER & SANITATION

D1	D2	D3	D4
What is your main source of water for domestic use? 1. Dam 2. Water pans 3. Piped water supply 4. Boreholes 5. River/Stream 6. Shallow Well 7. Water Kiosks (99) Other(Specify)	How long does it take to get to the nearest water source from your homestead? 1. < 20 mins 2. 21 – 40 mins 3. 41 – 60 mins 4. Over 1 hour	How do you ensure water for household use is safe? 1. Boiling 2. Filtering 3. Decanting 4. Use of Chemicals 99. Others	Do you have a toilet within your compound? 1. Yes 2. No>>>D6

D5	D6
<p>If Yes in D4 above, what type is it?</p> <ol style="list-style-type: none"> 1. VIP latrine 2. Simple latrine 3. Flush toilet 99. Others 	<p>If No how do you dispose of human waste?</p> <ol style="list-style-type: none"> 1. Neighbours Toilet 2. Bush 3. Burying within compound 99 Others

SECTION E INCOME & LIVELIHOOD

E1	E2	E3	E4
<p>Do you own any land?</p> <ol style="list-style-type: none"> 1. Yes 2. No>>>>E3 	<p>If Yes, what is the size?</p> <ol style="list-style-type: none"> 1. < 1 acres 2. 1 - 2.5 acres 3. 2.6 – 4 acres 4. 4.1 – 5 acres 5. Above 5 acres 	<p>What is your main source of income?</p> <ol style="list-style-type: none"> 1. Crop Farming 2. Livestock keeping 3. Bee Keeping 4. Poultry Farming 5. Formal Employment 6. Charcoal production 7. Trading/Businessman (Specify) 	<p>Name any other income generating activities practiced.</p>

E4	E5	E6	E7																																				
Do you practice crop farming? 1. Yes 2. No>>>E7	If Yes, which crops do you cultivate? <table border="1" data-bbox="651 379 1108 1005"> <tr><td>Cassava</td><td></td></tr> <tr><td>Millet</td><td></td></tr> <tr><td>Sorghum</td><td></td></tr> <tr><td>Maize</td><td></td></tr> <tr><td>Onions</td><td></td></tr> <tr><td>Beans</td><td></td></tr> <tr><td>Vegetables</td><td></td></tr> <tr><td>Tomatoes</td><td></td></tr> <tr><td>Others</td><td></td></tr> </table>	Cassava		Millet		Sorghum		Maize		Onions		Beans		Vegetables		Tomatoes		Others		How much do you get per acre/annum? <table border="1" data-bbox="1122 379 1579 1005"> <tr><td>Cassava</td><td></td></tr> <tr><td>Millet</td><td></td></tr> <tr><td>Sorghum</td><td></td></tr> <tr><td>Maize</td><td></td></tr> <tr><td>Onions</td><td></td></tr> <tr><td>Beans</td><td></td></tr> <tr><td>Vegetables</td><td></td></tr> <tr><td>Tomatoes</td><td></td></tr> <tr><td>Others</td><td></td></tr> </table>	Cassava		Millet		Sorghum		Maize		Onions		Beans		Vegetables		Tomatoes		Others		Do you practice animal farming? 1. Yes 2. No
Cassava																																							
Millet																																							
Sorghum																																							
Maize																																							
Onions																																							
Beans																																							
Vegetables																																							
Tomatoes																																							
Others																																							
Cassava																																							
Millet																																							
Sorghum																																							
Maize																																							
Onions																																							
Beans																																							
Vegetables																																							
Tomatoes																																							
Others																																							

E8	E9								
If Yes, which animals do you keep? <table border="1" data-bbox="174 1201 1102 1366"> <tr><td>Goats</td><td></td></tr> <tr><td>Sheep</td><td></td></tr> <tr><td>Cattle</td><td></td></tr> <tr><td>Carmel</td><td></td></tr> </table>	Goats		Sheep		Cattle		Carmel		What is the nature of your business?
Goats									
Sheep									
Cattle									
Carmel									

Poultry		
Others		

The end

Thank you for your time

12.4 List of Key Stakeholders Consulted

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Key Informant Interview List

No.	Name	Designation	County/Department	Contacts	Signature
1.	John W. Kamani	COUNTY ENVIRONMENT OFF Chief Officer	Kajiado	0722850205	[Signature]
2.	Titus S. Kooze	Roads + Public Works	Kajiado	0721285719	[Signature]
3.	PHILIP K. MATHU	WARD Agric. Extn officer	Imariro Ward Kajiado	0723419521	[Signature]
4.	ERNEST M. NJOGHOLO	WARD Agric Extn. Officer	Kimana - Imbirikani/Esalenkel	0727808005	[Signature]
5.	Silas Kipngetch	WARD Crops Officer	Kimana / Imbirikani/Esalenkel	0723954715	[Signature]
6.	Sam NJUGUWA	WARD Livestock Off. officer	Kimana/ Imbirikani	0724485898	[Signature]
7.	PHILIP K. RONO	WARDEN	KWS	0720697708	[Signature]
8.	HUSSEIN AHMED	FOREST RANGER	K.F.S	0706242312	[Signature]
9.	NARI MUIJO	SUB-COUNTY Edu. Officer	EDUCATION	0710324127	[Signature]
10.	DANIEL MEBE	MBIRIKANI GR Chairman	MBIRIKANI GR	0721291350	[Signature]
11.					
12.					
13.					

