KENYA ELECTRICITY SYSTEMS IMPROVEMENTS PROJECT (KESIP)

AN INTEGRATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE APPROXIMATELY 80KM 132KV MACHAKOS-MWALA-EKALAKALA DOUBLE CIRCUIT LINE AND NEW 132/33KV SUBSTATION AT MWALA AND EKALAKALA.

CONTRACT REFERENCE NO. KE-KETRACO-66986-CS-QCBS) - PACKAGE 3

FINAL REPORT

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November 2021

PROJECT

KENYA ELECTRICITY SYSTEMS IMPROVEMENTS PROJECT (KESIP)

CONSULTANCY SERVICES FOR PREPARATION OF RESETTLEMENT ACTION PLAN, VULNERABLE AND MARGINALIZED GROUPS PLAN AND ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT 80KM 132 KV MACHAKOS-MWALA-EKALAKALA AND 60KM 220 KV MALINDI-KILIFI TRANSMISSION LINES AND SUBSTATION EXTENSION AT KYENI, MWINGI AND MALINDI.

CONTRACT REFERENCE NO. KE-KETRACO-66986-CS-QCBS)

Package 3

PROPONENT:

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Cover Page Image Source – AWEMAC Field Survey

DOCUMENT CONTROL

This document and its contents have been prepared by Africa Waste and Environment Management Centre (AWEMAC) and are intended solely for Kenya Electricity Transmission Company (KETRACO) information and use in relation to Environmental & Social Impact Assessment Study Report for the approximately 80km 132kv Machakos-Mwala-Ekalakala double circuit line and new 132/33kv substation at Mwala and Ekalakala. Contract Reference No. Ke-KETRACO-66986-CS-QCBS) - Package 3

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Rev 3.4	Implement Final WB Comments	World Bank	JKK	JKK	18th November 2021

DECLARATION PAGE

ENVIRONMENTAL CONSULTANT

I, **Prof. Jacob K. Kibwage** on behalf of Africa Waste and Environment Management Centre (AWEMAC) submit this Integrated Environmental and Social Impact Assessment study report for the approximately 80km 132kv Machakos-Mwala-Ekalakala Double Circuit Line and new 132/33kv substation at Mwala and Ekalakala. To the best of my knowledge, all information contained in this report is an accurate and truthful representation of all findings as relating to the proposed project as per project information provided by proponent.

Signed in Nairobi on this .....day of ***....., 2021***

Signature: .....

Designation: ***Lead Environmental Consultant. NEMA Lead Expert Reg. No. 0126***

PROJECT PROPONENT

I,....., on behalf of Kenya Electricity Transmission Company (KETRACO) submit this Integrated Environmental and Social Impact Assessment study report for the approximately 80km 132kv Machakos-Mwala-Ekalakala Double Circuit Line and new 132/33kv substation at Mwala and Ekalakala. To my knowledge, all information contained in this report is an accurate and truthful representation of all findings as relating to the proposed project.

Signed at ***.....*** *on this.....day of* ***....., 2021***

Signature: .....

Designation: **.....**

LIST OF PLANNING AND PARTICIPATING CONSULTANTS

KEY EXPERTS

NAME	POSITION
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NAME	QUALIFICATIONS
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LIST OF ACRONYMS AND ABBREVIATIONS

AEZ	Agro-Ecological Zones
AIDS	Acquired Immunodeficiency Syndrome
AP	Angle Points
AWEMAC	Africa Waste and Environment Management Centre
BP	Bank Procedure
CAC	Catchment Advisory Committee
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CIA	Cumulative Impact Assessment
CIDP	County Integrated Development Plan
CSR	Corporate Social Responsibility
CT	Cash Transfer
EA	Environmental Assessment
ECD	Early Childhood Development
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMF	Electro-Magnetic Field
ERC	Energy Regulatory Commission
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESSA	Environmental and Social Safeguard Assessment
FGD	Focused Group Discussion
GCD	Geothermal Development Company
GDP	Gross Domestic Product
GIS	Geographical Information System
GoK	Government of Kenya
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
HIV	Human Immunodeficiency Virus
ICSC	International Chemical Safety Cards
ICT	Information Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IDA	International Development Association
IESIA	Integrated Environmental and Social Impact Assessment
IFC	International Finance Cooperation
IP	Indigenous People
IWRM	Integrated Water Resources Management
KCAA	Kenya Civil Aviation Authority
KEFRI	Kenya Forestry Research Institute

KeNHA	Kenya National Roads Authority
KeRRA	Kenya Rural Road Authority
KESIP	Kenya Electricity Systems Improvement Project
KETRACO	Kenya Electricity Transmission Company Limited
KFS	Kenya Forest Service
KM	Kilometre
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power and Lightening Company
KURA	Kenya Urban Roads Authority
KV	Kilovolts
KWS	Kenya Wildlife Service
LCPDP	Least Cost Power Development Plan
MAWASCO	Machakos Water and Sewerage Company
MEA	Multi-lateral Environmental Agreement
MoEP	Ministry of Energy and Petroleum
MoLPP	Ministry of Lands and Physical Planning
MSDS	Materials Safety Data Sheets
MTP	Medium Term Plan
MVA	Mega Volt Amp
NBSAP	National Biodiversity Strategy and Action Plan
NCCRS	National Climate Change Response Strategy
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
NLC	National Land Commission
NMK	National Museums of Kenya
NPGD	National Policy on Gender and Development
OP	Operational Policy
OVC	Orphans and Vulnerable Children
PAPs	Project Affected Persons
PCB	Polychlorinated Biphenyls
PDO	Project Development Objective
FPIC	Free, Prior, and Informed Consultations
PIT	Project Implementation Team
PLWD	People Living with Disabilities
PPE	Personal Protective Equipment
PPP	Public Private Partnership
RAP	Resettlement Action Plan
REA	Rural Electrification Authority
RoW	Right of Way
RPF	Resettlement Policy Framework
SDGs	Sustainable Development Goals
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment

SID	Society for International Development
STIs	Sexually Transmitted Infection
ToR	Terms of Reference
VIP	Ventilated Improved Pit latrine
VMGF	Vulnerable and Marginalized Groups Framework
WASREB	Water Services Regulatory Board
WB	World Bank
WHO	World Health Organization
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Introduction

The country's long-term development blueprint, the Vision 2030, aims at transforming Kenya into a globally competitive, newly industrialized, middle income and prosperous country. The electricity sub-sector has adopted a 20-year rolling plan that will align the sector with the Vision targets. As part of the plan to achieve this target, the Government of the Republic of Kenya is seeking the financial support of US$370 million from the World Bank for the Kenya Electricity System Improvement Project (KESIP). The project would aim to improve the power systems and electricity access and reliability, in line with the Kenya Growth and Development Strategy. The Project will be coordinated by The Ministry of Energy (MOE) and implemented by Kenya Electricity Transmission Company (KETRACO) and Kenya Power and Lightning Company (KPLC). The project comprises of three focused components but KETRACO will be involved in component 2 dealing with transmission network expansion and strengthening (Approximately US$120 million equivalent). The component is expected to introduce high voltage network to areas that have been serviced by long medium voltage lines to reduce technical losses and reinforce the existing medium voltage networks. The component will also increase transmission adequacy for interconnecting different regions of the country and improve reliability of power transmission and ensure compliance with N-1 contingency criteria. KETRACO has identified 6 sub-projects involving 132 kV and 220 kV transmission lines and associated substations and construction of three new 400/220kV substations estimated at US$298 million.

Under the Least Cost Power Development Planning process and through feasibility studies, Kenya Electricity Transmission Company - KETRACO (the Proponent) has identified priority projects for implementation. The transmission projects will provide reliability, enhance security of power supply to the existing demand hubs in the country; expand electricity transmission capacity necessary to enhance electrification initiatives and reduce technical losses in areas currently served by long medium voltage lines. The Proponent plans to conduct detailed design, environmental and social studies on selected priority projects for development. The transmission lines and substation have been divided into three separate packages (Package 1, 2 and 3) for ease of work execution. This Environmental and Social Impact Assessment (ESIA) study was undertaken by Africa Waste and Environment Management Centre (AWEMAC) is specifically for the Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala under the main project's Package 3.

Objective of the Environmental and Social Impact Assessment

The main objective of the Environmental and Social Impact Assessment (ESIA) was to highlight the potential positive and negative environmental and social impacts expected during the establishment and operation of the proposed Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala, with the aim of proposing appropriate mitigation measures. This was in line with ensuring that such a development does not negatively impact the environment and social aspects such as; human health and safety and physical (land, water, plants and animals) state of the project area. The study identified the possible environmental and social impacts during the implementation, operational and decommissioning phases of the project. The exercise was carried out in accordance with the World Bank Operational Policies triggered for this project, i.e. Environmental Assessment (OP4.01), Natural Habitats (OP4.04), Forestry (OP 4.36), Indigenous Peoples (OP4.10), Involuntary Resettlement (OP 4.12) and Physical Cultural Resources (OP4.11) together with relevant Kenyan environmental legislation and regulations that includes Environmental Management and Coordination Act (EMCA) Cap 387, and the Constitution of Kenya, 2010.. The KETRACO Environmental and Social Management Framework (ESMF) was vital in undertaking the environmental and social impact assessment whereas the Resettlement Policy

Framework (RPF) was key in the resettlement action plan (RAP). The Vulnerable and Marginalized Groups Framework (VMGF) was critical during the social assessment.

Overall Scope of the Work

The Consultant undertook investigations on social aspects, economic activities, and conservation of natural resources, historical and anthropological heritages, public consultations and disclosures. The "Integrated Environmental Assessment," which is a more holistic approach to the evaluation of the proposed project was used by encompassing: Environmental Impact Assessment; Archaeological Assessment; Social Impact Assessment, Biodiversity Impact Assessment; Health Impact Assessment; Cultural Impact Assessment; Visual Impact Assessment and Cumulative Impact Assessment. Given the scale and the complexity of the proposed project, a full environmental and social impact assessment study was undertaken to ensure comprehensiveness and completeness of the assessment process. The general steps followed during the assessment included:

- Environmental screening, in which the project was identified as among those requiring environmental impact assessment under *schedule 2 of EMCA* (Cap 387)
- Environmental scoping that provided the key environmental issues, desktop studies and interviews
- Physical inspection of the proposed route and surrounding areas
- Public participation using public meetings, participant observations, questionnaires and interviews.

Project description

This ESIA study report has been prepared under package three (3) sub-project specifically for the Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala. The line commences at Machakos County with the last 1.5Km of the line terminating in Murang'a County. The 132kV Machakos-Mwala-Ekalakala double circuit line measures 80 Kilometers with a way leave of 30 meters – 15 meters on both sides from the centre line. The line has 20 Angle Points (AP) with five (5) major road crossings which include C97, C98, C 99, C 100 and A3 roads. Athi and Thika River form the main drainage basins along the transmission line alignment. Virtually, the permanent and seasonal rivers such as Thwake, Muthini, Mukewo, Kamula, Kitulu, Kyalui, Ikiwe, Uvila, Kathuluni amongst others drain into the Athi River or Thika River.

