

KENYA ELECTRICITY TRANSMISSION CO. LTD

**KENYA GREEN AND RESILIENT EXPANSION OF ENERGY (GREEN)
PROGRAM
(P180465)**

**Environmental and Social Impact Assessment Project Report for the Proposed Kimuka
400/220kV Substation located at L. R. Number, Kajiado/Ntashart/18421, and associated
Short Transmission Lines in Kimuka and Saikeri Locations, Kajiado West Subcounty,
Kajiado County.**

ADDENDUM REPORT

Volume 1



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Do hereby certify that this report was prepared based on the information provided by various stakeholders as well as that collected from other primary and secondary sources and on the best understanding and interpretation of the facts by the Environmental Social & Impact Assessors. It is issued without any prejudice.

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LIST OF ABBREVIATIONS

AEZ	Agr-ecological Zone
AGO	Automotive Gas Oil
AIDS	Acquired Immune Deficiency Syndrome
AST	Above Ground Storage Tank
CB	Circuit Breaker
CCTV	Closed Circuit Television
CEO	Chief Executive Officer
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CT	Current Transformer
CVT	Constant Voltage Transformer
DC	District Commissioner
DO	District Officer
DOHSS	Directorate of Occupational Health and Safety Services
EA	Environmental Audit
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMCA	Environmental Management and Coordination Act, 1999
EmoP	Environmental Monitoring Plan
ERC	Energy Regulatory Commission
ESMP	Environmental and Social Management Plan
GDC	Geothermal Development Company
GHGs	Green House Gases
GoK	Government of Kenya
HFO	Heavy Fuel Oil
HIV	Human immunodeficiency virus
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPP	Independent Power Producers
KenGen	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KP	Kenya Power
Kshs.	Kenya Shillings
kV	Kilo Volt
KWH	Kilo Watt Hour
KWS	Kenya Wildlife Service
L.R	Land Registration
mg/kg	Milli grams per kilogram
MoE	Ministry of Energy
MVA	Mega Volt Amperes
MW	Mega Watts
NEMA	National Environment Management Authority
Nox	Oxides of Nitrogen
OSHA	Occupation Safety and Health Act
PM	Particulate Matter
PPE	Personal Protective Equipment
REA	Rural Electrification Authority
SCADA	Supervisory Control and Data Acquisition
SHE	Safety Health and Environment
Sox	Oxides of Sulphur
STDs	Sexually Transmitted Diseases
TPH	Total Petroleum Hydrocarbon

EXECUTIVE SUMMARY

Introduction

The Government of Kenya plans to increase access to electricity in Kenya 's rural areas to about 40% by 2030. To do this, the transmission lines network is being considered for upgrading and with it the communication system required for line protection and management purposes. The Kenya Power Least Cost Power Development Plan (LCPDP) identified various transmission lines for improving the performance of the national grid network to cater for the increasing load growth and meet the objectives of 2030. The Kenya Electricity Transmission Company Limited (KETRACO), which now assumes the full mandate of constructing and managing transmission lines and associated sub stations, is planning to construct a 400/220kV substation at Kajiado/Ntashart/18421 in Kimuka Location, Kajiado West Subcounty, Kajiado County.

The Kenya Government policy on all new projects requires that an Environmental and Social Impact Assessment (ESIA) study be carried out at the project planning phase to ensure that significant impacts on the environment are taken into consideration at the planning, construction, operations, and decommissioning stages. KETRACO has therefore used its in-house manpower consisting of Electrical and Civil Engineers, Socio-Economists, Land Economists, Surveyors and Environmental Experts to undertake the ESIA for the Kimuka 400/220kV substation. KETRACO has identified and bought on the basis of willing buyer willing seller 27.3 acres piece of land located approximately 3.7km from Kimuka Trading Centre. The site is to the right of the Ngong – Suswa highway, adjacent to an existing borrow pit.

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 potential impacts to the environment and people's health through all its phases (construction, operation and decommissioning phases).

In addition to the major objective as indicated above other study objectives are:

- i. To undertake a comprehensive public participation and stakeholders' consultation
- ii. To inform or educate the public and stakeholders about the project and the associated environmental and social risks.
- iii. To develop an adequate, comprehensive, and acceptable Environmental and Social Management Plan for the proposed Project.

Scope

The ESIA study done in consideration with the construction, operation and decommissioning phases of the project and was limited to:

- The baseline environmental and socio – economic conditions of the area,
- Description of the proposed project,
- Provisions of the relevant environmental laws,
- Public participation and stakeholder consultation,
- Identification and discussion of any adverse impacts to the environment anticipated from the proposed project,
- Appropriate mitigation measures,
- Development of an environmental and Social management plan outline.

Study Methodology

The approach to this exercise was structured such as to cover the requirements under the Environmental Management and Coordination Act (EMCA), 1999 and its constituent regulation, i.e. the Environmental Management and Coordination (Impact Assessment and Audit) Regulations of 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 Lead Agencies and members of the community in the project areas; survey; and photography.

Both primary and secondary data were used in the drafting of this ESIA report. Data requisite for the drafting of this report was collected through.

- Review of available project literature such as the feasibility report, draft bidding documents, pertinent legislative tools, the World Bank Environmental and Social Framework (ESF), other ESIA's similar to the proposed project, the county of Kajiado CIDP document, among others.
- One-one- interviews with key informants' stakeholders as detailed in chapter 5 of this report.
- Public meetings with the community as one of the key stakeholders.
- Experts' opinion
- Use of Geographical Information System (GIS).

The key activities undertaken during the assessment included the following:

- Consultations with the key project stakeholders including the project proponent, community members, the County Government of Kajiado's departments, county administration and opinion leaders. The consultations were based on the proposed project, site planning, the project implementation plan, the potential environmental and social impacts, and the mitigation measures thereof.
- Physical inspections of the proposed project area which included observation of available landmarks, photography and interviews with the local residents and local administration.
- Evaluation of the activities around the project site and the environmental setting of the wider area through physical observations Review of available project documents; and
- Report writing, review and submission.

An ecological assessment of the site was undertaken primarily through observation of the natural vegetation at site and enlisting of the tree species. As at the time of baseline data collection, while the purchase of the land was ongoing, the seller was in the process of clearing mature trees on site for his private use therefore it was not possible to undertake an inventory of the vegetation.

Project description

The Proposed Kimuka 400/220kV substation is located in the south of Kenya, about 30km away from Nairobi toward the west and about 8km away from Ngong railway station, is on a KETRACO-owned 27.3-acre piece of land, LR Number **Kajiado/Ntashart/1842 Kimuka location**, Kajiado West Subcounty in Kajiado County.

The distance from the New Kimuka substation to the existing Kimuka (Ngong) 220/66kV substation is about 2km. The New Kimuka 400/220kV SS will be connected to the existing Kimuka 220/66kV SS by a double-circuit overhead line. In addition, a Loop-In and Loop-Out (LILO) will be established from Suswa-Isinya 400kV double circuit OHL to New Kimuka SS. The location of New Kimuka SS has been illustrated in the below figure. The length of the transmission line to Suswa and Isinya substations is about 45km and 61km, respectively.

The essence of the project is providing system reinforcement to the Nairobi Transmission Electricity Network.

Baseline

This section of the report addresses the biophysical, social economic and cultural setting of the project. This section is key in identification of project impacts and key receptors of these impacts while identifying the best measures enhance positive impacts and mitigation measures for adverse impacts. The project is located in within Kajiado County in a peri-urban set up within Kimuka location. The county is predominantly home for the Maasais that are identified as vulnerable and marginalized and dependent on pastoralism as a livelihood. The section details their culture.

The section also covers a generic outlay of Kajiado County on various pertinent fronts key to this projects and the ESIA. It also narrows down to the immediate project baseline such as Transport infrastructure, Similar infrastructure, Site Topography, Soils and Geology, Flora and Fauna

Hydrology, Socio-economic activities and socioeconomics of the project affected persons as a result of the implementation of the LILO.

Key results of the baseline information include:-

- The immediate local population inclusive of the affected persons is highly cosmopolitan with diverse ethnic groups living within the project's Area of Influence (AoI).
- The substation will be located on Ketraco owned-piece of land

- The LILO affects 38 number of privately owned plots
- The LILO will affect 14 of structures that will need to be demolished. The structures are differentiated as follows: 6 temporary houses, 3 semi-permanent houses and 5 permanent houses.
- The LILO does not displace any business establishment.
- The substation site has a number of diverse tree species and thickets. The dominant tree species are *Acacia Xanthophloea*, *Acacia senegalis*.
- The project area is well traversed by a network of tarmacked roads infrastructure. The major road being the Ngong Suswa highway. Close to the project is the Standard Gauge Railway Line.
- The electricity transmission infrastructure in close proximity and linked directly to the proposed projects are, the 220/66kV Ngong substation and the Suswa- Isinya 400/220kV.
- The inherent topography of the proposed 27-acre site makes it somewhat have two distinct divisions of terrain. To the Northwest of the site there is a sharp cliff that towers almost to the mid periphery of the site to the west. The cliff's sharp descent reduces eastward. This divides almost the entire land into two lower staircase and an upper staircase.

Further details have been provided in Chapter 3 of this report.

Public Participation and Stakeholder engagement

This section provides details on the approach to stakeholder engagement and public participation. Stakeholder mapping and analysis for the project was first undertaken in February 2021. This was critical for the undertaking of the project's safeguard studies. Stakeholder engagement was thereafter undertaken as from 8th February to 13th February 2021 whereby 19 stakeholders were engaged through interviews and filled questionnaires with 4 being key informant stakeholders and 15 drawn from the community.

A second round of stakeholder engagement was undertaken between 16th October to 19th October 2023 that included 5 number of key informants, and 9 number of community members were interviewed in the process and filled questionnaires. Public meetings led by the area chief were organised and conducted on 11th February 2021 and 18th October 2023. A total of 71 attendees were recorded, 45 in the first meeting and 26 in the second meeting. The first meeting was only attended by men while the second meeting had 5 women in attendance.

To attain a culturally acceptable conduct of the public, the environmental and social experts involved the area chief and other local leaders to organize and lead the public meetings in a manner acceptable to the community.

The key issues raised are as summarised below but whose detail is in the report: -

- Queries on electromagnetic frequencies in relation to the project and impact to the community.
- The likelihood of the community will be connected to power through the project.
- Project Corporate social responsibility (CSR).
- The intent for undertaking the Environmental and Social Impact Assessment (ESIA).
- Modalities of compensation for structures and land.

Project alternatives

The project alternatives for the project were assessed and considered. The No-project alternative was weighed against the proposal and was found to be limit the county and the East African region the opportunity for electricity system reinforcement and power trade.

The proposed alternative option that warrants the reason for the ESIA was found preferred due to its socioeconomic benefits to the county and region. However, for its sustainability, an ESMP option was considered not only to mitigate the adverse potential impacts but also enhance the positive impacts that will be realized from the project.

Two route options for the Loop In and Loop Out (LILO) line were considered in the report with a justification on the choice of the preferred route provided in the main report under Chapter 3. The selection of the preferred route considered technical, environmental, social, and financial feasibility. An option that does not create an island with the community was most preferred to mitigate on the resultant socioeconomic impacts to the community.

Additionally, the technological options for construction of both the line and substation were considered with a justification on the preferred option(s).

Policy, Legal and Regulatory Framework

The key legal instruments relating to the proposed project were adequately reviewed and their relevance to the project and ESIA assessed as detailed in Chapter 5 of this ESIA report. The instruments include both local Policy, Legal and Regulatory Framework and, pertinent Multilateral Environmental Agreements, and the International good practice as provided by the World Bank ESF.

Here is a list of the pertinent instruments to this ESIA for the proposed project.

Policy Framework

- The Kenya Vision 2030
- National Environmental Action Plan (NEAP)
- Policy Paper on Environmental and Development (Sessional Paper No. 6 of 1999)
- The National Poverty Eradication Plan (NPEP) of 1999
- Physical Planning Policy
- Public Health Policy
- The Sessional Paper No.4 on Energy
- The Kenya National Climate Change Response Strategy
- National Policy on Gender and Development, 2019
- Kenya National Youth Development Policy, 2019
- Institutional Framework

Legal Framework

- The Constitution of Kenya 2010
- The Environmental Management and Coordination Act, Cap 387
 - The Environmental Impact (Assessment and Auditing) Regulations, 2003
 - Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003
 - Environmental Management and Coordination (Water Quality) Regulations of 2006
 - Environmental Management and Coordination (Waste Management) Regulations of 2006
 - Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009
 - Environmental Management and Coordination (Air Quality) Regulations, 2008
- The Traffic Act, 2012
- Public Health Act (Cap. 242)
- Urban and Cities Act No 13 of 2011
- The Land Act, 2012
- The Land Registration Act, 2012
- The Environment and Land Court Act, 2011
- The National Land Commission Act, 2012 (No. 5 of 2012) Error! Bookmark not defined.
- Water Act, 2016
- The Energy Act of 2019
- Building Code 2000
- Occupational Safety and Health Act (OSHA 2007)
- The Standards Act Cap. 496
- Physical Planning Act (Cap 286)
- Employment Act No 11 of 2007
- Penal Code Cap 63
- County Governments Act, 2012
- HIV and AIDS prevention and control Act, 2006
- The Sexual Offences Act, 2006.
- The Children Act, 2022.

- The IDP Act

World Bank Environmental and Social Framework (ESF)

- ESS 1: Assessment and management of environmental and social risks and impacts
- ESS 2: Labor and working conditions.
- ESS 3: Resource efficiency and pollution prevention and management
- ESS 4: Community Health and Safety
- ESS 5: Land Acquisition, restrictions on land use and involuntary resettlement
- ESS 6: Biodiversity conservation and sustainable management of living natural resources.
- ESS 7: Cultural heritage
- ESS 10: Stakeholder engagement and information disclosure

International Environmental Agreements, conventions and Treaties

- United Nations Framework Convention on Climate Change (UNFCCC)
- Vienna Convention for the Protection of the Ozone Layer
- Convention on Biological Diversity (CBD)
- African Convention on the Conservation of Nature and Natural Resources
- Earth Summit on Sustainable Development Agenda 21
- The World Commission on Environment and Development (The Brundtland Commission of 1987)
- The 1992 United Nations Framework Convention on Climate Change (UNFCCC)
- The Paris Agreement
- Convention on the Elimination of all forms of Discrimination against Women
- Conventions under the International Labour Organization
- Sustainable Development Goals (SDGs)

Resettlement Summary

The Kimuka LILO project involves the resettlement of twenty Project Affected Persons (PAPs) and the impact on thirty-eight parcels. Among the PAPs, seven are female with ten parcels, while nine are male with thirteen parcels. Additionally, Olive Limited, owning twelve land parcels, is affected, and three parcels lack ownership records at the Kajiado registry office.

The cut-off date for the project is October 18, 2023. Assets include permanent, semi-permanent, or temporary structures, compensated through the Gross Replacement Value Method with a 15% statutory allowance. PAPs can salvage materials from affected structures.

The total compensation budget is Kshs. 102,384,138.25, distributed across land, structures, disturbance allowance, and trees. The breakdown is as follows:

- Land: 24.315 acres, valued at Ksh. 92,714,157.11.
- Structures & Improvements: 20 structures, totaling Ksh. 7,908,679.25.
- Disturbance Allowance (15%): 1,186,301.89 Kshs.
- Trees: 125, valued at Ksh. 575,000

Identified Potential Environmental and Social Impacts

The following positive and negative impacts are likely to be associated with the proposed project.

Positive Impacts

- National reliable and secure power supply
- Direct and indirect skilled and non-skilled employment opportunities.
- Gains to the local and national economy and increase in revenue.
- Informal sectors benefits
- Development of other sectors
- Increased security in the area

Negative Environmental Impacts

- Noise pollution
- Generation of exhaust emissions
- Dust emissions
- Solid and liquid waste generation
- Oil spill hazards
- Destruction of existing vegetation and habitats
- Avifauna mortality
- Increased demand for material consumption
- Impacts on workers' and community health and safety
- Soil erosion
- Fire outbreaks
- Visual and aesthetic impacts
- Incidences of electrocution
- Perceived dangers of electrostatic and magnetic forces
- Increase in social vices.
- HIV/AIDS and Sexually transmitted diseases
- Impacts on Workers' and Community Health and Safety
- Operational phase Environmental Impacts
- Potential Exclusion of Vulnerable and Marginalised groups and minority clans
- Sexual harassment
- Sexual exploitation and abuse
- Sexual harassment
- Physical displacement and limited access to land

Proposed Mitigation Measures

Mitigation of the potential impacts as described in chapter 7, and implementation of the Environmental Management Plan and Environmental Monitoring Plan (chapter 8 and 9) will help to minimize the negative impacts and enhance the positive outcomes of the project.

Conclusion

An Environmental and Social Management Plan (ESMP) outline has been developed to ensure sustainability of the site activities from construction through operation to decommissioning. The plan provides a general outline of the activities, associated impacts, and mitigation action plans, responsible actors, implementation timeline and the costs thereof.

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

It is strongly recommended that a concerted effort is made by the site management, to implement the Environmental and Social Management and Monitoring Plan provided herein. Following the commissioning of the 220 kV transmission substation, statutory Environmental and Safety Audits must be carried out in compliance with the national legal requirements, and the environmental performance of the site operations should be evaluated against the recommended measures and targets laid out in this report.

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

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

1 CHAPTER ONE: INTRODUCTION

1.1 Project 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 do this, the electricity transmission lines network is being considered for upgrading and with it the communication system required for line protection and management purposes. The Kenya Power Limited (KP) least cost power development plan identified various 220 KV developments for improving the performance of the national grid network to cater for the increasing load growth and meet the objectives of 2030. The Kenya Electricity Company Limited (KETRACO), which now assumes the full mandate of constructing and managing transmission lines and associated sub stations, is proposing to put up a new 400/220kV substation in Kimuka location on a KETRACO-owned 27.3-acre piece of land.

The proposed substation will receive power from the existing 400kV Suswa – Isinya Transmission Line. The power will then be stepped down to 220kV, then be relayed via double circuit 220kV T-off Transmission line to the yet-to-be commissioned Kimuka 220/66kV substation then to the existing Ngong 66/33kV substation belonging to Kenya Power.

The power will ultimately exit Kimuka substation via one circuit of the same transmission line to the 400kVSuswa – Isinya Transmission Line feeding it into the Isinya 400/220 kV substation.

KETRACO aims at supplying power to meet the increasing needs and demands of end-users. To achieve this KETRACO is establishing its infrastructure of Transmission Lines and substations on an on-going basis. While achieving this vision KETRACO ensures that all its operations are sustainable.

The Kenya Government and World Bank Policies on all new projects requires that an Environmental and Social Impact Assessment (ESIA) study be carried out at the project planning phase to ensure that significant impacts on the environment are taken into consideration at the planning, construction, operations, and decommissioning stages. To ensure that this is done, KETRACO has used its in-house manpower consisting of Electrical and Civil Engineers, Socio-Economists, Land Economists, Surveyors and Environmental Experts to undertake the ESIA for the proposed Kimuka 400/220kV substation.

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

1.2 Study Objectives

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

The specific objectives of this ESIA were to:

- Identify and assess all potential environmental and social impacts of the proposed project.
- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation.
- Verify compliance with the environmental regulations and relevant standards.
- Identify problems (non-conformity) and recommend measures to improve the environmental management system.
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle.
- Recommend cost effective measures to be used to mitigate against the anticipated negative impacts.
- Prepare an Environmental Impact Assessment Project Report compliant to the Environmental Management and Coordination Act, Cap 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003, detailing findings and recommendations.

1.3 Terms of Reference (TOR) for the ESIA Process

The following are the TOR for the ESIA process.

- Description of the baseline environment (physical, biological, social, and cultural)
- Detailed description of the proposed project
- Review Legislative and regulatory framework that relate to the project.
- Identify potential environmental impacts that could result from the project.
- Carry out public consultation on positive and negative impacts of the project.
- Propose mitigation measures against identified environmental and social impacts of the project.
- Analysis of alternatives
- Development of an Environmental Management Plan to mitigate negative impacts.
- Development of an Environmental Monitoring Plan
- Environmental and Social Impact Assessment Report

1.4 Scope of the Study

The EIA scope largely covered the following areas:

- (1) Baseline Conditions:
 - Environmental setting (climate, topography, geology, hydrology, ecology, water resources, sensitive areas etc.),
 - Socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.),
 - Infrastructural issues (roads, water supplies, drainage systems, power supplies, etc.).
- (2) Legal and policy framework:
 - Focusing on the relevant national and international environmental laws, regulations and by-laws and other laws and policies focusing on allied activities relative to the project in question.
- (3) Interactive approach was adopted for the immediate neighbourhood in discussing relevant issues including among others:
 - Land use aspects,
 - Neighbourhood issues,
 - Project acceptability,
 - Social, cultural, and economic aspects.
- (4) Environmental impacts:
 - Physical impacts,
 - Biological impacts,
 - Legal Compliance.

1.5 ESIA Approach and Methodology

The approach to this exercise was structured such as to cover the requirements under the EMCA, Cap 387 as well as the Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003. It involved largely an understanding of the project background, the preliminary designs, and the implementation plan as well as commissioning. In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, desktop studies, public consultations with members of the community in the project areas, survey, photography, and discussions with the project implementation team.

The key activities undertaken during the assessment included the following:

- Consultations with the key project stakeholder including the project proponent, community members, opinion leaders and the national and county governments' key departments. 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 landmarks, 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 such as pertinent national and international legal instruments,

the County of Kajiado CDIPs, the Kimuka 220/33kV substation ESIA report, the World Bank Environmental and Social Framework among others .

- Review of available project documents; and
- Report writing, review and submissions.

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

1.5.1 Screening

Screening of the project was undertaken to evaluate the need of conducting an EIA and the level of study. Transmission substations are listed under schedule 2 of EMCA, 1999 and its amendments among projects requiring ESIA before commencement. In addition, other considerations considered during the screening process included the physical site location, zoning, nature of the immediate neighbourhood, sensitivity of the areas surrounding the site and socio-economic activities in the area, among others.

1.5.2 Desk Study

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

1.5.3 Site Assessment

A site assessment was conducted on to establish:

- Land ownership, usage, and conflicts.
- Flora, fauna, and avifauna found on the site.
- The site landscapes.
- Social-cultural and socio-economic environment
- Surface water bodies within the neighbourhood of the site and.
- The general environment and its sensitive receptors found within the environs of the site.

1.5.4 Consultation and Public Participation

Detailed stakeholder's consultations for Kimuka substation ESIA were undertaken as from the 8th to 13th February 2021. These consultations were conducted in the form of key informant interviews and household/community interviews. A total of 19 number of stakeholders were engaged through interviews and filled the questionnaires with 4 being key informant stakeholders and 15 drawn from the community as shown in the stakeholder consultation questionnaires attached in Annex 2 and 3b.

The Focused Group Discussion (Public *Baraza*) was led by the local area leaders and drew 45 attendants (See attendance list in Annex 3a).

The following stakeholders/institutions were consulted:

- County Government of Kajiado
- The office of county commissioner of Kajiado
- Sub county commissioner
- Kenya Forest Service- Ngong station
- Kenya Wildlife Service
- Sub – County Public Health office
- Office of the area chief
- The community members within the project's area of influence.

The second round of stakeholder consultation was undertaken between 16th to 19th October 2023. This was occasioned by the additional scope to the project of LILO that passes through private property. Due to this, fresh key informant interviews were undertaken. 5 number of key informants, and 9 number of community members were interviewed in the process.

A public meeting led by the area chief was organised and conducted on 18th October 2023 with 26 number of attendees of which 5 were women and 21 were men. To undertake the consultations

In a culturally acceptable manner, the E&S experts involved the area chief and other local leaders to organize and the lead the public meetings in a manner acceptable to the community.

1.5.5 Reporting

Specific issues covered in the project report include but are not limited to:

- Name of the proponent, address and contact person.
- Title of the project
- Objectives and scope of the project
- Nature of the project.
- Location of the proposed project,
- Types of activities that will be undertaken during the project construction, operation and decommissioning phases.
- Design of the project.
- Proposed Project budget.
- Materials to be used, products and by-products, including waste to be generated by the project and the method(s) of their disposal.
- Potential environmental impacts of the project.
- Economic and social impacts to the local community and the nation in general.
- Views of the public/potentially affected people about the project; and
- An Environmental and Social Management Plan (ESMP) for the entire project cycle including mitigation measures to be taken during and after implementation of the project and an action plan for the prevention and management of foreseeable accidents during the project cycle.
- An Environmental and Social Monitoring Plan (ESMoP).

2 CHAPTER TWO: PROJECT DESCRIPTION

2.1 Introduction

This section presents a description of the project by providing its administrative location, geographical location, technical, project activities and financial descriptions of the proposed project.

2.2 Project Location

The new Kimuka 400/220kV substation is located in the south of Kenya, about 30km away from Nairobi toward the west and about 8km away from Ngong railway station, is on a KETRACO-owned 27.3-acre piece of land, LR Number **Kajiado/Ntashart/1842 Kimuka location**, Kajiado West Subcounty in Kajiado County.

The distance from the New Kimuka substation to the existing Kimuka (Ngong) 220/66kV substation is about 2km. The New Kimuka 400/220kV SS will be connected to the existing Kimuka 220/66kV SS by a double-circuit overhead line. In addition, a Loop-In and Loop-Out (LILO) will be established from Suswa-Isinya 400kV double circuit OHL to New Kimuka SS. The location of New Kimuka SS has been illustrated in the below figure. The length of the transmission line to Suswa and Isinya substations is about 45km and 61km, respectively.



Figure 1: Part of the 27 acres land hosting the substation.

The piece of land was sold to KETRACO on a willing buyer willing seller basis. The title deed is attached to this report as Annex 5.

The GPS coordinates for the substation are in Table 1, map and sketch presentation of the orientation of substation with the existing and the proposed electricity transmission infrastructures is as per Figures 3 and 4 below.

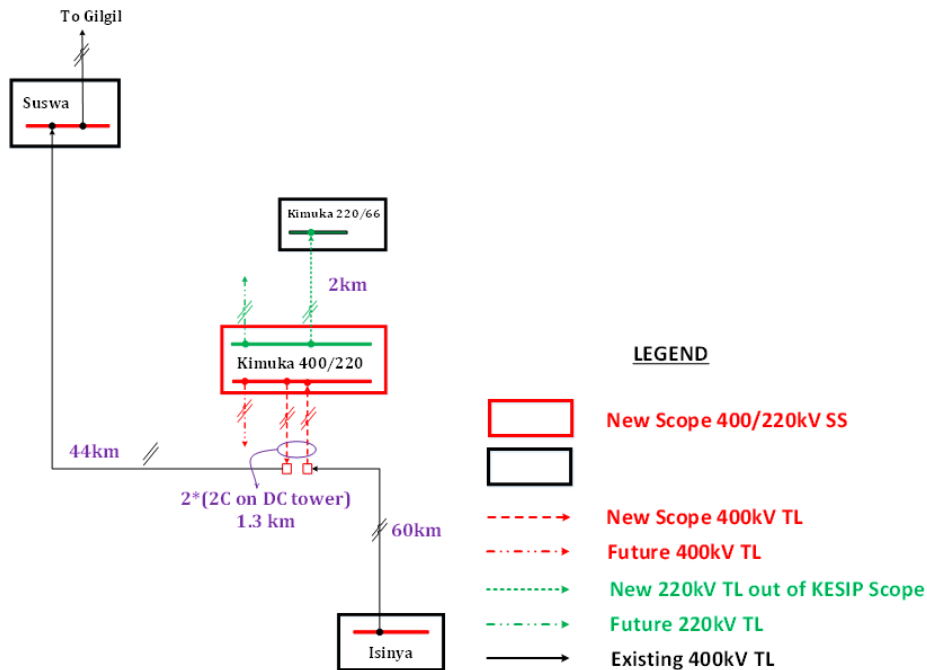


Figure 2: New Kimuka 400/220kV and Existing Kimuka 220/66kV substation sketch indicating scope of works

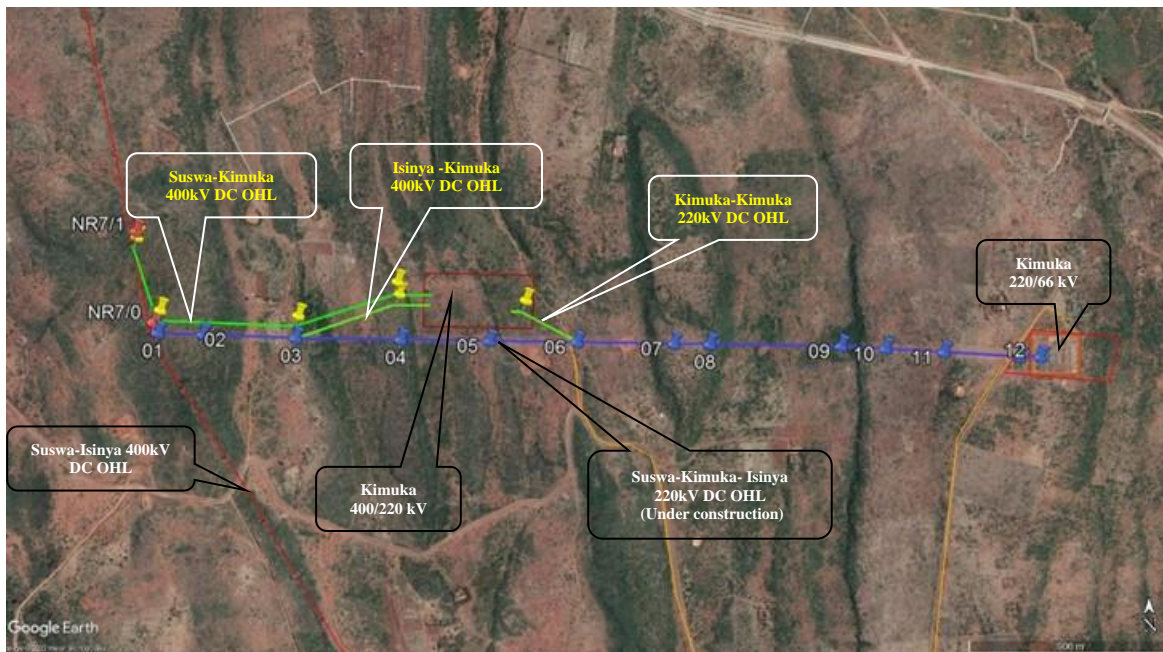


Figure 3: Location of New Kimuka 400/220kV and Existing Kimuka 220/66kV substations, LILO from Suswa-Isinya Transmission Line and Connection Between Substations.

Table 1: The coordinates of New Kimuka substation

Name of Substation	Substation Coordinates (ARC 1960 UTM ZONE 37 M)		
	Name	Easting (m)	Northing (m)
New Kimuka 400/220kV Substation	KSS1	230470.907	9853075.756
	KSS2	230945.951	9853069.254
	KSS3	230938.270	9852836.617
	KSS4	230463.226	9852843.120

2.3 Substation Works

2.3.1 Works at New Kimuka 400/220 kV Substation

The New 400/220kV substation (including supply, installation, and commissioning of 2 x 200MVA 400/220/11kV Auto-Transformers) along with associated LILO works.

The new Kimuka 400/220 kV substation will be connected to the existing Kimuka 220/66kV substation by a double-circuit overhead line. The complete 400kV and 220kV switchyards shall be constructed as a new air-insulated switchgear (AIS) substation and configured in “breaker and a half”, including:

- a) The new 400kV switchyard shall comprise of the following:
 - Two (2) fully populated diameters connecting Suswa 1, Suswa 2, A-Tr. 1 and A-Tr. 2.
 - Two (2) partially filled connecting Isinya 1 and Isinya 2. These two diameters will be connected to future A-Tr. 3 and A-Tr. 4.
 - Space for a full diameter shall be considered for future extension.
 - Required works for termination of LILO making from 400kV double circuit Suswa-Isinya OHL.
- b) Supply, installation, test and commissioning of Two (2) numbers, 400/220/11kV, 200MVA Ynaod11, ONAN/ONAF1/ONAF2 auto transformers (A-TR.) with OLTC in step of 1.25%, 17 Steps, percentage impedance of 14% are required and shall feed into a new 220kV switchyard. Depending on the location of the earthing & auxiliary transformer (EAT), an 11kV power cable shall be installed between the autotransformer, the earthing, and auxiliary transformers.
- c) Two (2) number, 11/0.415kV, 500kVA, Znyn11 Earthing & Auxiliary Transformers (EAT) whose detail design stage but there shall be no price adjustment.
- d) Supply, installation, test and commissioning of One (1) 0.415kV, 500kVA Diesel Generator.
- e) The new 220kV switchyard shall be comprised of the following:
 - Two (2) fully diameters connecting A-Tr. 1, A-Tr. 2, Existing Kimuka OHL 1 and Existing Kimuka OHL 2.
 - Space for three (3) full diameters shall be considered for future extension.
 - Required works for termination of Kimuka 220kV double circuit line connection.
- f) Substation control building complete with substation control, protection and communication system.
- g) Bay Control Rooms as per technical requirements and tender drawings
- h) The HVAC system including the DX Split units and the fans for Control Building, BCR, Storage warehouse, Guard House and Telecom Collocation Room, Technical Staff Housings and Security Staff Housings.
- i) Substation firefighting systems include portable fire extinguishers for buildings, fire hydrants for yard and Trolley mounted fire Extinguisher Nitrogen injection fire protection systems for Transformers and reactors.
- j) Complete water and sewage system plumbing for Control Building, Guard House and Telecom Collocation Room, Technical Staff Housings and Security Staff Housings
- k) Water supply for substation buildings and yard fire hydrant
- l) Elevated water supply reservoir for control building, Guard house, Security staff Housing, and Technical Staff Houses
- m) Septic tanks shall be considered for waste drainage.
- n) Other electrical, mechanical and civil works as per technical requirements are:

- Guard House and Telecommunication Collocation Room
 - Diesel Generator House
 - Fire Water Pump Houses and Equipment and Machineries
 - Nitrogen injection fire protection system for autotransformers.
 - HVAC Systems
 - Solar Water Heating Systems (and Backup Electric Elements)
 - Storage Warehouse
 - Internal Access Roads
 - External Access Road
 - Technical Staff Housings (4 units, equipped and furnished)
 - Security Staff Housings (4 units, equipped and furnished)
 - Boundary Chain-Link Fence and Entrance Gate
 - Covered Car parking (suitable for 10 cars)
- o) Tests, end-to-end testing, commissioning and training.
 - p) Complete and functional system integration to the existing power grid.
 - q) Phasor measurement unit (PMU) and fault monitoring system (FMS) together with required facilities and accessories (as per technical specifications) shall be supplied and commissioned.
 - r) All data engineering at the gateways and NCC and point-to-point testing of the signals from process to gateway and to the NCC.
 - s) Required facility for interconnection between the OPGW and fibre optic cable (including the joint box, splicing, termination at the gantry, etc.) and final end-to-end (ODF-ODF) OTDR and core-matching testing and preparing as-built documents.
 - t) Test, commissioning, and training.
 - u) End-to-end tests (with Dispatching Centers)
 - v) Complete and functional system integration to the existing power grid.