Key Informant Interview List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Key Informant Interview List

No.	Name	Designation	County/Department	Contacts	Signature
1.	JONATHAN OSEUR	N.R.O	ENVIRONMENT	0722579765 0722579765	
2.	Fredrick O. Ndiga	Forester	KFS	0713763313	
3.	PARETO B.H.	Forester Loitoktok	KFS	0722884504	
4.	MART MEITO	Edu. officer	Education	0710334127	
5.	SUSAN KINUITHIA	AET officer	AET	0712738607	
6.	CECILIAH M. MTELUBO	Adult STAFF	DIRECTORATE	0703615208	
7.	L. OLE LEPAU	B/man	-	072147479	
8.	NTAWASA OLE MEIBUKO	B/man		0723211324	
9.	JOSEPH OLE TISHO	B/man		0716794652	
10.	KIRAPASH LEPAU	TREA/Kimani Community		0726555698	
11.	MILLO OLOSTIMEMAI	Chief	Kimana Loc	071269968	
12.	JOHAN MBAA	Kimana Div. chairman	Kimana	0718600490	
13.	Raphad Kaleyia	Kimana chairman	Chief advisory committee Loc	0728801261	

Key Informant Interview List

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitokitok 120KM, 132kV Transmission Line and its Associated Sub-stations

Key Informant Interview List

No.	Name	Designation	County/Department	Contacts	Signature
1.	ABDIRISAK JALU ETI	DCC	INTERIOR MINISTRY	0728552519	
2.	SHADRACK MUDONYANG	A.C.C	INTERIOR	0723 073981	
3.	EDWIN S. OKEMWA	A.C.C	INTERIOR	0711136030	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					

Key Informant Interview List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitokitok 120KM, 132kV Transmission Line and its Associated Sub-stations

Key Informant Interview List

No.	Name	Designation	County/Department	Contacts	Signature
1.	Stephen Nyakwisi	Alcayim	Mashuru	0721-862685	[Signature]
2.	Richard ole Peino	Chief	Mashuru	0721058428	[Signature]
3.	Elijah H. Paniki	Alcay	Emali	0720919754	[Signature]
4.	Julius SUTANIKU	CHIEF	IMBIMLO	0728670557	[Signature]
5.	PAUL Z. KISEMET	Asst/Chief	KUNCHU	0726563517	[Signature]
6.	TIMOTHY K. SAHILU	CHIEF	ISIMET	0727619776	[Signature]
7.	SAMUEL N. MAYON	CHIEF	MERRUESHI	0724333411	[Signature]
8.	Joseph Ntupo	Chief	Imbirakam	0721199781	[Signature]
9.	JOHN LALATO	SAR CHIEF	KIMARA	0722138365	[Signature]
10.					
11.					
12.					
13.					

Key Informant Interview List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Key Informant Interview List

No.	Name	Designation	County/Department	Contacts	Signature
1.	O. N. NYECHIA	Ag P/O AS	KPC	0722324688	
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					

Key Informant Interview List



12.5 Minutes of Consultative Meetings

12.5.1 Minutes of Poka Location Baraza - Game

Minutes from the Poka Location Public Baraza on 29th/June/2016 at 6.00 pm in Gem

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 1/2016: Opening Remarks

The meeting was called to order by the Chief, Mr. Elijah N. Parikei at 6.00 pm and was opened by a word of prayer by a community member. The Chief later introduced the consultant to address the members. The figure below shows a section of members of public who were in attendance.



Plate 12.1 Poka Location Public Consultation Meeting

Min 2/2016: Team & Project Introduction

The consultant introduced the project and the ESIA study of the proposed transmission line to the members elaborating its objectives and the role of communities and leaders in development projects.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 3/2016: Concerns, comments and questions from the community members

Knowledge of the Project

A part of the community was aware of the difference between electricity transmission lines and distribution lines. After elaboration from the consultant, the members understood what the project was all about.

Socio-economic activities in the region

The major economic activity practiced in the area is livestock keeping; the animals kept include cattle, goats, donkey, bees, camels and sheep. Few individuals also practice crop farming as a way of boosting their primary income.

Envisaged project benefits

The community appreciated the fact that the project would boost the level of development in the area and provide employment opportunities.

Envisaged negative impacts

Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Proposed Mitigation Measures

Safety gear should be provided to the community members who will be employed on site to minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately.

The community will liaise hand in hand with the contractors / proponent at all stages of the project.

Compensation

The community asked for adequate compensation for the loss of their grazing land. Adequate compensation will be required for the structures that would be demolished to pave way for the transmission line. The Community also requested for compensation of trees that will be cut during construction. They said that they use the Indigenous trees in the area for making medicine and ornaments for cultural events. Unskilled employment opportunities should be reserved for community members.

Corporate Social Responsibility

As part of KETRACO's Corporate Social Responsibility efforts, community members recommended that water projects such as boreholes or water pans be constructed to serve the area.

Min 3/4/2014: A.O.B

The community recommended for a compensation of two trees for every one that will be fell. They also recommended that the proponent makes a tree nursery for every location in measures to conserve the environment. They then assured the consultant that manning of the trees will be their responsibility to full maturity.

Adjournment

The meeting was adjourned with vote of thanks from the chief and the consultant. The meeting closed with a word of prayer from a community member. The list of attendance is attached here in below.