The subproject proposes a double circuit 132 kV transmission line to be established between Machakos 132/33kV substation to the existing Kindaruma - Mangu 132kV transmission line, with a new 132/33kV substation at Mwala, and extension of 132 kV substations at Machakos to introduce two 132kV line bays. The estimated capital cost of this sub-project is USD 44.34 million. The feasibility report notes that the economic benefits of supply don't seem to outweigh the project costs. The Survey report notes that the rationale for a transmission project in Machakos area is under-pinned by the following:

- Provision of alternative and shorter route for power evacuation from the Eastern Hydros complex to Machakos 132/33kV substation and onwards to Juja - Rabai 132 kV line which supplies the critical Kenya Pipeline Company pumping stations among other loads.
- Establishment of 132/33kV transformation capacity at Mwala substation will establish feeders to electrify new areas and meet currently unserved demand between Mwala and Kithimani while reinforcing the 33kV feeder supplying Matuu Ex. Mwingi 132/33kV substation as well as the Ngoliba/Kantafu and Kithimani areas currently on 11kV line Ex Muka Mukuu 33/11kV substation. In addition, this will relieve the long 33kV Masii feeder Ex Machakos 132/33kV substation that is inefficiently utilised, while reinforcing

this network with a robust 33kV system by shortening the distance by supplying it from Mwala as well as introducing additional feeders for the area.

Angle Point (AP) 1 to AP5 denotes two basic land use structures which are rural and semi-urban. Rural set ups highlight presence of agriculture (arable) whereas the semi-urban showed characteristics of residential and semi-commercial zones mostly along the sections traversed by roads. Agricultural land use zones were also noted at Ithanga area near AP6 with several terracing notable from the hilly terrain. The area was also characterised by several parcels due to high subdivisions of land and settlements in the area. Within Kithimani area (AP14), the transmission line traverses areas characterized by hills and shrubs. At the site earmarked for Mwala substation, it was evident that the neighbouring community is involved in livestock rearing / grazing. Sand dams were observed between AP5 and AP11. A few sections with farm forestry and other mainly inhabited by shrubs and bushes were noted mostly within AP14 and AP15.

Baseline information

a) Physical environment

Topography: The topography of the proposed transmission line alignment can be divided into highland and lowland areas with altitude ranging from 400m and 1800m above sea level. AP1 to AP7, which are within the vicinity Machakos and Masii towns, are characterized by hilly ridges separated by wide, low lying areas with an elevation of between 1319m and 1531m above sea level. However, Yatta region, which stretches from AP13 to AP17, is generally a flat land with a topography of between 1175m-1197m a.s.l. The hilltops along the transmission line alignment forms the main relief features and affect the rainfall regimes within the transmission alignment. The Yatta plateau, which stretches from the north to the south separating the Athi and Tana River basins forms another relief feature. The plateau is almost plain with wide shallow spaced valleys. The proposed transmission line alignment receives varying amounts of rains with high altitude areas such as from AP1 to AP7 receiving relatively high amount of rains. In the plains, the soils are well-drained, shallow, dark and red clay soils. Well drained soils are notable as you approach Kakuzi location, Kwa Mukundi village in Murang'a County (AP 20).

Land ownership and settlements: According to Kenya Integrated Household Budget Survey (KIHBS) 2015/2016, Machakos County has 57.4% of proportion of parcels with title deeds. The most affected ward areas without title deeds are Athi River, Machakos Central and Kathiani Central. This has led to land ownership conflicts among interested parties. Most landlessness incidences are prevalent in urban areas such as some parts of Machakos Town, Mavoko and Matungulu Sub-counties. Landlessness in the County is as a result of high population and urbanization. This has resulted to several small parcels of land which are prevalent along the proposed route of the transmission line. Murang'a County is predominantly agricultural therefore, land holding is considered important. It is estimated that about 33,000 farmers (13.2%) have title deeds with a population of about 250,000 farmers (Murang'a CIDP 2018-2022). Qualitative sources of information confirmed that most land and property owners in the project area have legal land ownership documents, while a number lack ownership documents. Those without land ownership were attributed to delayed subdivision from inheritance. The key respondent also alleged that land disputes might be common amongst families due to contested land tenure: indications that although they live on the land by history, they do not have formal land ownership documents. This was also echoed during socio-economic survey with locals expressing fear that they do not hold title deeds to their land which might hinder compensation. Land disputes and lack of land ownership documents may pose a challenge of ownership confirmation during RAP implementation which might delay compensation of some of the PAPs.

Land Use Land use in Machakos County urban centres is generally mixed development. There are no clear-cut zones for specific land uses in the county. There are two (2) basic land use

structures: rural and urban. Rural: Agriculture (arable), Urban: residential, commercial, industrial, recreational, wildlife, rangeland. The main land use activities in Murang'a County are cash crop farming, subsistence farming, livestock keeping, fish farming, housing and forestry. Notably crop farming and subsistence farming of maize, beans are the most common agricultural practise on the approximately 1.5 kilometres stretch of the proposed line that terminates in Murang'a County.

The study estimated that approximately 232.504 Ha or 637.293 Acres will be required for the way leave. An estimated total of 591 land parcels will be affected with Kimutwa, Kithimani and Masii Locations having most land parcels. The impacts of land acquisition will vary from one affected person or entity to another but may include partial or full land acquisition. Only about 1% of the landowners will have their land parcels fully affected. Full impact entails land parcels affected more than 70% of the total parcel area. The most extreme impacts will be felt by the approximate 1% of landowners who will have to relinquish all or most of their land and other property and move to other areas away from the affected project area.

b) Socio-cultural environment

Human settlement patterns in both Machakos County and Murang'a County vary from town to town due to various reasons, which include socio-cultural basis, topographic characteristics, and economic output of the areas. Linear Settlements along lines such as major roads are common mainly in suburban areas. People tend to cluster within town centres while rural areas are sparsely populated. Stratified random sampling or stratification, was used to collect the sample along the proposed transmission line on a radius of approximately one (1) kilometre from the centre of the line. A total of 271 household heads were interviewed in the proposed project alignment**.**

Ethnic Distribution: Most of the respondents, 95%, are affiliated to the Akamba community while the remaining 5% of the sample population comprised of the Agikuyu.

Energy: Based on the socio-economic survey, 60.5% of the respondents both in Machakos and Murang'a Counties use solar energy making it the most popular source of energy as compared to electricity at 17.3%. In terms of sanitation along the proposed RoW, most of the households interviewed, 89.6%, use pit latrines forming the majority while 9.3% of the respondents use ventilated improved pit latrine (VIP).

Agricultural activities: As per the socio-economic survey, 88% of the total respondents practice subsistence agriculture along the right-of-way (RoW). This is attested by most of the land in the proposed project area being used for farming activities. The hill farming has necessitated farmers along the RoW to adopt terracing in a bid to mitigate soil erosion. Currently, the County has 12 irrigation schemes established by both the National and County Governments. In addition, there are small scale irrigation schemes at household levels. The total area under irrigation is 3,220 acres. As a result of persistent drought in the region, a substantial number of farmers embrace irrigation and have joined hands to set up irrigation schemes such as Kabaa Irrigation Scheme in Kithimani, Yatta region largely in Kitw'amba village where residents have installed drip irrigation in their farms.

The main cash crops grown in Machakos County are coffee, mangoes, citrus, French beans, pineapples, flowers, sorghum and vegetables. The subsistence food crops grown include maize, beans, pigeon peas, green grams, cowpeas and cassava which are cultivated in small scale. The main livestock kept in Machakos County are indigenous chicken, beef cattle, goats, sheep and dairy cattle. In Murang'a County, the major cash crops include tea, coffee, avocado, mangoes, macadamia and horticulture crops, among others. Horticultural crops include tomatoes, cabbages, kales, spinach and French beans while food crops include maize, beans, bananas, sweet potatoes and cassava (Murang'a CIDP 2018-2022).

It was noted that 80% of the respondents practice livestock keeping while 78% of them do poultry farming. Only 3% of respondents indicated to be practicing bee keeping. Out of the 80% that rear livestock, majority of them keep indigenous cattle at 43.1%. Fish farming (aquaculture) takes place along River Athi with a few private fishpond farms.

Health*:* Most of the respondents, 80%, seek medical services in government health facilities. Also, a considerable proportion, 18%, go to private hospitals/clinics. Malaria was the most prevalent disease reported by the respondents. HIV prevalence rate in Kenya is 6%, an average of 1.6 million people. The HIV prevalence in Machakos County stands at 4.50% with females being the most affected at 6.10%. However, the prevalence rate in Murang'a County is 5.2%, an average of about 58,666 persons.

Housing and Development: Most of the interviewed households, 55%, have permanent houses, Temporary houses were noted to be 28%. Only 18% were noted to have semi-permanent houses. There are sparingly rural households within the proposed RoW. Most of the structures are built of loam bricks with iron roofing.

Vulnerability:8% of the households interviewed have people living with disability out of which 48% of them are registered with the national government. Most of the interviewed households did not specify the type of disability but 26% indicated they have lame people in their household while 13% responded to have a household with a missing hand. 18% of the households had an elderly person of which 61% were reported to be registered and receiving Cash Transfer for the Elderly from Government.

Culture: Akamba community has diverse socio-cultural values, believes, and norms, however, according to a local assistant chief the contemporary generation has been reluctant in practicing the beliefs. The social assessment team observed some of cultural artefacts at Akamba Community Peace Museum in Kyanzasu village Iveti Location where one of the village elders confirmed that the museum is used by the community as a socio-cultural amenity not only to showcase and celebrate their cultural heritage, but also for inter-ethnic exchange and tourist attraction.

c) Biological Environment

Forests: The main forest products for both Machakos and Murang'a Counties are firewood, charcoal, poles, posts and timber for building and construction. Others include wood carvings and apiculture for domestic and commercial purposes. The communities along the line mainly rely on trees as a source of fuelwood for cooking and charcoal production. Fruit trees were also noted, mainly mangoes. There is also existence of both indigenous and exotic tree species. Some key indigenous species observed included different types of acacia; *Acacia-Acacia, Acacia-Croton, Acacia-Commiphora, Acacia-Terminalia and Acacia-Rhus formations*.

Notably, the transmission line alignment affects patches of privately owned natural forests and plantation forests. The natural forests are found in grazing fields along the alignment while the plantations are on farmlands. The plantations are mainly patchy, small and restricted in zones with highland like landscape as well as near water bodies. For instance, at the neighbourhood of Athi River a small and patchy plantation of Eucalyptus grandis exist in a farmland. Similar plantations of *Eucalyptus grandis, Eucalyptus camadulensis and Grevillea robusta* are common in the highland-like landscape from AP1 to AP4.