2.3.2 Works at Existing Kimuka 220/66 kV Substation

Secondary modification works and remote end works (including protection, SAS and Telecommunication) are required to execute the connection between the existing 220/66 kV Kimuka substation with the new 400/220 kV Kimuka substation.

Then New Differential protection relays (as Main II protection) shall be supplied and installed. All required modifications such as relay settings, tags, SCADA, telecommunication system, alarms and signals shall also be carried out in the remote substations and dispatching centres.

2.3.3 Works at Existing Suswa 400/220 kV Substation

Relocation of one circuit currently operated at 220 kV, connected to the 220 kV yard of Suswa to the 400 kV yard of Suswa, and associated required secondary modifications and remote end works (including related Protection, SAS and Telecommunication systems re-setting, re-testing and re-commissioning).

2.3.4 Works at Existing Isinya 400/220 kV Substation

Connecting the existing 400kV SUSWA-1 OHL to 400kV switchyard, which includes completion of the connection between feeder's equipment (LA-CVT-CVT-CT) and connection of the LA to the 400kV SUSWA-1 OHL (note that the existing Suswa-1 line used as 220kV line but designed for 400kV) and associated required secondary modifications and remote end works (including related Protection, SAS and Telecommunication systems re-setting, re-testing and re-commissioning).

In addition, the removal of the connection of the existing 220kV OHL from the 220kV switchyard which is already connected to diameter no.2 instead of IBT-1 and then completion of the connections of the IBT-1 to the 220kV Switchyard which includes the relocation of the LA to transformer side and installation of PI instead, and completing the connection of feeder's equipment such as CSE to PI and LA to 220kV bushings.

In Isinya 220 kV, diameter 2, one feeder bay is currently being used to connect the Suswa- Isinya line on 220 kV. Once Kimuka 400kV is constructed, the double circuit Suswa- Isinya line will be transferred to the 400kV side of Isinya and hence that feeder bay on 220 kV will be freed up. This freed-up bay will be used to connect IBT-1 which is already hooked on the Isinya 400kV side but does not have a bay to be connected to the 220 kV Isinya side.

IBT-1 is fully installed, tested and commissioned on the 400kV side. All the panels on the 400kV are in service. On the 220kV side, this panel are not installed. The panel is available and is with KETRACO. The panel will be handed over to the contractor for installation, testing and commissioning. The scope of work will include but will not be limited to:

- a) Shift the 3 existing surge arrestors on the Suswa line bay to the 220 kV side of the IBT-1 where they should be installed.
- b) Perform all the connection works on the 220 kV side of the IBT-1 to ensure the connection of the transformer is complete up to the feeder bay equipment. There is a cable in between but the cable connection is completed between the 2 cable sealing ends.
- c) Disconnecting all the cables from the existing RP 14 (Suswa line protection Panel)
- d) Dismantle and recover the existing Suswa line protection panel and handover to KETRACO.
- e) Install the new RP 14 (IBT-1 protection panel) in the same location where the Suswa line protection panel was installed.
- f) Perform all wiring works required from this panel to the existing equipment in the 220 and 400 kV yards and also to 400 kV IBT1 panels.
- g) Fully test this panel including all modifications works required in the existing system to match existing philosophy.
- h) Fully integrate this panel to the existing systems including SCADA, RCC/NCC, busbar protection etc.
- i) Fully test the IBT-1 protection system which includes both 400 and 220 kV system, inter-tripping schemes and interlocks.

2.4 Transmission Line Works

Apart from the substation works detailed, the scope of works includes the provision of the associated overhead line entries at the substations.

The Scope of Works consists of the design, manufacture, testing, delivery, storage at the site, installation, start-up field tests and work-related commissioning for the transmission lines, including all works.

- Currently, the Suswa-Isinya 400kV double circuit transmission line is constructed at 400kV but is operating at 220kV voltage level until the 400kV bus bars at both ends are ready.
- According to the future configuration, one circuit of the existing double circuit line will connect 400kV Suswa to 400kV Isinya directly at 400 kV while the second circuit from Suswa 220 kV to Isinya 220 kV will have a LILO into Kimuka 220/66kV substation.
- In future (after the construction of Kimuka 400/220 kV SS), the 220kV yard of Kimuka 400/220 kV SS will be connected to 220kV yard of the existing Kimuka 220/66 kV SS. In addition, the circuit operating at 220 kV will be upgraded to operate at 400 kV and the double circuit 400 kV Suswa-Isinya will have a LILO at Kimuka 400/220 kV SS.

Therefore, the final configuration, which shall be carried out under this project, is as follows:

2.4.1 400kV Loop in (to Kimuka 400/220kV substation)

The loop into the Kimuka 400/220kV substation will be about 1.5 km long starting with the construction of a new double circuit tension tower near existing tower No.NR7/1 of the Suswa – Isinya 400kV line (in order to connect both lines from Suswa to Kimuka 400 kV SS) and end at Kimuka 400 kV Substation.

The final short line will be a double circuit 400kV Suswa-Kimuka OHL.

2.4.2 400kV Loop out (of Kimuka 400/220kV substation)

The loop out of the Kimuka 400/220kV substation will be about 0.6 km long starting from tower No.3 of the loop into the Kimuka 220kV line (220kV Suswa-Kimuka-Isinya DC OHL) and ending at Kimuka 400 kV Substation.

In addition, the connection of Tower No.1 to the Suswa (one circuit) should be terminated and instead connect to the Isinya, so that both circuits from Isinya connect to Kimuka 400kV through Tower No.1 (according to the 2021 configuration which is under construction, the tower No.1 will connect one circuit from Suswa and one circuit from Isinya to the Kimuka 220kV SS. However, for the final configuration, tower No.1 shall connect both lines from Isinya to Kimuka 400 kV SS).

The final line will be a double circuit 400kV Isinya -Kimuka OHL.

2.4.3 220kV Connection (Kimuka 400kV to 220kV substation connection)

The proposed line from the Kimuka 400kV substation to the old Kimuka 220kV substation will be about 0.4 km long by terminating the existing 220kV line (Suswa-Kimuka-Isinya) at tower No.6 and connecting it to the 400kV substation (at 220 kV bus bar).

In addition, the scope of work of this part includes recovering the line section between towers no 3 and 6 of the existing 220kV line (Suswa-Kimuka-Isinya), which will be unused.

The final line will be 220kV Kimuka (400/220kV)-Kimuka (220/66kV) DC OHL.

It should be noted that this line will be constructed as 400 kV but will operate at 220 kV.

2.4.4 400 kV Suswa Line works.

Include the primary scope of works on the transmission line in Suswa 400 kV to facilitate termination of the one circuit from 220 kV to 400 kV Suswa. Include also primary works of disconnecting the line from 220 kV Suswa gantries. Include also the scope of recovering any towers, conductors and accessories that will be unused after the OHL is terminated into 400 kV yard. All required material and implementation work, in order to connect both circuits to the 400 kV bus bar.

2.4.5 400 kV Isinya Line works.

Include the primary scope of works on the transmission line in Suswa 400 kV to facilitate termination of the one circuit from 220 kV to 400 kV Isinya as well as termination works of IBT-1 into the free-up bay. Include also the scope of recovering any towers, conductors and accessories that will be unused after the OHL is terminated into 400 kV yard.

2.5 Definite work

The design, manufacture, supply, delivery to and off-loading at the Site, erection, testing, starting to work, completion and maintenance of the following and of the other work incidental thereto included: -

- Survey
- Preparing plan and profile and tower spotting
- Soil investigation
- Right-of-way clearance and access roads
- Equipment supply
- Foundation works
- Erection of towers
- Stringing works
- Dismantling surplus part of existing lines (and packing and transferring to the client's store/specified location as per client requirements)

- Re-tensioning part of existing lines in order to connect the new lines to the existing ones.
- Re-location of existing lines in Suswa and Isinya substations so as to both circuits are connected to the 400kV bus bar.
- Testing, final inspection and commissioning.
- Maintenance and guarantee.

2.6 Land Ownership documentation.

The 27.3-acre piece of land was purchased from the previous owner on a willing -seller, willing-buyer basis and now legally owned by KETRACO as shown in attached deed documents in Annex 4.

2.7 Purpose of substation

In line with its mandate, KETRACO is constructing a 440/220 kV substation in Kimuka as part of its vast Nairobi Ring project. The purpose of the substation is to power stability and reinforcing in the county of Kajiado and Nairobi Counties.

2.8 Project Justification

The proposed substation, besides strengthening the electricity transmission system, will also supply power to Kajiado Counties and environs. This will in essence boost various sectors including agriculture; tourism; health; education, business (and especially small-scale businesses); water and sanitation; security; etc.

2.9 Kimuka Substation Design and Layout

Substation Design Services Include: One-Line Diagrams and Construction Drawings, Site Selection & Equipment Layouts, Equipment Procurement, Construction Coordination, Relay, Control & Metering, Protective Systems Coordination, Substation Automation, SCADA Systems Design, Grounding Systems and Final Checkout, Start-up, and Testing.

The layout of the substation is very important since there should be a Security of Supply. In an ideal substation all circuits and equipment would be duplicated such that following a fault, or during maintenance, a connection remains available. Practically this is not feasible since the cost of Environmental & Social Impact Assessment Project Report implementing such a design is very high. Methods have been adopted to achieve a compromise between complete security of supply and capital investment.

The substation would include 220 kV switchgear, step-down transformers and 220 kV switchgear. The switchgear in the substation would be conventional outdoor air-insulated switchgear, both for 220 kV and 220 kV. Equipment for control, protection and auxiliary power will be housed in a small control building. The proposed substation layout consists essentially the arrangement of a number of switchgear components in an ordered pattern governed by their function and rules of spatial separation. The spatial separation will include.

- Earth clearance which is the clearance between live parts and earthed structures, walls, screens and ground,
 - Phase clearance which is the clearance between live parts of different phases and
 - Isolating distance which is the clearance between the terminals of an isolator and the connections thereto.
- The section clearance is the clearance between live parts and the terminals of a work section. The limits of this work section, or maintenance zone, may be the ground or a platform from which the substation works are executed.

2.10 Loop In and Loop Out Line (LILO)

The project is conceptualised to include a LILO as an associated facility. The LILO includes two disjointed short lines of a Loop In of 1.5km and Loop Out of 0.6km. The two short lines shall be 400kV and will require a wayleave of 60m on private property as per the cadastral map below.

The LILO passes through 39 privately owned plots and will require public right of way of 31.1 acres or 12.6 hectares.

The transmission LILO will involve the construction of double circuit steel lattice towers with a ground clearance of between 20 meters and 25 meters depending on the terrain and detail design considerations, with a longitudinal span length of between 350 meters to 400meters. The line will make use of overhead conductors.



Figure 4: Cadastral map for the LILO (green)

2.11 Construction Procedures

All construction activities including ground preparation, earth moving, materials delivery, building, walling, roofing and the installation of amenities (power, water, communication equipment, etc.), fittings (doors, windows, safety provisions, etc.) will be carried out by competent personnel obtained through rigorous tendering procedure to ensure the set quality standards and timelines are met.

2.12 Construction activities Outline

Subject to permitting requirements, substation construction typically, but not always, occurs in the following sequence:

2.12.1 Site Development

Site development begins with the clearing of vegetation at the site. Temporary environmental controls, such as silt fence, are also installed currently. The area is then levelled by cutting and filling as necessary to bring the site up to subgrade. Sand and aggregate fill materials may be brought in to make a level site for construction.

The substation site development also includes the installation of any required environmental controls such as plunge pools, retention ponds, or rip-rap slopes. The final grading and seeding of the areas outside of the substation fence will be installed during this phase.

2.12.2 Material delivery

Foundation and construction materials, including steel and gravel, are delivered to the work site. Construction equipment such as backhoes, semitrailers, moving equipment, concrete haulers and cranes may also be brought onsite. If required, we will use a storage yard to store materials and equipment.

2.12.3 Foundation Installation

Soon after site development is completed, the equipment foundations will be installed. The foundations are reinforced concrete and may be drilled pier or spread footing foundations depending on the size and weight of the equipment.

2.12.4 Equipment Installation

Following installation of the foundations, the substation equipment is delivered and installed at the station. The equipment installed at the stations includes, but is not limited to, substation security fence, steel structures, circuit breakers, transformers, capacitor banks, and control buildings.

After the equipment is installed, a finish layer of crushed stone (typically 6 inches deep) is installed over the entire station up to the base of the structure foundations. This gives the station its “finished”. Figures below give an impression of a substation and its layout.



Figure 5: An image of a completed substation

2.12.5 Final Restoration

Upon completion of construction, the contractor will do the final restoration of the site. Final restoration consists of the removal of all temporary environmental controls, final seeding, and the installation of any vegetative buffers.

2.12.6 Input Materials

The 400/220kV substation will be constructed using conventional construction materials and construction procedures that are not expected to compromise the safety of the neighboring communities as well as the general environment. The following inputs will be required for construction:

- (i) Raw construction materials e.g., sand, cement, natural building stone blocks, hard core, gravel, concrete among others
- (ii) A construction labour force (of both skilled and unskilled workers).

2.13 Target Group for the ESIA Report

The ESIA Report has been prepared for use by different stakeholders to be involved in the construction and operation of the proposed 400/220 kV substation. The report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of project activities. The information will be useful in planning, implementation, management, and maintenance of the substation.

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

- The Proponent.
- Funding agencies and donors.
- Relevant government ministries and agencies for policy implementation.
- Affected and Interested persons.
- Planners and Engineers to be involved in preparation of designs and plans for the 400/220kV substations.
- Contractors to be engaged in the construction works for;
- People to be involved in the management and operation of the substation.

2.14 Labor Force

During construction the project will draw a workforce of between 150 to 250 inclusive of contractors' staff, skilled semi-skilled, and non-skilled workers. The unskilled and semi-skilled workers will be hired from the locality as guided in the LMP. Skilled laborers will rent houses in Kimuka and Ngong town but will be transported to and from construction site daily by the contractor's vehicle(s). Labour management shall be guided by the labour Management Plan for the Green Program.

During project's operation and maintenance, the project is likely to have between 10-15 staff fully dedicated to its operation. These staff shall be drawn from the Operations and Power Maintenance directorate at KETRACO. They will include grounds-person, technicians, and engineers.

The substation shall be manned right from construction phase to operation and maintenance phase on a 24hr/ 7 days basis through a contracted company. The number of the guards and police officers (where necessary) shall be determined in the future and but should range from 4-6 and 2-4 for contracted guards and police officers respectively. Notably, in the event of construction along the line, the contractor will have to contract guards to man the active stations at night.

3 CHAPTER THREE: ANALYSIS OF PROJECT ALTERNATIVES

3.1 Introduction

This section analyses the project alternatives in terms of site, technology scale and shall involve studying design alternatives and analysing them based the environmental costs and benefits this shall involve studying the technology, design, capital investments, operation and maintenance requirements among others.

3.2 No Project Alternative

Concerns and assessment of the current proposed site, relocation of the project is not a viable option.

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will, however, involve several losses both to the landowner, the community, the Nairobi Metropolitan region, the country and the East African region. The landowner will continue to pay rates for the plot while the plot remains idle hence no income to the owner. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain underutilized.
- No employment opportunities will be created for Kenyans who will work in the proposed development.
- Increased urban poverty and crime in Kenya.
- Economic and social benefit from stable reliable energy will not be achieved.

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, Kenyans, and the Government of Kenya.

3.3 The proposed development alternative

Under the proposed development alternative, the developer of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed development project, provided all environmental and social mitigation measures are complied with during the construction period and operational phases. This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the environmental and social impacts to the maximum extent practicable.

3.4 Alternative Processes and Materials

Highly refined mineral insulating oils are used to cool transformers and provide electrical insulation between live components. Sulfur hexafluoride (SF₆) may also be used as a gas insulator for electrical switching equipment and in cables, tubular transmission lines and transformers. Polychlorinated Biphenyls (PCB) can be used as a dielectric fluid to provide electrical insulation. SF₆ is a greenhouse gas with a significantly higher Global Warming Potential (GWP) than carbon-dioxide. PCB is a highly toxic substance that is no longer commonly used for electrical insulation. For this project, the proponent is advised to use mineral insulating oil for cooling and insulation and to minimize or completely stop the use of SF₆ and PCB.

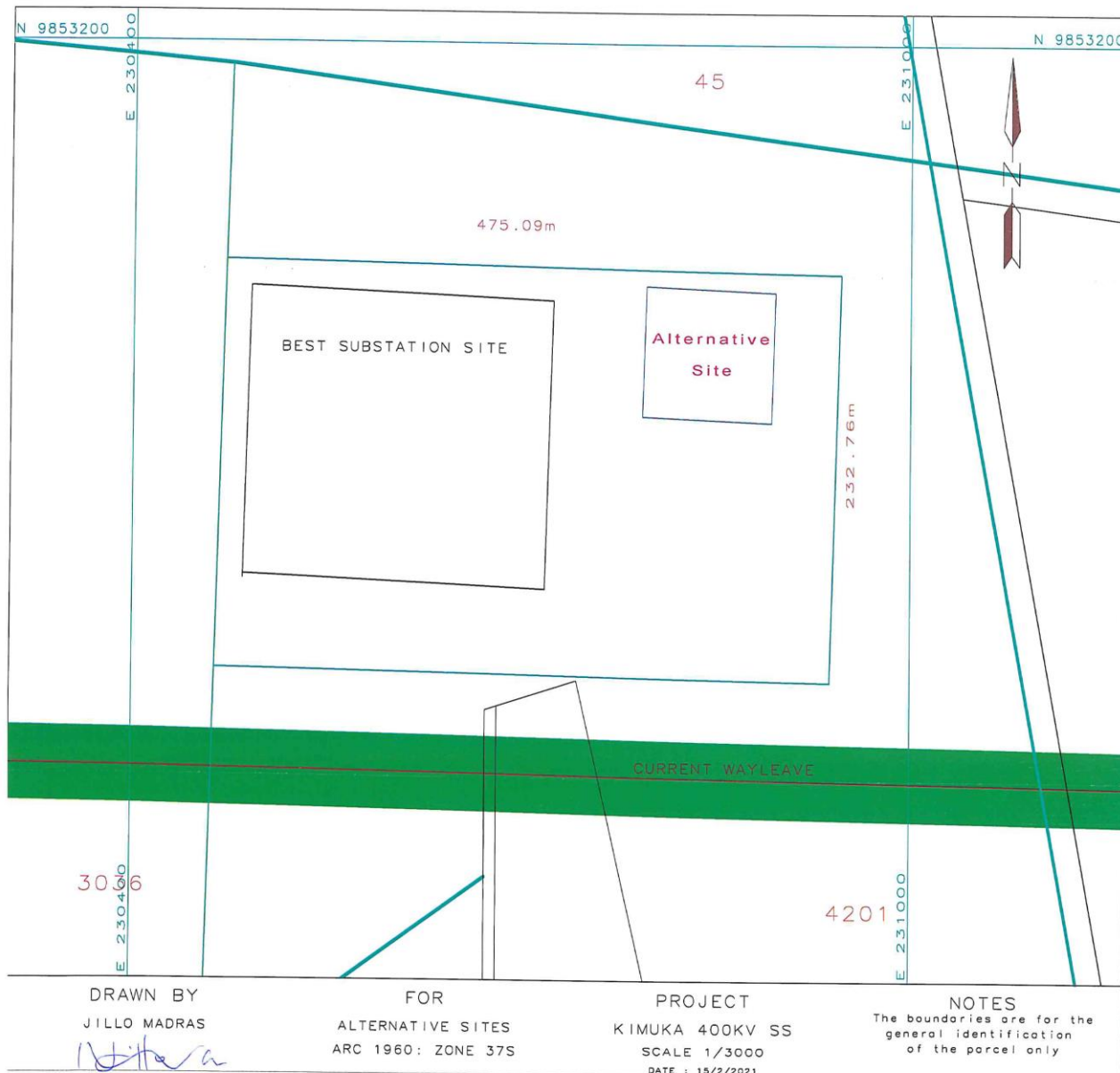
3.5 Site Analysis

3.5.1 Substation

The inherent topography of the proposed 27.3 -acre site makes it somewhat have two distinct divisions of the terrain. To the Northwest of the site there is a sharp cliff that towers almost to the mid periphery of the site to the west. The cliff's sharp decent reduces eastward. This divides almost the entire land into two lower staircase and an upper staircase.

Due to the terrain, the land is not homogenous and therefore, selection of three appropriate specific sites (of about 8 acres) from within the entire vast land was done as shown in the layouts below. From the three earmarked potential sites, the most appropriate will be picked. (see image below). Since the earmarked sites are within the 27.3 acres

piece of land, their difference in suitability is very minimal hence whichever site that shall be picked will serve the purpose.



3.5.2 Description of LILO Options

3.5.2.1 400kV Loop in (to Kimuka 400/220kV substation)

Two alignments were considered by the Project Implementation Team (PIT).

Option 1

The first one ran parallel to the 400kV line that goes to the Kimuka 220kV substation. This is shaded green in the attached drawing below. This alignment is described with the following GPS coordinates:

System Settings: Degrees – ARC1960 – UTM37S

=====

No.	Name	E	N	Chain (M)
1	TOWER 7/1.	229213.000	9853195.000	0.000
2	SUSWA1	229317.000	9852869.000	342.187
3	SUSWA2	229907.000	9852846.000	932.635
4	SUSWA TT	230344.000	9852994.000	1394.017
5	SUSWA GANTRY	230519.000	9852987.000	1569.157

This alignment affects 38 parcels.

Option 2

It is in this regard that a second alignment was considered. This is shaded pink in **Figure 7** below. This alignment is described with the following GPS coordinates:

System Settings: Degrees – ARC1960 – UTM37S

=====

No.	Name	E	N	Chain (M)
1	ap1	229190.440	9853311.762	0.000
2	ap2	229268.336	9853160.848	169.832
3	ap3	229527.048	9853216.598	434.483
3	ap4	230009.797	9853187.985	918.080
4	suswa tt	230344.000	9852994.000	1304.501
6	suswa gantry	230519.000	9852987.000	1479.641

Analysis of this option revealed that 26 land parcels would be affected by this alignment.

In both options, Terminal Tower and Gantry positions were maintained.

3.5.2.2 400kV Loop out (of Kimuka 400/220kV substation)

The alignment for the loop out was maintained for both options described above. This alignment is described with the following GPS coordinates.

System Settings: Degrees – ARC1960 – UTM37S

=====

No.	Name	E	N	Chain (M)
1	ISINYA GANTRY	230519.000	9852936.000	0.000
2	ISINYA TT	230384.000	9852942.000	135.133
3	TOWER3	229910.040	9852793.660	631.765
4	TOWER2	229522.110	9852808.650	1019.984
5	PROPOSED NEW TOWER-A	229385.871	9852813.917	1156.325
6	PROPOSED NEW TOWER-B	229328.643	9852760.971	1234.289

3.5.2.3 220kV Connection (Kimuka 400kV to 220kV substation connection)

The alignment for the 220kV connection to the 220kV Kimuka substation was maintained for either option described above. This connection has the following GPS coordinates:

System Settings: Degrees – ARC1960 – UTM37S

No.	Name	E	N	Chain (M)
1	KIMUKA GANTRY	230796.000	9852917.000	0.000
2	KIMUKA TT	230896.000	9852914.000	100.045
3	PROPOSED NEW TOWER-C	231037.999	9852778.227	296.509

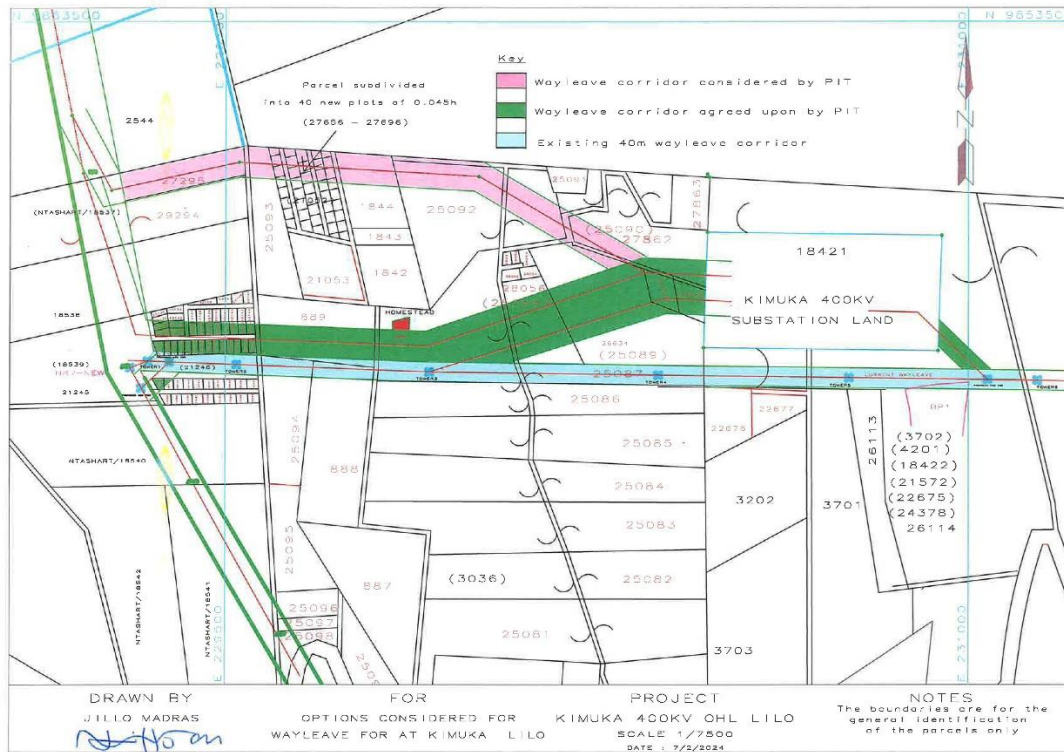


Figure 7: The schematic layout of the LILOs

3.5.2.4 Evaluation of LILO Options

From the description of LILO options above, it was found out that option 2 did not have any more advantage than option 1 as both were affecting so many parcels. Furthermore, choosing option 2 would create an island of land parcels sandwiched between transmission lines. It was feared that the landowners in the island would eventually want to be moved out and hence seek compensation from KETRACO.

It is in this regard option-1 was settled for as the optimal alternative.

4 CHAPTER THREE: ENVIRONMENTAL AND SOCIAL SET-UP OF THE PROJECT AREA

4.1 Introduction

This section is vital to this report since it provides the baseline state of the environment both biophysical, social, and economic prior to commencement of the project. The section is significant in undertaking the project's impact prediction and analysis. The baseline has been categorized into two: general baseline at the County level (Kajiado West Subcounty) and at the project site specific level.

4.2 Maasai History and Culture

4.2.1 Origin, Migration and Assimilation

According to their oral history, the Maasai originated from the lower Nile valley north of Lake Turkana (Northwest Kenya) and began migrating south around the 15th century. They arrived at a long land mass, stretching from what is now northern Kenya to central Tanzania between the 17th and late 18th century.

4.2.2 Settlement in East Africa

The Maasai territory reached its largest size in the mid-19th century and covered almost all of the Great Rift Valley and adjacent lands, from Mount Marsabit in the north to Dodoma in the south. At this time the Maasai, as well as the larger Nilotic group they were part of, raised cattle as far east as the Tanga coast in Tanganyika (now mainland Tanzania). Raiders used spears and shields but were most feared for throwing clubs (*orinka*) which could be accurately thrown from up to 70 paces (well over 100 yards).

Starting with a 1904 treaty, and followed by another in 1911, Maasai lands in Kenya were reduced by 60 per cent when the British evicted them to make room for settler ranches, subsequently confining the Maasai to present-day Samburu, Laikipia, Kajiado and Narok districts.

Maasai in Tanganyika (now mainland Tanzania) were displaced from the fertile lands between Mount Meru and Mount Kilimanjaro, and most of the fertile highlands near Ngorongoro in the 1940s. More land was taken to create wildlife reserves and national parks: Amboseli National Park, Nairobi National Park, Maasai Mara, Samburu National Reserve, Lake Nakuru National Park and Tsavo in Kenya; and Lake Manyara, Ngorongoro Conservation Area, Tarangire and Serengeti National Park in Tanzania.

Maasai are pastoralists and have resisted the urging of the Tanzanian and Kenyan governments to adopt a more sedentary lifestyle. They have demanded grazing rights to many of the national parks in both countries.

Maasai land now has East Africa's finest game areas. Maasai society never condoned the trafficking of human beings, and outsiders looking for people to enslave avoided the Maasai.

The Maasai are a Nilotic ethnic group inhabiting northern, central and southern Kenya and northern Tanzania. They are among the best-known local populations internationally due to their residence near the many game parks of the African Great Lakes, and their distinctive customs and dress. The Maasai speak the Maa language. Some have become educated in the official languages of Kenya and Tanzania, Swahili, and English.

4.2.3 Bead Working

Done by women, bead working has a long history among the Maasai, who articulate their identity and position in society through body ornaments and body painting. Visitors to the *Enjoolata* Center can watch and interact with the Maasai women making traditional jewellery and other beaded items.

Before contact with Europeans, the beads were produced mostly from local raw materials. White beads were made from clay, shells, ivory, or bone. Black and blue beads were made from iron, charcoal, seeds, clay or horn. Red beads came from seeds, wood, gourds, bone, ivory, copper or brass.

When late in the nineteenth century, great quantities of brightly colored European glass beads arrived in Southeast Africa, bead workers replaced the older beads with new materials and began to use more elaborate color schemes. Currently, dense, opaque glass beads with no surface decoration and a naturally smooth finish are preferred.

4.2.4 Shelter

As a historically nomadic and then semi-nomadic people, the Maasai have traditionally relied on local, readily available materials and indigenous technology to construct their housing. The traditional Maasai house was designed for people on the move and was thus very impermanent in nature. Constructed by able-bodied women, the houses are either somewhat rectangular shaped with extensions or are circular.

The structural framework is formed of timber poles fixed directly into the ground and interwoven with a lattice of smaller branches, called wattle. The wattle is then plastered with a mix of mud, sticks, grass, cow dung, human urine, and ash. The cow dung ensures that the roof is waterproof. The home pictured – *enkaj* or *engaji* – is small, measuring about 10 x 15 feet and standing only five feet high. Within this space, the family cooks, eats, sleeps, socializes, and stores food, fuel, and other household possessions. Small livestock is also often accommodated within the *enkaji*.

Villages are enclosed in a circular fence (an *enkang*) built by the men, usually of thorned acacia, a native tree. At night, all cows, goats, and sheep are placed in an enclosure in the centre, safe from wild animals. At the *Enjoolata* Center, visitors can experience life in a traditional Maasai compound, and see how homes are built today just as they have been for generations.

4.2.5 Music and Dance

Maasai music traditionally consists of rhythms provided by a chorus of vocalists singing harmonies while a song leader, or *olaranyani*, sings the melody. The *olaranyani* is usually the singer who can best sing that song, although several individuals may lead a song.

The *olaranyani* begins by singing a line or title (*namba*) of a song. The group will respond with one unanimous call-in acknowledgement, and the *olaranyani* will sing a verse over the group's rhythmic throat singing. Each song has its specific *namba* structure based on call-and-response. Common rhythms are variations of 5/4, 6/4- and 3/4-time signatures. Lyrics follow a typical theme and are often repeated verbatim over time. Neck movements accompany singing. When breathing out, the head is leaned forward. The head is tilted back for an inward breath. Overall, the effect is one of polyphonic syncopation. Unlike most other African tribes, Maasai widely use drone polyphony.

Women chant lullabies, humming songs, and songs praising their sons. *Nambas*, the call-and-response pattern, is the repetition of nonsense phrases and monophonic melodies. Repeated phrases following each verse are sung on a descending scale, and singers responding to their own verses are characteristic of singing by females. When many Maasai women gather, they sing and dance among themselves. Visitors to Basecamp will have several opportunities to observe and enjoy these traditional songs and dances, performed by Maasai men and women.