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 29/06/2016 Time: 6pm Venue: POKA LOCATION

NO.	Name	ID No.	Contacts	Signature
1.	RICHARD ORE PEINO	9209963	0721558423	
2.	ELIJAH N. PARIKEI	12951695	0704281300	
3.	SAMUEL KENTURAI	9656991	0710777384	
4.	Kolokuh Leonard	12652341	0729762436	
5.	Wilson Leskadad	9208032	0713589954	
6.	Godfrey Kipanda	11529386	0712251590	
7.	Daniel Ketukei	1349455	0711230050	
8.	PETER MPAASHIE	5304311	0704267034	
9.	JOSEPH & NIKUISUMA	75069546	0716815816	
10.	PETERSON KONCHELLA	28061390	07101055518	
11.	SHAKVA MAMAYIO	22563253	0729141310	
12.	TEREMIAH KURENTE	28532323	0726690936	

Public Participation Attendance List

ELIJAH N. PARIKEI
 AREA CHIEF, POKA SUB-LOCATION
 POKA-LOCATION
 P.O. Box 619 - EMAIL
 Date:.....



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13.	NICKSON Sitalu		0724349757	
14.	Bernard Makau	26060829	0721572915	
15.	John Lehrs		0723983849	
16.	Sammy Kipambi	0089906	0728817187	
17.	David mapeng	12951025	0727215970	
18.	Danielle KIPAMBI	6116912	0712410823	
19.	JEREMIAN UKANIA	6116938	0705647724	
20.	Simon Rukore	26038088	0728029461	
21.	LORIS OWE KANARE	12950957	0702734625	
22.	ANDREW MURRAY	12150418	0712337194	
23.	Benjamin Ntiliga	25062488	0723065120	
24.	Robert Kaata	23783242	0723888985	
25.				
26.				

Public Participation Attendance List

ELIJAH
ASST CHIEF
P.O. Box 219 - EMALI
Date:.....

LOG
Associates

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 29/06/2016 Time: 6pm Venue: POKA LOCATION

NO.	Name	ID No.	Contacts	Signature
1.	REMBEN MAKU	24255409	0725973562	
2.	DEHMU KARERA	0724714650		
3.	ALLAN JEREMAH	0716828736		
4.	Gideon Kitishu	0726372063		
5.	DANIEL KIPILOBH			
6.	PETER KOTIKASH	01345920		
7.	PS. STEPHEN M. KIPANUA	11385283	0720522498	
8.	MATIKO SANTI	12951022	0706445627	
9.	JACOB LUMASU KIPILSH	22584855	0729862618	
10.	BERNARD SAKATION	24375378	0714787003	
11.				
12.				

Public Participation Attendance List

ELIJAH N. PARTKI
ASST CHIEF, SMALL SUB-LOCATION
POKA - LOCATION
P.O. Box 219 - NGALE
Date:



12.5.2 Minutes of Imbuko Location Public Baraza - Isara

Minutes from the Imbuko Location Public Baraza on 30th/June/2016 at 10:56 am at Isara Shopping Center Chief's office

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 1/2016: Opening Remarks

The meeting was called to order by the Chief, Mr. Julius K. Suyianka at 11:00 am and was opened by a word of prayer by a community member. The Chief later introduced his assistant Mr. Paul Kisemei before calling on the consultant to address the members. The figure below shows a section of members of public who were in attendance.



Plate 12.2 Imbuko Location Public Consultation Meeting

Min 2/2016: Team & Project Introduction

The consultant introduced the project and the ESIA study of the proposed transmission line to the members elaborating its objectives and the role of communities and leaders in development projects.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive

and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 3/2016: Concerns, comments and questions from the community members

Knowledge of the Project

A part of the community was aware of the difference between electricity transmission lines and distribution lines. After elaboration from the consultant, the members understood what the project was all about.

Socio-economic activities in the region

The major economic activity practiced in the area is livestock keeping; the animals kept include cattle, goats, donkey, bees, camels and sheep. Few individuals also practice crop farming as a way of boosting their primary income.

Envisaged project benefits

The community appreciated the fact that the project would boost the level of development in the area and provide employment opportunities.

Envisaged negative impacts

Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Proposed Mitigation Measures

Safety gear should be provided to the community members who will be employed on site to minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately.

All grave yards will be protected and no pylon will be put on top of a grave.

Compensation

The community asked for adequate compensation for the loss of their grazing land. Adequate compensation will be required for the structures that would be demolished to pave way for the transmission line. The Community also requested for compensation of trees that will be cut during construction. They said that they use the Indigenous trees in the area for making medicine and ornaments for cultural events. Unskilled employment opportunities should be reserved for community members.

Corporate Social Responsibility

As part of KETRACO's Corporate Social Responsibility efforts, community members recommended that water projects such as boreholes or water pans be constructed to serve the area.

Min 3/4/2014: A.O.B

The consultant mentioned that the event was part of full ESIA study and that the consultant would incorporate issues discussed in the full ESIA study report.