Applicable Policy, Legal and Institutional Frameworks

The Consultant reviewed key policies, plans, legislation and institutions relevant to the energy sector in Kenya. Some of these are:
Policies:

- Big four Agenda, 2017
- Kenya Vision 2030

- The National Land Use Policy (Sessional Paper No.1 of 2017)
- National Environment Policy, 2013
- National Water Policy, 2012
- The National Climate Change Response Strategy (NCCRS), 2010
- Kenya National Policy on Gender and Development (NPGD), 2019
- The National Biodiversity Strategy and Action Plan (NBSAP) 2000
- National Forest Policy, 2014
- HIV/AIDS Policy of 2009

Plans:

- Least Cost Power Development Plan, 2017-2037
- Machakos County Integrated Development Plan, 2018-2022
- Murang'a County Integrated Development Plan, 2018-2022

The Consultant reviewed the following key pieces of legislation in Kenya relevant to the proposed project: -

- The Constitution of Kenya, 2010;
- Environmental Management and Coordination Act (EMCA, Cap 387) and relevant subsidiary legislation;
  - Environmental Impact Assessment and Audit Regulations, 2003, amended 2019
  - Water Quality Regulations, 2006
  - Waste Management Regulations, 2006
  - Air Quality Regulations, 2009
  - Biodiversity Regulations,
  - Noise Regulations, 2009
- Building Code, 2000;
- Civil Aviation Act No. 21 of 2013;
- Energy Act, 2019;
- Forest Conservation and Management Act, No. 34 of 2016;
- Kenya Roads Act, 2007;
- Land Act, 2012;
- Land Registration Act, 2012;
- National Museums and Heritage Act, No. 6 of 2006;
- National Land Commission Act, No. 5 of 2012;
- Occupational Safety and Health Act, No. 15 of 2007;
- Penal Code Act (Cap 63);
- Physical Planning and land Use Act, 2019
- Public Health Act (Cap 242);
- Public Roads and Roads of Access Act (Cap 399);
- Climate Change Act, 2016;
- County Governments Act, No. 17 of 2012; together with its Amended Act, 2016
- Employment Act, No 11, 2007;
- Water Act, 2016;
- HIV and AIDS Prevention and Control Act, 2006;
- National Authority for the Campaign Against Alcohol and Drug Abuse Act, 2012;
- Occupiers' Liability Act (Cap 34);
- Persons with Disabilities Act, 2003;
- Protection of Traditional Knowledge and Cultural Expressions Act, 2016;
- Sexual Offences Act, 2006;
- Standards Act (Cap 496);
- Work Injury Benefits Act, 2007;
- Way-leaves Act (Cap 292);
- Wildlife Conservation and Management Act, No. 47 of 2013.
- Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012,

Key guiding documents:

- World Bank's Operational Policy on Environmental Assessment (OP 4.01);
- World Bank's Operational Policy on Natural Habitats (OP 4.04);
- World Bank's Operational Policy on Physical Cultural Resources (OP 4.11);
- World Bank's Operational Policy on Forestry (OP 4.36)
- World Bank's Operational Policy on Indigenous Peoples (OP4.10)
- World Bank's Operational Policy on Involuntary Resettlement (OP 4.12)
- World Bank Environment Health and Safety (EHS) Guidelines;
- KETRACO -Kenya Electricity Systems Improvements Project (KESIP)Environmental and Socio Management Framework (ESMF); Resettlement Policy Framework (RPF); and Vulnerable and Marginalized Groups Framework (VMGF).
- Applicable Multilateral Environment Agreements (MEAs);
- Project designs.

Data Analysis, Reporting and Documentation

The Environmental and Social Impact Assessment (ESIA) Study Report was compiled from the field work findings in accordance with the World Bank Environmental and Social Safeguards guidelines, KETRACO Environmental and Social Management Framework, Resettlement Policy Framework, Vulnerable and Marginalized Groups Framework; and guidelines issued by NEMA for such works and; prepared and submitted by the proponent for consideration and approval.

Consultation and Public Participation (CPP)

The Consultation and Public Participation (CPP) Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA (Cap 387) section 58, on ESIA for achieving the fundamental principles of sustainable development. World Banks also requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project.

In order to ensure effective stakeholders' consultation and public participation, stakeholders' mapping was conducted, and a database created consisting of likely interested, affected individuals and relevant institutions. The database was later divided into key stakeholders and public based on interests in the project. Various methods and instruments were identified for effective and efficient public consultation and participation. Questionnaires were administered to the project route neighbours to ensure adequate public participation in the ESIA process. The information gathered was subsequently synthesized and incorporated into the ESIA Study Report.

To ensure full stakeholder engagement and public participation, ESIA public meetings, Baraza's targeting Project Affected Persons (PAPs), vulnerable persons meetings and key stakeholders meeting were convened. This was done to incorporate the concerns and views of all stakeholders and individuals in the project neighbourhood.

ESIA Public meetings: A total of nine (9) ESIA public community meetings were conducted in the following areas: Kwa Mwau Market in Kimutwa Location; Makaveti Trading Centre in Kimutwa Location; Kaani Market Centre in Iveti Location; Masii Chief's Office Grounds near Masii market, Masii location; Mwala Multi-purpose Social Hall in Mwala Location; Mumbuni Market in Mbiuni Location; Sofia Market in Kithimani Location; Mukundi Market in Kakuzi Location, Murang'a County; and Kambi Mawe Market in Mavoloni Location, Machakos County. The venues covered eleven (11) administrative locations in Machakos and Murang'a counties along the transmission line. These locations include Katheka Kai, Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani and Mavoloni in Machakos; and Kakuzi in Murang'a. All the affected locations and villages along proposed transmission line were covered during the consultation meetings as the venues were spread out equally along the proposed project area. Courtesy calls had been made to the respective local administration leaders (Chiefs and Assistant chiefs) to advice on the most suitable venues for holding the ESIA public meetings.

The venues' selection was also based on ease of site accessibility, population, and renown venues for holding meetings in the respective project alignment. The participants at the ESIA meetings were briefly sensitized about the PAPs compensation procedures and encouraged to attend the scheduled RAP meetings for detailed information.

Baraza meetings with PAPs: Based on the draft RAP report for the proposed project, a total of 10 baraza meetings targeting the project affected persons (PAPs) were held attracting 1,021 attendants. The baraza meetings with PAPs were held in the following areas: Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, and Kakuzi. The selection of the meeting venues was done in consultation with the local leadership including village elders, assistant chiefs and Senior chiefs. Further, the venues' selection were based on ease of accessibility by PAPs, PAPs population in the respective areas – sublocation and location, and renown venues for holding meetings in the respective project areas. All the key locations, sublocations and villages with high concentration of settlements and households' clusters along proposed line were covered during the consultation meetings with PAPs *(Draft RAP report for Machakos Mwala Ekalakala)*. The objectives of the meetings with PAPs were to gather comments, suggestions and concerns of project affected persons and incorporate them in the Environmental and Social Impact Assessment (ESIA) and Resettlement Action report; elaborate on the procedures and requirements for valuation, compensation and resettlement action plan (RAP); and finalize the mechanisms for addressing grievances from project affected persons by constituting locational Grievances Resolution Committee (GRC).

Vulnerable Individuals and HouseholdsVulnerable individuals and households meetings: A total of 10 meetings were held with vulnerable persons to establish their overall group opinion, concerns, and suggestions along the transmission alignment. Nine (9) in respective locations in Machakos county, (Chief's Office Grounds in Kimutwa Location; Chief's Office Grounds in Iveti Location; Chief's Office Grounds in Masii Location; Kyanganga Primary School in Mango Location; Mwala Multipurpose Hall in Mwala Location; Mumbuni Catholic Church in Mbiuni Location; Chief's Office Grounds-Kimangu in Kithimani Location; Chief's Office Grounds-Mamba in Ndalani Location; Chief's Office Grounds in Mavoloni Location while one was held in Muti Primary School in Kakuzi Location, Murang'a County. Local chiefs, village managers were used to inform the Vulnerable Individuals and HouseholdsVulnerable individuals and households of the planned FGDs as well as the venues. In addition, ESIA and RAP PAPs meetings had been used to communicate information to the target Vulnerable Individuals and HouseholdsVulnerable individuals and households. Amongst those in attendance were various Vulnerable Individuals and HouseholdsVulnerable individuals and households such as people living with disabilities, elderly, and widows.

A key stakeholders meeting was also undertaken in Machakos County at Tea Tot Hotel on 12th November 2019. The meeting targeted relevant Machakos County Government ministries, key Non-Governmental Organisations (NGOs) working within Machakos, technical institutions and institutions of higher learning, and National Government parastatals. Key stakeholders' interviews were organised in Murang'a County targeting key stakeholders such as County Department of Environment and natural resources, social development, Kenya Forest Service and Kenya Power among others. This was undertaken to capture the stakeholder's concerns over the approximately 1.5 kilometres stretch of the transmission line that terminates in Murang'a County. Further, key informant interviews that targeted the following main organizations involved in biodiversity conservation along the transmission line: Nature Kenya, KWS, and KFS were undertaken. Details of the meetings and consultations are described into detail in chapter five of this report.

Environmental and Social Management and Monitoring Plan

The proponent of the proposed project acknowledges that the proposed project activities will have some impacts on the biophysical environment, health and safety of its employees and members of the public, and socio-economic wellbeing of the residents. Thus, the focus was on

reducing the negative impacts and maximizing the positive impacts associated with the project activities through a continuous improvement programme. Continuous observations and assessments have been essential for identification of impacts unforeseen during the ESIA exercise. Monitoring parameters/indicators were identified and programmes developed for their observation and action. When developing the monitoring programme, the following were considered:

- Frequency of monitoring
- Required personnel -monitoring should be conducted by trained personnel
- Methods of record keeping
- Availability of calibrated and maintained equipment
- Existence of baseline information
- Data analysis and review

Table below highlights some of the possible key impacts and respective mitigation measures.