The peak season for singing and dancing is during the rains, which is of course a favourable time to celebrate important passages of life such as circumcision and marriage. This mostly occur around the *manyattas* and involve flirting.

4.2.6 Maasai Religion

The Maasai people are monotheistic, and their God is named Engai or Enkai, a God who is mostly benevolent and who manifests himself in the form of different colours, according to the feelings he is experiencing. Said colours have precise meanings: black and dark blue mean that God is well-disposed towards men; red, on the other hand, is identified with God's irritation.

Enkai has two manifestations: *Enkai-Narok*, the Black God, good and beloved, brings grass and prosperity. He is found in thunder and rain. *Enkai-na-Nyokie*, the Red God, vengeful, brings famine and hunger. He is found in lightning and is identified with the dry season.

The importance of cattle to the Maasai can be traced back to their religion and to Enkai. Today most of the Maasai people are Christians and very few are Muslims.

4.2.7 Maasai Diet

The traditional Maasai diet consists of six basic foods: meat, blood, milk, fat, honey, and tree bark. They drink both fresh and curdled milk. The fresh milk is drunk from calabash and sometimes it's mixed with fresh cattle blood. The blood is obtained by nicking the jugular vein. Mixed blood and milk is mostly used as a ritual drink and as nourishment for the sick. Bulls, oxen and lambs are slaughtered for meat on special occasions and for ceremonies. The by-products of the animals – skin and hides are used as bedding while cow dung is used for building (it is smeared on the walls). The Maasai's entire way of life truly revolves around their cattle. More recently, the Maasai people have supplemented their diet with farm crops such as maize meal, rice, and cabbage among other food crops.

4.2.8 Maasai Clothing

Clothing varies by sex, age, and place. Young men wear black for several months after their circumcision. Although, red is a favored colour among the Maasai. Black, Blue, checked, and striped cloth are also worn, together with multi-coloured African garments. In the 1960s the Maasai began to replace sheepskin; calf hides and animal skin for more commercial material. The cloth used to wrap around the body is the called Shúkà in the Maa language.

The Maasai women regularly weave and bead jewellery, which plays an essential part in the ornamentation of their body. Ear piercing and the stretching of earlobes are also part of Maasai beauty, and both men and women wear metal hoops on their stretched earlobes.



Figure 8: Traditional Clothing of Maasai; Maasai Shuka's

Maasai Hair: The Maasai people, both women and men mostly shave their head to celebrate rites of passage such as circumcision and marriage. This represents the fresh start that will be made as one passes from one to another of life's chapters. It's only the Maasai warriors who are allowed to wear long hair, which they weave in thinly braided strands.

The Maasai children are named upon reaching the age of 3 “moons” and their heads are shaved clean apart from a tuft of hair, which resembles a cockade, from the nape of the neck to the forehead. The young boys are also shaved two days before they are circumcised. The young warriors then allow their hair to grow and spend a great deal of time styling the hair.



Figure 9: Maasai Warrior Hair Style

4.2.9 Preserving the Culture of Cattle, Sustainably

Maasai society is firmly patriarchal in nature, with elder Maasai men sometimes joined by retired elders, determining most major matters for the Maasai tribes. For Maasai people living a traditional way of life, the end of life is virtually without a formal funeral ceremony, and the dead are left out in the fields for scavengers. Burial has in the past been reserved for great chiefs only, since it is believed by the Maasai that burial is harmful to the soil.

Traditional Maasai people's lifestyle concentrates on their cattle which make up the primary source of food. Amongst the Maasai the measure of a man's wealth is in terms of children and cattle. They believe that a man who has plenty of cattle but not many children is poor and vice versa. A Maasai myth says that God afforded them all the cattle on earth, resulting in the belief that rustling from other tribes is a matter of claiming what is rightfully theirs, a practice that has now become much less common.

Traditionally a Maasai man's wealth and status were determined by his number of cattle and number of children. We are training herders in grazing practices so that grazing is sustainable, and the ecosystem is healthy. We are also encouraging better cattle genetics, with herders attaining the same value with fewer cattle. The improved quality means cows can be sold directly to safari camps for meat. These efforts help to preserve and sustain the core of the Maasai culture, which is cattle.

4.2.10 Threats

Poverty and unemployment threaten this livelihood leading to increased land sales and subsequent subdivision and fencing off land, making large areas of land inaccessible to wildlife. This negatively impacts their migrations, the Mara is home to the largest, most spectacular wildlife migrations on the planet.

This resulting fragmentation increases the risks from climate change, and diseases, bringing erratic weather patterns and unpredictable rainfall.

4.3 General Baseline for Kajiado County

4.3.1 Energy access

The County is one of the frontier counties in the development green energy. Ngong Hills wind power station is connected to the national power grid with a capacity of 25.5 MW. Kipeto 1&2 wind power project, Magadi solar project and Mt. Suswa geothermal project are also underway. The major sources of lighting energy are electricity, solar, lantern and tin lamp. The Analytical Report on Housing Conditions, Amenities and Household Assets 2012 indicates that the percentage distribution of households using electricity is 39.8, tin lamp 39.8 and lantern 18.9 percent. The major sources of cooking energy are Liquefied Petroleum Gas (LPG), paraffin, firewood, and charcoal. The percentage distribution of households using the smoky cooking fuels (paraffin, firewood, and charcoal) in rural areas is 94.6 and 74.5 percent in urban areas. Firewood is the most used cooking fuel in rural areas with 75.3 percent of households while charcoal is mostly used in urban areas with 35.6 percent households. LPG is mostly used for cooking in urban areas followed by electricity with 21.4 and 2.0 percent respectively.

The county has great potential around green energy, specifically wind, solar, biogas among others. To ensure access to affordable, reliable, sustainable, and modern energy for all, the county needs to increase accessibility and increase the share of renewable energy in the national grid. The government has put a ban on charcoal production in the country and is promoting tree planting to improve the country's tree cover, there is need to promote use of alternative sources of energy for domestic and industrial use.

4.3.2 Land and Land Use

Land is considered an important factor of production and development. The county is endowed with vast land and diverse land resources within the arid and semi-arid zones of Kenya. It must therefore be put to best and sustainable use. The county. The predominant activity on the land is livestock farming where majority of the residents in rural areas (particularly the *Maasai*) practice pastoralism. There are however areas where small and medium scale crop farming is practiced in high potential areas such as Ngong, Loitokitok, and Nkuruman. Flower farming is mainly practiced in large scale within Isinya and Kitengela areas. Horticultural farming is also picking targeting both the local and international markets.

4.3.3 Land ownership categories/ classification

Land in Kajiado is categorized as community land, private land or public land and registered as leasehold or freehold interest.

4.3.4 Environmental threats

Kajiado being an ASAL is characterised by prolonged periods of abnormally low rainfall and shortage of water. This results to substantial impact on the ecosystem and agriculture harming the local economy. The above-mentioned areas have been highly degraded by illegal tree felling, charcoal burning, over harvesting of sand risking loss of biodiversity, pollution and loss of aesthetic value. Flash floods are a common menace during long rains season mainly because of erosion and lack of vegetation cover.

4.3.5 Health Access

There are four (4) sub county hospitals; Kajiado, Loitokitok, Ngong and Kitengela; sixteen (17) health centres and seventy-eight (78) dispensaries run by the county government. There are also six (6) hospitals, thirteen (13) nursing homes, seven (7) health centres, twenty-seven (27) dispensaries and one hundred and one (101) clinics which are either run by private, faith based, community based and other non-government organizations. The county has 92 community health units initiated out of which only 78 are active. The doctor population ratio is 1:26,094, Public Health Staff is 1: 7,619, and the nurse population ratio is 1: 1,068. The average distance to a health facility is 14.3 km with only 9.9 percent of the population within less than a Kilometre to a health facility.

4.3.6 Population size and composition

The Population of Kajiado County as of 2019 census results was 1,117,840 with a projected population of 1,386,794 by 2027.

The 2018 projected population stands at 1,112,823 with female population constituting of 50.2 percent and male population constituting of 49.8 percent of the total population. The population is projected to be 1,386,794 in 2017.

4.3.7 Climatic Conditions

Kajiado County has a bi-modal rainfall pattern with two distinct raining seasons. Ngong (Kajiado north) had the highest average annual rainfall of 1454.05mm, followed by Isinya (Kajiado east) 896.16mm and Mashuuru (Kajiado central) 674.70mm and least for Magadi (Kajiado west) 450.50mm. The result revealed that rainfall trend in Kajiado County has a high variability level both spatially, seasonally and inter annually. Spatial variation revealed that Ngong had the highest level of CV% of 27.5%, followed by Isinya 26.4% and Mashuuru 25.5% and least for Magadi 21.5%. Except for Ngong, the result shows that the short rain (October – December) had higher coefficient of variance than the long rains (March – May).

4.4 Specific Baseline Information for the project site

4.4.1 Transport infrastructure

The project area is well traversed by a network of tarmacked roads infrastructure. The major road being the Ngong Suswa highway. The site from the tarmac road is accessed by a well graded earth road as shown in plate 3-1. Close to the project is the Standard Gauge Railway Line.



Plate 4-1: Access earth road on site

4.4.2 Similar infrastructure

Within the proximity of the 400kV substation project, there is a 220/66kV Ngong substation whose construction is ongoing but nearing completion. The proposed 400kV substation will step down the incoming 400kV power from the Suswa 400kV substation via Suswa Ngong 400/220kV Transmission line, then feed it into the Kimuka 220 kV substation (under construction). The Kimuka 220kV will further step down the power to 66kV to be evacuated for use by 66kV feeder lines as a reinforcement for Ngong area. Secondly, the power will also leave the Kimuka 220kV substation through an alternative circuit a loop (line in line out) connecting the two Kimuka substations to join the Suswa- Isinya 400/220kV transmission line at 220kV, evacuating the power to Isinya 220kV substation.



Figure 10: The 400kV Suswa Isinya Transmission line

Site Topography The inherent topography of the proposed 27-acre site makes it somewhat have two distinct divisions of the terrain. To the Northwest of the site there is a sharp cliff that towers almost to the mid periphery of the site to the west. The cliff's sharp decent reduces eastward. This divides almost the entire land into two lower staircase and an upper staircase.

Due to the terrain, the land is not homogenous and therefore, selection of three appropriate specific sites (of about 8 acres) from within the entire vast land was done as shown in the layouts below from the three earmarked potential sites, the most appropriate will be picked. (see image below):



Figure 4-11: Site layout indicating alternative sites within the land

4.4.3 Soils and Geology

The geology of the area is a product of volcanicity and continuous weathering of the parent rock. The area has several outcropping monolithic rocks predominant to the western end where the cliff is existent. Other areas of the land have red loamy- sandy soils ranging depth depending on the slope gradient with the lower (east) part of the land having some deposits of deep alluvial soils. These type of soil is highly prone to erosion especially on the steep slopes.



Figure 12: Nature rocks and soil and the substation site

4.4.4 Flora and Fauna

The entire 27.3 acres of the site are characterized by different species of indigenous trees with the dominant being the *Acacia Xanthophloea*, *Acacia senegal*, *Litharea molleoides*, thickets and patches of grass which are food to the browsers and cattle belonging to the local community (since the land is yet to be fenced by KETRACO). See plates below: -

Notably, there was no crop farming done on site as at the time of baseline data collection.



Plate 4-2: Vegetation type on substation site

4.4.5 Hydrology

The site is not crossed by any hydrological feature nor is it adjacent to such a feature. The source of water is therefore surface runoff from occasional rains, from water vendors and nearby boreholes.

4.5 Socio-economic survey for transmission line wayleave

4.5.1 Landowners

The total number of PAPs affected by the Kimuka LILO is twenty (20) PAPs which includes seven (7) females with ten (10) parcels, nine (9) male PAPs with thirteen (13) parcels and the unknown gender, which is Olive Limited, a company which owns twelve (12) land parcels affected by the transmission line. One member of Olive Limited Company indicated that they were planning to build residential houses on their land. In addition, there are 3 no. unidentified PAPs i.e., these parcels are missing green cards which means there are no records of who owns them at the Kajiado registry office. This information is presented in Table 2 below.

Table 2 Number of Landowners Affected

	Total number of PAPs	Total number of Parcels
Female PAPs affected	7	10
Male PAPs affected	9	13
Vulnerable PAPS	0	0
Olive Limited Company	1	12
Unidentified PAPs	3	3
Total	20	38

The total number of PAPs losing structures in the Kimuka area is four (4) PAPs, with a total of twenty (20) structures affected. No vulnerable PAPs were enumerated in Kimuka nor were there any Indigenous People (IPs) identified since this area is in a peri-urban setting.

Out of the 4 No. project-affected households (PAHs) whose structures are affected by the project, only one (1) household (with 10 structures) is currently residing in the project area. This household has four (4) adults, and two (2) children and is from the Maasai tribe. This household will be physically displaced and will need additional assistance as a Project Displaced Person (PDP). The remaining three (3) PAHs have structures that are under construction and were unoccupied at the time of the Resettlement Action Plan (RAP) preparation (October 2023). This information is presented in Table 3 below. There is no project affected household with vulnerable groups, (i.e., IPs), or vulnerable individuals and households (i.e., poor widows, orphan headed households, poor elderly people etc.)

Table 3 Total number of PAPs losing structures

No. PAHs	TOTAL NO. OF STRUCTURES AFFECTED	STATUS
1	10	Occupied Residential
1	6	Residential under construction
1	3	Residential under construction
1	1	Residential under construction
Total no. of Structures	20	

4.5.2 Cut-off date

The affected persons are eligible for some form of assistance if they engaged in any livelihood activity at the affected sites before the entitlement cut-off date.

The cut-off date was discussed and agreed upon during consultative meetings as the date of start of PAPs census activities. This date was adopted to be Wednesday, 18th October 2023 as indicated in the minutes of meetings presented as Annex 3b of this report.

4.6 Valuation of Affected Assets

4.6.1 Valuation Methodology

The method adopted for this RAP was the Gross Replacement Value Method (GRVM) that evaluates the current cost of replacing an asset. The approach entails measurement of the improvements (buildings, site works) to which the appropriate construction costs are applied, resulting in the new replacement (or reproduction) cost. An addition of 15% is added to the value of structures as a statutory allowance to cater for disturbance. This method is consistent with the replacement cost method as required by ESS5.

4.6.2 Structures Valuation

The affected assets are either permanent, semi-permanent or temporary structures in nature. The construction was mainly from natural stone blocks on mortar, iron sheets or mud walls on a timber framework. Therefore, in valuing the structures, that is, the cost of replicating a similar structure at the current cost/rate of construction per square foot, the rates given in Table 5 below were adopted for residential structures.

Table 4: Residential Structure Valuation

Item	Type of structure	Type of Walling	Type of Roofing and Floor	Rate Per Square Feet (Kshs)
1.	Permanent	Natural Stone Walls	GCI roof on timber trusses and tiles floor	2,800 – 3,800
			GCI roof on timber trusses and Screed floor	2,500 – 3,000
2.	Semi-permanent	GCI sheets walls	GCI roof on timber trusses and cement screed floor,	1,200 – 1,800
3.	Temporary	Mud walls/GCI sheets	Iron sheet roof on timber trusses and earth floor	400 – 1,000
4.	Temporary	Timber/wood strips, barbed wire fences	Open to sky	50 – 250 per foot run

Table 5 Entitlement Matrix Loss Category of PAP Entitlement

Loss	Category of PAP	Entitlement
Residential houses	Structure owners	Cash compensation based on the Gross Replacement value plus 15% of the full replacement cost as the disturbance allowance to cater for the cost of transportation and labour during removal of the structures. • 90 days' notice to the PAPs of intention to use the site to allow them to remove their structures.

		<ul style="list-style-type: none"> • Right to salvage construction materials • Financial management training.
Limited loss of use of land	Landowners	Cash compensation based on: - <ul style="list-style-type: none"> • Full Current Market value of their plots for small land holders who will be fully displaced (PDPs) • A minimum of 30% of the Current Market Value of the affected area of land for holders of more than one (1) acre of land.
Crops and trees	Farmers	Cash compensation based on the full value of the damaged/destroyed trees or crops for the farmers.



Figure 13: Images of some of affected structures

4.6.3 Socio-economic activities

4.6.3.1 Farming

The predominant farming done within the vicinity of the proposed site is livestock keeping (cattle and goats).

The general area right from Kimuka is under a gradual but steady metamorphosis from pastoral land to welcoming small-sized single dwelling family plots and housing units.

4.6.3.2 Small-scale businesses

The residents do also practise small-scale businesses for fast moving goods such as agricultural produce and household items in small shops.

4.6.3.3 Cultural Heritage activities

The Kimuka location has for a long been predominantly inhabited by the Maasai persons with key socioeconomic activity deeply rooted to their long-standing culture being pastoralism.

However, the proximity of Kimuka to Ngong town and Nairobi city, has seen it metamorphize gradually to being part of the Nairobi Metropolitan region. Many a people who are non-natives from other ethnical et profiles are now finding Kimuka home. This has also been enabled by construction and installation of pull factors around the area such as the new constructed Ngong Suswa highway, the Standard Gauge Railway Line, construction of high voltage transmission and electricity distribution systems, the presence fresh water enabled by the SGR contractor, building of social amenities such as schools, the gradual urbanization of the Kimuka town and most importantly the effect of devolution that has led to opening up of various centres in Kajiado County.

The impact of urbanization and the gradual change of the area can well be evidenced in subdivision of land traversed by the transmission line LILO conceptualized under these projects.

While the area is appreciably opening and welcoming guests and infrastructural projects, it is on the other have an impact on the available land available for pastoralism which a cultural socioeconomic activity for the Maasais. Due to this, the Maasai community at Kimuka is adapting to the new reality but diversifying their economies to other socioeconomic activities such as trade. The two images below adopted from google earth show a temporal resolution of the Kimuka centre in space of 10 years between 2013 and 2023.

The site does not have any resources of cultural significance to the local communities. However, as a precautionary approach, chance find procedures have been included in this ESIA for guidance to all pertinent stakeholders **(Annex 10)**.

Notably, the two key clans within Kimuka location are the Il-molelian clan, the Il-Kumae clan and the minority Il-taarrosero clan.



Figure 14: Kimuka Trading Centre in 2013

Source: Google Earth – August 2013

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5 CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Introduction

Environmental and Social impact assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. According to section 58 of the Environmental Management and Coordination Act (EMCA) Cap 387, second schedule 9 (I), and Environmental (Impact Assessment and Audit) Regulation, 2003, both new and old projects must undergo Environmental Impact assessment and Audits. The report of the same must be submitted to National Environmental Management Authority (NEMA) for approval and issuance of the relevant certificates.

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

5.2 Environmental policy

This ESIA has been prepared to fully comply with environmental and social safeguard policies and procedures as outlined in the World Bank Environmental and Social Performance Standards for Projects with regional impacts and as per various regulations by National Environment Management Authority, in Kenya.

5.3 Relevant Kenya Policies, Plans and Strategies

The policies that are relevant to the proposed development project include the following:

5.3.1 The National Land Commission Act, 2012 (No. 5 of 2012)

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1):-

- to manage public land on behalf of the national and county governments.
- to recommend a national land policy to the national government.
- to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya.
- to conduct research related to land and the use of natural resources and make recommendations to appropriate authorities.
- to initiate investigations, on its own initiative. or on a complaint, into present or historical land injustices, and recommend appropriate redress.
- to encourage the application of traditional dispute resolution mechanisms in land conflicts.
- to assess tax on land and premiums on immovable property in any area designated by law; and
- To monitor and have oversight responsibilities over land use planning throughout the country.

5.3.2 The Kenya Vision 2030

The Economic Pillar of Vision 2030 seeks to improve the prosperity of all regions of the country and all Kenyans and as such the development blueprint recognizes projects such as the Proposed Kimuka 400/220kV Substation to be a prerequisite in attaining the Kenya's Vision 2030.

Moreover, Environment's cleanliness and security is ensured via protection and conservation of sensitive areas such wetlands and wildlife corridors and migratory routes which can be done by conducting project's Environmental and Social Impact Assessments and developing of comprehensive mapping of land use patterns in Kenya and provision Environmental Management Plans.

5.3.3 National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy effort to integrate environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of societal decision-making

5.3.4 Policy Paper on Environmental and Development (Sessional Paper No. 6 of 1999)

This policy was formulated based on the National Environment Action Plan (NEAP) process of 1994. The policy's major objective is to harmonize environmental and developmental concerns to ensure sustainability. Furthermore, this policy ensures that environmental issues are taken into consideration before the commencement of development policies, programmes, plans and projects. The proposed project is therefore consistent with the Sessional Paper No. 6 of 1999.

5.3.5 The National Poverty Eradication Plan (NPEP) of 1999

The National Poverty Eradication Plan (NPEP) was formulated with an objective of reducing the high levels of poverty in Kenya by 50 percent by the year 2015, as well as to strengthen the capabilities of the poor and vulnerable groups to earn income. The plan also aimed at reducing gender and geographical disparities in order to create a healthy, better educated and more productive population. The formulation of the plan was guided by the goals and commitments agreed during the World Summit for Sustainable Development (WSSD) of 1995. The plan therefore focuses on the delivery of four WSSD themes of poverty eradication; reduction of unemployment; social integration of the disadvantaged people and creation of an enabling economic, political, and cultural environment through development of transport and communication sector. The plan is implemented by the Poverty Eradication Commission (PEC) that was established in collaboration with various Government Ministries, bilateral and multilateral donors, the private sector, Community Based Organizations (CBOs) and Non-Governmental Organizations (NGOs). The NPEP is relevant since the proposed highway will create an enabling environment that will contribute immensely to the enhancement of economic growth in Kenya. The proposed project would also impact businesses, agricultural and tourism related activities that have great relevancy to poverty eradication in the country.

5.3.6 Physical Planning Policy

The current policy governs the development and approval of all building plans as provided for in the Physical Planning Act (Cap 286). The proposed project will be subjected to the provisions of this policy and legislation.

5.3.7 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that buildings are adequately provided with utilities so that they are fit for human habitation whether for residence or for commercial purposes. The proposed development has been designed by professional engineers and architects and as such will have all amenities/utilities that are essential for safeguarding public health for all people using the facilities.

5.3.8 The Sessional Paper No.4 on Energy

The Sessional Paper No.4 on Energy of Kenya's vision is to promote equitable access to quality energy services at the least cost while protecting the environment and thus it does recognize the importance of harnessing and utilizing solar energy. Additionally, the Sessional Paper states that, The Government recognizes the great potential of this source of energy and will encourage the development and utilization of appropriate technologies in attaining its vision. It is recommended that the proponent consider harnessing solar energy that can be utilized to power common areas within the proposed office development.

5.3.9 The Kenya National Climate Change Response Strategy

The purpose of this strategy is to put in place robust measures needed to address most of the challenges posed by climate variability and change through thorough impact assessments and monitoring of various projects. According to Climate Change Projections, in this country we are likely to experience hotter drier sunny seasons, warmer wetter rainy seasons, rise in sea levels and an increase in extreme weather events. These climatic changes will impact on our daily lives and the buildings that we work and live in must be adapted to cope with such changes. With time both existing buildings and the construction of new buildings will have to adapt to cope with the condition's climate change may produce. A range of new ways to design, construct, upgrade and occupy buildings so that they are more energy efficient as well as resilient to threats such as flooding and drought is proposed.

In the construction sector, priority inclusion areas should include energy efficient innovations and technologies, and utilization low-carbon appliances and tools; the utilization of eco-friendly energy resources such as wind, solar, biogas, small hydros, etc; as well as possible utilization of biofuels.

5.3.10 National Policy on Gender and Development, 2019

The Policy spells out a policy approach of gender mainstreaming and empowerment of women and clearly states that it is the right of women, men, girls, and boys to participate in and benefit equally from the development process.

The NPGD provides a framework for mainstreaming gender in all policies, planning and programming in Kenya and puts in place institutional mechanisms to ensure effective implementation.

The proposed project will ensure gender concerns are mainstreamed into the planning and implementation of the project to ensure that the needs and interests of each gender are addressed.

5.3.11 Kenya National Youth Development Policy, 2019

The Youth policy provides for Youth inclusion in the different sectors to identify specific Youth issues and how to address and include them.

Article 260 of Kenya's Constitution defines a Youth as a person aged between eighteen (18) years and thirty-four (34) years.

The proposed project will identify the needs and concerns of youth and include their views. Public participation was youth sensitive and ensured the groups were well represented.

5.4 Institutional Framework

There are various national institutions that are important in matters related to environmental management in Kenya. At present there are over twenty (20) institutions and departments, which deal with environmental issues in Kenya. Some of the institutions include the National Environment Tribunal (NET), National Environment Management Authority (NEMA), the Kenya Forest Service (KFS), Kenya Wildlife Services (KWS), and Water Resources Authority (WRA) among others. There are also local and international NGOs involved in environmental issues in the country. From the above institutions, NEMA plays the regulatory and oversight role in the management of environment in Kenya. Below is a highlight of the key institutions and their mandate:

Table 6: Institutional Framework

Institutions / Departments	Key Mandate
The Ministry of Energy	<ul style="list-style-type: none"> The Ministry of Energy and Petroleum is responsible for energy policy and regulation of electricity and gas reticulation. The ministries mission statement is to facilitate provision of clean, sustainable, affordable, reliable, and secure energy services for national development while protecting the environment. The mandate of the ministry is <ul style="list-style-type: none"> ➤ Hydro power Development. ➤ Geothermal Exploration and Development. ➤ Thermal Power Development. ➤ Oil and Gas Exploration. ➤ Oil/Gas and Minerals sector capacity development. ➤ Rural Electrification Programme. ➤ Petroleum products, import/export/marketing policy Management. ➤ Renewable Energy Promotion and Development ➤ Energy Regulation, Security and Conservation. ➤ Fossil Fuels Exploration and Development. <p><i>MOE will be the coordinating agency for the proposed project.</i></p>
Ministry of Environment and Natural Resource	<ul style="list-style-type: none"> This Ministry is responsible for policies and programmes aimed at improving, maintaining, protecting, conserving and managing the Country's natural resources (water, forestry, wildlife and environment). <p><i>The proposed project is expected to align with the policies and programs of this Ministry.</i></p>

National Environmental Tribunal	<ul style="list-style-type: none"> ▪ The National Environment Tribunal (NET) created under Section 125 of EMCA Cap 387 has the following functions: <ul style="list-style-type: none"> ➢ To hear and determine appeals from NEMA's decisions and other actions relating to issuance, revocation or denial of (EIA) licenses or amount of money to be paid under the Act and imposition of restoration orders; ➢ To give direction to NEMA on any matter of complex nature referred to it by the Director General; and ➢ If the proponent or any other stakeholder disagree with NEMA decisions in exercising the above-mentioned functions, then they may lodge a case at the NET to seek to overturn the decision. Should this avenue not lead to a favorable ruling from the NET, an appeal may be lodged in the Environment and Land Court.
National Environment Complaints Committee	<ul style="list-style-type: none"> ▪ The National Environment Complaints Committee performs the following functions: <ul style="list-style-type: none"> ➢ Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Cabinet Secretary. ➢ Prepare and submit to the Cabinet Secretary periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and ➢ To undertake public interest litigation on behalf of the citizens in environmental matters. <p><i>This committee will act as a safeguard for members of the public who feel aggrieved by actions taken under the proposed project and can exercise their constitutional rights to launch a complaint should they have exhausted all other grievance redress mechanisms available to them.</i></p>
National Environment Management Authority (NEMA)	<ul style="list-style-type: none"> ▪ The National Environment Management Authority (NEMA) exercises general supervision and, co-ordination of all matters relating to the environment. ▪ NEMA is also the principal instrument of the government in the implementation of all policies relating to the environment. ▪ NEMA is also the Designated National Authority for certain Multilateral Environmental Agreements. <p><i>The Authority reviews EIA project and study reports for the proposed projects, visits the project sites to verify information provided in the report and issues EIA licenses if it considers that all the issues relevant to proposed projects have been identified and mitigation measures to manage them have been proposed.</i></p>
Kajiado County Government	<ul style="list-style-type: none"> ▪ The proposed project is within the jurisdiction of Kajiado County Government <p><i>KETRACO shall collaborate with the County government on physical planning.</i></p>
The County and Sub-County Environment Committees	<ul style="list-style-type: none"> ▪ The County and Sub-County Environmental Committees contribute to decentralization of activities undertaken by NEMA. ▪ This has enabled local communities to have greater access to environmental management information. It has also enabled the County and Sub-County Environment Committees to conduct quick site visits and review of reports of proposed projects. <p><i>Since the proposed project is of national importance, the review of the report will be done at a National level for issuance of EIA license. However, it is also notable that the EIA study report should also be reviewed at Kajiado County level to create awareness and obtain local institutional ownership.</i></p>
Water Resources Authority (WRA)	<ul style="list-style-type: none"> ▪ Water Resources Authority (WRA) is a state corporation established under Section 11 of the Water Act, 2016. ▪ Pursuant to Section 6 of the Act, the Authority is an Agent of the National Government responsible for regulating the management and use of water resources. ▪ The Water Act, 2016 makes extensive provisions on the Authority's role in regulating the use and management of water resources. ▪ WRA was operationalized on 21st of April 2017 vide Gazette Notice No. 59. However, the Authority has been in existence for 12 years following its establishment under the Water Act, 2002 as Water Resources Management Authority (WRMA). <p><i>WRA will provide the necessary water extraction permits envisioned / required for the project.</i></p>

The Directorate of Occupational Safety and Health Services (DOSHS)	<ul style="list-style-type: none"> ▪ The Directorate of Occupational Safety and Health Services (DOSHS) is one of departments within the Ministry of Labour and East African Community Affairs, whose primary objective is to ensure safety, health and welfare of all workers in all workplaces. ▪ Unsafe and unhealthy work environment causes accidents, diseases, disasters and environmental pollution that occasion huge economic and social burdens to individuals and enterprises thereby stifling economic and social growth. <p><i>DOSHS is a key stakeholder based on the role they play regarding safety, health and welfare of all workers in all workplaces and in registration of all workplaces which are envisioned in the proposed project.</i></p>
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5.5 Legal Framework

There are several legal provisions on environmental protection, which touch on and regulate the development of infrastructure like the one under this proposal. A summary of the various legislations relevant to the development is given hereunder. The following pieces of legislation and regulations are applicable to the proposed of development.

5.5.1 The Constitution of Kenya 2010

The Constitution of Kenya has taken on board various issues that are related to environmental management. Article 42 of the Bill of Rights contained in the Constitution provides that ‘every Kenyan 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. Chapter 5 of the Constitution is dedicated to land and the environment. The constitution requires that land be used and managed in a manner that is equitable, efficient, productive, and sustainable. Part 2 of Chapter 5 of the constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall provide encourages efforts towards sustainable of natural resources, increasing of the national forest cover public participation in the management, protection and conservation of the environment, protection of genetic resources and biodiversity, environmental impact assessment, environmental audit and monitoring of the environment, etc.

5.5.2 The Environmental Management and Coordination Act, 1999 (2015 amendments)

Provides for the establishment of appropriate legal and institutional framework for the management of the environment and related matters. Part II of the Environment Management & Coordination (Amendment) Act, 2015 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. To partly ensure this is achieved, Part VI of the Act directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to the National Environmental Management Authority (NEMA), who in turn may issue an EIA license as appropriate. The approval process time frame for Project Reports is 45 days and for full EIA Study is 90 days.

Based on the constitutional provisions to a healthy and clean environment, there are several legislations aimed at operationalizing these rights, the EMCA Cap 387 being one the key ones. This is the principal law in Kenya that governs the management, use and regulation of environmental resources including natural capital. The law provides for several policy and institutional arrangements aimed at ensuring that Kenya’s environmental resources are utilized in a sustainable and equitable manner. The law provides for a series of measures to be taken in pursuance to achieving this aim, i.e., establishment of various organs from the county level (County Environmental Committee) to the national level, development of County/National Environmental Action Plans and monitoring and compliance plans among others. Other aspects provided for include Strategic Environmental Assessment, Standards and Quality Monitoring, and Environmental Impact assessment. Schedule 2 of the Act provides details on projects that require Environmental Impact Assessment which include projects that may have a bearing on, changes of land-use, water resources (construction of weirs, river diversion, drilling for the purpose of using underground water resources), and waste disposal (solid waste disposal, wastewater disposal/treatment) among others. Below are regulations pertinent to the project.

Additionally, the Act defines the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment. This Act is guided Policy wise by the national environmental council, while the day-to-day enforcement falls under the Director General of the National

Environmental Management Authority. Thus (NEMA) enforces the Act on behalf of the Cabinet Secretary responsible for Environment. Its functions include: -

- The coordination of various environmental management activities.
- Initiation of legislative proposals.
- Research, investigations, and surveys on the field of environment.
- Creation of environmental education and awareness programmes.
- Advise the government on regional and international agreements to which Kenya is party to;
- Executing the Environmental Impact Assessment (EIA) under the Environmental Impact (Assessment and Auditing) regulations, 2003, among other duties.

Under EMCA, Cap 387 there are several regulations geared towards sustainable development.

5.5.2.1 The Environmental Impact (Assessment and Auditing) Regulations, 2003

Environmental Impact Assessment under the Act is guided by the Environmental Impact Assessment (Assessment and Auditing) Regulations of the year 2003, which is given under legal notice no. 101. The regulations stipulate the ways in which environment impact assessment and audits should be conducted. The project falls under the second schedule of EMCA, 1999 section 58 (1), (4) that require an Environmental Impact Assessment study report. As stipulated by the legal notice No. 101, 2003, PART V, Section 31 (3 (a) (i) and (ii) it is required that an environmental assessment be undertaken to provide baseline information upon which subsequent environmental control audit shall be based.