Adjournment

The meeting was adjourned with vote of thanks from the chief and the consultant. The meeting closed with a word of prayer from a community member. The list of attendance is attached here in below

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 30 June 2016 Time: 10:30 AM Venue: Imbuko Location (Kisumu S/C) Chief's Office

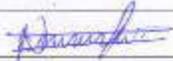
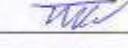
NO.	Name	ID No.	Contacts	Signature
1.	AARON MUTISYA	28294527	0725646925	
2.	Julius Suyianka	12534283	0728691557	
3.	ANIL MASHAYIA			
4.	noah kumee	13242976	0724900025	
5.	James tepet	22035497	0701822788	
6.	Matano	202421460		
7.	KOPIRATO KARIRAI KOSIOM	23783223	0733100064	
8.	SIMON KATITA METEME	28794946	0720432821	
9.	RICHARD T-KUNEE	21522103	0726744223	
10.	MOKOI Raphael	26123966	0724661587	
11.	JENIACHAN CHAI	852787	0718407204	
12.	ANDREW MOKOI	36251866	0703818232	

Public Participation Attendance List

JULIUS K. SUYIANKA
 CHIEF, IMBUKO LOCATION
 P. O. Box 222, EMALI
 Date: 30/6/2016



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13	Kepchirchir Nicholas	24607278	0721521549	
14	JAMES MPURRA	25054805	0737783226	
15	MARTIN IGUWEE			
16	PETER PARMUTIA	3929219	0706614949	
17	STANBACK REINO	31 30291451	0707518200	
18	NICKSON PARSAOTI		0720480193	
19	JOSEPH NTOONG	1356686	0713859447	
20				
21				
22				
23				
24				
25				
26				

Public Participation Attendance List

JULIUS K. SUYTANIKI
 CHIEF, IMBUKO LOCATION
 P. O. Box 280, EMALI
 Date: 30/6/2016

LOG
 Associates

12.5.3 Minutes and Lists of Public Participation Merrueshi

Minutes from the Merrueshi Location Public Baraza on July 1 2016, 09:00 AM at the Chief's office, Merrueshi

Agenda

5. Opening remarks
6. Team & Project Introduction
7. Concerns, comments and questions from community members
8. AOB

Min 1/07/2016: Opening Remarks

The meeting was called to order by the Chief, Mr. Samuel Mayon at 09:00 AM. A word of prayer was then offered by a community member. After brief introduction of the purpose of the meeting, Chief Mayon called on the consultant to address the members. The photos below show a section of members of public who were in attendance.



Plate 12.3 Merrueshi Center Public Consultation Meeting



Plate 12.4 Merrueshi Center Public Consultation Meeting

Min 2/07/2016: Team & Project Introduction

The 132kV Sultan Hamud – Loitoktok Transmission Line and Associated Substations project was introduced by the consultant. A description of where the line begins (Sultan Hamud substation) and the areas it goes through (Pipeline road, Game, Merrueshi, Imbirikani, Kimana, Loitoktok) was given so that the community members could get a clear picture of the proposed route. The consultant also explained the role of communities and leaders in development projects.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 3/07/2016: Concerns, comments and questions from the community members

Knowledge of the Project

The community members were aware of the difference between electricity transmission lines and distribution lines. They wanted confirmation whether this line would be for transmission or for distribution. The consultant explained that at 132kV, this would be a distribution line. Transmission can only occur after the line is switched at a substation to lower voltage (33kV).

Socio-economic activities in the region

The major economic activity practiced in the area is livestock keeping - goats, cows and sheep. Few community members practice crop farming (tomatoes). Another significant activity is boda boda (motorcycle taxi).

Envisaged project benefits

The community appreciated the fact that the project would boost the level of development in the area and provide employment opportunities.

Envisaged negative impacts

Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Proposed Mitigation Measures

Safety gear should be provided to the community members who will be employed on site to minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately. Locals should also be trained on first aid.

Compensation

The community asked for adequate compensation for the loss of their grazing land, structures that would be demolished, and trees that will be cut during construction. Of particular interest to majority of the attendants was if employment opportunities for the locals would arise. The consultant assured them that unskilled employment opportunities should be reserved for community members but upon receiving the jobs they should do good work otherwise people from outside would be hired.

Corporate Social Responsibility

As part of the proponent's Corporate Social Responsibility efforts, community members recommended that water projects such as boreholes, water pans and classrooms be constructed to serve the area.

Min 4/07/2016: A.O.B

The consultant mentioned that the event was just an ESIA study and later on other issues such as identification of PAPs and compensation would take place.

Adjournment

The meeting was adjourned with vote of thanks from the chief and the consultant. The meeting closed with a word of prayer from a community member. The list of attendance is attached here in below.

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 1 July 2016 Time: 9:21 AM Venue: Meru (L.M.C.D. OFFICE)

NO.	Name	ID No.	Contacts	Signature
1.	WILFRED LINTET MUSOONKO	30291542	0705678619	
2.	NICHOLAS SANTI MAJON	29791873	0725178436	
3.	PHILIPIAN SOKO	20225312	0722-311332	
4.	ERICK M MATON	26076304	0737222503	
5.	JOSEPH MAYON	2245878	0714102250	
6.	PATRICK KORES	32950598	0725654834	
7.	ALFRED SOPON	2874578	0704282245	
8.	Richard Mayon	2256996	0717773449	
9.	Nicolas Mayon	14473666	0725-953197	
10.	Patrick de Siri	26657520	0722795990	
11.	NICHOLAS KORES	12099582 072042778	0720429984	
12.	WILSON KIRAI	20226320	0724468300	

Public Participation Attendance List

SAMUEL N. MAYON
CHIEF, MERRUSSHI
LOCATION
P. O. Box 255 - EMALI
Date: 01/07/2016



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

	Name	ID Number	Phone Number	Sign
13.	Kepchir chir Nicholas	24607270	0721521549	
14.	Erin O. Odeh	24077629	0721178524	
15.	Sakaya Atione	1356998	0717706910	
16.	SORONGO Ole mainai	9366427	074787058	
17.	Moi Sankale	26654134	07265247696	
18.	APPO NURUJA	28290523	0725806725	
19.	KUALCAN PASABAN SIFEI	^{PHONE} 24320682	^{ID} 26654336	
20.	NITAO SIFEI	^{PHONE} 926399588	^{ID} 12951030	
21.	SAMUEL N. MAYON	14473659	0724333411	
22.				
23.				
24.				
25.				
26.				