Table 0-1 possible impacts and mitigation measures

Possible impacts	Proposed mitigation measures
Environmental Impacts	
Terrestrial habitat alteration	• Use of existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible to avoid 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 especially by varying tower spans; • Avoiding construction activities during the breeding season and other sensitive seasons • Management of construction site activities by limiting access road gradients to reduce runoff-induced erosion • Re-vegetation of disturbed areas with native / indigenous plant species such as Acacia sp. and Croton sp.; • Working in close coordination with pertinent agencies (KWS and KFS) when undertaking construction of towers.
Avian (Bird) collisions and electrocutions	The following should be undertaken especially on the bird flight section where bats and migratory birds fly from Konza area to Machakos town and between Machakos Valley and Masinga Dam Reservoir. This should also mitigate Avian Collisions and Electrocutions; • Engineering solutions including installing visibility enhancement objects such as wire marker balls, bird perch deterrents, or diverters; especially within Kimutwa Location and Nzasu sub-location; and Mamba village within Ndalani Location. Other key areas that require to be considered include sections of the Ikiwe, Kimutwa, Love, Mwania, Wamua and Wamui areas to alert birds to the presence of power line, allowing them time to avoid the collision; • Building raptors platforms on top of towers for roosting and nesting; • Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware; • Insulation through covering energised parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; • Installing elevated perches, insulating jumper loops, placing obstructive perch deterrents (e.g. insulated "V's") on the transmission line. • Working with line agencies such as NMK, KWS and relevant NGOs such as Birdlife International and Nature

Possible impacts	Proposed mitigation measures
	Kenya for expert opinion and specialized monitoring studies (ornithological studies).
Mammals (including Bats) Collisions and Electrocutions	The following should be undertaken. ▪ Implementation of an integrated vegetation management approach (IVM) during repairs and maintenance of RoW. The selective removal of tall-growing tree species and the encouragement of low-growing grasses and bushes to avoid alteration and disturbance to critical natural habitats such as bat foraging corridors, roosting and breeding areas. ▪ Provision of engineering solutions such as wire-marking through installing visibility enhancement objects such as marker balls ▪ Ensuring towers / pylons are insulated to act as bats roosting places. ▪ Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware; ▪ Insulation: covering energised parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to bats. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; ▪ Work with line agencies such as KWS and relevant NGOs such as Nature Kenya for expert opinion and specialized bat survey. The data acquired may inform other studies in future and document which bat species exist in the area. •
Increased generation of solid waste	• Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle; this should apply to plastics, wood pellets, metallic, glass and paper waste or any other materials. • Accurate estimation of the dimensions and quantities of materials required; • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time; • Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage; • Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste; • Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site; • Waste collection bins to be provided at designated points on all active sites;

Possible impacts	Proposed mitigation measures
	• Dispose waste more responsibly by contracting a NEMA registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws. • Composting of vegetation waste for reuse as a landscaping fertilizer. • Develop and implement a Construction Waste Management Plan before start of the project. • Comply with provisions of the Environmental Management and Co-ordination, Waste Management Regulations 2006
Occupational Health and Safety	
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-
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; ▪ Hoisting equipment should be properly rated and maintained, and hoist operators properly trained;
Risk of occupational accidents and diseases/physical hazards	▪ Set up a health and safety committee and periodic site inspections, training and annual safety audits. ▪ Provide appropriate Personal Protective Equipment (PPE) to workers and visitors to the proposed route ▪ Adhere to the provisions of the occupational Health and Safety Act of 2007. ▪ Have a qualified Environment Health & Safety (EHS) Officer on site
Community Health and Safety	
Electrocution	• Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding substations, particularly in Mwala sub-stations. • Sensitization / public outreach on community health and safety awareness to prevent public contact with potentially dangerous equipment along RoW;

Possible impacts	Proposed mitigation measures
	▪ Grounding conducting objects (e.g. fences or other metallic structures) installed near power lines, to prevent shock.
On Electromagnetic Fields (EMF)	• Ensure the recommended wayleave of 30m (15m on both sides of the centreline) is observed for the proposed 132kv transmission line. The EMF decays very rapidly with distance from source and there should be no potential health risks for people living outside the 30 m wide wayleave corridor.
On Access to active construction sites	• Limit community access to active sites through barricades, fencing etc.; • Barricade all inactive excavations to prevent falls and injuries especially at night; • Having warning signs on all active sites deterring community interaction or entrance; • Community sensitization on safety in towns centres and market centres such as Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Mukundi and Kambi Mawe.
Cumulative environmental Impacts	▪ 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, respective Machakos and Murang'a 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
Social Impacts	

Possible impacts	Proposed mitigation measures
Risks and impacts from displacement of households and businesses	▪ Apply RAP compensation procedures in a transparent and consistent way to all communities and persons; ▪ Provide compensation for loss of assets at current replacement cost in accordance to project RPF; ▪ Apart from cash compensation, consider other alternatives such as in-kind or land to land compensation especially for vulnerable people such as orphans, PLWD, widows and elderly ▪ Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status, and put measures in place to ensure they have access to development benefits and opportunities; ▪ Provide a choice of options to affected individuals and consult with communities over community assets and resources; ▪ Provide opportunities to displaced communities and persons to derive development benefits from the project; ▪ Provide transitional support for a reasonable period of the time to enable people 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. compensation, GRM. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to engage host communities as well, in addition to PAPs where appropriate. ▪ Where possible avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement. ▪ Displacement and compensation of squatters, absentee landlords, tenants, those without formal land rights are potential risks, which will be guided by provisions within the RPF developed under this project. ▪ Resettlement to adhere to the provisions within the RPF prepared under this project.
Land acquisition (wayleave contractor facilities sites, workers camp sites, and sub-station sites) and resettlement disputes	• Resettlement and compensation of PAPs to align to the RPF developed under this project. • A project Grievances Redress Mechanism (GRM: Annex 14 in chapter 7) including a GRM committee 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. If the Locational Grievance Redress Committee is not able to reach a resolution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters. • Loss of land and crops will be compensated; the amount of compensation to be paid for private land will be as per the Machakos County and Murang'a County land registry rates provided by National Land Commission (NLC). However, the rates will be in line with the RPF developed for the project.

Possible impacts	Proposed mitigation measures
	• A Resettlement Action Plan (RAP) study has been commissioned for the proposed project. The RAP has been carried out in accordance with the legal framework of the Government of Kenya, the requirements of the World Bank's OP 4.12 (Involuntary Resettlement) and RPF developed for this project for compensation purposes. • 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 including valuation to ensure compensation for displaced structures. • Where possible avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement. • Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication, community buy in and ownership of the project. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks in public and Limiting gatherings as per GoK directive
Gender-Based Violence– Sexual exploitation & Abuse / Sexual Harassment (GBV-SEA/SH)	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 within the context of the COVID-19 pandemic • Adopt and implement a grievance redress mechanism (GRM) and referral mechanism to address all emerging complaints including risks such as COVID 19 related to Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH). • Implement the GBV-SEA/SH Management Plan (Annex 14 section 3.19) and Labour Influx Management Plan (Annex 14 section 3.13)

Possible impacts	Proposed mitigation measures
	• Ensure establishment and Implementation of a GBV-SEA/SH Action Plan by the contractor which should reflect the unique dimensions of COVID-19. • Ensure separate sanitation and hygiene facilities (toilets, utility rooms and changing rooms) for men and women in the workers' camps / workplaces are provided. • Prioritize GBV -SEA/SH prevention, response, and risk mitigation approaches as essential parts of COVID-19- related measures. • 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. • Apply all Kenyan Constitutional / legal requirements on gender and sexual based violence throughout the project. • Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication on GBV-SEA/SH. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks in public and Limiting gatherings as per GoK directive
Spread of STD, HIV and AIDS	• 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 through the use of educative posters, offering free HIV/AIDS testing services and HIV/AIDS counselling in main towns situated along the RoW. Such towns include, Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Kambi Mawe in Machakos County and Mukundi town in Murang'a County. • 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.

Possible impacts	Proposed mitigation measures
	• Liaise with relevant health agencies both at national and County level (Machakos County and Murang'a County) (Ministry of Health, National AIDS Control Council (NACC)), including NGOS (AHF Kenya), and CBOs (youth, men and women groups) on awareness creation • Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) and 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 prepared under this project. Such sensitizations or trainings should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks in public and limiting gatherings as per Gok directive. • 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 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. Labour influx impacts will be managed through a labour management plan – *Annex 14 section 3.12*. • Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.

Conclusion and recommendation

The ESIA study indicated that the proposed transmission line and substations are a worthwhile investment. The project will contribute significantly to the power stability, provide reliability, enhance security of supply to the existing demand hubs in Machakos County, Murang'a County and country at large which by extension will spur economic development; expand transmission capacity necessary to enhance electrification initiatives. This will reduce technical losses in areas currently served by long medium voltage lines.

The water quality parameters analysed along the right of way (RoW), showed that some samples had variations from the NEMA standards/guideline values and World Health Organization standards (WHO). Several parameters such as pH range, chloride, fluoride, nitrite, sulphate and total dissolved solids were within the acceptable levels in the samples collected. Nonetheless, the sources of samples collected from River Mwania; River Ikiwe; Kwa Mbuno Dam; Thika River and Athi River did not conform to EMCA (Water Quality) Regulations, of 2006 standards for Sources of Domestic Water, Effluent Discharge into The Environment and Irrigation Water. This is due to being coloured, turbid water with high Iron content and; bacteriologically contaminated with E.Coli, Legionella ssp and total coliforms.

Noise measurements obtained from sample areas along the RoW indicated that apart from Kithendu Sub-location near AP 16, other levels were within the allowable limits as provided by the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the World Bank IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines - Environmental Noise Management. The sample point for Kithendu was in proximity to A3 highway which had passenger and commercial vehicles plying that route. The high noise recorded was attributed to the vehicular movement. The lowest measurements were recorded in Kathuma and Mwenyea villages. The areas were generally silent comprised of vast farms and scattered settlements.

The baseline study and survey conducted established that there were no current air polluting activities within the project RoW. For instance, vehicle traffic within the project RoW is low hence does not pose air quality risk. Further, there are no industries along the project RoW which could otherwise pose air quality risks. The geology of the project area suggests that the Machakos-Mwala-Ekalakala double circuit transmission line will also, not trigger any known radiological impacts. However, should any radionuclides be detected along the project area RoW due diligence should be followed as per existing legal requirements.

The ESIA study identified approximately 651 structures - Permanent (88), Semi-permanent (418), Temporary (134), Services (watering points) (3), Burial sites (6) and Wells (1). The proposed transmission line will also affect five (5) busines structures located in Iveti. The study also established that a total of 591 land parcels with a total of approximately 232.504 Ha or 637.293 Acres will be required for the way leave. Only about 1% of the landowners will have their land parcels fully affected. Full impact entails land parcels affected more than 70% of the total parcel area. The most extreme impacts will be felt by the approximate 1% of landowners who will have to relinquish all or most of their land and other property and move to other areas away from the affected project area. Nonetheless, the study identified that the location of the Transmission line traverses almost 99.9% in rural setting, which is a major advantage in terms of resettlement and land availability. This largely means that although communities have settled along the route, the prospects including adequacy, quality of land and accessibility of resettlement land (where compensation is provided) in the vicinity (cost allowing) will not be a major challenge. This asserts that social support systems and networks will not be greatly disrupted, since affected persons can still consider themselves as part of their current communities and still access the same services and advantages from the original areas. Nonetheless, the highlighted social -cultural and economic issues underpins the recommendation for a comprehensive resettlement action plan (RAP) that would ensure compensation and livelihood restorations for projected affected persons.