5.5.2.2 Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003

Environmental Impact Assessment (EIA) is a critical examination of the effects of a project on the environment. The goal of an EIA is to ensure that decisions on proposed projects and activities are environmentally sustainable. An EIA is conducted in order to identify impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of the various alternatives on the project and propose mitigation measures for the significant negative impacts of the project on the environment.

The EMCA, Cap 387 requires that during the EIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity through posters, newspaper, radio and hold at least three public meetings with the affected parties and communities.

Environmental Audit (EA) is the systematic documentation, periodic and objective evaluation of activities and processes of an on-going project. The goal of EA is to establish if proponents are complying with environmental requirements and enforcing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. A comprehensive EA ensures a safe and healthy environment at all stages of project operations and decommissioning.

An initial environmental audit and a control audit are conducted by a qualified and authorized environmental auditor or environmental inspector who is an expert or a firm of experts registered by the Authority. In the case of an on-going project the Authority requires the proponent to undertake an initial environmental audit study to provide baseline information upon which subsequent environmental audits shall be based.

Self-Audits are carried out after the environmental impact assessment study report has been approved by the Authority or after the initial audit of an on-going project. The proponent shall take all practical measure to ensure the implementation of the environmental management plan by carrying out a self-auditing study on a regular basis.

This Report complies with the requirements of the Environmental Regulations in the coverage of environmental issues, project details, impacts, legislation, mitigation measures, management plans and procedures. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA.

5.5.2.3 Environmental Management and Coordination (Water Quality) Regulations of 2006

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells, and other water sources. The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA) Gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

5.5.2.4 Environmental Management and Coordination (Waste Management) Regulations of 2006

The Minister for Environment and Natural Resources gazetted these regulations in 2006. These Regulations may be cited as the Environmental Management and Co-ordination (Waste Management) Regulations, 2006. Waste Management Regulations are meant to streamline the handling, transportation, and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production, and segregation of waste at source.

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

5.5.2.6 Environmental Management and Coordination (Air Quality) Regulations, 2008

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2008". The objective 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 savannah grasslands.
- Burning for purposes of public health protection.

5.5.3 The Traffic Act, 2012

The Traffic Act, 2012 gives provisions and guidelines that govern the Kenya roads transport sector. These guidelines are essential to private, public, and commercial service vehicles in ensuring safety and sanity on the roads hence ensuring the environment; the human being a component is safeguarded. In section 41 The Act demands for installation and certification of speed governors for the commercial vehicles ferrying goods adjusted to the loading condition of such vehicles to a limit of 80 KPH, registration and competence of drivers.

Moreover, the owner of commercial vehicles or trailer shall ensure clear markings on their vehicles in English language on the right side of the vehicle showing ownership details, tare weight of vehicle and maximum authorized weight.

Section 26 and 27 of the same discourages engines that emit exhaust gases to the atmosphere without passing via a silencer or expansion chamber. In ensuring safety of all the persons in transit section 56 encourages that every public and commercial vehicle be fitted with inspected and first class first aid box and fire extinguisher.

In ensuring compliance to this Act the contractor and developer shall ensure that all site drivers and all material suppliers to the site satisfy the provisions as stipulated in Act.

5.5.4 Public Health Act (Cap. 242)

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drainers or refuse pits in such state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health.

5.5.5 Urban and Cities Act No 13 of 2011

The Act came into function with regard to Article 184 of the Constitution providing regulations on the classification, governance and management of urban areas and cities and further providing the criteria of establishing urban areas.

Part III of the Act gives the regulations and functions of every city or municipality with regard to integrated development plans, which shall include but not limited to environmental plans and disaster preparedness, within the area of jurisdiction in achieving objects of devolved governments under section 174 of the constitution while maintaining the socio-economic rights of the people.

Moreover, in the first schedule, the Act enlists the services the services that the any municipality/ City shall provide to its residents which include but not limited to traffic control and parking, water and sanitation, refuse collection, solid waste management, pollution abatement services among others.

The Kajiado County Planning and Environment Department will have been actively involved in the planning of this development as from its initial stages.

5.5.6 The Land Act, 2012

This is an ACT of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources, and

for connected purposes. The Land Act of 2012 subsection (1) states that ‘any land may be converted from one category to another in accordance with the provisions of this Act or any other written law.’ it continues to state in subsection (2) that Without prejudice to the generality of subsection (1)

- a) Public land may be converted to private land by alienation.
- b) Subject to public needs or in the interest of defence, public safety, public order, public morality, public health, or land use planning, public land may be converted to community land
- c) private land may be converted to public land by
 - i. Compulsory acquisition.
 - ii. Reversion of leasehold interest to Government after the expiry of a lease; and
 - iii. Transfers; or
 - iv. Surrender.

(d) Community land may be converted to either private or public land in accordance with the law relating to community land enacted pursuant to Article 63(5) of the Constitution.

It is important to note that any substantial transaction involving the conversion of public land to private land shall require approval by the National Assembly or county assembly.
as the case may be.

Part I of the same Act states that title to land may be acquired through—

- Allocation.
- Land adjudication process.
- Compulsory acquisition ;
- Prescription;
- Settlement programs;
- Transmissions;
- Transfers;
- Long term leases exceeding twenty-one years created out of private land; or
- Any other manner prescribed in an act of parliament.

Part viii of this ACT provides procedures for compulsory acquisition of interests in land. Section 111 (1) States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination.

In ensuring that no contravention to this Act is done, the proponent acquired the land through a 99 years’ leasehold and has applied for necessary approvals requisite to the proposed development i.e. amalgamation and change of user approvals.

5.5.7 The Land Registration Act, 2012

The Land Registration Act is place to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act applies to Subject to section 4, this Act shall apply to:

- Registration of interests in all public land as declared by Article 62 of the Constitution.
- Registration of interests in all private land as declared by Article 64 of the Constitution; and
- Registration and recording of community interests in land.

Section 24 states that: (a) the registration of a person as the proprietor of land shall vest in that person the absolute ownership of that land together with all rights and privileges belonging or appurtenant thereto; and (b) the registration of a person as the proprietor of a lease shall vest in that person the leasehold interest described in the lease, together with all implied and expressed rights and privileges belonging or appurtenant thereto and subject to all implied or expressed agreements, liabilities or incidents of the lease.

In ensuring that no contravention to this Act is done, the proponent acquired the land through a 99 years’ leasehold and has applied for necessary approvals requisite to the proposed development i.e. amalgamation and change of user approvals. The copies of the application of change of use is attached to this report as annex 8.

5.5.8 The Environment and Land Court Act, 2011

This Act is in place to give effect to Article 162(2) (b) of the Constitution; to establish a superior court to hear and determine 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.

This Act shall of great essence to the proponent, public, interested or affected party that may want to litigate against the development on settlement issues, location of project or even effects of the project to the public

5.5.9 Water Act, 2016

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, and requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 59 (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 the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRA) to demand from any person or institution, specified information, documents, samples, or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the Authority.

The proponent and all the allied stakeholders to the project shall ensure proper water use, management, and conservation. In the event of borehole drilling WRA shall be consulted by the project hydro geologists for the purpose of attaining permits for borehole sinking.

5.5.10 The Energy Act of 2019

The Act establishes an Energy and Petroleum Regulatory Authority mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, Public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to energy sector in Kenya. Section 30 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the Environmental and Coordination Act of Cap 387 moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

The provisions of this Act have and will be enforced by the proponent in consultation with the project EHS experts, planners, and electrical consultants in ensuring the best practices are ensured for sustainable energy use while attaining public health and safety.

5.5.11 Building Code 2000

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the Local Authority for a permit to connect to the sewer line and all the wastewaters must be discharged into sewers.

The proponent will dully make the necessary application to the NCWSC for the connection of the sewer to the proposed development.

5.5.12 Occupational Safety and Health Act (OSHA 2007)

Before any premises are occupied, or used a certificate of registration must be obtained from the chief inspector. The occupier must keep a general register. The Act covers provisions for health, safety, and welfare.

4.5.13.1. Health

The premise must be kept clean, daily removal of accumulated dust from floors, free from effluvia arising from any drain, sanitary convenience, or nuisance and without prejudice to the generality of foregoing provision. A premise must not be overcrowded, there must be in each room 10 meters of space for each employee, not counting space 14 feet from the floor and a 9 feet floor-roof height.

The circulation of fresh air must secure adequate ventilation of workrooms. There must be sufficient and suitable lighting in every part of the premise in which persons are working or passing. There should also be sufficient and suitable sanitary conveniences separate for each sex, must be provided subject to conformity with any standards prescribed by rules. Food and drinks should not be partaken in dangerous places or workrooms.

Provision of suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, and maintained for the use of workers in any process involving exposure to wet or to any injurious or offensive substances.

4.5.13.2. Safety

Fencing of premises and dangerous parts of other machinery is mandatory. Training and supervision of inexperienced workers, protection of eyes with goggles or effective screens must be provided in certain specified processes. Floors, passages, gangways, stairs, and ladders must be soundly constructed and properly maintained, and handrails must be provided for stairs.

Special precaution against gassing is laid down for work in confined spaces where persons are liable to overcome by dangerous fumes. Air receivers and fittings must be of sound construction and properly maintained. Adequate and suitable means for extinguishing fire must be provided in addition to adequate means of escape in case of fire must be provided.

4.5.13.3. Welfare

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

Section 42 stipulates that every premise shall be provided with maintenance, readily accessible means for extinguishing fire and person trained in the correct use of such means shall be present during all working periods.

Section 45 states that regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed, and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earning for the employees and if possible within normal working hours.

Section 55B provides for development and maintenance of an effective programme of collection, compilation, and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illness including disabling during working hours, are adhered.

The proponent will ensure that safety is put first through by contacting at least four on-site EHS officer who will ensure adherence to proposed EHS best practices and ESMP recommendations on all sections of the development.

Additionally, in the implementation of the Act, the contractor and all actors involved in the implementation of the project shall ensure compliance with the following pertinent rules under OSHA: -

- **Fire risk reduction rules-2007:** These rules are critical for fire prevention and management at a workplace. The rules provide for the following but not limited to location of flammable substances, storage of highly flammable substances, monitoring and fire risk assessment, provision of ventilation, preparation of fire management plans, fire escape exits, appointment and training of firefighting team among others.
- **Health and safety committee rules:** These rules apply to all factories and workplaces, which regularly employ twenty or more employees. The rules require the occupier or owner to undertake the following:
 - Establish a safety and health committee in the workplace. To organize safety representatives to include management and workers.
- **First aid rules:** They give provision and guidance on workplace expectations and readiness on matters first aid including provision of well-equipped first aid kit among other equipment and trained personnel.

- **Medical examination rules :** The rules provide guidance on duties of employers and employees as to medical examination, and occupations requiring medical examination among other provisions.

5.5.13 The Standards Act Cap. 496

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

The developer has to comply with the provisions of the Act to ensure the overall safety of the development by ensuring strict vetting of material to be used in the construction. Thorough scrutiny of these material and frequent monitoring will be done by the construction supervisory staff on site such the Resident Engineers', EHS and Clerk of Works office.

5.5.14 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.

5.5.15 Employment Act No 11 of 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 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 housing sector.

The developer, the contractor and the employees' relationship during the construction and later phases of this project shall be guided by this Act and the pertinent regulations under the Act or any other legal instrument to the effect of the Act including the wages order on minimum wages to workers.

5.5.16 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.

5.5.17 County Governments Act, 2012

This Act vests responsibility upon the County Governments in planning of development projects within their areas of jurisdiction be it projects of importance to the local County government or those of national importance.

Section 102 of the Act provides the principles of planning and development facilitation which include integration of national values in county planning, protect the right to self-fulfilment within the county communities and with responsibility to future generations, protection of rights of minorities and marginalized groups and communities, promotion of equity resource allocation, among others.

Section 103 of the Act outlines the prime objective of county planning which aligned to the bill of rights and the constitution of Kenya. Section 114 and 115 indicate and give guidelines in planning of projects of national significance and instil the aspect of public participation in every aspect of the planning process through that: clear strategic environmental assessments; clear environmental impact assessment reports; expected development outcomes; and development options and their cost implications.

Each county assembly is tasked with the role to develop laws and regulations giving effect to the requirement for effective citizen participation in development planning and performance management within the county.

The project proponent has initiated the process of County Government engagement in the initial project planning through application of essential development approvals from Kajiado County Government.

5.5.18 HIV and AIDS prevention and control Act, 2006

Section 3 of The Act indicated the purpose of the legislation including public awareness and rights to people living with HIV/AIDS.

This Act's provisions then give the guidelines unto which the project shall follow in educating workers and staff and providing incentives to combat HIV/AIDs. The proposed project will adopt the guidelines as set in the provisions of the act to enhance public awareness and rights to people living with HIV/AIDS.

Public awareness will be achieved through education, public campaigns at workplaces

5.5.19 The Sexual Offences Act, 2006.

The Act of Parliament makes provision about sexual offences, their definition, prevention, and the protection of all persons from harm from unlawful sexual acts, and for connected purposes.

The act emphasis on observing a standard work ethic to ensure persons from both genders are not subjected to sexual offences.

The Act highlights key aspects within its provisions as follows, rape, attempted rape, sexual assault, compelled or induced indecent acts, acts which cause penetration or indecent acts are committed within the view of a child or person with mental disabilities, the Attempted defilement, gang rape, indecent act with child or adult, promotion of sexual offences with a child, child trafficking, prostitution, trafficking for sexual exploitation, sexual harassment, Incest, defilement, among others

Ample working environment shall prevail in all workplaces in the project, to be enhanced through implementation of a Sexual Misconduct Policy.

5.5.20 The Children Act, 2022.

The objectives of the Act are to give power to Article 53 of the Kenyan Constitution by making extensive provisions on children's rights, children in need of care and protection, parental responsibilities, alternative care, children in conflict with the law, children services administration, and even the establishment. It strengthens the immunity provided by **Article 53(2)** of the Kenyan Constitution against any adverse actions, omissions, considerations, or treatment meted out to a child.

Sections 22(4), (5), and (6) of the Act establish provisions aimed at protecting children against cyberbullying and online sexual abuse.

The Act refers to the Employment Act further underpinning the legal provision on protection of minors from child labour.

KETRACO and the contractors under them shall ensure that children rights are well safeguarded.

5.5.21 The Internally Displaced Persons Act, 2012

The Act makes provision for the prevention, protection, and provision of assistance to internally displaced person and affected communities and give effect to the Great Lakes Protocol on the Protection and Assistance to Internally Displaced Persons, and the United Nations Guiding Principles on Internal Displacement and for connected purposes.

5.6 International Policies and Good Practice

5.6.1 World Bank Environmental and Social Framework (ESF)

The objective of the World Bank's ESF and the related Social and Environmental Standards (ESSs) is to prevent and mitigate undue harm to people and their environment in the process of project development, and to promote environmental and social sustainability. These policies provide guidelines for Bank and borrower staff in the identification, preparation, and implementation of programs and projects. Operational policies provide a platform for the participation of stakeholders in project planning and design.

Table 7: WB Environmental and Social Standards

5.6.2 Alignment of WB and GOK Policies relevant to this ESIA

ESS	Applies	Application
ESS 1: Assessment and management of environmental and social risks and impacts	Yes	Project will undergo mandatory ESIA process and be subject to all necessary steps as stipulated
ESS 2: Labor and working conditions	Yes	The project will require and attract labor force that will be managed under the provisions of the ESS and pertinent national legislation
ESS 3: Resource efficiency and pollution prevention and management	Yes	The project will involve vehicular and mechanical equipment usage that may lead to emissions. Adequate measures in tandem with ESS 3 provisions have been provided in the ESMP
ESS 4: Community Health and Safety	Yes	There will be interaction of projects elements and personnel with the community that may raise concerns public health, noise, dust, traffic, SEA, SH and GBV. Adequate measures have been provided in the ESMP to manage these risks.
ESS 5: Land Acquisition, restrictions on land use and involuntary resettlement	Yes	The implementation of the LILO will require acquisition of public right of way leading to limited use capacity of the owners of the land. An abbreviated RAP has been prepared to adequately manage this risk as per the provision of ESS 5.
ESS 6: Biodiversity conservation and sustainable management of living natural resources	Yes	The substation land and LILO have indigenous trees that are likely to be lost. Mitigation measures have been provided in the ESMP
ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Yes	The project is located within the Maasai region who are regarded as vulnerable and marginalized as per the Kenyan constitution.
ESS 8: Cultural heritage	Not certain as at the time of study	Chance find procedures incorporated
ESS 9: Financial Intermediaries	No	N/A
ESS 10: Stakeholder engagement and information disclosure	Yes	Contant stakeholder engagement and information disclosure as guided and provide under the stakeholder engagement plan.

Both the World Bank safeguards and Government of Kenya (GoK) legislation are generally aligned in principle and objective:

- Both require screening of subproject investments in order to determine if further environmental assessments (ESIAs) is needed
- Both require Environmental Impact Assessment before project design and implementation. This also includes an assessment of social impacts.
- Both require public disclosure of ESIA reports and stakeholder consultation during preparation.
- EMCA recognizes other sectorial laws while WB has safeguards for specific interests;
- The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project which is consistent to the requirements of EMCA.
- Additionally, statutory annual environmental audits are required by EMCA.

5.7 International Environmental Agreements, conventions and Treaties

Kenya has signed several international conventions and treaties on environment and natural resources also known as multi-lateral environmental agreements (MEAs) that obligate the country to promote sustainable

environmental and natural resources management and social equity. Conventions are legally binding bilateral, regional, or international agreements that binding to the states that are parties thereto. Kenya has ratified some of the most important conventions on the environment as discussed below which apply to the proposed power transmission project hence the contractor is bound to comply by the respective provisions.

Table 8: Pertinent Multilateral Environmental Agreements

Multilateral Environmental Agreements	Key areas of application
United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> UNFCCC has near universal membership and is the parent treaty of the 1997 Kyoto Protocol. The Kyoto Protocol has been ratified by 192 of the UNFCCC Parties. The ultimate objective of both treaties is to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. <p><i>The proposed project should ensure all activities and development plans are undertaken in line with the provisions of the Convention aimed at stabilizing greenhouse gas concentrations in the atmosphere.</i></p>
Vienna Convention for the Protection of the Ozone Layer	<ul style="list-style-type: none"> The Vienna Convention for the Protection of the Ozone Layer was adopted in 1985 and entered into force on 22 Sep 1988. In 2009, the Vienna Convention became the first Convention of any kind to achieve universal ratification. The objectives of the Convention were for Parties to promote cooperation by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.
Convention on Biological Diversity (CBD)	<ul style="list-style-type: none"> The CBD is one of the outcomes of the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The CBD establishes a global legally binding framework for the conservation of biodiversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of utilization of genetic resources. <p><i>The provisions of this convention will be considered in the conservation of various species of plants, animals, and the variety of ecosystems in the project area.</i></p>
African Convention on the Conservation of Nature and Natural Resources	<ul style="list-style-type: none"> The convention was adopted in Algiers on 15th September 1968 and came into force on 16th June 1969. <p><i>This convention reaffirms the importance of natural resources both renewable and non-renewable, particularly the soil, water, flora and fauna.</i> <i>The main objective is to facilitate sustainable use of the above resources.</i></p>
Earth Summit on Sustainable Development Agenda 21	<ul style="list-style-type: none"> Agenda 21 is a non-binding, voluntarily implemented action plan of the United Nations regarding sustainable development. It is a product of the Earth Summit (UN Conference on Environment and Development) held in Rio de Janeiro, Brazil, in 1992. It is also regarded as an action agenda for the UN, other multilateral organizations, and individual governments around the world that can be executed at local, national, and global levels. The "21" in Agenda 21 refers to the 21st Century. Agenda 21 Section I on Social and Economic Dimensions is directed toward combating poverty, especially in developing countries, changing consumption patterns, promoting health, achieving a more sustainable population, and sustainable settlement in decision making. Section II on Conservation and Management of Resources for Development Includes atmospheric protection, combating deforestation, protecting fragile environments, conservation of biological diversity (biodiversity), control of pollution and the management of biotechnology, and radioactive wastes. Section III focuses on strengthening the Role of Major Groups including the roles of children and youth, women, NGOs, local authorities, business and industry, and workers; and strengthening the role of indigenous peoples, their communities, and farmers. <p><i>Kenya continues to implement Agenda 21 to support sustainable development through the integration of environmental concerns into the national development policies, plans, and programmes. Also relevant is the implementation of Agenda 17. The proposed project would need to be consistent with the objectives of Agenda 21.</i></p>
The World Commission on Environment and Development (The Brundtland Commission of 1987)	<ul style="list-style-type: none"> The Commission in its 1987 report dubbed "Our Common Future" focused on the environmental aspects of development, in particular the emphasis on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. In addition to environmental sustainability is economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources.

Multilateral Environmental Agreements	Key areas of application
	<ul style="list-style-type: none"> While social sustainable development is development that maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement. The key aspect of sustainability is the interdependence of generations. <p><i>The concept of EIA is embodied in many multilateral environmental agreements. Principle 17 of the Rio Declaration provides that environmental impact assessment as a national instrument shall be undertaken for proposed activities that are likely to have a significant impact on the environment and are subject to a decision of a competent national authority.</i></p>
The 1992 United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> The primary purpose of the convention is to establish methods to minimize global warming and the emission of the greenhouse gases. The UNFCCC was adopted on 9th May 1992 and came into force on 21st March 1994. The Convention has been ratified by 189 states. Kenya ratified the Convention on 30th August 1994. NEMA is the focal point for the Convention. <p><i>The proposed project should ensure minimizing emission of the greenhouse gases.</i></p>
The Paris Agreement	<ul style="list-style-type: none"> This agreement was adopted on 12th December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris, it then came into force on 4th November 2016 after meeting the ratification threshold. The Agreement provides the framework to address climate change for a safer and sustainable future, it has an objective of preventing a global temperature increase above 1.5 degrees Celsius relative to pre-industrial levels by reduction of Greenhouse gas emissions. Kenya ratified the Paris Agreement and welcomed it into force on 28th December 2016. As at now a total of 171 parties out of 197 have ratified the agreement. <p><i>The proposed project should ensure all activities re in line with the tenets of the Paris Agreement to minimize greenhouse gas emission.</i></p>
Convention on the Elimination of all forms of Discrimination against Women	<ul style="list-style-type: none"> The Convention on the Elimination of all forms of Discrimination against Women (CEDAW) places explicit obligations on states to protect women and girls from sexual exploitation and abuse. Universal Declaration of Human Rights (Article 7), the UN Charter (Articles 1, 13, 55, and 76) and the International Covenant on Civil and Political Rights (Article 24) reaffirm the freedoms and rights of all children, including internally displaced children. The proposed project will ensure tenets of human right and protection of women and girls from sexual exploitation and abuse are embroiled in the development.
International Labour Organization	<ul style="list-style-type: none"> The International Labour Organization (ILO) is built on the constitutional principle that universal and lasting peace can be established only if it is based upon social justice. The ILO has generated such hallmarks of industrial society as the eight-hour working day, maternity protection, child-labour laws, and a range of policies which promote workplace safety and peaceful industrial relations. The ILO has four principal strategic objectives: <ul style="list-style-type: none"> ➤ To promote and realize standards, and fundamental principles and rights at work. ➤ To create greater opportunities for women and men to secure decent employment. ➤ To enhance the coverage and effectiveness of social protection for all. ➤ To strengthen tri-parties and social dialogue. The key ILO Conventions applicable to the proposed power transmission project include: <ol style="list-style-type: none"> Equal Remuneration Convention (1951) (No. 100) - Calls for equal pay and benefits for men and women for work of equal value. Discrimination (Employment and Occupation) Convention (1958) (No. 111) - Calls for a national policy to eliminate discrimination in access to employment, training, and working conditions, on grounds of race, colour, sex, religion, political opinion, national extraction or social origin, and to promote equality of opportunity and treatment. Minimum Age Convention (1973) (No. 138) - Aims at the abolition of child labour, stipulating that the minimum age for admission to employment shall not be less than the age of completion of compulsory schooling. Worst Forms of Child Labour Convention (1999) (No. 182) - Calls for immediate and effective measures to secure the prohibition and

Multilateral Environmental Agreements	Key areas of application
	<p>elimination of the worst forms of child labour which include slavery and similar practices, forced recruitment for use in armed conflict, use in prostitution and pornography, any illicit activity, as well as work which is likely to harm the health, safety, and morals of children.</p>
Sustainable Development Goals (SDGs)	<ul style="list-style-type: none"> ▪ The Sustainable Development Goals (SDGs) are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years. The SDGs include 17 Sustainable Development Goals and 169 targets. The 17 sustainable development goals (SDGs) include <ul style="list-style-type: none"> ➤ GOAL 1: No Poverty ➤ GOAL 2: Zero Hunger ➤ GOAL 3: Good Health and Well-being ➤ GOAL 4: Quality Education ➤ GOAL 5: Gender Equality ➤ GOAL 6: Clean Water and Sanitation ➤ GOAL 7: Affordable and Clean Energy ➤ GOAL 8: Decent Work and Economic Growth ➤ GOAL 9: Industry, Innovation and Infrastructure ➤ GOAL 10: Reduced Inequality ➤ GOAL 11: Sustainable Cities and Communities ➤ GOAL 12: Responsible Consumption and Production ➤ GOAL 13: Climate Action ➤ GOAL 14: Life Below Water ➤ GOAL 15: Life on Land ➤ GOAL 16: Peace and Justice Strong Institutions ➤ GOAL 17: Partnerships to achieve the Goal ▪ The GOALs seek to build on the Millennium Development Goals that expired in 2015. Most notably SDGs are integrated, indivisible and balance the three dimensions of sustainable development: the economic, social, and environmental. <p><i>This project is expected to cut-across the three dimensions of sustainable development hence making SDGs a key reference point. The SDGs are also linked to several Kenyan legal frameworks such as Water Act, Forestry Act, and EMCA Cap 387.</i></p>

6 **CHAPTER FIVE: PUBLIC PARTICIPATION AND STAKEHOLDER CONSULTATIONS**

6.1 Introduction

Public consultation and participation process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA Cap 387 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development. Moreover, public and stakeholder's consultation is integral to the operationalization of the World Bank's Environmental and Social Standards. Therefore, this chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed residential houses. The objective of the consultation and public participation was to:

- Disseminate and inform the stakeholders about the project with Special reference to its key components and location.
- Gather comments, suggestions, and concerns of the interested and affected parties about the project.
- Incorporate the information collected in the ESIA study.

In addition, the process enabled,

- 1) The establishment of a communication channel between the public and the team of consultants, the project proponents, and the Government.
- 2) The concerns of the stakeholders be known to the decision-making bodies at an early phase of project development

6.2 Methodology used in public consultation.

The exercise was conducted by an experienced ESIA team comprising of registered and licensed environmental experts, socio – economist and land surveyor. The entire process involved:

- Key informant interviews and discussions
- Field surveys and observations
- Completion of the pre-designed questionnaires which captured all the phases of the proposed development.
- Public Focussed Group discussions as guided by the local administration (chief and *nyumba kumi* elders) to achieve the appropriate, culturally accepted approach and obtain Free Prior and Informed Consent (FPIC).
- Household interviews focused on the project affected persons.

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts, respectively. It also helped in identifying any other miscellaneous issues, which may bring conflicts in case project implementation proceeds as planned. The information gathered enabled the identification of the specific issues from the stakeholders' response, which provided the basis upon which the aspects of the Environmental Impact Assessment was undertaken.

6.3 Sources of information

The exercise of public consultation was conducted between 8th to 13th February 2021. The exercise was conducted through public meetings, informative interviews, and administration of questionnaires to capture the concerns, comments and issues that the stakeholders, neighbours and businesspeople around the project site have regarding the construction of the proposed substation. The completion of such questionnaires allowed for the synthesis and analysis of issues that arose. The list of participants who were interviewed is shown in and **Error! Reference source not found..** The questionnaires administered and minutes for the public meetings held are attached as Annex 3b of the report.

6.3.1 Key Informant Questionnaires

Table 9: Key informant Questionnaires' respondents in February 2021

No.	Name	Institution/Organization	Designation	Address/Contact No.
1.	Richard Njaka	Kenya Wildlife Service	Warden	0716048001/0733362724

2.	Janet Kemunto	National Government- Kajiado North Sub County	Social Development Officer	0728153140
3.	Paul Waweru	Kenya Forest Service	Forester	0726900471
4.	Levi Matere	Ministry of Health, Kajiado West Sub- County	Public Health Officer	0722680761

6.3.1.1 Issues raised by the key informants in February 2021 and October 2023.

Environmental, Social and Economic Benefits

- Job creation
- Access to sustainable power supply
- Attract investors in the area leading to growth of the town.
- Adequate and sustainable power supply will improve forestation of the area by providing well drilling solutions that will support planting and growth of trees.
- Improved lifestyle from the resultant socio-economic development in the area

Environmental, Social and Economic Negative Impacts

- Displacement of people and the consequent direct impacts on existing large-scale farming
- Destruction of the landscape and people's property
- Lag in compensation of the residents
- Possible accidents from explosions resulting from the proposed projects.
- Noise and air pollution

Suggested Mitigation Measures

- Replant trees and grass on bare ground left because of the proposed activities.
- Compensating displaced people.
- Offering employment to the residents.

General Opinions

- Environmental conservation should be accorded priority. For instance, key partnerships with key stakeholders such as Kenya Forest Service should be formed to enhance conservation measures such as tree planting.
- The benefits outweigh the perceived negative impacts, and the project should therefore be implemented.

Table 10: Key informant Questionnaires' respondents in October 2023

No.	Name	Institution/Organization	Designation	Address/Contact No.
1.	William Toyonke	Interior Ministry	Chief	0720420841
2.	Amos Menyo	Interior Ministry	Assistant Chief	0715800702
3.	Jackline Gathome	Social Department	Subcounty social officer	0721589861
4.	Eng Kennedy Omwoyo	DOSHS	Deputy county DOSS Director	0722732963
5.	Purity Kathambi	KFS	Forester-Kajiado North	0701777787

6.3.2 Community interviews and questionnaires

In the two rounds of public participation exercises, a total of 36 questionnaires were filled as indicated in Tables 10 and 11 below: -

Table 11: Community Questionnaires' respondents- February 2021

No.	Name	Location	Occupation	Contact No.
1.	Moses Pariken	Kimuka	Farmer	0724595508
2.	Joseph Ole Tipanko	Kimuka	Community Opinion Leader	0721510979
3.	Simon Mankura	Kimuka	-	0713504881

No.	Name	Location	Occupation	Contact No.
4.	John Sayo	Kimuka	-	0712941853
5.	Martin Mejungi	Kimuka	Farmer	0724100784
6.	Joseph Karino	Kimuka	Farmer	0728271305
7.	Joel Kinaiya	Intershort	-	0743090744
8.	Stephen Pariken	Kimuka	-	0724316740
9.	Paul Sargey	Kimuka	-	0707860364
10.	Moses Sarnet	Kimuka	Farmer	0720790917
11.	Joel Kinsiet	Kimuka	Businessman	0728226933
12.	Josphat Ntiati	Kimuka	-	0758973448
13.	Leonard Kaitei	Kimuka	Farmer	0729730224
14.	Tipaya Peter Saidimu	Ntashat	Steel Worker	0723473842
15.	John Letowen	Ntajia	Businessman	0711419296

Table 12: Community Questionnaires' respondents- October 2023

No.	Name	Location	Gender	Contact No.
1.	Jeremiah Sasire	Kimuka	Male	0795872286
2.	Peter Loishona	Kimuka	Male	0746826040
3.	Enock Lekuka	Kimuka	Male	0713504881
4.	Salaash Kawino	Kimuka	Male	0726608278
5.	Daniel Waithaka	Kimuka	Male	0725444493
6.	Fred Abuga	Kimuka	Male	0722213625
7.	Juma Oduor	Kimuka	Male	072000875
8.	Mukuku Kupei	Kimuka	Male	0794761392
9.	Edward Rira	Kimuka	Male	0725054919

6.3.2.1 Summary of Issues raised by the community in February 2021 and October 2023

Environmental, Social and Economic Benefits

- Job creation
- Access to sustainable power supply
- Attract investors in the area leading to growth of the town.
- Improved knowledge on electricity and safety
- Improved lifestyle from the resultant socio-economic development in the area
- Cross-cultural interaction
- Increase in the value of land in the area.
- Emergence of small businesses in the area
- Enhanced community unity through working together

Environmental, Social and Economic Negative Impacts

- Displacement of people and the consequent direct impacts on in land parcel owners of cumulative 2.1km traversed by the short lines.
- Destruction of the landscape and people's property
- Lag in compensation of the residents (assets include land, structures and trees.)
- Possible accidents from explosions resulting from the proposed projects.
- Noise, soil and air (dust) pollution
- Inadequate grazing land for pastoralists
- Rise in insecurity

Suggested Mitigation Measures

- Replant trees and grass on bare ground left as a result of the proposed activities.
- Offering employment to the residents
- Provide CSR to increase community awareness on the project's activities and the perceived benefits.
- Ensure control of dust in the environment through regular water spraying
- Provision of staff and workers with safety gears to minimize accidents and their impacts.
- Work and liaise with necessary bodies to deploy security personnel.

- Land reclamation of the damaged landscape e.g., refilling trenches and pits

General Opinions

- Environmental conservation should be accorded priority.
- The benefits outweigh the perceived negative impacts, and the project should therefore be implemented.
- The proposed project is a great step towards achieving the Vision 2030 Agenda
- Ensure compliance by the contractor.
- Provision of the project's projected time frame and should also be a realistic one.