SAMUEL N. MAYON
CHIEF, MERBUESHI
LOCATION
P. O. Box 232 - EMAIL
Date: 01/07/2016

Public Participation Attendance List



12.5.4 Minutes and Lists of Public Participation- Imbirikani

Minutes from the Imbirikani Location Baraza on July 02 2016, 09:00 AM at Imbirikani Shopping Centre

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 1/07/2016: Opening Remarks

The meeting was called to order by the Chief, Mr. Joseph Ntoipo at 09:00 AM. Chief Ntoipo gave a description of what the meeting was about then offered to be the translator for the meeting into the Maasai Language. The Chief then called on the consultant to address the members. The photos below show the members in attendance.



Plate 12.5 Imbirikani Location Public Consultation Meeting



Plate 12.6 Imbirikani Location Public Consultation Meeting

Min 2/07/2016: Team & Project Introduction

The consultant introduced to the attendees the 132kV Sultan Hamud – Loitoktok Transmission Line and Associated Substations. The attendees were informed that the purpose of the line was to supply power to Loitoktok town. The Line would start at the Sultan Hamud Substation, then at Merrueshi (National Cement Factory) a Substation would be constructed and then the line terminates at Loitoktok at another proposed Substation. The attendees of the meeting were made to see the need for the project and as a community residing in the vicinity of the project area, they had to be consulted to air their views and raise issues both those affecting them currently and the anticipated ones.

Min 3/07/2016: Concerns, comments and questions from the community members

Knowledge of the Project

The community was made aware of the high voltage nature of the transmission line. They raised concerns over them not having power yet the line would cross their area. The consultant made them understand that a 132kV line cannot be tapped for domestic use. Its purpose is only for transmission.

Socio-economic activities in the region

The major economic activity practiced in the area is livestock keeping though some select community members engage in agriculture. Livestock kept includes: goats, sheep, cows and chicken; while crops grown are maize, beans and tomatoes.

Envisaged project benefits

The community appreciated that increased power supply in the area would bring about development and create jobs for the youth in the area.

Envisaged negative impacts

Noise, dust and flying rocks during the construction phase, as well as the danger of children and livestock falling into excavation pits were the major negative impacts mentioned.

Proposed Mitigation Measures

Proper safety procedures to be observed. The construction area should have a clear boundary established to restrict entry of livestock and children. Excavation activities to be done during the day only to minimize nuisance and mobile clinics should be set-up at the project sites to treat medical emergencies and injuries immediately.

Compensation

The community asked for adequate compensation for the loss of their grazing land. Adequate compensation will be required for the structures that would be demolished to pave way for the transmission line. The Community also requested for compensation of trees that will be cut during construction. They were made to understand on how the compensation exercise would be conducted for structures, land and vegetation.

Project commencement date/Employment for locals

Majority of the attendees were eager to know when project would start. They made it clear that are ready to work so the project should start soon. The consultant informed them that the project was still in the initial phases. However, it was emphasized that once they get the jobs they work with the enthusiasm that they had while enquiring on the same, and not slack off on the job as has been the case in similar projects.

Min 4/07/2014: A.O.B

The consultant mentioned that the event was just an ESIA study and later on other issues such as identification of PAPs and compensation would take place.

Adjournment

The meeting was adjourned with vote of thanks from the chief and the consultant. The meeting closed with a word of prayer from a community member.

12.5.5 Minutes of Kimana Location Baraza

Minutes from Kimana Location Public Baraza on 15/September/2016 at 10.30 am in Kimana

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 1/2016: Opening Remarks

The meeting was called to order by Snr Chief, Mr. John Lelaito at 11.00 am and was opened by a word of prayer by a community member. He also went ahead and introduced his members from the assistant chiefs to the “Nyumba Kumi” representatives. He went further to welcome the consultant to introduce and take over the meeting.



Plate 12.7 Kimana Location Public Consultation Meeting

Min 2/2016: Team & Project Introduction

The consultant introduced the project and the ESIA study of the proposed transmission line to the community elaborating its objectives and the role of communities and leaders in development projects.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 3/2016: Concerns, comments and questions from the community members

Knowledge of the Project

Community said they had never heard of the proposed project, a part of the community was aware of the difference between electricity transmission lines and distribution lines. After elaboration from the consultant, the members understood what the project was all about.

Socio-economic activities in the region

The major economic activity practiced in the area is livestock keeping; the animals kept include cattle, goats, donkey, bees, camels and sheep. There is also small scale irrigation in Lomelok Irrigation scheme and horticultural crops are grown including tomatoes and vegetables.