The proposed transmission line may impact birdlife fly paths identified along the proposed line area such as within AP1 -AP4; Kimutwa Location and Nzasu sub-location; and Mamba village within Ndalani Location. The proposed line is also in proximity to Important Bird Areas (IBA) such as Machakos Valleys (approximately 3.2 Km near Machakos SS), Masinga Dam approximately (5.2 Km near Ekalakala) and Protected areas (Mwea National Reserve (32Km Northwest of Ekalakala) and Ol Donyo Sabuk National Park (17 Km near Mavoloni). Comprehensive mitigation measures have been suggested including provision of engineering solutions such as installations of bird diverters especially identified fly paths, installing visibility enhancement objects such as marker balls, bird deterrents, or diverters; building raptors platforms on top of towers for roosting and nesting; and maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, insulating energized parts and hardware. It is also recommended that the proponent should work with line agencies such as NMK, KWS and relevant NGOs such as Birdlife International and Nature Kenya for expert opinion and specialized studies (ornithological studies).

The ESIA study has established detailed environmental and social management plan (ESMP); a comprehensive environmental and social monitoring plan (ESMmP); including standalone management plans for various aspects with mitigation measures for the anticipated impacts. The ESIA has recommended the need to ensure stakeholder engagement and grievances management is undertaken post ESIA (applicable to the pre-construction, construction, operations, and decommissioning phases). This should be attained through full implementation of the SEP (Annex 14 -section 3.16 SEP) and GRM (Annex 14 - chapter 7-GRM) which provides aspects post the ESIA, including principles, processes, and procedures to guide the project in engaging stakeholders and managing grievances throughout the project cycle. This ESIA also recommends that the proponent to disseminates the correct information on KETRACO CSR policy and the cap for trees and crops allowed under the RoW guided by the RPF provisions to PAPs in consecutive stakeholder engagement sessions e.g., during the disclosure of the RAP and ESIA. An approximate budget to implement the ESMP and ESMmP has been calculated at Kshs. 875,012,182.03. Some of the management plans are as follows;

- Atmospheric Emissions Management Plan
- Hazardous Substances Management Plan
- Spill Prevention and Countermeasures Management Plan
- Fire Risk Management Plan
- Noise Management Plan
- Surface Water Management Plan
- Waste Management Plan
- Biodiversity Management Plan
- Occupational Health and Safety Management Plan
- Emergency Preparedness and Response Management Plan
- Labour Management Plan
- Labour influx management plan
- Local Recruitment Plan
- Associated Facilities Management Plan
- GBV-SEA/SH action management plan
- Stakeholder Engagement Plan
- Grievance Redress Mechanism
- CSR plan.
- Resettlement Action Plan
- Livelihood Restoration Plan
- Gender mainstreaming plan
- Chance Finds Procedure

- Resource Efficiency and Pollution Prevention and Control Plan
- External Communication Mechanism on Environmental Issues
- Community Health and Safety Plan

KETRACO has established a dedicated Project Implementation Team (PIT) to implement the Project. The PIT will include a project engineer, three site managers, one civil engineer, one accountant, one procurement expert, one socio-economist and one environmentalist. The PIT will be assisted by a consultant with experience in undertaking similar projects in the region. The PIT reports to the KETRACO Board Committee that will oversee project implementation, including the review of annual work plans and budgets. The consultant will prepare the technical specification and draft bid documents for transmission lines and substations. KETRACO will at all times remain responsible for the overall performance of all ESMPs. Currently, KETRACO has 7 NEMA and Environmental Institute of Kenya (EIK) registered professionals, 12 socio-economists, 14 land surveyors, 3 safety officers and 14 land valuers/economists. The Environmental and Social division of KETRACO will monitor compliance of the project to applicable environmental and social standards whereas the KETRACO safety unit ensure safe work management and support the E&S unit to carry out contractor inductions. Its worth, noting that the KETRACO E&S department is well trained and capable to ensure monitoring of the project. From the consultant perspective KETRACO has the capacity to monitor implementation of the Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMnP) developed for the project. The department also has the capacity to undertake training and build the capacity of the contractor to implement both the ESMP and ESMnP.

The proponent is committed to putting in place the proposed measures to mitigate the potential negative environmental, safety, health and social impacts associated with the life cycle of the proposed project. Taking into cognizant the anticipated project benefits to the Country on power stability, reliability and spur on economy; and the adequate mitigation measures provided for the impacts, it is within our expert opinion that the project be approved with full implementation of the established ESMP, ESMmP and respective management plans.

1 INTRODUCTION

1.1 Project Background information

The country's long-term development blueprint, the Vision 2030, aims at transforming Kenya into a globally competitive, newly industrialized, middle income and prosperous country. The growth objectives underpinning the Vision 2030 require a sustainable annual economic growth rate of more than 10% supported by industry, agriculture and services. Efficient, accessible and reliable infrastructure has been identified as an enabler for achieving sustained economic growth, development and poverty reduction by lowering cost of doing business and improving the country's global competitiveness.

The electricity sub-sector has adopted a 20-year rolling plan that will align the sector with the Vision targets. The plan provides the road map to meet the estimated power demand. Power generation sequence, necessary network upgrades and expansions required to adequately evacuate the generated power and efficiently meet the demand is proposed.

As part of the plan to achieve this target, the Government of the Republic of Kenya is seeking the financial support of US$370 million from the World Bank for the Kenya Electricity System Improvement Project (KESIP). The proposed implementation period is 5 years, from 2019 to 2024. The project would aim to improve the power systems and electricity access and reliability, in line with the Kenya Growth and Development Strategy. The Project will be coordinated by The Ministry of Energy (MOE) and implemented by Kenya Electricity Transmission Company (KETRACO) and Kenya Power and Lightning Company (KPLC).

Project Development Objectives

The proposed project development objectives (PDOs) are:

- To increase the capacity of the transmission system and
- To increase access to electricity.

The achievement of development objectives will be assessed using the following key outcome indicators:

- Increase in nominal transmission capacity (MVA)
- People provided with new or improved electricity service (number)

Project Components

There are two implementing agencies for the project. KPLC, a public limited company listed on the Nairobi Stock Exchange will be responsible for implementation of the distribution network investment and associated technical assistance activities. KETRACO, a public sector company, will be responsible for implementation of the transmission line investment and associated technical assistance activities. MOE will be responsible for implementing the technical assistance component while also coordinating overall project activities.

The project comprises of three focused components but KETRACO will be involved in component 2 only. The various components have been elaborated below:

Component 1- Access Expansion and Distribution Network Strengthening (approximately US$ 235 million equivalent): The proposed project will aim to support mostly grid densification and intensification and some grid expansion to reach about 120,000 new connections benefiting about 450,000 people. The exact lines and substations to be supported under the component will be determined during project implementation. The component has three sub components: (i) new medium and low voltage infrastructure to help address system bottlenecks for reducing losses, improving reliability, and create capacity to support last mile electrification (US$85 million); ii) connections of new consumers through Last Mile electrification (US$130 million); and (iii) Slum Electrification to connect consumers living in informal settlements (US$20 million). The component will be implemented by KPLC.

Component 2: Transmission Network Expansion and Strengthening (Approximately US$120 million equivalent): This component will be implemented by Kenya Electricity Transmission Company Limited (KETRACO). The component is expected to introduce high voltage network to areas that have been serviced by long medium voltage lines to reduce technical losses and reinforce the existing medium voltage networks. The component will also increase transmission adequacy for interconnecting different regions of the country and improve reliability of power transmission and ensure compliance with N-1 contingency criteria. KETRACO has identified 6 sub-projects involving 132 kV and 220 kV transmission lines and associated substations and construction of three new 400/220kV substations estimated at US$298 million. The exact lines and substations that can be supported within the funding allocation for this category under the proposed Project will be determined later based on priority, readiness, and environmental and social screening and assessment. The component is also expected to support an owner's engineer (firm), which will help KETRACO with preparation of design, bidding documents, bid evaluation, and project supervision during implementation phase. The funding requirement for the six (6) transmission lines and three (3) substations is around US$298 million. With the funding allocation available (US$120 million), only 2 or 3 lines and 1 or 2 substations can be supported under the Project.

Component 3: Technical Assistance and Capacity Building: (Approximately US$15 million equivalent): The component will support KETRACO to carry out a detailed feasibility study in accordance with the Public Private Partnership (PPP) law to determine the technical, financial, legal, social and environmental feasibility of piloting development of some identified transmission lines under PPP arrangements, including establishing the value for money for PPP. The initial phase of the feasibility study will start soon with support from an on-going International Development Association (IDA) credit (Eastern Electricity Highway Project, P126579) while the second phase will be supported under the proposed Project. Implementation of the public–private partnership (PPP) pilot will be supported by Africa50 and International Finance Corporation (IFC) Advisory who are currently in discussion with KETRACO. The feasibility study will be supervised by IFC on behalf of KETRACO and closely coordinated with Africa50 to ensure a consistent approach for all the 5 lines included in the pilot PPP. The preparation of the relevant feasibility-stage safeguard instruments (ESIA and RAP, as appropriate) will also be supported under the Project.

The component will also include sector studies, capacity building, and training activities to help sustain and enhance the policy, institutional and regulatory arrangements and reforms of the Government of Kenya (GoK) as well as gender and citizen engagement. Some of the studies to be supported under the component will include optimal power market design, system operation and dispatch guidelines for the Energy and Petroleum Regulatory Authority (EPRA) successor for Energy Regulatory Commission (ERC) under the Energy Act, 2019. The capacity building will also include training and activities to strengthen governance, management, technical and operation capacity of the sector agencies including the KPLC, KETRACO, EPRA *(former ERC),* KenGen, Geothermal Development Company (GDC), and Rural Electrification and Renewable Energy Corporation *(former Rural Electrification Authority (REA))*. The Ministry of Energy (MOE) will implement this component in coordination with the sector agencies.

Project Beneficiaries

Project beneficiaries include households and businesses that will be connected to the electricity network for the first time and whose use of electricity will replace consumption of kerosene and other fuels for lighting and will enable productive activities thus contributing to economic growth. A second group of beneficiaries will be the existing electricity consumers, including business customers of KPLC for whom the quality and reliability of electricity service will improve. Businesses suffer loss of sales, damage to equipment, and additional cost of electricity supply from standby generators when grid electricity supply is unstable. By providing public financing for the last mile electrification, the project will help KPLC maintain its commercial viability while meeting the GoK social objective of universal access to electricity. By building capacity for KETRACO in PPPs and developing a cost reflective tariff initially for the PPP payments, and later for a gradual transition to full cost-recovery tariff, the project will help

KETRACO on its path towards a state-of-the art transmission company able to leverage commercial financing for developing transmission infrastructure in Kenya. Leveraging private sector investment in the development of transmission assets through PPPs arrangement will benefit GoK by releasing the scare public resources for investments in other priority areas including the social sectors where opportunities for attracting private financing is limited.