6.3.3 Public Meetings

Two public meetings were held on 11th February 2021 and 18th October 2023. The first public meeting for the Kimuka substation ESIA was undertaken on 11th February 2021.

All the meetings were organised and led by the area chief and village elders to conform with the cultural expectations. The meetings were done in Swahili with a translation from one of the local Maasai residents.

A total of 71 attendees were recorded, 45 in the first meeting and 26 in the second meeting. The first meeting was only attended by men while the second meeting had 5 women in attendance. However, in both meetings the youth were in attendance.

The minutes of the two (2) meetings are attached to this report as Annex 3b and Attendance sheets as Annex 3a.



Figure 16: Public meetings at Chief's Office in Kimuka on 11th February 2021

6.3.3.1 Summary of issues raised in community meeting on 11th February 2021

The main Issues Raised During Stakeholder Consultation and Response

QUESTIONS	ANSWERS
Are there any harmful electromagnetic effects of high voltage electrical installations, the line and the substations	Studies have shown that the effect of electromagnetic radiations reduces as one moves away from the centre line of the transmission line. Consequently, any effects associated with EMFs will not be experienced by people living just outside the wayleave corridor.
What is the likelihood of getting connected to the power resulting from construction of the proposed substation?	The power will be linked to the existing Kenya Power 33kV and 132kV transmission line subsequently strengthening the availability and reliability of power within Ngong and Kimuka and surrounding areas. The power from the substation will strengthen the existing grid. There are also plans by Kenya power to have 66kV lines from the substation that will serve, Kijiado North and West
What do you give back to the community as a way of enhancing development?	KETRACO is committed to sustainable business practices by caring for the environment, community, and people in pursuit of our goals.

QUESTIONS	ANSWERS
	In doing so, KETRACO has CSR policy but with limited resources against many competing needs. Since societal needs are varied, KETRACO prefers proposals from the community so that the best is selected to serve the people at large when fund will be available. But key to KETRACO mandate is availability and reliability of power which key enable of vision 2030 and the government Big 4 agenda.
Why do you conduct the ESIA?	<ul style="list-style-type: none"> • To identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation. • As a compliance with the environmental regulations and relevant standards. • To identify problems (non-conformity) and recommend measures to improve the environmental management system. • To identify and quantify different categories of PAPS who would require some form of assistance e.g compensation, rehabilitation and relocation. • To verify the adherence and compliance of the financier environmental policies.
How safe will the substation be to the locals?	<p>The substation will be very safe and to ensure safety the following measures will be observed:</p> <ul style="list-style-type: none"> • The substation will be built by experienced personnel. • Regular maintenance will be done once operational. • Perimeter fencing and lighting system will be put in place. • There will be one access to the substation that will be manned on a 24/24-hour basis <p>Entry of the substation will be restricted to only authorized persons</p>
How will the locals benefit from the project?	<ul style="list-style-type: none"> • Access to cheap and reliable power in the long term. • Casual job opportunities during construction phase which will spur economic growth of the town. • Development of other sectors e.g. industry, education, hospitals, agriculture, etc which will benefit from the availability of the availability and the reliable power. • Enhanced business environment. • Direct and indirect, skilled, and non-skilled employment opportunities. • General enhancement of the living standards of the residents.
Will KETRACO compensate damage of properties outside the way leave during construction.	The contractor will be advised to work within the acquired wayleave but in case of damage outside the corridor caused by access of the heavy machineries during construction, KETRACO will instruct the Contractor to compensate any damaged properties.
There could be a lot of dust during the construction which will affect both human and animals, how will you deal with this?	This is true especially during dry spell; however, the proponent will ensure Regular sprinkling of water on work areas and access roads to prevent dust violations.

6.3.3.2 Summary of issues raised in community meeting on 18th October 2023

Respondent	Questions Asked	Answers Given
David Ndamario	I have not heard my name with Dan yet from the Map I am affected by the TL.	The names listed are the people affected & the list is from the Land registrar official searches. However, at the end of the meeting you can confirm with the surveyor on his records.
Salash Karino	I am also representing David Karino. This is the initial meeting for New Kimuka but the previous project we had issues with KETRACO Regarding 26634. The suggestion is for PAPS to convene and agree if we will agree compensation or to give our land.	The project is at preliminary stage and we have not done the valuation of land. We also apologize for any old/previous unresolved issues but this time we will be as much valuable as possible to provide solutions. The new LILO is very short, and the proposed site is the most viable as per survey, engineering, ESIA studies conducted during feasibility

Respondent	Questions Asked	Answers Given
	Cant the New line only enter through tower 4 instead of using existing wayleave	
<i>Amos Moniyo</i>	<p>Concern- KETRACO has been in this area before. But most land has been affected. Initially we were promised power for residents but never done years later.</p> <p>We don't see the power benefits yet the power infrastructure, yet we are in darkness.</p> <p>The local youths here were never considered during the first project.</p>	<p>We would recommend all community CSR requests to be officially communicated through an official letter to KETRACO office addressed to CEO.</p> <p>Also, these concerns will be expedited to the office.</p> <p>Any contractor who comes on board will be instructed to consider youth and women for the jobs in the project. The office of the chief will assist in verification of residents.</p>
<i>Peter Gitau</i>	<p>KETRACO has convened this as an initial community meeting, as an investor, can we be given timelines for project for our investment. Eg if we have planned to develop an estate and KETRACO is still waiting for compensating us who will pay for the losses.</p> <p>Proposal of opening WhatsApp group for easier communication .</p>	<p>As for now no definite time can be given however the project is at its preliminary stage.</p> <p>KETRACO usually officially communicates through the chief's office however your suggestion on WhatsApp group will be forwarded for consideration.</p>
<i>Peter Odera</i>	<p>The PIT has informed us about the EHS aspects in the field however, If there's a magnetic flux density there is a health impact to the PAPs affected. Is 60m wayleave corridor enough to mitigate the impact.</p>	<p>KETRACO has successfully completed many projects countrywide, however during ESIA & RAP studies we have ensured all matters related to EHS are considered and addressed. During energization we test the EMFs and other aspects to ensure they are within limits.</p> <p>Additionally, KETRACO does quarterly ESMPs to ensure there is no negative health impact before operation & commissioning.</p> <p>You are allowed to relocate to any place of your choice after compensation. However, you must verify the new location with area chief for the 15% disturbance compensation to be completed.</p>
<i>Jack Odera</i>	<p>How will we know the next meeting. As we wait for the gazette notice. when should we wait?</p> <p>Is this a notice to also ensure PAPs do not construct before the gazette notice. If I have an approved building plan will the costs be included in the compensation?</p>	<p>the gazette notice usually marks the cutoff date. the next meeting will be communicated through the chief's office. It is also good we now have our contacts we can also communicate to you directly.</p> <p>Yes the costs incurred for the plans /approvals will be considered</p>
<i>Yvonne Were</i>	<p>If no one was in the meeting. How will they know what was discussed?</p>	<p>The meeting has been minute and recorded. Upon ratification the chief will verify and a copy will be with the area chief for any reference of persons who didn't attend.</p> <p>However, the members present can cascade the information and any clarification can be sought through official KETRACO phone numbers given</p>
<i>Daniel Nthaka</i>	<p>Bought Land from Olive Limited. transfer has not been done. I had plans also to construct. Within 90 days, how will I be compensated</p>	<p>All affected members present are advised to complete the acquisition of valid title deeds. Also, their compensation will still be reserved for their later payment until they produce proof of ownership.</p>



Figure 17: Public meetings at Chief's Office in Kimuka on 18th October 2023

7 **CHAPTER SIX: ENVIRONMENTAL AND SOCIAL IMPACTS OF THE 400/220kV KIMUKA SUBSTATION**

7.1 **Introduction**

The proposed power transmission infrastructure will have both positive and negative environmental effects in terms of nature of impacts. Through an intensive and extensive field survey; key stakeholder consultation and public participation forums; literature review and professional judgement, impacts were identified and analysed. The impacts were categorised according to different phases/timing of the project i.e. construction, operation and decommissioning phases. Under the different phases, the impacts were further analysed into their corresponding nature i.e. either positive or negative and given a rating figure to depict its magnitude.

The negative and positive impacts likely to originate from the project have generally been linked to the social and biophysical environment and the economic aspects along the power transmission project area. Among the broad linkages are as follows:

- I. Biophysical Environment:
 - Biodiversity: Flora and Fauna.
 - Water: hydrology of the area.
 - Land and Soil.
 - Climate and Weather
- II. Social-economic Environment:
 - Population characteristics.
 - Settlement trends.
 - Land use patterns.
 - Health and Safety.
 - Culture.
 - Trade and industries.
 - Transportation and communication.
 - Income generation activities.

7.2 **Quantification of the magnitude of impacts**

The magnitude of each impact is described in terms of, no impact, minimal impact, moderate impact, high impact, very high impacts, and those whose magnitude is not known. Each impact magnitude was assigned a corresponding value that expresses the scale of the impact. To make the following observation, expert knowledge based on the magnitude of the predicted impacts was relied upon. The scale that was applied in the analysis of impacts is highlighted in the table below.

Table 13: Levels of Scale used in analyzing the magnitude of potential impacts.

Value	Description	Scale Description
0	No impact	This means that to the best knowledge of the expert, the activity/action will not have any known impact on the environment. Such an impact will not in any way affect the normal functioning of either the human or the natural systems and does not therefore warrant any mitigation.
1	Minimal impact	Any activity with little impact on the environment calls for preventive measures, which are usually inexpensive and manageable. Such activities have minimum impacts on either natural or human environment or both.
2	Moderate impact	A moderate impact will have localized effect on the environment. If the effect is negative and cumulative, action in form of mitigation measures needs to be put in place to ensure that it doesn't become permanent and /or irreversible.
3	High impact	An impact is high if it affects a relatively high area (spatial), several biological resources (severity) and/or the effect is felt for a relatively long period (temporal) e.g., more than one year. In case the effect is negative, such an impact needs to be given timely

Value	Description	Scale Description
		consideration and proper mitigation measures put in place to prevent further direct, indirect, or cumulative adverse effects.
4	Very high impacts	Such an activity rates highly in all aspects used in the scale i.e., temporal, spatial and severity. If negative, it is expected to affect a huge population of plants and animals, biodiversity in general and a large area of the geophysical environment, usually having trans-boundary consequences. Urgent and specialized mitigation measures are needed. It is the experts' opinion that any project with very high negative impacts MUST be suspended until sufficient effective mitigation measures are put in place.
5	Not known	There are activities for which impacts are not yet known e.g., some chemicals are suspected to produce carcinogenic effects, but this has not yet been confirmed.

7.3 Environmental Impacts during the Planning and Construction Phase

7.3.1 Positive environmental impacts

7.3.1.1 Tree growing

KETRACO (the proponent) has annual target of planting 200,000 trees. To achieve this, proponent has geared towards an ambitious approach to ensure that the targets are achieved by institutionalizing several strategies that include but not limited to ensuring that every new project being implemented has a tree planting component to it. KETRACO liases with the community and other allied agencies such as Kenya Forest Service (KFS) and Kenya Forest Research Institute (KEFRI) in planting at 3,500 tree seedlings as an offset of trees lost in the event of project implementation. The trees shall be grown in areas as would be identified and advised by KFS. This impact will be moderate hence a value of **2**.

7.3.1.2 Enhanced national sink potential.

By undertaking to grow trees as part of the project. The national CO₂ potential shall be enhanced considerably. Additionally, the enhanced tree cover will come with it improved ecological services such as provision of habitat, aesthetics and enhance socio-economic livelihoods in case where the community is involved and fruit/ woody trees and plantations are considered. This impact will be moderate hence a value of **2**.

7.3.1.3 Enhanced environmental conservation capacity.

In the event of planning for the taking -off of the project, the proponent will be holding several sensitization meetings as guided by the Stakeholder Engagement Plan (SEP). The SEP and the stakeholder engagements thereof will in part include public awareness on the essence of environmental conservation in the face of climate change and its impacts. The awareness will include but will not be limited to tree growing aspects, solid waste management, electromagnetic frequencies (EMFs), among other environmental concerns. This impact will be critical and shall enhance environmental and ecological stewardship for the residents of Kimuka area that is growingly urbanizing at the expense of environmental protection. This impact will be moderate hence a value of **2**.

Impact Enhancement Measures

- To enhance all the positive impacts as enlisted above, KETRACO shall intentionally set aside a budget and other requisite resource to ensure their achievements.
- The budget shall be complemented by a robust monitoring and evaluation to ensure compliance and implementation.

7.3.2 Negative environmental Impacts

7.3.2.1 Increased storm water

Impact Analysis

Paving of the ground structures and roofing will increase water collection and runoff as opposed to the infiltration and ground percolation. The increased storm water runoff will be as a result lead to soil erosion if proper channels will not be put in place to direct water into underground tanks or existing drainage systems. The eastern part of the land which is the lowest on site is likely to be the recipient of the storm water if remodelling of the natural storm on site will not be done and may affect both the integrity of structures, level of service of installed equipment and possible storm water flow to adjacent neighbouring parcels of land belonging to the immediate community.

Additionally, to ensure the resilience of this critical infrastructure, it will be prudent to avoid this lowest part of the land parcel while providing infrastructure protection measures to avoid any likelihood for flooding, erosion, and siltation. This impact will be moderate hence a value of **2**.

Impact Mitigation

Increased run off from paved grounds and expansive roofs causing extreme flooding and overflows of drainage systems shall be mitigated. Surface runoff and roof water shall be harvested and stored in underground reservoir for reuse. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.

7.3.2.2 Soil Erosion

Impact Analysis

The prevailing edaphic and geological properties on site are majorly volcanic soils with a few areas characterized by huge boulders of volcanic rocks are that gradually weathering off.

With the inherent nature of the soils and their structures, the possibilities of soil erosion occurring during construction exist especially during rainy seasons. The location of the run-off load deposition could increase the siltation on site as through alluvial deposits due to storm water flow as indicated above. Soil erosion is not expected to impact the local surface hydrological system since the area is devoid of any such system.

It may however pose a water quality issue directly because of siltation and indirectly from contaminants carried with or attached to soil particles. This impact will be high at the initial period of construction hence a value of **3**.

Impact Mitigation

KETRACO will put in place measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include terracing and levelling the project site to reduce run-off velocity and increase infiltration of rainwater into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off.

7.3.2.3 Disposal of excavated rocks and soil

Impact Analysis

Site excavations shall be done, and some excavated materials will be rendered as waste including rocks and overburden soil. These rejected materials will be collected as waste for disposal if not to be reused within the site especially in levelling off the ground or elsewhere within the community. Disposal of this category of waste may have adverse impacts on the receiving environment depending on their content, type, and intensity. This waste may compromise the aesthetic value, soil biogeochemical content, air quality water quality at the receiving end if not handled as per the laid regulations and proposed ESMP as best practice.

The current use of the site determines the current content and contamination level of the overburden soil. The land is currently arable and with a mix of trees hence negating any possible presence of hazardous substance that may alter the biochemical content of the receiving area. However, due to the uncertainty on the possibility of reuse of the overburden material, and since the receiving area and its suitability, should the material be disposed, has not been mapped out yet, the impact significance is moderate hence a weighting of 2.

Impact Mitigation

The contractor will ensure that as much as possible, ripping of soil and rocks has been limited to the areas of project footprint to reduce on the volume of material to be ripped off. Secondly, should the material that has been excavated be found suitable for re-use at site, it is recommended that the contractor with supervision of the consultant and KETRACO re-uses such material either in backfilling, landscaping, or levelling of the sites. Thirdly, the material if not laced with any contaminant can be given to the community for their use in firms, land scaping in the case of soils or as building material in the case of rocks and murram. In the adoption of the third, and to limit conflict while encouraging equity the contractor shall liaise with the area chief and elders for allocation of such material to the community. Lastly, in case there be any volume of such overburden material remaining its shall be considered as solid waste and shall therefore disposed in accordance with the waste management regulations 2006 and provisions of the Sustainable Waste Management Act, 2022.

7.3.2.4 Oil spills

Impact Analysis

Mechanization will be part of implementation of the project. The contractor shall have construction motor-powered equipment such as excavators, ground compressors back hoes, lorries, project cars etc. These equipment for use will need to be regularly serviced either onsite or off the site depending on the level of need. Due to their nature, the equipment will require regular oiling to minimize the usual corrosion or wear and tear. Possibilities of such oil spills are eminent due to such activities which could result to soil contamination, and surface and ground water contamination during rains through infiltration and percolation. But these dangers are contained by maintaining the machinery in specific areas designed and designated for this purpose. However, as precautionary measure, and as a guiding principle for the operation of the contractor, it will be prudent for the contractor to develop a hazardous waste management plan that shall include oil spill control and management. The probability for the occurrence of this impact is minimal hence a rating of 1.

Impact Mitigation

The proponent will control the dangers of oil, grease, and fuel spills during construction by maintaining the machinery in specific areas designed for this purpose. Machinery site repair will be discouraged, and repair work restricted to only approve garages to avoid pollution from oil, grease and fuel. As a precautionary, the contractor will be required to prepare a hazardous material management plan inclusive of spill management.

7.3.2.5 Increased water demand

Impact Analysis

Kimuka community is constrained of sufficient sources of water for subsistence use. The area partly exhibits arid conditions off the rainy seasons and has in the past few years been affected by drought that has ravaged the wider Kajiado County. Generally, the area is interspaced by dry river channels that are highly seasonal and only rich during the rainy seasons. Devoid of surface water and natural springs, the populace is dependent on boreholes, water bowsers/ vendors, and water supply CSR project undertaken by the Standard Gauge Railway Phase 2 A. The implementation of 400/220kV Kimuka substation shall require huge volumes of water whose abstraction is likely to exacerbate the current water strain in the area. The need for water shall be for drinking, mixing, curing among other critical activities on site.

Owing to the prevailing water demand and supply in the area and the likelihood of heightening the demand, the significance of this impact will therefore be high hence a weighting of 3.

Impact Mitigation

The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use. The proponent will install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff.

7.3.2.6 Dust emissions

Impact Analysis

Particulate matter and fugitive dust are likely to be produced during the site's clearance, excavation, transportation, spreading of the topsoil during construction. There is a possibility of PM₁₀ suspended and settle able particles affecting the site workers' health.

Particulate matter and dust depending on the content can pose a serious health hazard (respiratory and even carcinogenic) unto the workers and neighbours if not well contained and controlled.

Noteworthy, the significance of this impact is a factor of the sensitivity of its receptors The site is not in proximity to human receptors since residential areas for the community that would have been key receptors to the potential dust emissions are off and quite distance from the site. This therefore means that the impact is likely to be localized to the site with the workers, staff and the natural vegetation therein being the only impact receptor if not well managed in accordance with the ESMP's provisions. The impact of dust and particulate matter will likely have a bearing on primary production as an ecological function to vegetation nearby by settling on leaves and clogging their pores hence limiting their capacity to transpire. The impact is likely to be moderate hence a weighting of 2.

Impact Mitigation

Controlling dust during construction is useful in minimizing nuisance conditions. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (NO_x, CO₂, SO_x, and diesel related PM₁₀) that would occur in the exhaust from heavy equipment are also included. The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines.

Dust emissions will be controlled by the following measures:

- Watering all active construction areas as and when necessary to lay dust.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with physical sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Fast growing trees will be planted around the project area to act as a wind breaks to reduce the uplift of particulate matter that led to respiratory diseases.
- Project will be undertaken in phases to cushion the cumulative effects of dust which would be great in case the project is done at once.

7.3.2.7 Faecal waste generation and general sanitation

Impact Analysis

The human factor in the implementation and construction of the project is critical and with their presence key biological activities will be going on. The construction workers will generate faecal waste during their day-to-day operations on site. The generated waste needs proper handling (through latrines and toilets) as stipulated in the waste management regulations, 2006 to prevent contamination with water and other environmental parameters hence which may otherwise cause diseases, such cholera, diarrhoea, typhoid, and dysentery to fellow workers and the community.

With expected number of workers on site (approximately 200-300), open defaecation and urination on site presents unsightly and unsanitary with a potential of in-dignifying the project and community while promoting community health hazards especially in event of rains. The impact is likely to be high hence rating of 3.

Impact Mitigation

The contractor shall: -

- Sensitize workers on proper sanitation.
- Provide sufficient, gender-segregated mobile toilets when working along the LILO.
- Provide sufficient gender-segregated toilets/ latrines for workers working in the substation, and staff in the workers' camp.
- Install signage showing directions to the sanitary conveniences.
- Provide sufficient hand-washing facilities fully equipped with water and hand sanitizer.

7.3.2.8 Destruction of existing vegetation

Impact Analysis

The proposed project site as indicated in Chapter 3 of this report, covered with diverse species of indigenous trees, thickets, and grass. The physical footprint of the proposed substation will on a hived approximately 10 acres from the existing 27.3 acres and the 2.1 km combined distance for the short lines. It would be necessary to clear the footprint areas to pave way for the project's civil works and ground stabilization. This translates to destruction of existing vegetation cover with a regression contribution to the existing national forest cover and a reduced national carbon sink potential. The impact is likely to be high hence rating of 3.

Impact Mitigation

Clearance of part of the vegetation at the project site to pave way for construction will be inevitable. However, the proponent will ensure proper demarcation of the project area to be affected by the construction works. This will be aimed at ensuring that any disturbance to flora and fauna is restricted to the actual project area and avoid spillover effects on the neighbouring areas. In the same vein, there will be strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works. The clearance will be modelled in a way that some vegetation will not be cleared.

The contractor shall undertake a tree planting exercise at location(s) to be identified in consultation with KETRACO, the community and relevant authorities. The contractor shall plant trees worth KES 5,000,000 or at least 30,000 trees whichever is less. The cost shall be deemed to cover the entire exercise which shall involve the following:

- Selection of trees species with highest survival rate and can grow with baseline environmental conditions at the selected planting locations.
- Transportation of the seedlings to the selected planting locations.
- Preparation of the land including but not limited to clearing the site of invasive species and preparing the hole.
- Planting the seedlings at the onset of rainy seasons.
- Protection and care of the planted tree for a period of 12 months.

7.3.2.9 Generation of exhaust emissions and air pollution

Impact Analysis

Exhaust emissions will be generated by the construction equipment during the construction phase and vehicular operations associated with infrastructure. Motor vehicles used to mobilize the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through exhaust emissions. Because large quantities of construction materials are required, some of which will be sourced off Kimuka area, such emissions do have a significant contribution to greenhouse gases concentration with residual impact on ozone layer depletion and resultant increased global temperatures. The content of the emissions from these operations includes the following **carbon** dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). area. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site because of frequent gunning of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas. The impact is likely to be moderate hence a weighting of 2.

Impact Mitigation

To control exhaust emissions, the following measures shall be implemented during construction:

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

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

7.3.2.10 Surface and ground water hydrology and water quality degradation

Impact Analysis

Changes in surface hydrology alter the flow of water through the landscape. Construction of impervious surfaces such as parking lots, roads and buildings increase the volume and rate of runoff, resulting in habitat destruction, increased pollutant loads, and flooding. Built or paved areas and changes in the shape of the land also influence groundwater hydrology (i.e. recharge rates, flow, conditions).

Project related excavation could lead to surface and ground water quality degradation. Contaminated soil or ground water in the path of the project could be disturbed by excavation resulting in a potential transfer of the contamination to surface waters. The excavated area, if linear, could act as a conduit to extend groundwater contamination to new areas. Spills of hazardous materials in excavated areas during construction could introduce contaminants to ground water such as oils, etc.,. Development activities such as office construction as well as the spillover effects of development such as increased demand for drinking water and increased water use can impact water quality by contributing sediment, nutrients, and other pollutants to limit water supplies, increasing the temperature of the water, and increasing the rate and volume of runoff. The impact is likely to be moderate hence rating of 2.

Impact Mitigation

Several measures shall be put in place to mitigate the impacts that are likely to lead to hydrology and water quality degradation. The proponent through the contractor will prepare a hazardous substance control and emergency response plan that will include preparations for quick and safe clean-up of accidental spills. It will prescribe hazardous materials handling procedures to reduce the potential for a spill during construction and will include an emergency response programme to ensure quick and safe clean-up of accidental spills. The plan will identify areas where refuelling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted.

Soil sampling and trial pits digging will be conducted before construction begins and soil information will be provided to construction crews to inform them about soil conditions and potential hazards. If hazardous substances are unexpectedly encountered during trenching, work will be stopped until the material is properly characterized, and appropriate measures are taken to protect human health and the environment. If excavation of hazardous materials is required, they will be handled in accordance with applicable regulations. If suspected contaminated groundwater is encountered in the depths of the proposed construction areas, samples will be collected and submitted for laboratory analysis of petroleum hydrocarbons, metals, volatile organic compounds and semi-volatile organic compounds. If necessary, ground water will be collected during construction contained and disposed of in accordance with all applicable regulations. Appropriate personal protective equipment will be used, and waste management will be performed in accordance with applicable regulations. Oil absorbent material, tarps and storage drums will be used to contain and control any minor releases of engine and other equipment oil.

7.3.2.11 Solid waste generation

Impact Analysis

Construction of the substation and associated short lines will involve the installation and use of various equipment and material. This equipment and material are to be fitted in terms of size and quality to their intended use. During construction therefore, it is expected that solid waste shall be generated. Equally, solid waste from other non-construction activities such as cooking at the camp sites among others are precedent to generate a considerable amount of waste. The anticipated waste include brick, mortar, metal cuttings, wood, plastic, rubber, paper among others. Some of this solid waste is likely to be laced with hazardous chemicals such as oil, petro-based compounds among others. Dumping around the site will interfere with the aesthetic status of the area while creating a breeding ground for rodents. This has a direct effect to the surrounding community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic, pest breeding, pollution of physical environment, invasion of scavengers and informal recycling communities. Stacking of excavated soil will also contribute to the general anaesthetic nature of the site if unchecked. The impact is likely to be high hence rating of 3.

Impact Mitigation

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

The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal.

It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once used or recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste.

Additional recommendations for minimization of solid waste during construction of the project include: -

- Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.
- Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements.
- Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials.
- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.
- Use of construction materials containing recycled content when possible and in accordance with accepted standards.

7.3.2.12 Energy consumption

Impact Analysis

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable, and its use may have serious environmental implications on its availability, price, and sustainability. The project will also use electricity supplied by Kenya Power (KP) Ltd. Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. In this regard, there will be needed to use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability. The impact is likely to be high hence rating of 3.

Impact Mitigation

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

7.3.2.13 Noise and Excessive vibration

Impact Analysis

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials and workers to site. To be affected mostly are the site workers and immediate neighbours since noise beyond some level is itself a nuisance if not maintained within acceptable limits (an exposure 85 Db/ 8 hours as WHO standards). Excessive vibration also from the construction activities of blasting and excavation can cause economic and physical damage of the neighbouring properties. Notably, the substation site is far from residential areas which therefore reduces the

stimuli impact on the community as a key receptor. The effect and intensity of noise and vibration attenuates with an increase in distance between the source of stimuli and the receptor.

Exposure of workers beyond the specified limits (85db for 8 working hours) will lead to hearing complication such as tinnitus, partial even complete hearing loss. The impact is likely to be moderate hence rating of 2.

Impact Mitigation

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:

- Exposure of persons to, or generation of, noise levels more than standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels (more than five dBA) in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The proponent shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimize the impact of temporary construction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e., equipment designed with noise control elements).
- Install sound barriers for pile driving activity.
- Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible.
- Application of modern methods of construction that avoids excessive vibrations.
- Ensuring the contractor has a good insurance policy that covers accidental damage of neighbours' properties in case of excessive vibration that may lead to damages to nearby property.
- Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used.
- Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation.
- Ensure that all workers wear earmuffs and other personal protective gear/equipment when working in noisy sections.
- Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. preferably between 12.00 noon and 2.00 pm).
- Comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009.

7.4 Socio-economic Impacts during the Planning and Construction Phase

During the ESIA study, social impacts were categorized and discussed into detail as; community impacts, cultural impacts, health impacts, lifestyle impacts, and quality of life impacts. Based on the social impact assessment that was carried out on the proposed site; this chapter discusses both the positive and negative issues which were identified.

The ESIA study estimated that a total of 31.1 acres will be affected by the right of way for the proposed transmission line LILO and 10 acres substation (hived from 27 acres owned by KETRACO).

7.4.1 Positive social impacts

7.4.1.1 Creation of employment opportunities

The construction phase of the power transmission infrastructure will offer temporary job opportunities for males and females including the youth both semi-skilled and unskilled locals in Kimuka area. Drivers, masons, civil engineers, steel-fixers, welders, and other casuals such as carpenters will gain employment during the

construction phase of the power transmission line and substation. 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. Some maintenance activities such as clearing of vegetation along the RoW will still provide seasonal jobs to the community members. These jobs are expected to improve the economy of the area and improve the livelihoods of the local people. Unskilled labour will be recruited as per administrative unit i.e., per location. This impact will be very high hence given a value of **4**.

7.4.1.2 Gains in the local and national economy

Through the provision of employment to the locals, income from the salaries and wages will improve the economy of community around the project and the county at large. The contractor is also expected to purchase some of the materials from the project area and as such contribute positively to the local and national economy. The workers will need basic amenities such as food, shelter, and clothing during construction period. They will as well need recreation for time off. All these goods and services will be sourced from providers in the transmission area thus increasing the economic activity around the region. 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. The materials for construction will also be sourced from other areas within the nation hence positively affecting the national economy. This impact will be very high hence given a value of **4**.

7.4.1.3 Transfer of skills

There will be transfer of skills as semi-skilled labour will be sourced from within and where unavailable outside the project area to provide different services. As such, the local people will learn new skills from the transferred skills and knowledge. This impact will be moderate hence a value of **2**.

7.4.1.4 Provision of market and supply for building materials

The contractor will purchase building materials such as sand, cement etc. from suppliers within or outside the project area. This is anticipated to temporarily improve on business due to increased income. This impact will be moderate hence a value of **2**.

7.4.1.5 Improvement of local and regional trade and business opportunities

The project will lead to the permanent growth of local and regional trade. In the construction phase, building materials for construction will be purchased both locally and regionally. Other small-scale businesspeople such as food vendors, kiosk owners will also benefit during the construction of the transmission line and associated facilities. This impact will be moderate hence value of **2**.

7.4.1.6 Improved security

In the wake of insecurity incidences in the project area, the proposed power transmission project is anticipated to improve security. There will be deployment of police and private security services along the project RoW during the construction. This impact will be moderate hence value of **2**.

Impacts Enhancement Measures

- Implementation of the SEP
- Implementation of the LMP

7.4.2 Negative Socio-economic Impacts

The following are the expected negative social impacts for the proposed project during the construction phase:

7.4.2.1 Land (wayleave) acquisition and resettlement impacts

The Kimuka LILO project entails the resettlement of twenty PAPs and has significant implications for thirty-eight parcels, where the 2.1km long LILO traverses privately owned land with 38 identified landowners through cadastral surveys.

The main negative impact arises from the necessity to place land under easement for the LILO, particularly affecting approximately 12.6 Ha or 31 acres designated for the public right of way (RoW). The parcels impacted by the proposed RoW include various-sized private and public lands. The wayleave acquisition, expected to affect 19 landowners through 39 parcels, carries a high impact, rated at 4. Three households have also been identified as impacted.

The cut-off date for the project is October 18, 2023. Assets include permanent, semi-permanent, or temporary structures, compensated through the Gross Replacement Value Method, with a 15% statutory allowance. PAPs have the option to salvage materials from affected structures.

The total compensation budget is Kshs. 102,384,138.25, distributed across land, structures, disturbance allowance, and trees:

- Land: 24.315 acres, valued at Kshs.92,714,157.11
- Structures & Improvements: 20 structures, totalling Kshs.7,908,679.25
- Disturbance Allowance (15%): Kshs.1,186,301.89
- Trees: 125, valued at Kshs.575,000

Impact Mitigation

The location of the LILO is significantly in a peri-urban setting, which increases the number of affected parcels over a unit distance of the line. Urbanization is a key factor to land parcel subdivisions to small plots for single dwelling family units. With the nature of the public right of way required for the LILO (60m) means several parcels are likely to be affected more than 70% by the line. To safeguard the affected household, the following measures are proposed: -

- Resettlement and compensation of PAPs to align to KETRACO's approved RPF and the ESS5 for WB.
- Apply RAP compensation procedures in a transparent and consistent way to all persons affected by the project.
- Provide compensation at full replacement cost.
- Where possible, avoid involuntary resettlement; and where avoidance is not possible, minimize involuntary resettlement.
- Carry out timely-before project commencement, fair and adequate compensation as per Kenyan law, WB guidelines and aid as appropriate, (allowances and livelihood restoration programs) to PAPs until such a time that their livelihoods and incomes are restored to pre-project levels or better.
- Implement internal monitoring to ensure the RAP is implemented appropriately.
- Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status including women household heads, minority groups, OVCs, widows, and PLWD, and put measures in place to ensure they have equal access to project benefits and opportunities.
- Apart from cash compensation, consider resettlement assistance for vulnerable persons and households such as orphans, PLWD, widows and elderly.
- Provide a choice of options to affected persons and consult with communities over community assets and resources.
- Provide opportunities to displaced communities and persons to derive development benefits from the project through employment or any other way that may identified.
- Provide transitional support for a reasonable period to enable PAPs whose livelihoods have been affected, to restore their income-earning capacity, production levels, and standards of living.
- Ensure displaced persons are informed of their full rights and entitlement to e.g. their right to compensation and compensation options.
- Implement the stakeholder's engagement plan (SEP) to engage host communities as well, in addition to PAPs where appropriate.
- Adopt and implement a Grievances Redress Mechanism to address all emerging complaints and grievances from the PAPs and project area community.
- Ensure that the displaced persons are:
 - a) Informed about their options and rights pertaining resettlement and compensation.
 - b) Consulted on, offered choices among, and provided with alternatives.
 - c) Provided prompt, adequate, and effective compensation at full replacement cost for losses of assets attributable directly to the project in accordance with project RPF.
 - d) Offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living.