Envisaged project benefits

The community appreciated the fact that the project would boost the level of development in the area and provide employment opportunities and increase reliability of the electricity

Envisaged negative impacts

Wildlife corridor is in Kimana Location; hence movement of wildlife would be disrupted. Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Proposed Mitigation Measures

Contractor should ensure animal paths are not tampered with also safety gear should be provided to the community members who will be employed on site to minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately.

The community will liaise hand in hand with the contractors / proponent at all stages of the project.

Compensation

The community asked for adequate compensation for the loss of their grazing land and the farm land. Adequate compensation will be required for the structures that would be demolished to pave way for the transmission line. The Community also requested for compensation of trees that will be cut during construction. They said that they use the Indigenous trees in the area for making medicine and ornaments for cultural events. Unskilled employment opportunities should be reserved for community members.

Corporate Social Responsibility

As part of Projects Corporate Social Responsibility efforts, community members recommended that proponent should have a discussion with the community leaders on the same

Min 3/4/2016: A.O.B

The community concerns are about land compensation, the owners have title deeds and some farms are smaller and will require adequate compensation. Also, the community recommended for a compensation of two trees for every one that will be fell. They also recommended that the proponent makes a tree nursery for every location in measures to conserve the environment. They then assured the consultant that manning of the trees will be their responsibility to full maturity.

Adjournment

The meeting was adjourned with vote of thanks from the Snr chief and the consultant. The meeting closed with a word of prayer from a community member. The list of attendance is attached here in below.

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 15/9/2016 Time: 10:30 AM Venue: KIMANA

NO.	Name	ID No.	Contacts	Signature
1.	AARON MUTISA	28294523	0925646725	
2.	KILELA OLOSIMAMAI	8336926	0712699686	
3.	John K. Olangasari	0497549	0727028757	
4.	MERTUJ CONKISHU	9209774	0712699409	
5.	MARGARET NDUNGE	11727978	0729696921	m.ndunge
6.	TITUS T OLTUKUBI	27977033	0777174463	
7.	KALAMA PIPAI	13614100	0945301604	
8.	JOSEPH LEMAYAW SERONGA	22341167	0710751163	J.
9.	PATRIK Karwuki	2230133	0723221645	
10.	Joseph wainama stem	11384627	0725721293	Wainama
11.	Moses mwangi Chege	8342996	0728071106	Mchege
12.	Raphael Kaleya Naitiange	1353212	0728301261	Kang

Public Participation Attendance List

ASST. CHIEF KIMANA SUB-LOCATION
DATE

LOG Associates

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120km, 132kV Transmission Line and Associated Sub-stations

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13.	M TOMAZA ROSEI		0700193543	Rosei
14.	Peter MURANGA	11526937	0712315409	Peter M
15.	DANIEL SEYAI	11727779	0714706516	Daniel
16.	MUSA MUI	11727799	0708827134	Musa
17.	KILU KUMANGA	1703668	0707911178	Kilu
18.	JOHN MBOA	8342795	0718600490	John M
19.	STEPHEN KARUJA	13611343	0727814711	Stephen
20.	HARRISON NJENGA M.	3135794	0729342442	Harrison
21.	BENJAMIN SIALACA	14473649	0718360243	Benjamin
22.	JACOB LUKAMBA KAROMA	13611368	0714375738	Jacob
23.	Adelaide Siniyu	23671359	0723841229	Adelaide
24.	ERIC OWA	24077629	0721178529	Eric
25.				
26.				

Public Participation Attendance List

ASST. CHIEF OFFICER SUB-
LOCATION
DATE

LOG
Associates

12.5.6 Minutes of Isinet Location Baraza

Minutes from the Isinet Location Public Baraza on 30th/June/2016 at 1.43 pm in Isinet Shopping Centre

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 1/2016: Opening Remarks

The meeting was called to order by Chief, Cllr. Timothy K Saigilu at 1.43pm and was opened by a word of prayer by a Pastor. He also went ahead and introduced community leader the assistant chiefs to the “Nyumba Kumi” representatives and Church leaders. He went further to welcome the consultant to introduce and take over the meeting.



Plate 12.8 Isinet Location Public Consultation Meeting

Min 2/2016: Team & Project Introduction

The consultant introduced the project and the ESIA study of the proposed transmission line to the community elaborating its objectives and the role of communities and leaders in development projects.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 3/2016: Concerns, comments and questions from the community members

Knowledge of the Project

Community said they had never heard of the proposed project, a part of the community was aware of the difference between electricity transmission lines and distribution lines. After elaboration from the consultant, the members understood what the project was all about.

Socio-economic activities in the region

The major economic activity practiced in the area is livestock keeping; the animals kept include cattle, goats, donkey, bees, camels and sheep. There is also small scale irrigation in Lomelok Irrigation scheme and horticultural crops are grown including tomatoes and vegetables.

Envisaged project benefits

The Community welcomed the proposed project terming it as a positive move in taming the unstable power supply in the area. The anticipated that the power would:

- Enhancing the growth of small businesses such as Jua Kali works and small retail shops etc.
- Promoting industrialization in the area
- Improving security
- Lighting of schools, hospitals and government hospitals

Envisaged negative impacts

Wildlife corridor is in Isinet Location; hence movement of wildlife would be disrupted. Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Proposed Mitigation Measures

Contractor should ensure animal paths are not tampered with also safety gear should be provided to the community members who will be employed on site to minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately.

The community will liaise hand in hand with the contractors / proponent at all stages of the project.