The client planned to conduct detailed design, environmental and social studies on selected priority projects for development. The transmission lines were divided into three separate packages (elaborated in chapter 2) for ease of work execution. This Environmental and Social Impact Assessment (ESIA) study was undertaken by Africa Waste and Environment Management Centre (AWEMAC) is specifically for approximately 80km 132kv Machakos-Mwala-Ekalakala Double Circuit Line and new 132/33kv substation at Mwala and Ekalakala under the main project's Package 3.

1.2 Objective of the ESIA Study

The principal objective was to identify the potential positive and negative environmental and social impacts expected during the establishment and operation of the proposed power transmission project with the aim of proposing the possible mitigation measures. This was done to ensure that such a development does not negatively impact the environment in terms of social aspects; human health and safety; and physical (land, water, plants and animals) state of the area.

The exercise was carried out in accordance with the World Bank Operational policies triggered under this project, I.e. Environmental Assessment (OP4.01), Natural Habitats (OP4.04), Forestry (OP 4.36), Indigenous Peoples (OP4.10), Involuntary Resettlement (OP 4.12) and Physical Cultural Resources (OP4.11) together with relevant Kenyan environmental legislation and regulations that includes Environmental Management and Coordination Act (EMCA) Cap 387, and the Constitution of Kenya, 2010. KETRACO's Environmental and Socio Management Framework (ESMF) was also key in undertaking of the Environmental and Social Impact Assessment (ESIA) study whereas the Resettlement Policy Framework (RPF) was key in the resettlement action plan (RAP). The Vulnerable and Marginalized Groups Framework (VMGF) was critical during the social assessment.

In brief, the specific objectives of the study were to:

i. Describe the proposed project (construction, operations and decommissioning), including the technology to be used, the location of towers (transmission lines) or layout (substations), offsite facilities, geographic location and areas of traverse and construction timelines
ii. Discuss the policy, legal, and administrative frameworks within which the ESIA is carried out. Most particularly review; Government of Kenya (GoK) requirements and procedures for the management of environmental and social issues, including labour, health and safety requirement; World Bank Safeguards Policies, KETRACO policies and analyse the gap between the applicable World Bank Safeguards Policies and Kenyans laws.
iii. Collect, collate and present baseline information (Physical environment; Biological environment and Socioeconomic and cultural environment) on the existing environmental and socioeconomic characteristics of, within and around the project site/area of influence.
iv. Analyse and describe all significant deviations from the environmental and socioeconomic baseline that might be caused by the project, including environmental and social impacts, both positive and negative, the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated; and identify mitigation measures and any residual negative impacts that cannot be mitigated.
v. Undertake analysis of alternatives by systematically comparing feasible alternatives to the proposed transmission lines and associated ancillary facilities, such as alignment, technology, design, and operation including project site, design and technologies and reasons for preferring the proposed site, design and technologies;

vi. Carry out public participation and consultations to collect the concerns, expectations, and opinions of affected, concerned and interested stakeholders. In addition, ensure disclosure of the ESIA report in a manner, form, and language that is understandable, and accessible, to enable full public participation.

vii. Prepare a comprehensive Environmental and Social Management Plan (ESMP) that consists a set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

viii. Establish a technical summary of the proposed project, its environmental setting, and highlight key findings, recommended mitigation measures, and monitoring procedures.

The role ESIA study was to identify significant environmental and social impacts associated with the proposed power transmission project projects and recommend appropriate mitigation measures for integration in all phases of the projects cycle including project planning, design, implementation (construction and operation) and follow-up (monitoring). The ESIA generated an ESMP that described in detail the mitigation measures to be carried out, costing, scheduling and responsibility of such measures, and a detailed monitoring process and its schedule.

1.3 Overall Scope of Work

The consultant undertook investigations on social aspects, economic activities, and conservation of natural resources, historical and anthropological heritages, public consultations and disclosures. The "Integrated Environmental Assessment" entailed the following:

- ***Environmental Impact Assessment***: This involved an examination, analysis and assessment of planned activities with a view to ensure environmentally sound and sustainable development. It entailed evaluation of the proposed project's potential environmental risks and impacts in its area of influence; examination of project alternatives; identification of ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and included the process of mitigating and managing adverse environmental impacts throughout project implementation.
- ***Archaeological Assessment***: This included inventory collection and evaluation of archaeological resources, and the assessment of potential impacts from the proposed power transmission project.
- ***Social Impact Assessment***: This entailed analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of the proposed project and any social change processes invoked by those interventions.
- ***Biodiversity Impact Assessment:*** involved identifying, measuring, quantifying, valuing and internalizing the unintended impacts (on biodiversity) of development interventions.
- ***Health Impact Assessment***: This involved a combination of procedures, methods, and tools to assess the potential health impacts of the proposed project on nearby populations, in order to recommend mitigation measures.
- ***Cultural Impact Assessment***: This entailed a full inventory of the cultural heritage resources; analysis of alternative sites, route and designs that would eliminate or reduce the adverse impacts; and development of a plan to mitigate damages and manage the cultural heritage.
- ***Visual Impact Assessment***: This included analysis of the potential visual impacts to the landscape and landscape views resulting from the proposed development and proposing mitigations to the negative effects. Visual components that were analysed include appearances and scenes. The visual impacts depended on how the new

development will relate to the surrounding landscape with regards to form, line, colour, texture, variety, intensity, perceptions, and associated factors.

- ***Cumulative Impact Assessment***: This entailed analysing the potential impacts and risks of proposed power developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen valued environmental and social components over time; and proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

These analyses also included reviews of the respective relevant existing rules and procedures to manage the environmental and social aspects affected by the proposed project. The scope of the assessment covered impacts directly or indirectly associated with the construction and operation /routine maintenance activities of the proposed project, supply of construction materials and other accessories. The consultant used both conventional and participatory approaches in identifying the potential environmental and social impacts and mitigating measures for the proposed project. In pursuing the exercise in accordance to the Environmental (Impact Assessment and Audit) Regulations, 2003, the consultant:

a) Identified the anticipated environmental impacts of the project and the scale of the impacts;
b) Identified and analysed alternatives to the proposed project;
c) Proposed mitigation measures to be taken during and after the implementation of the project; and
d) Developed an environmental and social management plan (ESMP) with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures.

1.4 Purpose and Terms of Reference

The purpose and terms of reference developed for this project were to assess the environmental and social impacts that may arise during the construction, operational and decommissioning phase of the approximately 80km 132kv Machakos-Mwala-Ekalakala Double Circuit Line and new 132/33kv substation at Mwala and Ekalakala. Africa Waste and Environment Management Centre (AWEMAC), herein referred to as the, 'the consultant', on behalf of the proponent / client, KETRACO conducted the ESIA study.

1.5 Kick-off meetings and Commencement Date

KETRACO organized the Kick-off meeting for the assignment on 9th May 2019. This served as a platform for the team of experts to meet the client and outline working arrangements and key factors for success. It served as an avenue to establishing synergies for the assignment. The meeting was also used to discuss the general scope of the assignment based on the terms of references (TOR). The avenue was also used to seek and request for the project documents, information and contact persons' details needed to undertake the assignment. The consultant also enquired on the project timelines, deliverables and program.

An inception meeting was also conducted with the World Bank on 13th May 2019. The meeting was used to address expectation of the World Bank on the deliverables of the assignment. The consultant also used the avenue to emphasize on data required to commence the project. The commencement letter was issued by the client on 16th May 2019.

1.6 Methodology for the study

Given the scale and the complexity of the proposed project, a full Environmental and Social Impact Assessment (ESIA) study was undertaken to ensure comprehensiveness and completeness of the assessment. The study was conducted as guided by the Environmental Impact Assessment/ Audit Regulations of 2003. The general steps that were followed during the assessment included:

- Environmental screening, in which the project was identified as a high-risk project

requiring Environmental Impact Assessment study under Amendment of the Second Schedule of EMCA 1999 *(30th April 2019),* and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. As per WB OP 4.01 the proposed project was classified as Category A since it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.

- Environmental scoping that provided the key environmental issues, desktop studies and interviews.
- Physical inspection of the proposed right of way and surrounding areas
- ESIA Public participation and stakeholder consultation via the use of public meetings, key stakeholders meeting, household interviews, questionnaires and focus group discussions.
- Data analysis; and
- Report preparation.

The report approach has been structured based on two key areas discussed in succeeding section; Environmental impact assessment (EIA) section 1.7 and Social impact assessment (SIA) in section 1.8.

1.7 Environmental Impact Assessment (EIA)

The environmental assessment aimed at examining, analysing and assessing the proposed project activities with a view to ensuring environmentally sound and sustainable development systems.

1.7.1 Environmental Screening

A screening exercise was conducted in the period of May to June 2019 to determine whether an Environmental Impact Assessment (EIA) would be required and what level of assessment was necessary. This was done in line with the requirements of the EMCA (Cap 387), specifically the second schedule which categorizes projects into; Low Risk Projects; Medium Risk Projects and High-Risk Projects. The World Bank *Operational Policy 4.01, Environmental Assessment,* which uses four categories (A, B, C, or FI) for its projects depending on the type, location, sensitivity and scale of the proposed project; as well as the nature and magnitude of its potential impacts was also considered.

The screening exercise identified that the project is listed in the Amendment of the Second Schedule of EMCA 1999 *(30th April 2019)*, and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 as a High Risk Project in power and infrastructure projects specifically article *(a) high voltage electrical transmission lines*; for which an Integrated Environmental and Social Impact Assessment study report is prepared. As per WB OP 4.01 the proposed project is classified as *Category A* since it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may also affect an area broader than the sites or facilities subject to physical works.

Plate 1-1 The team of experts making consultations during the screening exercise
Source AWEMAC field Survey

1.7.2 Environmental Scoping

The scoping exercise was carried out during the months of June 2019 to August 2019 where key issues identified during screening were further investigated through desktop analysis and key stakeholders' engagement to ascertain whether additional information was needed to evaluate baseline conditions and potential impacts within the proposed project corridor. The desktop evaluation included reviewing applicable environmental and social data collected from external sources with published information. In addition to desktop review, primary data was collected by field studies conducted by environmental and social experts. The key objectives for the Scoping phase were: -

- To identify stakeholders and inform them of the proposed project and the ESIA process;
- To provide stakeholders with the opportunity to identify any issues and concerns associated with the proposed project; and equally propose potential interventions to the issues raised for consideration in the ESIA process.
- To identify areas of likely impact and environmental and social issues that may require further investigation in an ESIA (including the initial results of the screening phase);
- To determine the Terms of Reference (ToR) for specialist baseline and impact assessment studies in response to initial stakeholder input.