- e) Provided with development assistance in addition to compensation measures.
- Mitigating land acquisition (wayleave) and resettlement conflicts
 - Resettlement and compensation of PAPs to align to the KETRACO approved RPF and WB ESS 5 provisions.
 - A project Grievances Redress Mechanism [GRM] to be established and implemented, with various tiers of escalation including provision for legal redress; receipt and recording of grievances at locational level, to address all emerging complaints and grievances from the PAPs and project area community.
 - Loss of land and crops will be compensated; the amount of compensation to be paid for private and public land will be as per the Kajiado County land registry rates by National Land Commission (NLC). However, the rates must be in line with the KETRACO approved RPF.
 - Surveys have been conducted to establish which properties (land and buildings) lie within the RoW for compensation of PAPs.
 - The exact number of PAPs affected, and the types of properties affected should be determined for compensation.
 - Where possible avoid involuntary resettlement and where avoidance is not possible, minimize impacts on people/households and livelihoods.
 - Implement the stakeholder's engagement plan to ensure effective communication, community buy in and ownership of the project.

7.4.2.2 Agricultural produce loss / restriction to access Pasture

Impact Analysis

With the creation of a public right of way on private land, there will be limited access by the land parcel owners to the full utility of land in the future. The land parcels as at the time of the assessment were used as grazing land. KETRACO, by creating a public right of way on these parcels of land will create restrictions on activities such as quarrying, planting of woody trees with a potential of growing past 6 meters high and building structures within the public right of way.

Since the transmission lines (LILOs) ground clearance ranges from 20m to 425m high, coupled with its inherent nature that only requires a public right of way instead of land acquisition to pave the way for the transmission line, no significant impact is expected on pastureland and animal grazing. Pastureland will only be temporarily affected during construction, and afterward farmers will be able to continue utilizing the portion of land in the area as before, e.g. for natural pasture or animal grazing. For households where transmission line towers / pylons will be constructed on their land, the affected portion of land will permanently remain unutilized for the entire period of existence of the transmission line hence negatively impacting on pasture and agricultural land.

Despite the non-restriction on grazing and tilling, the minimal footprint of transmission towers' legs on private land limits the parcels maximum production potential. Notably, the pastoralists and/or farmers will have the other part of parcels within the transmission span for their economic use on non-restricted activities. The nature of the design ensures a minimal footprint of the towers' legs (foundations) on the parcel.

Finally, there is a potential of impacting crops and fruit trees through destruction in the event of construction of the LILOs. Compensation of affected crops will align to the RPF. Although there will be limited use of eased land along the RoW, the land under the ROW will still be used for crops that may not grow to more than 12ft high. This impact will be moderate hence a value of 2.

Impact Mitigation

- Enumeration of destroyed farm crops (if any) through a Crop Damage Register in the presence of crop owner.
- Identify, address, and document concerns such as agricultural produce loss, restrictions to access to pasture before construction begins.
- Using transmission structures with longer spans to avoid clearing the agricultural fields and impacting pasture.

- Using existing roads or lanes utilized by the farm owner.
- Avoiding construction and maintenance activities during times when soils are saturated.
- Ensuring construction is scheduled after crop harvesting (when farms are largely with no produce)
- Sensitize contractors / workers / local community to avoid any interference of the beehives if outside the RoW.
- Adopt and implement a Grievances Redress Mechanism to receive and address complaints from the PAPs and host community.

7.4.2.3 Health Impacts such as spread of STD, HIV and AIDS

Impact Analysis

The residents along with the projects Area of Influence (AoI) expressed concern that there would be likely temporary increase in incidences of health impacts such as sexually transmitted diseases including HIV and AIDS especially during construction of the transmission line and associated facilities due to increased prostitution. The project proponent will need to work jointly with appropriate county and national government health agencies to mitigate STD, HIV and AIDS during the construction and operational phases of the project. This impact will be moderate hence a value of **2**.

Impact Mitigation

- Review activities of the proposed electric power transmission and distribution project to integrate with HIV/AIDS campaigns.
- Develop appropriate training, awareness content and implement awareness sessions for communities and workers on HIV/AIDS and other STDs, as well as GBV-SEA and sexual harassment at workplaces.
- Support HIV/AIDS and STD awareness and education. This can be done using educative posters, offering free HIV/AIDS testing services and HIV/AIDS counselling in main towns situated along the RoW.
- Ensure an adequate and accessible provision of condoms to workers both male and female.
- Providing health services (treatment through standard case management in on-site or community health clinic).
- Promoting collaboration with local authorities to enhance access of workers' families and the community to public health services.
- Liaise with relevant health agencies both at national and County level (Kajiado County) (Ministry of Health, National AIDS Control Council (NACC)), including NGOs (AHF Kenya), and CBOs (youth, men, and women groups) on awareness creation.
- Periodic sensitization forums for workers on ethics, morals, general good behaviour and the need for the project to co-exist with the neighbours.
- Ensure sensitization of workers and communities on HIV/AIDS and other STDs including ethics, morals; general good behaviour in accordance to the Stakeholder Engagement Plan (SEP) prepared under this project. Such sensitizations or training should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures.
- Adhere to and implement the HIV and AIDS Prevention and Control Act, 2006 and the Sexual Offences Act, 2006 and its amendment 2012.
- Contractors to develop a code of conduct and ensure it's signed by all workers with physical presence on site as well as within the project area. The code of conduct will address worker and community interactions considering risks of GBV-SEA and sexual harassment in workplaces, HIV/AIDS and other STDs resulting from population/labour influx. Labour influx impacts will be managed through a Labour Management Plan (LMP).
- Adopt and implement a Grievances Redress Mechanism (GRM) to receive and address complaints from the PAPs and host community. Sensitize PAPs about the existence of an alternative GRM through World Bank's Grievance Redress Service (GRS).

7.4.2.4 Insecurity

Impact Analysis

There were concerns that due to an influx of people as construction workers at the project, insecurity is likely to increase especially in Kimuka. This impact will however be low hence a value of **1**.

Impact Mitigation

The proponent should integrate both physical and technological security solutions to provide advanced security surveillance system. This should include, but not limited to;

- Thoroughly screen workers, suppliers, and distributors.
- Ensure 24-hour surveillance by engaging the Administration Police services during the day and night.
- Install CCTV cameras in strategic locations in workers' camps.
- Ensure close liaison with the local Police Department.
- Implement the Stakeholder Engagement Plan (SEP) to ensure project ownership, and mitigate the risk of insecurity-theft, and vandalism.
- Adopt and implement a Grievances Redress Mechanism to receive and address complaints from the PAPs and host community.

7.4.2.5 Gender and equality biases

Impact Analysis

Gender and equality biases in the proposed project may be the basis of differential treatment of persons based on their sex roles, ethnicity, status, religion, race, age, beliefs, and disability among other attributes. KETRACO should put measures in place to address issues of gender equality and freedom from discrimination among all Kenyans that will be involved in the project with a focus on Special Interest Groups, namely, women youth, children, persons with disabilities (PWDs), the elderly and minority and marginalized groups and communities. KETRACO is expected to roll out programs and activities including employment, resettlement, compensation, and livelihood support programs during the project implementation. The overall goal will be the reduction of gender inequalities and the discrimination against all interest groups during the project cycle. Therefore, this impact will be low hence a value of 1.

Impact Mitigation

- Applying all Kenyan Constitutional requirements on gender throughout the project.
- Apply all guidelines under the National Gender and Equality Commission Act, 2011 and adhere to Gender Strategy.
- Developing the project sustainably by transforming the distribution of opportunities, resources and choices for males and females so that they have equal power to shape their own lives and contribute to their families, communities, and country.
- Undertake gender mainstreaming at project design, implementation/ construction, operation, and decommissioning stages.
- KETRACO to give equal treatment to both men and women recruitment and doing business with the community. The Transmission line and associated facilities contractors will be expected to implement the Labour Management Plan and uphold equal treatment of men and women during recruitment.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective information disclosure and communication for both men and women.
- Contractor to adopt and implement a Gender Mainstreaming Plan to ensure that both men and women have equal opportunities to participate in and benefit from the proposed power transmission project.

7.4.2.6 Cultural impacts

Impact Analysis

As indicated in the baseline information chapter, the proposed project is to be located within Kajiado County in a peri-urban environment which is slowly becoming a cosmopolitan but most of the populace being the Maasais. Due to the growing urbanization because of the Nairobi Metropolis overflow, the distinct culture of the original dwellers (the Maasais) is being constantly eroded. For instance, many within the area are now disposing their parcels of land, diversifying the livelihoods from pastoralism to trade and farming. The area is evidently devoid of the traditional Maasai *Manyattas* which have given way to semi-permanent to permanent modern houses made of brick, stones blocks, mortar and corrugated iron sheets secured in perimeter-walls.

Additionally, the project site is already criss-crossed by a myriad of development infrastructure by both the national government and the county government. These projects include the Standard Gauge Railway line- Phase 2 A, the Suswa Ngong highway, the 220/33kV Kimuka substations, the 400kV Suswa- Isinya transmission line

among others. The implementation of these projects coupled by the growing urbanization in the area, and the cosmopolitan change have seen a gradual but constant acculturation for the residents. Despite the prevailing acculturation, and the existing greying of the conventional Maasai culture the implementation of the project is also likely to have a subtle impact to the host community's culture. From the assessment, the implementation of the project will not affect any totem, shrine, grave, or any item of cultural significance. This notwithstanding, this ESIA report provides chance-find procedures for use and adoption by pertinent actors. This impact will be moderate hence a value of 2.

Impact Mitigation

The following should be undertaken:

- Avoid constructing substations or transmission line design changes / changing tower spans to avoid spotting the pylons in areas of archaeological or cultural heritage importance if such sites be found.
- Work together with local elders to identify and map any other physical cultural resource and other areas of cultural heritage importance, not identified during the ESIA process.
- Use existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible.
- Work in close liaison with national agencies that deal with areas of archaeological and cultural importance such as the National Museums of Kenya (NMK) to offer guidance on chance finds procedure if unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication in relation to cultural resources with the host community.

7.4.2.7 Social-political disputes exacerbated by the Project.

Impact Analysis

Due to the perceived marginalization of the region, there is a likelihood of social – political interference attributed to land and historical relations along the proposed project area. The communities are likely to raise grievances based on land displacement and compensation. The residents also highlighted possibility of socio-political disputes as political leaders try to portray their influences in the region. The impact scale is moderate hence a value of 2.

Impact Mitigation

- Ensure all stakeholders and the public are involved in the planning process and sensitized to understand that increase in the capacity of transmissions system will increase access and distribution of electricity at homesteads and institutional level within Kajiado-North sub-county and the county at large.
- Ensure proper identification and compensation of all persons who will lose businesses and land.
- Obtain necessary permissions and approvals from the County Governments.
- Ensure EIAs are conducted for specific project activities such as workers campsites, materials sites, boreholes etc.
- Largely involve the community in the project through their leaders, timeliness in addressing their grievances and ensure a good percentage of the local community members are employees in the project area.
- Adopt and implement a Grievances Redress Mechanism to receive and address complaints from PAPs and host community.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication with the host community and PAPs where appropriate.

7.4.2.8 Illicit behaviour / drug and alcohol abuse

Impact Analysis

The residents highlighted that the project, especially during resettlement and compensation, was likely to increase illicit behaviour and drugs abuse. Women cited that their men and youths would resort to substance abuse (alcoholism and smoking). Men highlighted the possibility of prostitutes migrating to the area due to

availability of money. The community explained that alleged behaviours might jeopardise marriages and family wellbeing, and harmonious existence. The impact scale is moderate hence a value of **2**.

Impact Mitigation

The following should be undertaken:

- Elders and local administration in the project area to manage illicit behaviour / drug and alcohol abuse at the community and family level whereas the contractor and proponent should be responsible for worker conduct on site.
- Contractors, subcontractors, and all project staff to behave in a culturally appropriate manner.
- The contractor and proponent to establish a code of conduct and ensure workers conduct at site adheres to set rules and regulations e.g., on drug use and alcohol, interactions with locals and Gender Based Violence (GBV) – Sexual Exploitation & Abuse (SEA) / workplace Sexual Harassment (SH).
- Ensure an adequate and accessible provision of condoms to workers, both male and female.
- Elderly and social protection officers can be used to uphold moral standards and dignity in the affected community.
- Establish Grievance Redress Committee (GRC) and put in place the elderly to liaise and identify such situations and address them before they escalate to pressing social problems.
- Adopt and implement a Grievances Redress Mechanism to receive and address illicit behaviour / drug and alcohol abuse complaints before escalating to pressing social problems.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication with the host community and PAPs where appropriate.
- Adhere to and implement the HIV and AIDS Prevention and Control Act, 2006 and the Sexual Offences Act, 2006 and its 2012 amendment.

7.4.2.9 Domestic Conflicts exacerbated by project.

Impact Analysis

Disputes might emerge whereby some family members might be angered after feeling they are short-changed during the compensation process. Residents noted that the land compensation will attract various forms of conflicts as everyone in the project area will want to benefit from the compensation even if they are not property owners. As such, there might be situations of illegal land ownership, an influx of impersonators, and regeneration of unresolved land cases, which might degenerate into domestic conflicts. This situation would deprive the victims of properties owned and compensation, which might also subject them to abject poverty. The impact scale is moderate hence a value of **2**.

Impact Mitigation

The following should be undertaken:

- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication with the host community and PAPs where appropriate.
- Adopt and implement a Grievances Redress Mechanism to receive and address domestic conflicts exacerbated by project.
- The project to engage the elders and social workers to guide and mediate cases of domestic violence.
- Encourage the married couples to open a joint bank account to avoid mistrust.

7.4.2.10 Sexual Exploitation and Abuse (SEA) and Workplace Sexual Harassment (SH) and other forms of Gender-Based Violence (GBV)

Impact Analysis

The number of contractors' workers expected to implement the project is substantial as indicated in Labor Management Plan (LMP). With this expected numbers, cases of Gender-Based Violence (GBV) such as Sexual Harassment (SH) and Sexual Exploitation & Abuse (SEA) cannot be overlooked.

Perceived project benefits such as higher income in the community for the workers could lead to prostitution and extra-marital affairs. The risk of incidents of sexual exploitation and abuse for minors, even when it is not transactional / prostitution, could also increase. There was also a possible risk of sexual exploitation and abuse through unwanted sexual advances to women and men mainly by project workers, contractors, and service providers.

Sexual Harassment (SH) among workers / staff working on the project, unwelcome sexual advances, requests for sexual favours, and other unwanted verbal or physical conduct of a sexual nature might arise at the project workplace. Regardless of the prevailing rates of GBV, SEA and SH in Kajiado as shown in the image graph below as at 2020 (adopted from <https://www.crimeresearch.go.ke/kajiado/>). This impact is likely to be low hence a rating of **1**.

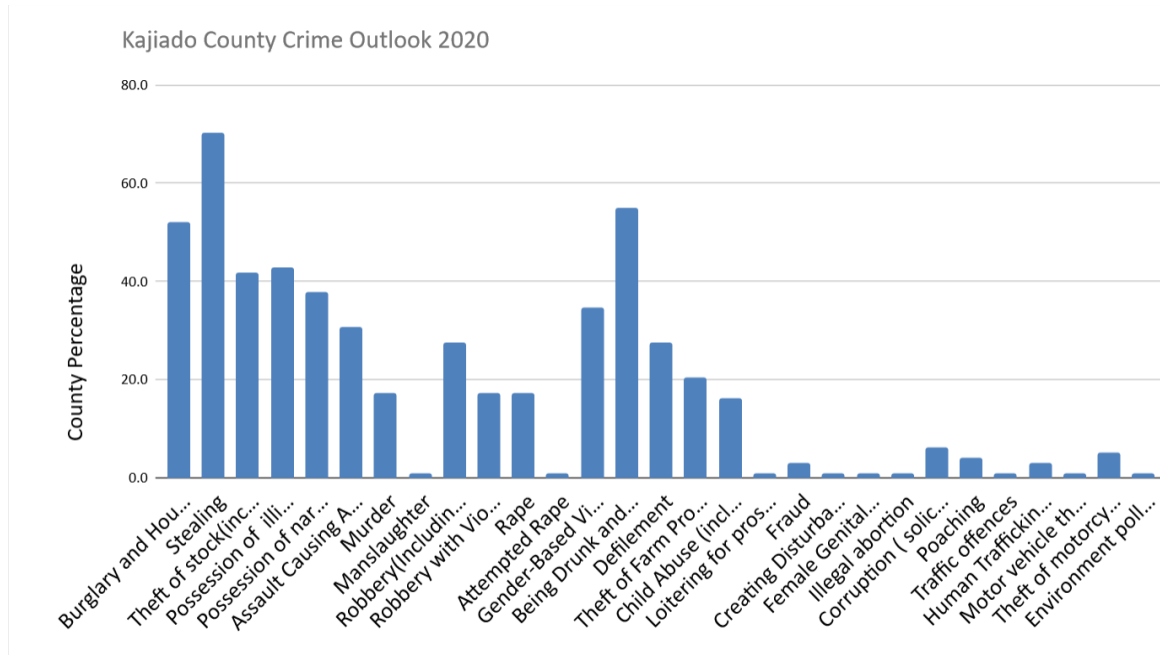


Figure 18: Crime rates in Kajiado as of 2020

Source : <https://www.crimeresearch.go.ke/kajiado/>

Impact Mitigation

The following should be undertaken:

- Ensure sensitization of the contractor, their sub-contractors, and consultants on GBV, SEA/SH issues including refraining from unacceptable conduct towards local community members.
- Introduce a worker Code of Conduct as part of the employment contract, to be signed by all with physical presence on site as well as within the project area, and to include sanctions for non-compliance (e.g., termination).
- Ensure mandatory trainings regarding GBV, SEA/SH to be provided to all project workers including temporary and casual workers.
- Undertake awareness meetings for the project affected communities on GBV-SEA/SH issues. Participants should be informed about the Code of Conduct, related national legislations and available GRM including available services/referral mechanism mechanisms for seeking help.
- Implement the GBV-SEA/SH Management Plan as part of the ESMP and Labour Management Plan. The contractor to incorporate GBV-SEA/SH in the C-ESMP.
- Ensure separate sanitation and hygiene facilities (toilets, utility rooms and changing rooms) for men and women in the workers' camps / workplaces are provided.
- Adopt a policy to cooperate with law enforcement agencies in investigating complaints about GBV-SEA/SH should a survivor choose the legal redress. Survivors should be facilitated to understand that this may require them to commit to cooperate with the agencies.

- Inform workers and local community about national laws such as the Sexual Offences Act. No 3 of 2006 that make GBV-SEA/SH a punishable offence which is prosecuted.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication on GBV-SEA/SH.

7.4.2.11 Labour influx

Impact Analysis

Although labour influx of workers (skilled, semi-skilled and unskilled) is likely to result to both negative and positive social benefits, the locals stated that the temporary influx of non-locals might expose the project area to illicit behaviours, which might undermine the existing socio-cultural aspects, values, and norms of the locals. The situation is likely to cause animosities between the locals and the outsiders, degenerating into conflicts and scramble for scarce resources such as accommodation in town centres, water, and food as well as job opportunities. Also, labour influx may arouse exorbitant land brokers and conmen whose motive is to make abnormal profits or engage in fraudulent transactions at the expense of locals and vulnerable members of the community. Further, the situation may trigger inflation of prices of goods and services because of the high demand for such commodities and services, degenerating into hard economic times. The impact scale is moderate hence a value of **2**.

Impact Mitigation

The following should be undertaken:

- KETRACO has developed a Labour Management Plan (LMP) that gives details and guideline on recruitment and project labour management. The contractor as part of C-ESMP will comply with provision of the LMP. The local recruitment policy should be carefully developed with relevant stakeholders such as the local administration before the commencement of project activities.
- Encourage community business interaction within the project where possible e.g., local procurement where possible, selling of consumable like food etc. to discourage influx.
- Provision of workers camps to alleviate pressure on existing community housing infrastructure and basic services viz., food, water, and sanitation. This will minimise the interactions with the locals, consequently reducing competition for resources and the spread of diseases.
- Provision of worker transport for locals to reduce the impetus for migration towards the project site which creates demand for local housing, pressure on local infrastructure, services, and utilities, and thus pre-empt the development of larger population centres close to the project site.
- Ensure induction of all immigrant workers to abide by the code of conduct and respect the community cultural norms and values.
- Contractors to develop & implement a Labour Influx Management Plan and Workers' Camp & Accommodation Management Plans, GBV-SEA/SH plan, as part of C-ESMP.
- Contractors to develop a Code of Conduct and ensure its signed by all workers with physical presence on site as well as within the project area. The code of conduct will address worker and community interactions considering risks of GBV-SEA and sexual harassment in workplaces, HIV/AIDs and other STDs resulting from population/labour influx.
- Establish and ensure early uptake of a Grievance Redress Mechanism for local community and workers. The Grievance Redress Committee to act as link between community and the project; and should be sought as a priority in solving issues.
- Undertake stakeholder engagement / awareness to prepare local communities psychologically. Awareness should include efforts toward instilling attitudes of tolerance, support and understanding of labour immigrants by the local communities. Discuss issues, risks and opportunities linked to labour influx, understand the concerns of local communities, raise awareness of risk and opportunities, and identify solutions to issues relating to labour influx.

7.4.2.12 Community Expectations on the Project including CSR.

Impact Analysis

During the stakeholder engagement and public consultation and participation exercise, the local community highlighted various Corporate Social Responsibility (CSR) proposals. Some of the expectations varied in sectors such as education, health, security, social services, power supply, water, and agriculture. Notably most of the expectations require establishment distribution of power which fall short of KETRACO's mandate. Further, community expectations on the project including jobs, and high salaries may be exacerbated. It is therefore imperative to ensure community expectations are well managed throughout the project cycle to reduce on level of disappointment and tensions. The impact scale is moderate hence a value of **2**.

Impact Mitigation

The following should be undertaken:

- Provide support for supplies and movable items for institutions or sectors identified by the community.
- KETRACO to establish deliberations / procedures on donation to local community of facilities used by the contractor, at the conclusion of the project. Such facilities could include campsite buildings, and boreholes.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication, community buy in and ownership of the project without lowering realistic expectations.
- KETRACO to consider liaising with or bringing to attention the relevant Ministries and County departments on critical community needs. For instance, linking vulnerable populations at project locational levels for registration in local government support programs.
- Adopt and implement a clear and accessible Grievances Redress Mechanism to receive and address grievances from host community.

7.4.2.13 Child and Forced Labour

Impact Analysis

Due to increased temporary opportunities for the local community to sell goods and services to the incoming workers, pupils may drop out of school to produce and deliver such goods and services, which in turn can result to child labour. Although child labour may not be so heavily pronounced in the proposed project due to existing laws that prohibit the act, there are possible risks hence need for establishing stringent mitigation measures.

COVID-19 impacts affected the livelihood capacity of many communities which has been exacerbated by the dwindling economy and shrinking opportunities. These factors lay ground for forced labour. Vulnerable individuals and families who have lost their jobs in the informal economy, in urgent need of funds for household survival but with few savings and limited access to social protection or other forms of government support, are likely to be at greater risk of falling prey to lenders providing credit on terms constituting debt bondage / forced labour. Vulnerable persons are more likely to get tricked and trapped in forced labour. With more workers in the project area likely to contract debts to survive, the risk of increasing debt bondage is high. Restrictions on movement may shift forms of exploitation, women and children for example may be commercially sexually exploited by their abusers within their homes.

The COVID-19 pandemic's economic fallout has pushed many communities, especially those in the informal economy, to the brink. With livelihoods shattered, shrinking opportunities, and limited access to social safety nets, these vulnerable individuals and families become easy prey for exploitative practices like debt bondage and forced labour. Driven by desperation for basic survival, they would be easily lured by lenders offering seemingly easy credit, unaware of the trap they're entering. These predatory loans often come with crippling interest rates and unfair terms, leading to a cycle of debt that binds them to forced labour. Women and children are particularly at risk, facing increased danger of sexual exploitation within their homes due to restricted movement. In essence, the project area faces a risk of escalating debt bondage, further fuelled by economic hardship and desperation. This impact is likely to be moderate, hence a rating of **2**.

Impact Mitigation

The following should be undertaken to protect the rights of children and elimination child labour and forced labour:

- No employment for anyone under the age of 18.
- All persons seeking employment (contractor, subcontractor) should be required to provide a national identity card.
- The client and contractor should not employ forced labour, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty.
- Implement the Labour Management Plan (LMP) –to promote fair and equitable labour practices throughout the project cycle including the fair treatment, protection of workers' rights, non-discrimination, and equal opportunity of workers.
- Adopt and implement a Grievances Redress Mechanism to receive and address grievances from host community.
- Implement the Stakeholder Engagement Plan (SEP) to ensure effective communication with host community on raising awareness to prevent child labour and forced labour, with particular attention given to domestic work and the worst forms of child labour.
- Promoting financial literacy by educating communities about predatory lending practices empowers them to make informed decisions.
- Enhancing law enforcement through robust efforts to identify and dismantle forced labour networks are crucial.

7.4.2.14 Occupational safety and health

Impact Analysis

The Occupational safety and health issues associated with the construction of the proposed transmission line and associated facilities will include physical hazards, chemical hazards, and noise hazards. The occupational health and safety hazards specific to the proposed electric power transmission and distribution project primarily include live power lines, working at height and exposure to chemicals such as oils. The power transmission construction personnel can be exposed to a variety of physical hazards from operating machinery and moving vehicles but also working at elevation on towers. Workers may be exposed to occupational hazards when working at elevation during construction of the towers. Occupational safety and health issues include:

Live Power Lines: Workers may be exposed to occupational hazards from contact with live power lines during construction, maintenance, and operation activities.

Working at height on poles and structures: Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities.

Electric and magnetic fields: Electric utility workers typically have a higher exposure to EMF than the public due to working in proximity to electric power lines. Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program.

Ergonomics, Repetitive Motion, Manual Handling: Injuries due to ergonomic factors, such as repetitive motion, overexertion, and manual handling, take prolonged and repeated exposures to develop, and typically require periods of weeks to months for recovery. These OHS problems should be minimized or eliminated to maintain a productive workplace.

Exposure to chemicals: Occupational exposures to chemicals in this sector primarily include exposure to PCB in transformers and other electrical components.

Other physical hazards include exposure to weather elements, contact with overhead power lines, falls from machinery or structures, and risk of falling objects. There is also a possibility of accidents when transporting workers to the construction sites. This impact will however be low hence a value of **2**.

Impact Mitigation

The following should be undertaken including adopting and implementing the Occupational, Health and Safety Management Plan (OHSMP) –

Live power lines

- Only allowing trained and certified workers to install, maintain, or repair electrical equipment.
- Deactivating and properly grounding live power distribution lines before work is performed on, or in proximity, to the lines.
- Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards. Qualified or trained employees working on transmission or distribution systems should be able to achieve the following-
 - Distinguish live parts from other parts of the electrical system.
 - Determine the voltage of live parts.
 - Understand the minimum approach distances outlined for specific live line voltages.
 - Ensure proper use of special safety equipment and procedures when working near or on exposed energized parts of an electrical system.
- Workers should not approach an exposed energized or conductive part even if properly trained unless:
 - The worker is properly insulated from the energized part with gloves or other approved insulation; or,
 - The energized part is properly insulated from the worker and any other conductive object; or,
 - The worker is properly isolated and insulated from any other conductive object (live-line work).
- Specific training, safety measures, personal safety devices, and other precautions should be defined in a health and safety plan.
- Workers not directly associated with power transmission and distribution activities who are operating around power lines or power substations should adhere to local legislation, standards, and guidelines relating to minimum approach distances for excavations, tools, vehicles, pruning, and other activities;

Working at height

- Testing structures for integrity prior to undertaking work;
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others;
- Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity). The fall protection system should be appropriate for the tower structure and necessary movements, including ascent, descent, and moving from point to point.
- Installation of fixtures on tower components to facilitate the use of fall protection systems.
- Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be compatible with the tower components to which they are attached.
- Hoisting equipment should be properly rated and maintained and hoist operators properly trained.
- Safety belts should be of not less than 16 millimetres (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibres become evident.
- When operating power tools at height, workers should use a second (backup) safety strap.
- Signs and other obstructions should be removed from poles or structures prior to undertaking work.
- An approved tool bag should be used for raising or lowering tools or materials to workers on structures.

Electric and magnetic fields	<ul style="list-style-type: none"> • No drunk worker should be allowed on site to reduce risk falling from height and ensuring proper communication on site. • Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities. <ul style="list-style-type: none"> ✓ Training of workers in the identification of occupational EMF levels and hazards; ✓ Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers.
Exposure chemicals	<ul style="list-style-type: none"> • Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE). Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g. 50 percent). Action plans to address occupational exposure may include limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, or the use of shielding materials. • Replacement of the hazardous substance with a less hazardous substitute. • Implementation of engineering and administrative control measures to avoid or minimize the release of hazardous substances into the work environment keeping the level of exposure below internationally established or recognized limits. • Keeping the number of employees exposed, or likely to become exposed, to a minimum. • Communicating chemical hazards to workers through labelling and marking according to national and internationally recognized requirements and standards, including the International Chemical Safety Cards (ICSC), Materials Safety Data Sheets (MSDS), or equivalent. Any means of written communication should be in an easily understood language and be readily available to exposed workers and first-aid personnel. • Training workers in the use of the available information (such as MSDSs), safe work practices, and appropriate use of PPE.
Risk of occupational accidents and diseases/physical hazards	<ul style="list-style-type: none"> • Set up a health and safety committee and periodic site inspections, training and annual safety audits; • Provide appropriate PPEs to workers and visitors to the proposed route; • Adhere to the provisions of the occupational Health and Safety Act of 2007; • Have a qualified EHS Officer; first aider/ medic on site.
Incidents, accidents and dangerous occurrences	<ul style="list-style-type: none"> • Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction and operation is as per prescribed forms obtainable from the local Occupational Safety and Health Office are in place.
Ergonomics, Repetitive Motion, Manual Handling	<ul style="list-style-type: none"> • Use of mechanical assists to eliminate or reduce exertions required to lift materials, hold tools and work objects, and requiring multi-person lifts if weights exceed thresholds · • Selecting and designing tools that reduce force requirements and holding times, and improve postures · • Providing user adjustable workstations · • Incorporating rest and stretch breaks into work processes, and conducting job rotation · • Implementing quality control and maintenance programs that reduce unnecessary forces and exertions.

- Taking into consideration additional special conditions such as left-handed persons

7.4.2.15 Community health and safety impacts.

Impact Analysis

Community health and safety issues will emerge during construction of the transmission line and associated facilities. The impacts will include dust, noise, and vibration from construction vehicle movements and communicable diseases associated with the influx of temporary construction labour work force. The key impact receptors will be Kimuka trading centre. Additionally, risk of falls of animals and human beings into open excavation pits, community unwanted access to active sites and security of equipment. Mitigation measures will however be put in place to prevent further direct, indirect, or cumulative adverse effects. The impact scale is moderate hence a value of **2**.

Impact Mitigation

The following should be undertaken:

- Proponent to engage local persons as Community Liaison Officers (CLOs) to work with the contractor on local engagements. They act as the focal point for communications between the local population and the project management team.
- Proponent to establish an effective grievance redress mechanism for community members as early as possible in the project development for reporting complaints and grievances.
- Electrocutation:
 - Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding substations.
 - Sensitization / public outreach on community health and safety awareness to prevent public contact with potentially dangerous equipment along RoW;
 - Grounding conducting objects (e.g. fences or other metallic structures) installed near power lines, to prevent shock.
- Electromagnetic Fields (EMF):
 - Ensure the recommended wayleave of 40m (20m on both sides of the centreline) is observed for the proposed 220kV transmission line. The EMF decays very rapidly with distance from source and there should be no potential health risks for people living outside the 60 m wide wayleave corridor.
- Noise (Buzzing)
 - The recommended wayleave of 40m (20m on both sides of the centerline) to be observed for the proposed 220kV transmission line.
 - The buzzing noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the 40 m wide wayleave corridor.
- On Traffic / Access roads safety
 - Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.
 - Develop a robust transport management plan.
 - Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present.
 - Using locally sourced materials, whenever possible, to minimize transport distances.
 - Locating workers campsites close to project sites and arranging bus transport to minimize on external traffic.
 - Emphasizing safety aspects among drivers
 - Improving driving skills and requiring licensing of drivers
 - Adopting limits for trip duration and arranging driver rosters to avoid overtiredness.
 - Avoiding dangerous routes and times of day to reduce the risk of accidents.
 - Use of speed control devices (governors) on trucks, and remote monitoring of driver actions.

7.5 Operational phase Environmental Impacts

Some of the impacts both positive and negative that may be because of the proposed project during the operation stage will include.