Compensation

The community asked for adequate compensation for the loss of their grazing land and the farm land. Adequate compensation will be required for the structures that would be demolished to pave way for the transmission line. The Community also requested for compensation of trees that will be cut during construction. They said that they use the Indigenous trees in the area for making medicine and ornaments for cultural events. Unskilled employment opportunities should be reserved for community members.

Corporate Social Responsibility

As part of Projects Corporate Social Responsibility efforts, community members recommended that proponent should have a discussion with the community leaders on the same

Way Forward

The community insisted that, project will continue after the proponent has had a discussion with community leaders since the proposed transmission Line traverses through a group ranch. They also said the proponent should disclose all the agreements on compensation to the community for transparency purposes

Min 3/4/2016: A.O.B

The community concerns are about land compensation, the owners have title deeds and some farms are smaller and will require adequate compensation. Also, the community recommended for a compensation of two trees for every one that will be fell. They also recommended that the proponent makes a tree nursery for every location in measures to conserve the environment. They then assured the consultant that manning of the trees will be their responsibility to full maturity.

Adjournment

The meeting was adjourned with vote of thanks from the Snr chief and the consultant. The meeting closed with a word of prayer from a community member. The list of attendance is attached here in below.

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 30/06/2016 Time: 1:45 PM Venue: ISINET

NO.	Name	ID No.	Contacts	Signature
1.	AARON MUTISYA	28246727	0723686725	
2.	JOHN MURON	1044		
3.	RICHARD SUTET	13611006	0724783276	
4.	JOSHUA KAMUKA	20986097	0724451741	
5.	Isaiah Mutai	19492505	0713448561	
6.	SIMEON SUTET	12492537	K 0720965975	
7.	Willis Odhiambo Soodia	115309440	0723798225	
8.	JOSHUA KIP TIRAPE		0717927857	
9.	JOSHUA NKAPERU	5323922	0700261051	
10.	JOHN HART SIMANKA	23853130	0924561595	
11.	Isiah M. Mogaie	3929572	0726747396	
12.	Peter Olembano	0727799475		

Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13	ISAIAH NKUIFO	11385152	0718216470	
14	JOHN P. MUA	1311119	0720482684	
15	Joseph K. -liampat	072554766	072554766	
16	TIMOTHY K. SAGILU	22232429	0729619776	
17	John Kasembi	14474137	0718213595	
18	Joseph Oleipatuni	0499257	0717254152	
19	MUPETE Ole seet	11728081	0723025542	
20	Leah sokome	9202758	072638740	
21	Joyce PAMARIAN	11728136	0706573040	
22	Sambu Nkonina			Sambu
23	Sereya SORIGARA			Sereya
24	Mwashi Kingese			Mwashi
25	Simbari Lokorua			
26	Njambi Sitanik			Njambi

Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitokitok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 30/01/2016 Time: 4:45 pm Venue: ISINET

NO.	Name	ID No.	Contacts	Signature
1.	MARIAH DINASH			
2.	Haron Solomei Tumika	30432638	0701219407	
3.	ISAIAH KIMATI	10492506	0721627639	
4.	SOINE KIMWASHU	25078075	0706765588	
5.	PAUL LEITI			
8.	WILLIAM SOIKAN	26640006	0728439586	
7.	NETHEMIATI NIOCKE LANKOSI	10708813	0720964527	
8.	JOSHUA MANTO		0708270146	
9.	Francis M. Ndung'u	1240920	0721166742	
10.	MUSA MALOTA	31728066	0700158547	
11.	DANIEL K. SAKUMI	23285471	0723164598	
12.	JULIANA WANJIRU	6112672	0702840527	

Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13	Risimitt	Oloitu Kuoko	24921086	0713652018	
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Public Participation Attendance List



12.5.7 Minutes of Merrueshi Location – Chief’s office

Minutes from the Merrueshi Location Public Baraza on 16th/September/2016 at 10.00 am outside Chief’s office

Agenda

1. Opening remarks
2. Team & Project Introduction
3. Concerns, comments and questions from community members
4. AOB

Min 1/2016: Opening Remarks

The meeting was called to order by the Chief, Mr. Joseph Ntalama at 10.00 am and was opened by a word of prayer by a community member. The Chief later introduced the consultant to address the members. The figure below shows a section of members of public who were in attendance.



Plate 12.9 Merrueshi Location Public Consultation Meeting

Min 2/2016: Team & Project Introduction

The consultant introduced the project and the ESIA study of the proposed transmission line to the members elaborating its objectives and the role of communities and leaders in development projects.

The legal requirement that development projects are subject to Environmental and Social Impact Assessment was outlined. The consultant explained that the proposed project would have both positive and negative impacts on the surroundings and on the community and welcomed them to voice their concerns, comments and questions.

Min 3/2016: Concerns, comments and questions from the community members

Knowledge of the Project

A part of the community was aware of the difference between electricity transmission lines and distribution lines. After elaboration from the consultant, the members understood what the project was all about. The community was also informed about the proposed National Cement Substation. This encouraged the members and were now more optimistic about the changes that may occur in their area.

Socio-economic activities in the region

The major economic activity practiced in the area is formal employment (National Cement), livestock keeping; the animals kept include cattle, goats, donkey, bees, camels and sheep. Few individuals also practice crop farming as a way of boosting their primary income.

Envisaged project benefits

The community appreciated the fact that the project would boost the level of development in the area and provide employment opportunities.