The scoping exercise established the need for an ESIA study to be undertaken as a result of the environmental and social issues that required further assessment and mitigation measures. This prompted drafting of the proposed transmission line's Terms of Reference (ToR). The ToR was prepared as guided by the Environmental (Impact Assessment and Audit) Regulations, 2003. It was submitted to NEMA in the prescribed form on 17th July 2019 and approved by Authority on 19th July 2019 allowing for public engagements with the stakeholders and Project Affected Persons (PAPs).

1.7.3 Desktop Study

Key documents for the assessment were reviewed, these included; the nature of the proposed activities, project documents, designs policy and legislative framework as well as the environmental setting of both Machakos County and Murang'a County. Some of the key documents that were reviewed included: -

Policies:

- Big four Agenda, 2017
- Kenya Vision 2030
- The National Land Use Policy (Sessional Paper No.1 of 2017)
- National Environment Policy, 2013
- National Water Policy, 2012
- The National Climate Change Response Strategy (NCCRS), 2010
- Kenya National Policy on Gender and Development (NPGD), 2019
- The National Biodiversity Strategy and Action Plan (NBSAP) 2000
- National Forest Policy, 2014
- HIV/AIDS Policy of 2009

Plans:

- Least Cost Power Development Plan, 2017-2037
- Machakos County Integrated Development Plan, 2018-2022
- Murang'a County Integrated Development Plan, 2018-2022

Legislation in Kenya relevant to the proposed project: -

- The Constitution of Kenya, 2010;
- Environmental Management and Coordination Act (EMCA, Cap 387) and relevant subsidiary legislation;
  - Environmental Impact Assessment and Audit Regulations, 2003, amended 2019
  - Water Quality Regulations, 2006
  - Waste Management Regulations, 2006
  - Air Quality Regulations, 2009
  - Biodiversity Regulations,
  - Noise Regulations, 2009
- Building Code, 2000;
- Civil Aviation Act No. 21 of 2013;
- Energy Act, 2019;
- Forest Conservation and Management Act, No. 34 of 2016;
- Kenya Roads Act, 2007;
- Land Act, 2012;
- Land Registration Act, 2012;
- National Museums and Heritage Act, No. 6 of 2006;
- National Land Commission Act, No. 5 of 2012;
- Occupational Safety and Health Act, No. 15 of 2007;
- Penal Code Act (Cap 63);
- Physical and Land Use Planning Act, 2019;
- Public Health Act (Cap 242);
- Public Roads and Roads of Access Act (Cap 399);
- Climate Change Act, 2016;
- County Governments Act, No. 17 of 2012; together with its Amended Act, 2016
- Employment Act, No 11, 2007;
- Water Act, 2016;
- HIV and AIDS Prevention and Control Act, 2006;
- National Authority for the Campaign Against Alcohol and Drug Abuse Act, 2012;
- Occupiers' Liability Act (Cap 34);
- Persons with Disabilities Act, 2003;
- Protection of Traditional Knowledge and Cultural Expressions Act, 2016;
- Sexual Offences Act, 2006;
- Standards Act (Cap 496);
- Work Injury Benefits Act, 2007;
- Way-leaves Act (Cap 292);
- Wildlife Conservation and Management Act, No. 47 of 2013.
- Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012

Key guiding documents:

- World Bank's Operational Policy on Environmental Assessment (OP 4.01);
- World Bank's Operational Policy on Natural Habitats (OP 4.04);
- World Bank's Operational Policy on Physical Cultural Resources (OP 4.11);
- World Bank's Operational Policy on Forestry (OP 4.36)

- World Bank's Operational Policy on Indigenous Peoples (OP4.10)
- World Bank's Operational Policy on Involuntary Resettlement (OP 4.12)
- World Bank Environment Health and Safety (EHS) Guidelines;
- KETRACO -Kenya Electricity Systems Improvements Project (KESIP)Environmental and Socio Management Framework (ESMF); Resettlement Policy Framework (RPF); and Vulnerable and Marginalized Groups Framework (VMGF).
- Applicable Multilateral Environment Agreements (MEAs);
- Project designs.

1.7.4 Household to Household / Village to Village Visits

Household to Household / Village to Village visits were conducted with the key objective being to create sensitization and awareness about the proposed project. The household to household visits targeted the local community along the proposed right of way (RoW). Village to Village targeted the village elders, and leaders under jurisdiction of every 10 households popularly known as '*Nyumba Kumi*'. This ensured all the villages along which the RoW had traversed were briefed of the proposed project and impending public awareness and consultations.

1.7.5 Project Route Site Assessment

Transect walks along the RoW were undertaken with the key objective meant for physical inspections of the project route characteristics and the environmental status of the surrounding areas to determine the anticipated impacts. This was achieved by walking along the project route to collate baseline information such as ecological assessment and undertake sampling of key environmental parameters. An ESIA checklist was developed to capture all the environmental and social issues that were studied into detail (Annex 1).

1.7.6 Stakeholder Engagement and Public Participation

Questionnaires were administered to the project route neighbours to ensure adequate public participation in the ESIA process. The information gathered was subsequently synthesized and incorporated into the ESIA Study Report. In order to ensure full stakeholder engagement and public participation, ESIA public meetings, Baraza's targeting Project Affected Persons (PAPs), vulnerable persons meetings and key stakeholders meeting were convened. This was done to incorporate the concerns and views of all stakeholders and individuals in the project neighbourhood.

ESIA Public meetings: A total of nine (9) ESIA public community meetings were conducted in the following areas: Kwa Mwau Market in Kimutwa Location; Makaveti Trading Centre in Kimutwa Location; Kaani Market Centre in Iveti Location; Masii Chief's Office Grounds near Masii market, Masii location; Mwala Multi-purpose Social Hall in Mwala Location; Mumbuni Market in Mbiuni Location; Sofia Market in Kithimani Location; Mukundi Market in Kakuzi Location, Murang'a County; and Kambi Mawe Market in Mavoloni Location, Machakos County. The venues covered eleven (11) administrative locations in Machakos and Murang'a counties along the transmission line. These locations include Katheka Kai, Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani and Mavoloni in Machakos; and Kakuzi in Murang'a. All the affected locations and villages along proposed transmission line were covered during the consultation meetings as the venues were spread out equally along the proposed project area. Courtesy calls had been made to the respective local administration leaders (Chiefs and Assistant chiefs) to advice on the most suitable venues for holding the ESIA public meetings. The venues' selection was also based on ease of site accessibility, population, and renown venues for holding meetings in the respective project alignment. The participants at the ESIA meetings were briefly sensitized about the PAPs compensation procedures and encouraged to attend the scheduled RAP meetings for detailed information.

Baraza meetings with PAPs: A total of 10 meetings targeting the PAPs were held attracting a total of 1,021 attendants. Meetings were held in the following areas: Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, and Kakuzi. The selection of the meeting venues was done in consultation with the local leadership including village elders, assistant chiefs and Senior chiefs. Further, the venues' selection were based on ease of accessibility by PAPs, PAPs population in the respective areas – sublocation and location, and renown venues for holding

meetings in the respective project areas. All the key locations, sublocations and villages with high concentration of settlements and households' clusters along proposed line were covered during the consultation meetings with PAPs *(Draft RAP report for Machakos Mwala Ekalakala)*.

Vulnerable Individuals and HouseholdsVulnerable individuals and households meetings: A total of 10 meetings were held with vulnerable persons to establish their overall group opinion, concerns, and suggestions along the transmission alignment. Nine (9) in respective locations in Machakos county, (Chief's Office Grounds in Kimutwa Location; Chief's Office Grounds in Iveti Location; Chief's Office Grounds in Masii Location; Kyanganga Primary School in Mango Location; Mwala Multipurpose Hall in Mwala Location; Mumbuni Catholic Church in Mbiuni Location; Chief's Office Grounds-Kimangu in Kithimani Location; Chief's Office Grounds-Mamba in Ndalani Location; Chief's Office Grounds in Mavoloni Location while one was held in Muti Primary School in Kakuzi Location, Murang'a County. Local chiefs, village managers were used to inform the Vulnerable Individuals and HouseholdsVulnerable individuals and households of the planned FGDs as well as the venues. In addition, ESIA and RAP PAPs meetings had been used to communicate information to the target Vulnerable Individuals and HouseholdsVulnerable individuals and households. Amongst those in attendance were various Vulnerable Individuals and HouseholdsVulnerable individuals and households such as people living with disabilities, elderly, and widows.

A key stakeholders meeting was also undertaken in Machakos County at Tea Tot Hotel on 12th November 2019. The meeting targeted relevant Machakos County Government ministries, key Non-Governmental Organisations (NGOs) working within Machakos, technical institutions and institutions of higher learning, and National Government parastatals. Focus group discussions including one on one meetings were organised in Murang'a County targeting key stakeholders. This was undertaken to capture the stakeholder's concerns over the approximately 1.5 kilometres stretch of the transmission line that terminates in Murang'a County. Further, key informant interviews that targeted the following main organizations involved in biodiversity conservation along the transmission line: Nature Kenya, KWS, and KFS were undertaken. Details of the meetings and consultations are described into detail in chapter five of this report.

1.7.7 Environmental Impacts

During the ESIA study the following impacts were analysed in accordance and addition to OP 4.01 - Environmental Assessment guidelines. Key impacts assessed included; Biodiversity Impact Assessment; Archaeological Impact Assessment; Visual Impact Assessment; and Cumulative Impact Assessment (CIA)

The ESIA study also covered into detail the key environmental parameters which included; Air Quality Assessment; Water Quality Assessment and Noise Level Assessment.

1.8 Social Impact Assessment (SIA)

The Social Impact Assessment (SIA) was informed by the need to systematically integrate social issues in the planning and implementation of the proposed Machakos-Mwala-Ekalakala electricity transmission line and substation projects. It aimed to improve the quality and sustainability of the proposed project, support and strengthen national requirements, and enhance project acceptance and local ownership. Undertaking the SIA helped to identify and manage potential adverse social impacts of the proposed project that may cause or contribute to project delay, and to maximize benefits to local communities and other groups. Further, the SIA assisted to analyse and assess the anticipated social impacts of the project and develop a framework for stakeholder participation in the design and implementation of the project.

The SIA provided a framework for prioritizing, gathering, analysing, and incorporating social information and participation into the design and delivery of the proposed power transmission project. The SIA ensured that the proposed project interventions; are informed and consider the key relevant social issues and; incorporate a participation strategy for involving a wide range of stakeholders.

1.8.1 Goals and Objectives

The goal of the SIA exercise was to incorporate an analysis of social issues and develop a framework for stakeholder participation in the design and implementation of the Machakos-Mwala-Ekalakala electricity transmission line and substation projects.

The objectives were to:

i. Identify and map project stakeholders;
ii. Identify and prioritize social issues associated with the project;
iii. Mitigate negative impacts on communities or individuals;
iv. Enhance benefits to those affected;
v. Avoid delays and obstruction in gaining development approval;
vi. Act as a precautionary measure to avoid costly errors in the future and;
vii. Build trust and cooperation between community and stakeholders and the developer that is necessary for successful implementation of the proposed project and its sustainability.