7.5.1 Positive Impacts

7.5.1.1 Reduction in Greenhouse Gas emission

Impact Analysis

The national grid for Kenya is over 90% green and by reinforcing the Nairobi transmission ring will enhance the stability of green energy available to the Nairobi Metropolis hence reducing the reliance of carbon-based thermal generators especially for industrial use. This will considerably reduce the amount of CO₂ atmospheric emissions.

By provision of reliable electricity, the project will contribute towards reduction in the generation of greenhouse gasses from diesel powered generators and fossil fuels that are currently in use in parts of in Nairobi Metropolis especially in the industrial sector. The project will further reduce dependence on fuelwood by providing an alternative lighting and cooking source of energy. The reduced reliance on fuelwood would in turn result to more sustainable forests due to reduced logging for wood hence more carbon sink.

The 400/220kV Kimuka substation get its source of power from a mix of green energy, namely the geothermal generation in Olkaria, the Lake Turkana Wind Power project and the imported HEP power from Ethiopia. The connection to the proposed substation shall be via the Suswa 500kV HVDC. This impact is very high hence rated as 4.

Impact Enhancement

KETRACO shall ensure timely implementation of the project so as to enable the country and the region reap from its implementation through reduced CO₂ emission on a business-as-usual scenario.

7.5.1.2 Negative environmental impacts of operation.

At the operation phase of the project many negative environmental impacts will arise. Such impacts include alteration of habitat, noise pollution, avian and bats collision impact etc. All these impacts will subsequently be eliminated when the project is decommissioned. This impact is moderate hence a rating of 2.

7.5.2 Negative Impacts

7.5.2.1 Noise (buzzing) pollution

Impact Analysis

Noise in the form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona. Ozone (O₃), a colorless gas with a pungent odor, may also be produced, however the ozone in a relatively short time, turns back into oxygen (O₂). Research shows neither the noise nor ozone produced by power distribution lines or transformers carries any known health risks. The acoustic noise produced by transmission lines is greater with high voltage power lines and reaches its maximum during periods of precipitation, including rain, as the result of fog.

Notably, there aren't significant human receptors to this impact since residences are far from the line and substation.

The buzzing noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the allocated public right of way. The buzzing noise pollution is expected to be very minimal hence a value of 1.

Impact Mitigation

This should be mitigated as follows:

- Ensure the recommended wayleave of 60m (300m on both sides of the centerline) is observed throughout the proposed 400kV transmission line.

- Ensure no households encroach within the project 60m RoW. The corona noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the 60 m wide wayleave corridor.

7.5.2.2 Risk of Fires

Impact Analysis

Uncontrolled burning of wastes during operations may cause risk of fire, especially during the dry season as the surrounding area is characterized by bushes, trees, and grass within the area.

During operations, high voltage power may also cause a fire risk in the event of electrical faults with equipment. If underlying vegetation growth is left unchecked, or slash from routine maintenance is left to accumulate within right-of-way (RoW) boundaries, enough fuel can accumulate that may promote bush / woodlots fires. Uncontrolled burning of wastes / bush clearing by farmers near the proposed transmission route could also cause risk of fire, especially during the dry season as the surrounding area is characterized by bushes, shrubs, and grass. Also, if underlying growth is left unchecked, or slash from routine maintenance is left to accumulate within right of way boundaries, sufficient fuel can accumulate and as such promote bush fires. This impact will be high hence a value of 2.

Impact Mitigation

The following should be undertaken:

- Conduct a fire risk assessment for project at hand especially in areas with fire receptors such as area with canopies with a potential to touch the conductors.
- Conduct regular training and fire drills for the operation and maintenance employees both at the line and substation.
- Removing blow down and other high-hazard fuel accumulations.
- Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access.
- Periodic maintenance to ensure that, there are - no overloaded electrical systems; no incorrectly installed wiring; no live naked wires; and fuel store areas are continuously monitored.
- Build capacity for community on fire related issues including fighting and vigilance.
- Ensure compliance with fire safety rules under OSHA 2007 at the substations.

7.5.2.3 Avian (Birds) Collisions and Electrocutions

Impact Analysis

The transmission infrastructure is a risk to birdlife as much as it does exist within a migratory corridor or an Important Bird Area (IBA). The fact that the area is characterised by thickets and bushes it could a habitat for a few bird species. The impact on birds may be through:

- Risk of electrocution - electrocutions occur at poles when a bird completes a circuit by touching two energized parts or an energized and grounded part.
- Risk of collision - Power line collisions occur when birds fly into wires/cables.

The combination of the height of the transmission towers and transmission wires can pose potentially fatal risks to birds (including raptors) through collision and electrocutions. Birds may be electrocuted by power lines in one of three ways:

- Simultaneously touching an energized wire and a neutral wire.
- Simultaneously touching two live wires; and
- Simultaneously touching an energized wire and any other piece of equipment on a tower that is bonded to earth through a ground wire.

This impact will be very low since the birds sighted are lesser birds with short wingspan hence the rating is 1.

Impact Mitigation

The following should be undertaken:

- Working with line agencies such as NMK, KWS for frequent monitoring of the short line to determine possibility avian risk.

7.5.2.4 Cumulative Impacts

Impact Analysis

Clearing of vegetation and trees along the RoW and the substation site could impact on climate change in the long time due to reduced carbon sequestration. The loss of vegetation could also indirectly affect vegetation remaining adjacent to the project by altering the natural continuum. These impacts on resources such as habitat alteration within the region might arise due to the needs for the periodic clearing of the public right of way as part of the maintenance works. The clearing of natural vegetation is occurring at an increasing rate because of human population growth and developments such as the proposed transmission line and associated substations. The clearing of vegetation to pave way for the maintenance works may result in a decrease in biodiversity and suitable habitat for fauna. However, mitigation measures have been recommended hence this impact will be minimal - a value of 1.

Impact Mitigation

Specific actions that may be needed to effectively manage cumulative impacts include the following:

- Make deliberate efforts to reduce or prevent emission of greenhouse gases throughout the project that can cumulatively exacerbate climate change impacts. This can be attained by adopting new technologies and renewable energies including use of low and zero carbon emitting project machinery, vehicles and equipment.
- Ensure the project route is retained as it or any designs alterations avoids towns and market centres.
- Ensure construction including RoW clearing and maintenance works are scheduled to avoid rainy seasons.
- KETRACO to ensure regional mitigation or offset management engagement strategies such as regional liaising with other government line agencies including KFS, Kajiado County Government and local community to participate in tree replanting program activities (plant in alternative public places such as schools, water towers in Kenya, promotion of livelihood restoration activities such as agroforestry to PAP)
- Adaptive management approaches to project mitigation including: using existing utility transport corridors for transmission and distribution as much as possible to reduce on habitat alteration; undertaking selective clearance by removing tall woody species leaving saplings, for quick regeneration of vegetation along the wayleave; installing transmission lines above existing vegetation to avoid land clearing; re-vegetation of disturbed areas with native plant species; reduce proliferation of the invasive species through active periodic way leave management.
- Ensure adequate project impacts monitoring to assess efficacy of management efforts.

7.6 Operational phase socio-economic impacts

7.6.1 Positive Impacts

7.6.1.1 Creation of employment opportunities

Both direct and indirect employment opportunities will emerge during the operation phase. For the direct employment, people will be employed for the normal and continuous transmission line and substation maintenance whereas for the indirect employment, locals will benefit from improved and increased business activities including increased investments along the proposed project area. The impact scale in this stage is low hence a value of 1.

7.6.1.2 Gain to the county and national economy through power distribution

The proposed project development objectives are aimed to increase the capacity / adequacy of the transmission system and access to electricity in the country. This is expected to lead to gain to the national economy from revenue generation. The proposed project will largely aim to support grid densification and intensification and some grid expansion to reach various households and promote industrial energy stability especially in the Nairobi Metropolis. With improved power distribution, it is expected that there will be improved livelihood likely to benefit the local and regional economy in the short term and the national economy in the long term. This will boost industrialization, education, and manufacturing sectors. This impact is very high and therefore has rating of 4.

7.6.1.3 Health benefits of the project

There is a considerable reliance in Nairobi Metropolis on wood fuel and its derivatives for their energy needs both lighting and cooking especially in the peri-urban areas. In addition, a significant number relies on paraffin lanterns as their main source of lighting. This poses health problems as reported by WB in 2008 on the Welfare of Rural Electrification. The report notes that kerosene lamps emit particles that cause air pollution as measured by the concentration of the smallest particles per cubic meter (PM₁₀). Burning a litre of kerosene emits PM₅₁ micrograms per hour, which is above the World Health Organization (WHO) 24-hour mean standard of PM₁₀ of 50 micrograms per cubic meter. These particles do not disperse, so burning a lamp for four hours can result in concentrations several times the WHO standard. The health risks posed by this indoor air pollution mainly include acute lower respiratory infections, but also low birth weight, infant mortality, and pulmonary tuberculosis. Additionally, available data suggests that insufficient illumination (low light) conditions can cause some degree of eye strain, and reading in these conditions over long periods of time may have the potential to increase the development of near-sightedness (myopia) in children and adults. Further, according to the World Health Organization, household air pollution from cooking with traditional fuels contributes to more than four million premature deaths every year. Mainly women and young girls are affected, who do the cooking and fuel gathering. This project will result in many families replacing kerosene lamps for lighting with electricity thereby reducing disease burden at the family level and on the government. This impact is high hence rated **3**.

7.6.1.4 Increased access and distribution of electricity

The increase in the capacity of the transmission system will increase access and distribution of electricity at the homesteads, institutional level and industrial within the Nairobi Metropolis. Improved energy will lead to improved health, and as well as large-scale and small-scale economic activities which in the long run will lead to development. This impact is regarded high hence rated **3**.

7.6.2 Negative Impacts

7.6.2.1 Occupational safety and health

Impact Analysis

The occupational health and safety hazards specific to the operation phase of the proposed electric power transmission and distribution project primarily include live power lines; working at elevated heights; Electric and Magnetic Fields (EMF) and exposure to chemicals such as oils. Maintenance workers may be exposed to occupational hazards from contact with live power lines during operation and maintenance schedules. Workers may also be exposed to occupational hazards when working at high elevations during repairs and maintenance of the towers. Electric utility workers typically have a higher exposure to EMF than the public due to working in proximity to electric power lines.

Occupational safety and health issues include:

Live Power Lines: workers may be exposed to occupational hazards from contact with live power lines during construction, maintenance, and operation activities.

Working at height on poles and structures: Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities.

Electric and Magnetic Fields (EMFs): Electric utility workers typically have a higher exposure to EMF than the public due to working in proximity to electric power lines. Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program. Studies on High Voltage electric overhead lines have not come up with any conclusive evidence of impacts on human health because of EMF.

Ergonomics, Repetitive Motion and Manual Handling: Injuries due to ergonomic factors, such as repetitive motion, overexertion, and manual handling, take prolonged and repeated exposures to develop, and typically require periods of weeks to months for recovery. These OHS problems should be minimized or eliminated to maintain a productive workplace.

Exposure to chemicals: Occupational exposures to chemicals in this sector primarily include exposure to PCB in transformers and other electrical components.

Other physical hazards include exposure to weather elements, contact with overhead power lines, falls from machinery or structures, and risk of falling objects. This impact will however be low hence a value of **2**.

Impact Mitigation

These impacts shall be mitigated as provides in section 7.4.3.14.

7.6.2.2 Community Health and Safety

Impact Analysis

The operation of live power distribution lines and substations may generate the following industry-specific impacts:

Electrocution: Hazards most directly related to power transmission and distribution lines and facilities occur because of electrocution from direct contact with high-voltage electricity or from contact with tools, vehicles, ladders, or other devices that are in contact with high-voltage electricity.

Electromagnetic Interference: The corona of overhead transmission line conductors and high frequency currents of overhead transmission lines may result in the creation of radio noise. Typically, transmission line rights-of way and conductor bundles are created to ensure radio reception at the outside limits remains normal. However, periods of rain, sleet or freezing rain sharply increases the streaming corona on conductors and may affect radio reception in residential areas near transmission lines.

Visual Amenity: Power transmission and distribution are necessary to transport energy from power facilities to residential communities but may be visually intrusive and undesirable to residents.

Noise (Buzzing) and Ozone: Noise in the form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona. Ozone (O₃), a colourless gas with a pungent odour, may also be produced, however the ozone (O₃), in a relatively short time, turns back into oxygen (O₂). Research shows neither the noise nor ozone produced by power distribution lines or transformers carries any known health risks. The acoustic noise produced by transmission infrastructure is greater with high voltage power lines (400-800 kV) and even greater with ultra-high voltage lines (1000 kV and higher). However, the proposed infrastructure has 400/220kV capacity hence the acoustic noise is expected to be very minimal. Further noise from transmission lines reaches its maximum during periods of precipitation, including rain, or as the result of fog. Nonetheless, the sound of rain typically masks the increase in noise produced by the transmission lines, but during other forms of precipitation such as fog the noise from overhead power lines can be troubling to nearby residents. However, with the allocated wayleave -the buzzing noise is expected to be very minimal.

The impact will be very minimal hence a rating of **1**.

Impact Mitigation

These impacts shall be mitigated as provides in Section 7.3.2.13.

7.6.2.3 Spread of STD, HIV and AIDS

Impact Analysis

There is likely to be an upsurge of sexually transmitted diseases including HIV and AIDS especially during maintenance works for RoW as migrant workers get attracted to prostitution. The project proponent will need to work jointly with appropriate county and national government health agencies to mitigate STD, HIV and AIDS during the operational phases of the project. This impact will be moderate hence a value of **2**.

Impact Mitigation

These impacts shall be mitigated as provides in Section 7.4.2.3.

7.6.2.4 **Perceived Danger of Electrostatic and Magnetic force**

Impact Analysis

Electric substations 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 substation to the receptor. Many studies published during the last decade on occupational exposure to Electro-Magnetic Fields (EMF) have exhibited several 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 the substation and away from the LILO public right of way.

Impact Mitigation

- Key measure is routing and siting the infrastructure to avoid residential properties or other locations intended for highly frequent human occupancy, (e.g. schools or offices). This has been done in the planning phase of the project. Additionally, the design will ensure that shielding of metal alloys is done, transmission towers are high, and ensure standard size and spacing of conductors.
- Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure.

7.7 **Decommissioning phase environmental impacts**

7.7.1 **Positive Environmental Impacts**

7.7.1.1 **Rehabilitation and restoration of the site to its original status**

During the decommissioning of the project the area will be rehabilitated to its original status by re-vegetating areas where vegetation is cleared, making sure that all towers are removed.

7.7.1.2 **Reduced negative environmental impacts of operation.**

At the operation phase of the project many negative environmental impacts will arise. Such impacts include alteration of habitat, noise pollution, avian and bats collision impact etc. All these impacts will subsequently be eliminated when the project is decommissioned.

7.7.2 **Negative Environmental Impacts**

7.7.2.1 **Excessive noise and vibration**

There will be noise and vibration from vehicles and machines that will be used during the decommissioning phase.

This impact will be mitigated as provided in section 7.3.2.13.

7.7.2.2 **Air Pollution due to dust emission**

Dust will be emitted by moving vehicles and from the decommissioning works through movement of machinery.

This impact will be mitigated as provided in section 7.3.2.6.

7.7.2.3 **Increased solid waste generation.**

A lot of solid waste such as steel and vegetation clearance and among other wastes will be generated during decommissioning of the project.

This impact will be mitigated as provided in section 7.3.2.11.

7.8 Decommissioning phase social impacts

7.8.1 Positive Social Impacts

7.8.1.1 Employment opportunities

In the event of decommissioning locals will gain employment from the various jobs that will arise.

7.8.1.2 Improvement of local business opportunities

The transmission line and substation decommissioning will lead to the growth small-scale businesspeople such as food vendors, kiosk owners.

7.8.2 Negative Social impacts

7.8.2.1 Reduced/ loss of positive impacts to the project.

Impact Analysis

During decommissioning people will lose employment.

Impact Mitigation

To mitigate this impact, it will be prudent for the government through KETRACO to provide an alternative transmission infrastructure for purpose of redundancy and constant power supply.

7.8.2.2 Spread of STD, HIV and AIDS

Impact Analysis

There is likely to be an upsurge of sexually transmitted diseases including HIV and AIDS as migrant workers indulge in prostitution.

Impact Mitigation

This impact will be mitigated as provided in section 7.4.2.3.

7.8.2.3 Fire Outbreaks

Impact Assessment

Fire due to electrical faults and flammable substance in the substation is a possible effect of the proposed project. Fires started outside the substation may also spread into the substation.

Impact Mitigation

- Undertake fire risk assessment and implement the mitigation measures thereof.

7.8.2.4 Incidences of Electrocution

Impact Analysis

Since the proposed project will be dealing with electricity, workers and other people who gain access to the substation risk being electrocuted or receiving electric shocks.

Impact Mitigation

- Undertake electrical risk assessment and implement the mitigation measures thereof.

7.9 Potential risks to the project

7.9.1 Risks and impacts of climate change

The proposed transmission infrastructure is expected to significantly cut on emission of greenhouse gases which result to climate change. However, like any development project, climate change may pose a risk and impact to the proposed project during construction. Climate change may impact on electric power infrastructure such as power generation technologies, transmission lines, and substations, and building loads. Climate change impact

during construction period may affect infrastructure systems by changing the weather conditions in the project area. For instance, increased precipitation may delay construction work due to; interference with work schedules due to prolonged rains, degradation of roads affecting transportation of construction materials amongst other impacts.

During the operational stage, climate change may affect the project electric service reliability. Severe weather changes such as increased precipitation may result into a sequence of faults in the delivery network, causing interruptions in power transmission. Extreme storms may also result into flooding which could damage the physical hardware of above and below ground such as proposed project substations and transmission pylons / towers if that hardware is not sufficiently shielded. Flooding can erode or short the hardware in substations and ground connection lines at the substations. High winds associated with storms may cause physical damage as winds make trees fall on transmission lines and pylons. Severe storms can also blow trees, and other foreign materials, into power lines and cause outages.

The power transmission infrastructure can be affected by climate change due to higher temperatures increasing risks of wildfires that can render power lines inoperable due to ionized air. Additionally, higher temperatures can result in reduced capacity for power lines to safely carry electricity by reducing their thermal rating (i.e. the maximum current allowed at a given temperature) and causing lines to sag to dangerous levels - reducing their clearance from land – to the general public. Sagging may also result in contact with trees and other structures, which could result in electrocution or fires. Moreover, transmission lines can sag to the point that they permanently deform. Alternatively, if protection devices are not properly insulated, high temperatures may cause power components to degrade or wear out.

Further, if the water levels in the natural hydropower sources are too low (e.g., low river flow during droughts), then production capacity and efficiency of the proposed power transmission project could be reduced. The power transformers expected to be installed in the proposed project substations may also be vulnerable to increase in temperature, as the air-cooling circulation systems become inefficient.

These impacts are compounded by increasing electricity demand during heat episodes, for example due to air conditioning.

7.9.2 Community issues in pursuit for employment opportunities

The local community members, owing to the location of the project in Maasai region regarded to be marginalised and vulnerable, will want to benefit from the proposed transmission infrastructure project through employment opportunities. Wherever they will feel not to have been adequately provided for in terms of employment, strikes may arise. During such strikes the construction progress may be interfered with where access roads and construction sites are blocked.

7.9.3 Theft and Vandalism

Theft and property destruction are a problem that can affect productivity and drain profits during construction and operational stages of the project. Firms engaging in all types of projects are susceptible to theft and vandalism from outsiders and employees who can easily retrieve materials from construction sites without being noticed by anyone due to lack of security measures.

7.9.4 Terrorism

Terrorism is a growing threat all over the globe, with a target on critical installations. The likelihood of terror attacks due to the location of the project are however minimal, nonetheless this being a key government project, security measures will be put in place to ensure safety of the workers.

7.9.5 Encroachment and Speculation

Due to the growing urbanization and with the location of the infrastructure being at a peri-urban set whose population seems increasing by day limiting available land for housing. This presents a risk to the project's RoW in the future of being encroached by informal settlements.

7.9.6 Political interference

The transmission line is within the Maasai community that is perceived to be marginalized and vulnerable regardless of the ongoing acculturation within the project area. Such factors may result in socio-political disputes as political leaders try to portray their influences and authority in the region hence a risk for the proposed project.

7.9.7 High expectations for social investment projects

The locals expressed high expectation for social investment projects during the stakeholder engagement and public consultation exercise. Some of the expectations varied in sectors such as education, health, security, social services, power supply, water, and agriculture. Notably most of the expectation require establishment of infrastructures hence falling short of the proponent legal mandate. The dwindling economy following the COVID-19 pandemic has also resulted into constraints that may end up exacerbating community expectations on the project including jobs, compensation monies, and expectation of high salaries.

8 CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Introduction

The proponent of the proposed project acknowledges the fact that the proposed project activities will have some impacts on the biophysical, socio – economic environment and health and safety of its employees and members of the public and socio-economic wellbeing of the residents. Thus, the focus will be on reducing the negative impacts and maximizing the positive impacts associated with the project activities through a programme of continuous improvement.

An Environmental and Social Management/Monitoring Plan has been developed to assist the proponent in mitigating and managing environmental impacts associated with the life cycle of the project. The ESMP has been developed to provide a basis for an Environmental Management System (EMS; ISO 14001 principles) for the project. It is noteworthy that key factors and processes may change through the life of the project and considerable provisions have been made for dynamism and flexibility of the ESMP. As such, the ESMP will be subject to a regular regime of periodic review.

Tables 9.1 to 9.3 form the core of this ESMP for the construction, operational and decommissioning phases of the proposed project respectively. In general, the tables outline the potential safety, health, social and environmental risks associated with the project and detail the corresponding mitigation measures, their financial costs, as well as responsibility for their implementation and monitoring. The ESMP will be used as checklist in future environmental audits.

8.2 Construction Phase Environmental Management Plan

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase the proposed project are outlined in Table 13.

Table 14: Environmental Management Plan during the construction phase of the proposed Kimuka 400/220kV substation

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Noise and vibration	Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or idle machinery.	Contractor	Entire period construction	Nil
	Sensitise construction drivers to avoid running of vehicle engines or hooting	Contractor	Entire period construction	Nil
	Regular servicing of engines and machine parts to reduce noise generation	Contractor	Entire period construction	100,000
	Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures (containers) to minimize ambient noise levels.	Contractor	Entire period construction	Design cost
	Trees to be planted around the site to provide some buffer against noise propagation	Contractor	Entire period construction	10,000
	The noisy construction works will entirely be planned to be during daytime when most of the neighbours will be at work.	Contractor	Entire period construction	Nil
	Provide necessary PPE to workers who may be exposed to high levels of noise and ensure proper and constant use	Contractor	Entire period construction	Ear plugs and earmuff @500 each
	All construction equipment and machinery to be used must be tested to verify if they are compliant with Kenya and the internationally acceptable standards of noise.	Contractor	Entire period construction	Nil
Dust emission	Ensure strict enforcement of on-site speed limit guidelines	Contractor	Entire period construction	Nil
	Minimize excavation works in extremely dry weather	Contractor	Entire period construction	Nil
	Sprinkle water on graded access routes when necessary to reduce dust generation by construction and vehicles	Contractor	Entire period construction	10,000
	Stockpiles of earth should be enclosed / covered / watered during dry or windy conditions to reduce dust emissions	Contractor	Entire period construction	Nil
	PPE to be provided to employees and ensure proper and constant use	Contractor	Entire period construction	Dust coats and dustmasks@3000 per employee
Exhaust emission	Sensitise truck drivers and machine operators to switch off engines when not in use	Contractor	Entire period construction	Nil
	Regular servicing of engines and machine parts to reduce exhaust emission generation	Contractor	Entire period construction	Nil
	Alternative non-fuel construction equipment shall be used where feasible	Contractor	Entire period construction	Nil
Increased solid waste generation	Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle	Contractor	Entire period construction	Nil

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Accurate estimation of the dimensions and quantities of materials required.	Contractor	Entire period construction	Nil
	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time	Contractor	Entire period construction	Nil
	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage	Contractor	Entire period construction	Design cost
	Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste	Contractor	Entire period construction	Nil
	Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site	Contractor	Entire period construction	Nil
	Waste collection bins to be provided at designated points on site	Contractor	Entire period construction	10,000
	Dispose waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.	Contractor	Entire period construction	10,000/month
Generation of wastewater	Provide means for handling sewage generated at the construction site	Contractor	One-off	30,000
	Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	Contractor	Entire period construction	Nil
	Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated	Contractor	Entire period construction	6,000 -quarterly
Oil spills Hazards	Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of vehicles.	Contractor	Entire period construction	Nil
	In case of an oil spill, immediate clean up measures will be instituted	Contractor		
	Storage and liquid impoundment areas for fuels, raw and in-process material solvents, wastes and finished products should be designed with secondary containment to prevent spills and the contamination of soil, ground and surface water	Contractor	One-off	10,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	A written substation response plan should be prepared and retained on the site and the workers should be trained to follow specific procedures in the event of a spill.	Contractor	One-off	Nil
	Collected used oils should be re-used, disposed of appropriately by licenced waste handlers, or be sold for reuse to licensed firms	Contractor	Entire period construction	5,000 per month
Destruction of existing vegetation and habitat	Avoid unnecessary vegetation clearing	Contractor	Entire period construction	Nil
	Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.	Contractor	Entire period construction	Nil
	Designate access routes and parking within the site.	Contractor	Entire period construction	50,000
	Design and implement an appropriate landscaping programme for the substation site.	Contractor	Entire period construction	20,000
	The contractor shall undertake a tree planting exercise at location(s) to be identified in consultation with KETRACO, the community and relevant authorities. The contractor shall plant trees worth KES 5,000,000 or at least 30,000 trees whichever is less. The cost shall be deemed to cover the entire exercise which shall involve the following: <ol style="list-style-type: none"> 1. Selection of trees species with highest survival rate and can grow with baseline environmental conditions at the selected planting locations. 2. Transportation of the seedlings to the selected planting locations. 3. Preparation of the land including but not limited to clearing the site of invasive species and preparing the hole. 4. Planting the seedlings at the onset of rainy seasons. 5. Protection and care of the planted tree for a period of 12 months. 	Contractor and KETRACO	Entire period construction	5,000,000

Potential Impacts	Negative	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Increased Demand	Water	Harness rainwater and storm-water whenever possible for use in dust suppression, gardening and other site specific uses	Contractor	Entire period construction	5,000
		Install water conserving taps that turn-off automatically when water is not being used	Contractor	One-off	40% more than price of ordinary taps
		Promote recycling and reuse of water as much as possible	Contractor	Entire period construction	Nil
		Promptly detect and repair water pipe and tank leaks	Contractor	Entire period construction	1,000 per month
		Sensitise construction workers to conserve water by avoiding unnecessary use.	Contractor	Entire period construction	Nil
		Ensure taps are not running when not in use	Contractor	Entire period construction	Nil
Increased consumption	energy	Ensure electrical equipment, appliances and lights are switched off when not being used	Contractor	Entire period construction	Nil
		Install energy saving bulbs/tubes at all lighting points instead of incandescent bulbs which consume higher electric energy	Contractor	One-off	5,000
		Plan well for transportation of materials to ensure that fossil fuels (diesel, transformer oil, petrol) are not consumed in excessive amounts	Contractor	Entire period construction	Nil
		Monitor energy use during construction and set targets for reduction of energy use.	Contractor	Entire period construction	Nil
Demand of Raw material		Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.	Contractor	Entire period construction	Nil
		Ensure that damage or loss of materials at the construction site is kept to a minimum through proper storage and use.	Contractor	Entire period construction	Nil
		Encourage material recycling	Contractor	Entire period construction	Nil
Impacts on workers' and community health and safety		Ensure strict compliance with the Occupational Safety and Health Act (OSHA) 2007	Contractor	Entire period construction	100,000
		Prohibit access by unauthorized personnel into the construction site	Contractor	Entire period construction	Nil
		Train all employees and regularly sensitize them on safe working procedures	Contractor and KETRACO	Entire period construction	100,000
		Periodic community sensitization on the dangers posed by the project	Contractor	Quarterly during the entire construction period	50,000
		Place warning signs where necessary	Contractor	Whenever necessary	10,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Provide necessary PPEs to workers	Contractor	Entire construction period	10,000
	Erect a perimeter fence to enclose the substation	Contractor	One-time off	Design cost
Soil erosion and storm-water runoff	A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.	Contractor	First quarter	10,000
	Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.	Contractor	Entire construction period	Nil
	Ensure that construction vehicles are restricted to use existing graded roads	Contractor	Entire construction period	Nil
	Ensure that any compacted areas are ripped to reduce run-off.	Contractor	Entire construction period	Nil
	Roof catchments will be used to collect the storm water for some substation uses	Contractor	Entire construction period	40,000
Fire safety	Conduct a fire risk assessment	KETRACO, and Contractor	Prior to construction	Nil
	Ensure compliance with fire safety regulations and install all necessary fire safety equipment	Contractor	Entire construction period	50,000
	Conduct regular trainings and fire drills for employees	Contractor	Entire construction period	10,000
	Periodic maintenance to ensure that, there are; - no overloaded electrical systems; no incorrectly installed wiring; no live naked wires; and fuel store areas are continuously monitored	Contractor	Entire construction period	Nil
	Create fire breaks (ploughed strips) on strategic areas of the 27 acre piece of SS land to prevent fire spreading to other adjacent pasture lands or from pasture lands to the substation.	KETRACO and Contractor	Entire construction period	50,000
	Build capacity for community on fire related issues including fighting and vigilance	KETRACO and community	Entire construction period	5,000 per session
Child labour and forced labour	The following should be undertaken to protect the rights of children and elimination child labour and forced labour: .	KETRACO and Contractor	Entire construction period	As per SEP budget
	No employment for anyone under the age of 18	KETRACO and Contractor	Entire construction period	As per SEP budget
	All persons seeking employment (contractor, subcontractor) should be required to provide a national identity card.	KETRACO and Contractor	Entire construction period	As per SEP budget

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	The client and contractor should not employ forced labour, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty.	KETRACO and Contractor	Entire construction period	As per SEP budget
	Implement a labour management plan promote fair and equitable labour practices.	KETRACO and Contractor	Entire construction period	As per SEP budget
	Implement the stakeholder's engagement plan (SEP) to ensure effective communication with host community on raising awareness to prevent child labour and forced labour, with particular attention given to domestic work and the worst forms of child labour during the COVID 19 pandemic including the project cycle	KETRACO and Contractor	Entire construction period	As per SEP budget
Risks on Vulnerable populations	Map vulnerable households and individuals such as orphans, PLWD, widows and elderly to ensure they have access to development benefits and opportunities.	KETRACO	Prior to construction	As per ARAP budget
	Apart from cash compensation, resettlement assistance to vulnerable people such as orphans, PLWD, widows and elderly to cushion them from projects impacts.	KETRACO	Prior to construction	As per ARAP budget
	Offer extra assistance during displacement / relocation of houses and structures. Procurement and delivery of construction material as well as supervision of construction; assisted mobility for elderly / PLWD while observing.	KETRACO	Prior to construction	As per ARAP budget
	Implement the Stakeholders Engagement Plan while ensuring adequate, meaningful, and continued consultation with vulnerable groups.	KETRACO	Prior to construction	As per ARAP budget
	Implement the Vulnerable Persons Plan to ensure that vulnerable persons are cushioned from the project impacts and have equal opportunities to participate in and benefit from the proposed project.	KETRACO	Prior to construction	As per ARAP budget
	Establish and implement targeted interventions / support for vulnerable groups during ARAP. Such could include protection support against sexual exploitation & abuse, placement assistance for PLWD to secure project jobs, Widows protection against hostile family members on account of eligibility for compensation.	KETRACO	Prior to construction	As per ARAP budget

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Establish and implement a GBV -SEA/SH action plan for the project to mitigate GBV as part of C-ESMP.	Contractor	Prior to construction	Nil
	KETRACO to liaise with relevant national and County Government agencies to register vulnerable persons in the National Safety Net programs for Vulnerable persons / Government support programs to cushion them from project impacts.	KETRACO	Prior to construction	As per ARAP budget
Community Expectations on CSR	KETRACO to establish deliberations / procedures on donation to local community of facilities used by the contractor, at the conclusion of the project. Such facilities could include campsite buildings, and boreholes.	KETRACO and Contractor	Entire construction period	As per SEP and ARAP budgets
	Implement the stakeholder's engagement plan (SEP) to ensure effective communication, community buy in and ownership of the project without lowering realistic expectations.	KETRACO	Entire construction period	As per SEP and ARAP budgets
	KETRACO to consider liaising with or bringing to attention the relevant Ministries and County departments on critical community needs. For instance, linking vulnerable populations at project locational levels for registration in local government support programs.	KETRACO	Prior to construction	As per SEP and ARAP budgets
	Adopt and implement a Grievances Redress Mechanism to receive and address grievances from host community.	KETRACO	Entire construction period	As per SEP and ARAP budgets
Sexual and Gender-Based Violence (GBV) Sexual Exploitation and Abuse (SEA) /Workplace Sexual Harassment (SH)	Ensure sensitization of the contractor, their sub-contractors, and consultants on GBV -SEA/SH issues including refraining from unacceptable conduct towards local community members.	KETRACO and contractor	Entire construction period	20,000
	Introduce a worker Code of Conduct as part of the employment contract, to be signed by all with physical presence on site as well as within the project area, and to include sanctions for non-compliance (e.g., termination).	KETRACO and contractor	One-off prior to construction	20,000
	Inform workers and local community about national laws such as the Sexual Offences Act. No 3 of 2006 that make GBV-SEA/SH a punishable offence which is prosecuted.	KETRACO and contractor	Entire construction period	20,000
	Ensure separate sanitation and hygiene facilities (toilets, utility rooms and changing rooms) for men	Contractor	One-off prior to construction	20,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	and women in the workers' camps / workplaces are provided.			
	Ensure mandatory trainings regarding GBV -SEA/SH to be provided to all project workers including temporary and casual workers.	Contractor	Entire construction period	20,000
	Undertake awareness meetings for the project affected communities on GBV-SEA/SH issues. Participants should be informed about the Code of Conduct, related national legislations and available GRM including available services/referral mechanism mechanisms for seeking help.	KETRACO and contractor	Entire construction period	20,000
	Contractor to develop and implemen GBV-SEA/SH Management Plan and Labour Influx Management Plan as per of C-ESMP	KETRACO and contractor	Entire construction period	20,000
	Adopt a policy to cooperate with law enforcement agencies in investigating complaints about GBV-SEA/SH should a survivor choose the legal redress. Survivors should be facilitated to understand that this may require them to commit to cooperate with the agencies.	KETRACO and contractor	Entire construction period	20,000
	Adopt and implement a grievance redress mechanism (GRM) to Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH).	KETRACO and contractor	Entire construction period	20,000
	Apply all Kenyan Constitutional / legal requirements on gender and sexual based violence throughout the project.	KETRACO and contractor	Entire construction period	20,000
Domestic Conflicts exacerbated by project	Implement the stakeholder's engagement plan (SEP) to ensure effective communication with the host community and PAPs where appropriate.	KETRACO	Prior to construction	Nil
	Adopt and implement a Grievances Redress Mechanism to receive and address domestic conflicts exacerbated by project.	KETRACO	Prior to construction	Nil
	• Resettlement and compensation to align to the RPF developed under this project.	KETRACO	Prior to construction	Nil
	• The project to slowly engage the elderly and social workers to guide and mediate case of domestic violence.	KETRACO	Prior to construction	Nil