Envisaged negative impacts

Environmental pollution in the form of noise resulting from construction activities would occur. Moreover, diseases and injuries would be caused by dusts and flying rock fragments emanating from the project sites during construction. Excavation activities would cause open pits that pose a safety hazard especially at night.

Proposed Mitigation Measures

Safety gear should be provided to the community members who will be employed on site to minimize the occurrence of injury incidences. A mobile clinic should be set-up at the project sites to treat medical emergencies and injuries immediately.

The community will liaise hand in hand with the contractors / proponent at all stages of the project.

Compensation

The community asked for adequate compensation for the loss of their grazing land. Adequate compensation will be required for the structures that would be demolished to pave way for the transmission line. The Community also requested for compensation of trees that will be cut during construction. They said that they use the Indigenous trees in the area for making medicine and ornaments for cultural events. Unskilled employment opportunities should be reserved for community members.

Corporate Social Responsibility

As part of KETRACO's Corporate Social Responsibility efforts, community members recommended that water projects such as boreholes or water pans be constructed to serve the area.

Min 3/4/2014: A.O.B

The community recommended for a compensation of two trees for every one that will be fell. They also recommended that the proponent makes a tree nursery for every location in measures to conserve the environment. They then assured the consultant that manning of the trees will be their responsibility to full maturity.

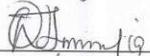
Adjournment

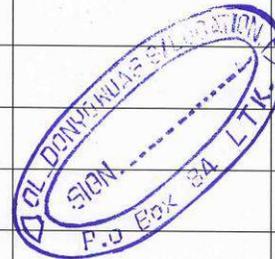
The meeting was adjourned with vote of thanks from the chief and the consultant. The meeting closed with a word of prayer from a community member. The list of attendance is attached here in below.

Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 16 SEP 2016 Time: 10:00 AM Venue: MEKRUETHI

NO.	Name	ID No.	Contacts	Signature
1.	AARON MUTLSYA	28294523	0725 646725	
2.	Chief Joseph Ntalamia	25664875	0729573662	
3.	Melubo Manena		0710487562	
4.	Leina Baekson			
5.	Mekuretu Ologela			
6.	Kuyan Mbarnoti			
7.	Moses Nteka			
8.	NKantole Ologela			
9.	Senchuka Mbayo			
10.	Samuel Baekson			
11.	Julius Ndorri			
12.	Daniel Senchuka			



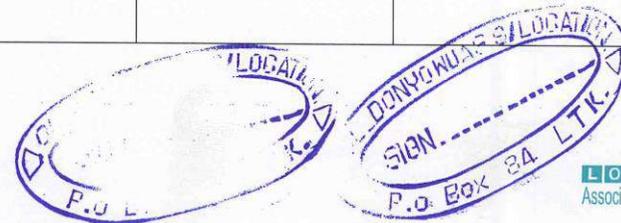
Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13.	Mutendo Lemka			
14.	Lenki NKalopo			
15.	Portimo Lemka			
16.	Josphat NKuito			
17.	John Kishapui			
18.	Joshua Beckson			
19.	Leonard Kurduni			
20.	Lesumpuka Ologels			
21.	Agnes Lesiker			
22.	Sayankwa Goret			
23.	Jubus Hamaase			
24.	SOLOMON KELYAN KIAMPA			
25.	MICHELINA			
26.	JACKSON OLUMO MAKURIA			

Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 16 SEP 2016 Time: 10:00 AM Venue: MERRUETHI

NO.	Name	ID No.	Contacts	Signature
1.	Alice NDEGA			
2.	MAUREEN MWIHAKI			
3.	Regina Kanga			
4.	GRACE MWIKALI			
5.	PENINIAH SEIKAN			
6.	Anastacia mwendu			
7.	Annah Nartine			
8.	Jennifer Faith			
9.	Anjelina Wambui			
10.	Jalice Nduge			
11.	Franklin Kison			
12.	Jedidiah Saama			

Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

13.	Sheila Parmares			
14.	Faith Hassan			
15.	Susan Philip			
16.	Magret Parbora			
17.	Nosekei Nketele			
18.	Emili Ologela			
19.	Susan Daniel			
20.	Milus Ngutak			
21.	Bernard Mwanza			
22.	Gulphos Muzozwa			
23.	Joshua Mayan			
24.	DAVID Mwelolo			
25.	CATHERINE Karini			
26.	Rose Lusily			

Public Participation Attendance List



Consultancy Services for Environmental and Social Impact Assessment for Sultan-Hamud-Loitoktok 120KM, 132kV Transmission Line and its Associated Sub-stations

Public Participation Attendance List

Date: 16 SEP 2015 Time: 10:00 AM Venue: Meru

NO.	Name	ID No.	Contacts	Signature
1.	KARON KILOKU LETAGUES	22426838	011734251	[Signature]
2.	David Mutoria			
3.	WILLIAM LOKIMANGUSI	3331371259	0702012071	[Signature]
4.	Steu Mwangi	3397271	0721629048	[Signature]
5.	ANNAY MWOVE			
6.	Kibwira John			
7.	Njira Xolanu			
8.	Jackson Kutoto		0724610606	[Signature]
9.	Adelaide Simiyu	23871859	0723841219	[Signature]
10.	ERICK O. OWA	24077629	0721178524	[Signature]
11.				
12.				

Public Participation Attendance List