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Encourage married couples to open a joint bank account to avoid mistrust	KETRACO	Prior to construction	Nil
Insecurity	Thoroughly screen workers, suppliers, and distributors.	KETRACO and contractor	Entire construction period	Nil
	Ensure 24-hour surveillance by engaging the Administration Police services during the day and night.	KETRACO and contractor	Entire construction period	100,000 per month
	Install CCTV cameras in strategic locations in workers' camps.	KETRACO and contractor	Entire construction period	100,000
	Implement the stakeholder's engagement plan (SEP) to ensure project ownership, and mitigate the risk of insecurity-theft, and vandalism.	KETRACO and contractor	Entire construction period	SEP budget
Land and property disputes exacerbated by the Project	Full and proper implementation of the ARAP for the proposed project.	KETRACO	Prior to construction	ARAP budget
	Where possible, avoid involuntary resettlement; and where avoidance is not possible, minimize impacts on people/households and livelihoods. Carry out timely (before project commencement), fair / just and adequate compensation as per the provisions in the RPF developed under this project. Implement internal and external monitoring in collaboration with PAPs and other stakeholders e.g. county, local leadership, local NGOs etc to ensure the RAP is implemented appropriately.	KETRACO	Prior to construction	ARAP budget
	Map vulnerable households and individuals in the project area and implement specific interventions as appropriate to ensure equal benefits sharing.	KETRACO	Prior to construction	ARAP budget
	Proponent to engage local persons as Wayleave Officers to work with the contractor, to ensure the project is implemented smoothly.	KETRACO	Prior to construction	ARAP budget
	KETRACO to engage affected persons as outlined in the Stakeholder Engagement Plan (SEP)	KETRACO	Prior to construction	ARAP budget
	Where there are land disputes and lack of land ownership documents, which might delay compensation of PAPs. KETRACO should deposit compensation monies on an interest earning escrow account until such cases are resolved.	KETRACO	Prior to construction	ARAP budget
	Ensure relocation and compensation is in accordance with provisions within RPF developed under this project.	KETRACO	Prior to construction	ARAP budget
	Stakeholder engagement as per SEP full information disclosure to PAPs as well as host communities where appropriate.	KETRACO	Prior to construction	ARAP budget
	Acquisition of land for contractor's camp and worker accommodation, will require a land use and	Contractor	Prior to construction	To be determined

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	restoration agreement between community and contractor			
	A project GRM including a Grievance Redress Committees. To be established and implemented, with various tiers of escalation including provision for legal redress; receipt and recording of grievances at locational level by Community Liaison Officers (CLOs), to address all emerging complaints and grievances from the PAPs and project area community.	KETRACO	Prior to construction	ARAP/SEP budget
Socio-Political Disputes exacerbated by the Project.	Ensure all stakeholders and the public are involved in the planning process and sensitized to understand that increase in the capacity of transmissions system will increase access and distribution of electricity at homesteads and institutional level within Kajiado county.	KETRACO	Entire construction period	Nil
	Obtain necessary permissions and approvals from the County Government.	KETRACO	Prior to construction	Part of Design Cost
	Ensure proper identification and compensation of all persons who will lose land.	KETRACO	Prior to construction	ARAP budget
	Ensure EIAs are conducted for specific project activities such as campsites, quarries, materials sites, campsites, boreholes etc.	KETRACO and contractor	Prior to construction	To be determined
	Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly.	KETRACO	Prior to construction	Part of project administrative budget
	Largely involve the community in the project through their leaders, take keen in timely addressing their grievances and ensure a good percentage of the local community members are employees in the project.	KETRACO	Prior to construction	Part of project administrative budget
	Engage Community Liaison Officers (CLOs) to support local engagements. They act as the focal point for communications between local population and the project management team.	KETRACO	Entire construction period	SEP budget
	Adopt and implement a GRM receive and address complaints from PAPs and host community.	KETRACO	Entire construction period	SEP and ARAP budget
	Implement the SEP to ensure all stakeholders and the public are involved during the project cycle	KETRACO	Entire construction period	SEP budget
Displacement of households; Land acquisition (wayleave) and resettlement conflicts	Resettlement and compensation of PAPs to align to the ARAP and ESS 5.	KETRACO	Prior to construction	As per ARAP
	Ensure displaced persons are informed of their full rights and entitlement to e.g. their right to compensation and compensation options, GRM.	KETRACO	Prior to construction	As per ARAP
	Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status including women household heads, minority groups, widows, and PWD,	KETRACO	Prior to construction	As per ARAP

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	and put measures in place to ensure they have equal access to project benefits and opportunities.			
	Provide opportunities to displaced communities and persons to derive development benefits from the project.	KETRACO	Prior to construction	As per ARAP
	Apply ARAP compensation procedures in a transparent and consistent way to all persons affected by the project.	KETRACO	Prior to construction	As per ARAP
	Provide compensation for structures at full replacement cost.	KETRACO	Prior to construction	As per ARAP
	Where possible, avoid involuntary resettlement; and where avoidance is not possible, minimize involuntary resettlement.	KETRACO	Prior to construction	As per ARAP
	Carry out timely-before project commencement, fair and adequate compensation as per Kenyan law, WB guidelines and provide assistance as appropriate, (allowances and livelihood restoration programs) to PAPs until such a time that their livelihoods and incomes are restored to pre-project levels or better.	KETRACO	Prior to construction	As per ARAP
	Implement internal monitoring to ensure the ARAP is implemented appropriately	KETRACO	Throughout the project	As per ARAP
	Loss of land and crops will be compensated; the amount of compensation to be paid for private and public land will be as per the Kajiado County land registry rates by National Land Commission (NLC). However, the rates must be in line with the RPF developed for the project.	KETRACO	Prior to construction	As per ARAP
	Surveys have been conducted to establish which properties (land and buildings) lie within the RoW for compensation of PAPs.	KETRACO	Prior to construction	As per ARAP
	The exact number of PAPs affected, and the types of properties affected should be determined for compensation.	KETRACO	Prior to construction	As per ARAP
Sexual Exploitation and Abuse (SEA)	Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP	Contractor	During construction	150,000
	Prevention of SEA: sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials.	KETRACO and Contractor		
	Response to SEA: including survivor-cantered coordinated multi- sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation, and disciplinary procedures at the project level.	KETRACO and Contractor		
	Management and Coordination: including integration of SEA in job descriptions, employments contracts,	KETRACO and Contractor	During construction	100,000

Potential Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.			
	Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights.	KETRACO and Contractor	During construction	SEP budget
Child labour and protection	Ensure no children are employed on site in accordance with National Labour Laws. The contractor should only employ persons aged 18yrs and above	Proponent/Contractor	During construction	Nil
	Adopt a Child Protection Code of Conduct	Proponent/Contractor	During construction	Nil
Spread of COVID-19 amongst construction workers	Develop SOPs for managing the spread of COVID-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization	Contractor	Prior to commencement	Nil
	Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including workers and visitors	Contractor	During construction	200,000
	Avoid concentrating of more than 15 persons or workers at one location. Where more than one person is gathered, maintain social distancing of at least 2 meters	Contractor	During construction	Nil
	Install hand washing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used;	Contractor	During construction	50,000
	Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, doorknobs, handrails etc.	Contractor	During construction	10,000 for sanitizers
	Electronic means of consulting stakeholders and holding meetings shall be encouraged whenever feasible. One on one engagements for the PAPs while observing social distance and adhering to PPE wearing shall be enforced	Contractor	During public consultations	20,000

8.3 Operational Phase ESMP for the 400/220kV Kimuka Substation and Lilo

Table 14: Environmental management Plan for the operation phase of the proposed 400/220kV Kimuka Substation

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Generation of exhaust emission	Vehicle idling time shall be minimised	KETRACO	Entire implementation time	Nil
	Regular servicing of engines and machine parts to reduce exhaust emission generation			
Solid waste generation	Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle	KETRACO	Continuous	Nil
	Provide solid waste handling facilities such as rubbish bags and skips	KETRACO	One-off	20,000
	Ensure that wastes generated at the substation are efficiently managed through recycling, reuse and proper disposal procedures.	KETRACO	Continuous	Nil
	A private licensed company to be contracted to collect and dispose solid waste on regular intervals	KETRACO	Continuous	30,000 /year
	Place in strategic places signs against littering and dumping of wastes	KETRACO	Continuous	5,000 /year
	Audits on waste generation and development of Waste Reduction Action Plans (WRAP)	KETRACO	Continuous	Nil
		KETRACO	Continuous/Annually	To be determined
Liquid waste generation	Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	KETRACO	Continuous	20,000 / annum
	Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated	KETRACO	Continuous/Annually	Nil
	Undertake Audits on liquid waste generation and development of liquid Waste Reduction Action Plans	KETRACO	Continuous/Annually	Nil
Release of sewage into the environment	Provide adequate and safe means of handling sewage generated at the substation	KETRACO	One-off	40,000
	Conduct regular inspections for sewage pipe blockages or damages and fix appropriately	KETRACO	Continuous	Nil
	Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated	KETRACO	Continuous/Annually	Nil
Oil spills Hazards	Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of vehicles	KETRACO	One-off	Nil

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	In case of an oil spill, immediate clean up measures will be instituted	KETRACO	As would be required	
	The substation should be designed with spill prevention and detection systems to protect the environment especially where the transformers will be located.	KETRACO	One-off	Part of construction cost
	Design appropriate protection devices against accidental discharge of transformer oil substances.	KETRACO	One-off	
	The substation design should provide adequate storage areas for the transformer oil	KETRACO	One-off	
	Drains should be routed through an oil/water separator	KETRACO	One-off	Part of construction cost
	Frequent inspection and maintenance of the transformers should be done to minimize spilling	KETRACO	Continuous	Nil
	A written substation response plan should be prepared and retained on the site and the workers should be trained to follow specific procedures in the event of a spill.	KETRACO	One-off	Nil
	The substation operator should ensure the proper containment or collection and disposal for the waste oil or used oil	KETRACO	Continuous	Nil
	All waste oils from maintenance of transformers and other associated equipment should be segregated and disposed properly by a reputable/registered waste handler in accordance with the waste disposal plan	KETRACO	Continuous	20,000/year
	Storage and liquid impoundment areas for fuels, raw and in-process material solvents, wastes and finished products should be designed with secondary containment to prevent spills and the contamination of soil, ground, and surface water	KETRACO	One-off	Project construction cost
Substation related avifauna mortalities	To minimize collisions, undertake wire marking to alert birds to the presence of power lines, allowing them time to avoid the collision	KETRACO	One-off	Part of construction cost
	Frequent monitoring in collaboration with KWS and NMK			
High water demand	Prompt detection and repair of water pipe and tank leaks	KETRACO	Continuous	30,000/year
	Substation workers to be sensitized on water conservation techniques.	KETRACO	Continuous	10,000/year
	Ensure taps are not running when not in use	KETRACO	Continuous	Nil

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Install water conserving taps that turn-off when water is not being used	KETRACO	One-off	30,000
	Install a discharge meter at water outlets to determine and monitor total water usage	KETRACO	One-off	10,000
	Harness rainwater and storm-water whenever possible for use in the substation	KETRACO	Continuous	Nil
	Create water conservation awareness	KETRACO	Continuous	10,000/year
High demand for energy	Switch off electrical equipment, appliances and lights when not being used	KETRACO	Continuous	Nil
	Install occupation sensing lighting at various locations such as storage areas which are not in use all the time	KETRACO	One-off	20,000
	Install energy saving fluorescent tubes at all lighting points within the substation instead of bulbs which consume higher electric energy	KETRACO	One-off	10,000
	Monitor energy use during the operation of the project and set targets for efficient energy use	KETRACO	Continuous	2,000/month
	Sensitise the substation workers to be energy efficient	KETRACO	Continuous	Nil
Impacts on workers' and community health and safety	Implement all necessary measures to ensure health and safety of the substation workers and the general public during operation of the proposed substation as stipulated in the Occupational Safety and Health Act, 2007	KETRACO	Continuous	5,000/month
	Ensure compliance with fire safety regulations and install all necessary fire safety equipment	KETRACO and Community	Continuous	Nil
	Conduct regular trainings and fire drills for employees	KETRACO	Continuous	20,000/year
	Periodic maintenance to ensure that, there are; - no overloaded electrical systems; no incorrectly installed wiring; no live naked wires; and fuel store areas are continuously monitored	KETRACO	Continuous	Nil
	Build capacity for community on fire related issues including fighting and vigilance	KETRACO	Annually	20,000 / annum
Electrocution from live power lines or electric equipment	Put in place a maintenance system to ensure physical integrity of substation equipment is maintained	KETRACO	Planning stage	Nil

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Deactivating and properly grounding live wires before repair works are performed	KETRACO	Continuous	Nil
	Ensure that live wire works is conducted by trained personnel	KETRACO	Continuous	Nil
	Access to the substation should only be by authorization and trained personnel.	KETRACO	Continuous	Nil
	Erect a perimeter fence to deny unauthorized people access the substation	KETRACO	During construction	Nil
	Clear warning signs to be placed on strategic places	KETRACO	Continuous	10,000/year
	Personnel should not approach an exposed energized or conductive part unless the personnel is ;-properly insulated from the energized part with gloves or other approved insulation; the energized part is properly insulated from the personnel and other conductive objects; the personnel is properly isolated and insulated from any other conductive object	KETRACO	Continuous	Nil
	Conduct periodic awareness and sensitization campaigns for the neighbouring communities	KETRACO	Annually	10,000/year
Perceived danger of Electrostatic and Magnetic force	Conduct education and awareness campaigns to dispel fear among community on the effects of electrostatic and magnetic forces	KETRACO	Continuous	20,000 / annum
10. Increase in social vices				
Increase in social vices including HIV/AIDS	Periodic sensitization forums for employees on ethics, morals; general good behaviour and the need for the project to co-exist with the neighbours	KETRACO	Continuous	30,000/year
	Guidance and counselling on HIV/AIDS and other STDs to employees	KETRACO	Continuous	Nil
	Provision of condoms to staff	KETRACO	Continuous	30,000/year
	Enforcement of KETRACO's policy on sexual harassment and abuse of office.	KETRACO	Continuous	Nil

8.4 Environmental Management Plan for the decommissioning phase of the proposed 220/220 kV substation

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Increase noise and vibration	Install portable barriers to shield compressors and other small stationary equipment where necessary.	KETRACO and Contractor	Throughout the decommissioning period	To be determined
	Demolish mainly during the day. The time that most of the neighbours are out working.	KETRACO and Contractor	Throughout the decommissioning period	Nil
	Provide appropriate PPE to workers	KETRACO and Contractor	Throughout the decommissioning period	1,000,000
	Co-ordinate with relevant agencies and neighbouring communities regarding all substation and TL demolition activities	KETRACO and Contractor	Throughout the decommissioning period	200,000
Generation of dust	Watering all active demolition areas as and when necessary to lay dust.	KETRACO and Contractor	Throughout the decommissioning period	200,000
	Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.	KETRACO and Contractor	Throughout the decommissioning period	100,000
	Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved areas, parking areas and staging areas at demolition sites.	KETRACO and Contractor	One-off	50,000
	Provide appropriate PPE to all workers	KETRACO and Contractor	Throughout the decommissioning period	Dust coats and dustmasks@3000 per employee
Generation of exhaust emission	Vehicle idling time shall be minimised	KETRACO and Contractor	Throughout the decommissioning period	Nil
	Regular servicing of engines and machine parts to reduce exhaust emission generation	KETRACO and Contractor	Throughout the decommissioning period	2,000,000
Demolition waste	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1.Source reduction 2.Reusing 3. Recycling 4.Incineration 5. Sanitary land filling.	KETRACO and Contractor	Throughout the decommissioning period	1,000,000
	All machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible or they be taken to a licensed waste disposal site	KETRACO and Contractor	One-off	1,000,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Dispose waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.	KETRACO and Contractor	Throughout the decommissioning period	1,000,000
Oil spills Hazards	Install oil trapping equipment in areas where there is a likelihood of oil spillage e.g. during maintenance of construction facility and vehicles.	KETRACO and Contractor	One-off	100,000
	In case of an oil spill, immediate clean up measures will be instituted	KETRACO and Contractor	As when required	Nil
	Close surveillance of the fuel and cooling oil store	KETRACO and Contractor	Throughout the decommissioning period	Nil
Health and Safety for workers' and community members	Ensure strict compliance with the Occupational Safety and Health Act (OSHA) 2007	KETRACO and Contractor	Throughout the decommissioning period	1,000,000
	Prohibit access by unauthorized personnel into the demolition site	KETRACO and Contractor	Throughout the decommissioning period	Nil
	Place warning signs where necessary	KETRACO and Contractor	Throughout the decommissioning period	100,000
Vegetation disturbance	Implement an appropriate re-vegetation programme to restore the site to its original status	KETRACO and Contractor	One-off	100,000
	Consider use of indigenous plant species in re-vegetation	KETRACO and Contractor	One-off	3,000,000
Community grievances	Quarterly Environmental Management Planning Monitoring will be done where views of the local community will be sort through public consultation meetings. The community will also be encouraged to forward their complaints through KETRACO Wayleave Assistant/Liaison Officer who is usually recruited from the local community	KETRACO	Quarterly	Part of administrative costs

Figure 19 Environmental Management Plan for the decommissioning phase of the proposed 400/220 kV substation

9 CHAPTER TEN: ENVIRONMENTAL MONITORING PLAN (EMoP)

Table 9-1: Environmental Monitoring Plan for the proposed 400/220kV Kimuka substation and LILO

Key Component / Activity	Parameters to be monitored	Points to be monitored	Frequency of monitoring	Lab Materials and Equipment/Other Requirements	Responsibility
Environmental Issues					
Water Quality	pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), heavy metals, oils and grease		Quarterly	Sampling bottles, cooler box, Access to a NEMA accredited laboratory	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Noise and Vibrations	Decibels (dBs)	Residential areas close to active sites	Monthly/ during the construction period	Noise & vibrations Meter	KETRACO Health and safety team / Contractor health and Safety team
Air Quality	TSP, NO _x , SO ₂ , CO, Dust particles, particulate matter etc.	On site, Residential areas close to active sites	Continuous, with quarterly air quality measurements	Air sampling equipment	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Solid Waste Generation	Slag, domestic refuse, metallic scraps, sludge, waste composition, treatment methods	On active sites	Monthly	Waste inventory	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Human Accidents	Total number of human accidents, categories of humans knocked, accident locations	On active sites, access road and the community	Continuous	Accident recording book, camera, field patrol vehicle, GPS device.	KETRACO Health and safety team / Contractor health and Safety team
HIV/AIDS Incidences	- Training programmes, number of incidences, number of condoms distributed, seminars, and participants trained etc. -COVID 19 prevention strategies in place during sensitization / training (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive.)	On site	Quarterly	Office Supplies	KETRACO Social Safeguards Team / Contractor Social Safeguards Team
Soil Erosion	Soils eroded, Turbidity in storm water and other water sources, sources and causes	RoW and within the Substation site	Continuous	Camera, field vehicle	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Storm Water Drainage	Rainfall volume, topography	On site	Continuous	Rain-gauge, field survey maps	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Environmental Risks	Fire outbreak, floods etc.	On site	Continuous during operation stage	Field inspections and information from lead agencies	KETRACO Environmental Safeguards Team

Terrestrial Habitat Alteration	Existence of vegetation Type and number of species	RoW and Substation site	Continuous	Field inspections and information from lead agencies	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Avian Bat/Bird collisions and electrocutions	-Number of bat/bird collisions and electrocutions - Presence of resident birds	RoW	Annually during operation	Field inspections and information from lead agencies	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Reforestation	- No. of PAPs compensated for lost trees. - No. of planted trees	RoW and community	Continuous	Field surveys and information from EHS Personnel	KETRACO environmental & social safeguards Team
Occupational Health and Safety Issues	- Evaluation against ICNIRP published occupational exposure limits guidelines to electric and magnetic fields. - Number of occupational diseases and accidents - Record(s) of occupational accidents and dangerous occurrences - Record(s) of occupational diseases	On site	Continuous	Field inspections and information from EHS Personnel	KETRACO Health & Safety Team and Contractor Health and Safety team
Community Health issues and spread of diseases	-Trend of infectious diseases for example: HIV/AIDS, STI's -Correlation between project team and local community -COVID 19 prevention strategies in place during sensitization / training (Hand washing facilities, physical distancing, use of masks, adherence to government restrictions as per GoK directive.)	RoW and community	Continuous	Field surveys and information from EHS Personnel	KETRACO Health & Safety Team
Social Issues					
Compensation and Livelihood restoration	To be implemented through RAP monitoring; Key aspects include. - Number and amounts of payments made to PAPs / Vulnerable Populations - Number of PAPs / Vulnerable Populations with restored assets disaggregated by type of structure. - Number of PAPS/ Vulnerable Populations with restored livelihood enterprises - Average income level by source - Number of people/groups/ Vulnerable Populations with improved livelihoods - Number of PAPs compensated, by type of PAP. - Number of PAPs promptly paid disaggregated by gender. - Number of PAPs not paid promptly and reasons. - Employment status and income earnings (average) - Number of re-established businesses, and average monthly income - Number of livelihoods specific training held by type, gender, and thematic areas covered. - Employment status and income earnings (average) - Number of beneficiaries disintegrated by gender on livelihood restoration programs (tree planting, Enterprise Based Livelihoods, A Local Buying Program, Micro Loans/Small Business Grants, Apiculture, Financial Literacy Training / Entrepreneurial training - Number of locals in employment: semi-skilled and unskilled jobs disintegrated by gender - Number of livelihoods specific training held by type, gender, and thematic areas covered.	Row	Continuous	Field surveys	KETRACO social safeguards Team
Training and Capacity Building	- Number of trainings held disaggregated by target group/institutions and issues amongst employed locals. - Number and type of participants disaggregated by gender. - Number of staff trained in implementation of the ESMP.	On site	Quarterly	Field surveys and information from EHS Personnel	KETRACO social safeguards Team

/	- COVID 19 prevention strategies in place during information disclosure (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive.)				
Transfer of Skills					
Grievance management	<ul style="list-style-type: none"> - Implementation of the GRM - Number & type of grievances received and recorded by CLOs in the grievances log. - Number & type of grievances resolved promptly (within the duration allowed in the grievance redress mechanism) and resolutions reached. - Number & type of grievances not resolved in time but completed - Number & type of outstanding grievances not resolved - Average timelines for resolution of grievances disaggregated by the various levels of grievance redress mechanism/institutions - Number of grievances referred to Level 3 (Courts of Law) - Number of complaints referred to KETRACO 	Row and Kimuka Town	Monthly	Field surveys; grievance log / acknowledgement form and information from EHS Personnel	KETRACO social safeguards Team / Contractor social safeguards team.
Gender Based Violence (GBV) Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH)	<ul style="list-style-type: none"> - implementation of a GBV Action Management Plan including COVID 19 risks - Number of training courses related to GBV – SEA/SH delivered; / GRM access amidst COVID 19 - Percentage of workers that have signed a Code of Conduct (CoC); and/or - Percentage of workers that have attended CoC training. - Implementation of labour influx management plan 	Camp sites, construction sites, Kimuka Town, RoW	Continuous	Field surveys; grievance log / acknowledgement form and information from EHS Personnel	KETRACO social safeguards Team / Contractor social safeguards team
Land and property disputes exacerbated by the project / lack of land documentation	<ul style="list-style-type: none"> - Established an interest earning escrow accounts. - No. of PAPs not compensated/with stalemates 	RoW	Continuous	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team
Vulnerable populations;	<ul style="list-style-type: none"> - Number of vulnerable PAPs especially orphans, PLWD, widows and elderly assisted by type and gender - Type of assistance provided to vulnerable PAPs especially orphans, PLWD, widows and elderly. - Number of vulnerable PAP especially orphans, PLWD, widows and elderly not assisted and reasons. - Number of meetings attended by vulnerable groups. - Number and types of vulnerable issues articulated. - Number of Vulnerable PAPs sensitized. - No. of vulnerable Household Heads affected by the project. - Type of vulnerability and limitations - The assistance offered to Vulnerable persons. 	RoW	Continuous	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team
Cultural Aspects / Impacts	<ul style="list-style-type: none"> - Appropriateness of modes used in consultation etc. - Assessing relevant cultural institutions engaged in Stakeholders Engagement Plan (SEP) 	RoW	Continuous	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team

	<ul style="list-style-type: none"> - Change in social-cultural setting of the permanently relocated PAPs triggered by RAP 				
Gender inequality;	<ul style="list-style-type: none"> - Implementation of a gender mainstreaming plan - Participation of women, men in project implementation, including the decision-making processes - Enhancement of the social and economic status of both women and men 	RoW	Continuous	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team
Stakeholder engagement and information disclosure;	<ul style="list-style-type: none"> - Implementation of the SEP - Disclosure of ESIA report on KETRACO and World Bank websites. - Availability of ESIA report at the county level. - Disclosure of ESIA report summary at in a culturally appropriate language, and in locations accessible to all. - Number of consultative meetings held, by type. - Stakeholders' awareness of ESIA and RAP entitlements - Number of County and National Government leaders engaged/briefed about the ESIA process. - Number of stakeholders consultative meetings held. - Type of information provided in meetings. - Type of issues raised at public consultation meetings, and response rate. - Number of participants attending public consultation meetings related to project disaggregated by gender. - Modes and language of communication. - Minutes of meetings held and lists of attendance. - Number of people seeking information on displacement and compensation - COVID 19 prevention strategies in place during information disclosure (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive.) 	RoW / Project area (Buffer zone of 1km)	Quarterly	Field surveys / information from EHS Personnel	KETRACO via social safeguards Team
CSR	<ul style="list-style-type: none"> - Number, type, amount spent on CSR initiatives per location. - Donations made to the community. - No. of vulnerable persons linked to government support programs. - COVID 19 prevention and mitigation strategies in place - Sustainability, transparency, and accountability of CSR initiatives 	Towns, community along the RoW	Monthly	Field surveys / information from CLO / PIC	KETRACO via social safeguards Team / Contractor safeguards team
Assets Acquisition	<p>To be monitored during ESMP and RAP implementation</p> <ul style="list-style-type: none"> - Amount (area) of private land acquired. - Amount (area) of government land acquired. - Number, type, and size of the private building acquired. - Number, type, and size of community buildings acquired. - Number, type, and size of cultural buildings acquired. - Number, type, and size of government buildings acquired. - Number and types of trees acquired 	RoW	Monthly	Field surveys / information from CLO	KETRACO via social safeguards Team
Local recruitment;/ creation of employment / Labour Influx	<ul style="list-style-type: none"> - Grievances lodged by type and number, illustrated with graphs. Open grievances by type and number - Disciplinary cases – type and number - Disciplinary action by type and number, including graphs. - Induction training numbers, queries, and comments - Pay slip queries -Type and number. - Food and accommodation complaints – Type and number - Issues raised by workers' committees and action taken. - Workforce numbers by local employees and immigrant workers (labour influx)- actual against planned - Industrial relations incidents – stoppages go slows, threats, damage to property, violence. 	RoW	Monthly	Field surveys / PIC	KETRACO Site Managers social safeguards Team / Contractor Site Managers, social safeguards team

	<ul style="list-style-type: none"> - Lost hours by category - Absenteeism, sick leave, and late arrivals - Issues raised by camp committees and action taken. - Workers Camp numbers by local and foreign workers – actual against planned 				
HIV/AIDs and other STDs;	<ul style="list-style-type: none"> - Number of HIV/AIDs and other STDs awareness trainings held disaggregated by target group/institutions / Gender and issues amongst stakeholders / workers / community. - The number of condoms distributed per gender. - Adequacy and accessibility in provision of condoms to workers both male and female - Levels and knowledge of condom use or other safer sex methods. - Knowledge and attitudes about HIV and STDs - Potential channels, methods, materials and messages for reaching target groups. - Factors that can facilitate or hinder intervention. - Cultural beliefs about sex, sexuality, sexual health and HIV/AIDs and STDs - Involvement of community stakeholders - Number of workers who have signed a code of conduct. 	RoW	Monthly	Field surveys / PIC	KETRACO Site Managers social safeguards Team / Contractor Site Managers , social safeguards team
Child labour and forced labour	<ul style="list-style-type: none"> - Number of workers employed and ID numbers. - implementation of Labour Management Plan - Implementation of local recruitment plan - Implementation of Grievances Redress Mechanism and recorded grievances on child and forced labour - stakeholder's engagement plan (SEP) – with awareness creation sessions on child and forced labour - Implementation of livelihood restoration plan - Implementation of Vulnerable Persons Plan 	Campsites / Worksites along RoW	Monthly	PIC	KETRACO Site Managers, social safeguards Team / Contractor Site Managers, social safeguards team
Community Expectation on the Project and CSR	<ul style="list-style-type: none"> - Implementation of CSR plan - support for supplies to the community - donation to local community - Implementation of stakeholder's engagement plan (SEP) - Number of people registered in local government support programs - Implementation of plans (vulnerable peoples plan, local recruitment plan, labour management plan, gender mainstreaming plan, Labour influx Management Plan, Social Impacts Management Plan, Livelihood Restoration Plan) - Grievances on community expectations 	construction sites, towns, villages along RoW	Monthly	Field surveys / CLO observation / PIC	KETRACO Site Managers social safeguards Team / Contractor Site Managers, social safeguards team
Encroachment of RoW	<ul style="list-style-type: none"> - Bush Woody plant encroachment/bush encroachment with satellite imagery - Areas with significant land cover changes, - Established standards for clearing/thinning encroached areas. - Number of manual clearing programmes in selected communal areas. - Number of identified hotspots areas - Spatial variation in bush encroachment - No. of structures-built households along RoW 	RoW	Monthly	Field surveys / CLO observation / PIC	KETRACO via Social safeguards team

10 CHAPTER ELEVEN: RECOMMENDATIONS AND CONCLUSION

10.1 Introduction

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

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

It is strongly recommended that a concerted effort is made by the site management, to implement the Environmental Management and Monitoring Plan provided herein. Following the commissioning of the 400/220kV transmission substation, statutory Environmental and Safety Audits must be carried out in compliance with the national legal requirements, and the environmental performance of the site operations should be evaluated against the recommended measures and targets laid out in this report.

It is quite evident from this study that the construction and operation of the proposed transmission substation will bring positive effects in the project area including improved supply of electricity, creation of employment opportunities both skilled and unskilled (safety officer, welders, carpenters, masons, cleaners, drivers etc.), gains in the local and national economy, provision of market for supply of construction materials, Informal sectors benefits, Increase in revenue, Improvement in the quality of life for the workers and community members, and Improved security.

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

10.2 Recommendations

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

- The proposed project to be implemented in compliance with the relevant legislation and planning requirements.
- The proponent to ensure implementation of the mitigation measures provided in the ESMP
- The proponent to monitor implementation of the ESMP using the developed ESMoP
- The proponent to conduct annual Environmental Audits and submit to NEMA
- NEMA to consider, approve and grant an Environmental Impact Assessment License to the proponent.

10.3 Conclusion

From the foregoing, it is noted that.

- no immitigable negative impacts were encountered.
- No objection from the community was received.
- Identified potential negative impacts can be mitigated.
- Benefits to the community, region, and the country at large are immense.
- A Grievance Redress Mechanism (GRM) has been provided in the LMP and SEP.

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

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12 ANNEXES

Annex 1: Filled Community questionnaires
Annex 2: Filled key informant questionnaires
Annex 3a. Public *Baraza* Attendance Sheets
Annex 3b. Public Baraza Minutes
Annex 4: Title Deed
Annex 5: Site maps
Annex 6a: Generic substation layout plan.
Annex 6b: LILO route.
Annex 7: Experts 2024 practicing license
Annex 8: Labour Management Procedures
Annex 9: Stakeholder Engagement Plan
Annex 10: Chance Find Procedures