1.8.2 Methodology for Social Impact Assessment

A triangulated methodological approach was used in the collection of data and engagement with sub project stakeholders. Qualitative and quantitative approaches were utilized in a participatory way. Data collection incorporated both primary and secondary sources. Secondary data was obtained through document reviews, while primary data was collected through socio-economic survey in the project area. Stakeholders and public meeting consultations, key informants, and focused group discussions as well as field observations were undertaken. SIA adopted mixed methods (qualitative and quantitative) data gathering and analyses as follows:

- Desktop/document reviews and analyses;
- Social vulnerability mapping (group level information analyses based on census block and County Integrated Development Plans (CIDPs));
- Socio-economic surveys (Key informant interviews, household surveys, focus group discussions);
- Social vulnerability analysis (SVA) [low income/poverty; elderly/very young; physically challenged; female-headed households; minorities, occupants of temporary structures/renters; and transient/homeless/landless populations;
- Social Impact Analyses (community impacts, cultural impacts, health impacts, lifestyle impacts, quality of life impacts); and
- Public consultations/participatory methodologies

1.8.2.1 Desktop/document reviews

Secondary data was obtained from relevant documents such as relevant social policy and legal framework in Kenya. Some of the documents reviewed comprised of; Constitution of Kenya (2010), Kenya Vision 2030, National Social Protection Policy (2011), Gender Policy (2011), Kenya National Youth Policy (2016), National Land Policy (2017), National Policy for Older Persons and Ageing (2009), the draft disability policy, and the Household Economic Survey (2018). Other documents included: NSNP Environmental and Social Safeguards Assessment (ESSA), Cash Transfer for Orphans and Vulnerable Children (CT-OVC) Program and Machakos County Integrated Development Plan 2018-2022 and Murang'a County Integrated Development Plan 2018-2022.

1.8.2.2 Project Route Area Assessment

Field visits were undertaken to conduct physical inspections of the social characteristics and the social status of the surrounding community and determine the anticipated impacts along the proposed transmission line route. A comprehensive ESIA checklist was developed to capture all the environmental and social issues that were studied into detail (Annex 1).

1.8.2.3 Socio-economic Survey

A household social impact assessment questionnaire was administered to household heads and business owners in the project area. The questionnaire generated quantitative information on various aspects of social life in the project area. It captured information, particularly: administrative location, household characteristics, sources of livelihood, types of housing and ownership, economic activities, religion, sanitation, education, priorities among others. A team of enumerators were trained to administer the social-economic survey questionnaires (See annex 2 for the sample socio-economic survey questionnaire).

1.8.2.4 Stakeholders engagement, consultation, and Public Participation

Stakeholder engagement and consultations were undertaken to fully inform the communities about the proposed project. The objectives for engagement and consultations aimed to:

- Establish a participatory process for identifying potential impacts and benefits of the project;
- Accord the locals a fair and culturally appropriate way, to be engaged and determine how they wish to be involved throughout the project phase;
- Solicit the support of the communities from the proposed project area;
- Determine the nature of the local power structure and document the procedures for the entry and access into the community.
- Obtain accurate and detailed data on local livelihoods, customs and historical traditions for information to project partner agencies and agents.
- Determine through careful consultation with the community members the preferred mechanisms for information provision and consultations and representatives in decision making.

In order to ensure adequate public participation in SIA, questionnaires were administered to the proposed project route neighbours. The information gathered was subsequently synthesized and incorporated into the ESIA Study Report.

The Public baraza meetings (chapter 5) were done in order to incorporate the concerns and views of all individuals in the project neighbourhood. Further, key stakeholder consultations were conducted to incorporate views from key institutions such as the County Government of Machakos and Murang'a ; Local Community Based Organisations (CBOs)/Non-governmental Organisations (NGOs); heads of learning institutions and Local Administration (Chiefs and Assistant-Chiefs). It is anticipated that the proponent will ensure stakeholder engagement and consultations is applied throughout the project cycle.

1.8.3 Social impacts

The main types of social impacts anticipated by the proposed transmission line were grouped into five overlapping categories as follows:

- *Lifestyle Impacts* – on the way people behave and relate to family, friends and cohorts on a day-to-day basis;
- *Cultural Impacts*– on shared customs, obligations, values, language, religious belief and other elements which make a social or ethnic group distinct; this included: determining whether the proposed project passes near physical cultural resource sites recognized by the National Museums of Kenya (NMK).
- *Community Impacts* – on infrastructure, services, voluntary organizations, activity networks and cohesion;
- *Quality of life Impacts* – on sense of place, aesthetics and heritage, perception of belonging, security and liveability, and aspirations for the future;
- *Health Impacts* – on mental, physical and social well-being. This also entailed project-related activities that may directly, indirectly, and even cumulatively change community exposures to environment-based health risks, such as annoyance and noise and Electric and Magnetic Fields (EMF), and exposure to hazardous materials or conditions.

1.9 Data Analysis, Reporting and Documentation

Upon data collection, potential environmental and social impacts (both positive and adverse) were predicted based mainly on concerns raised by the public, stakeholders and expert observations on the ground and available tools. The magnitude, significance, and acceptability of predicted impacts were evaluated with a view to determine whether observed adverse impacts were significant enough to warrant mitigation. Impacts were further screened for occurrence and significance of residual (those which cannot be mitigated satisfactorily) and cumulative impacts with a view to provide a basis of making recommendations on the way forward for the project.

The ESIA study report compilation was a continuous exercise throughout the process until final submission. The study report was compiled from the field work and desktop review findings in accordance with the World Bank Environmental and Social Safeguards guidelines, KETRACO Environmental and Social Management Framework, relevant legislations and guidelines issued by NEMA for such works.

1.10 ESIA Organization and Structure

The overall study team leader coordinated the day-to-day functions and other related institutional support matters. The organogram of the study team and team structure was as presented below:

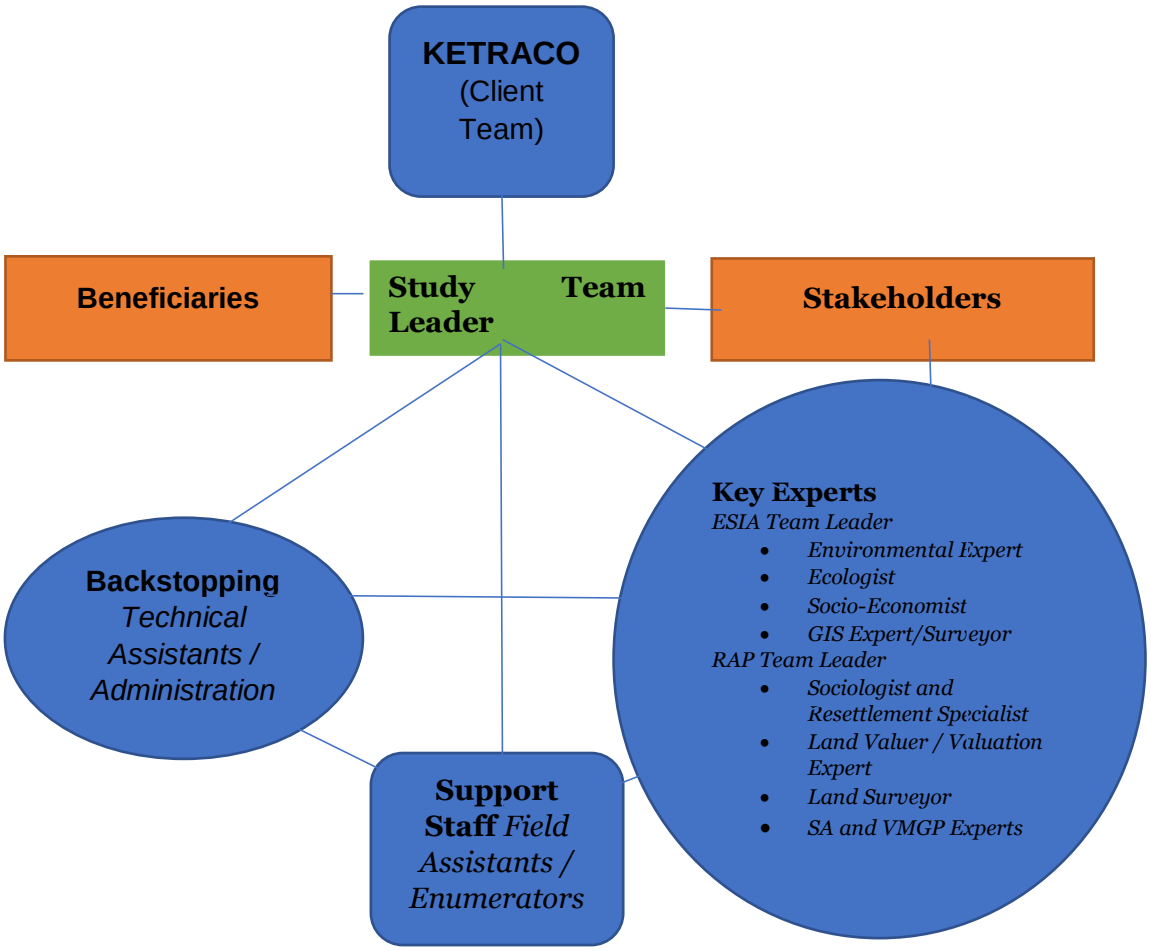


Figure 1-1 The Study team structure
Source – AWEMAC

1.11 The ESIA report structure

The ESIA report is concise and limited to significant environmental and social issues. The main text focuses on findings, conclusions and recommended actions, supported by annexed summaries of the data collected and citations for any references used in interpreting those data. Detailed or un-interpreted data has been presented in annexes. The ESIA study is as outlined below;

- *Chapter 1:* Gives Background Information to the Study Describing the Objectives and the Terms of Reference and Methodology for the Study
- *Chapter 2:* Project Description.
- *Chapter 3:* Outlines the Baseline Information of the Study Area.
- *Chapter 4*: Gives the Policy, Legal and Regulatory Framework Policy, Legal, Institutional and Administrative Framework.
- *Chapter 5*: Summarizes the outcome of the Stakeholder Engagement and Public Consultations process.
- *Chapter 6*: Identification of Environmental Impacts of the Project.
- *Chapter 7*: Identification of Social Impacts of the Project.
- *Chapter 8:* Proposed mitigation measures for a) Environmental Impacts and b) Social Impacts of the Project.
- *Chapter 9:* An analysis of Alternatives to the Project.
- *Chapter 10:* Environmental and Social Management Plan (ESMP).
- *Chapter 11:* Environmental and Social Monitoring Plan (ESMnP).
- *Chapter 12:* Concludes the findings and recaps the main recommendations.

2 PROJECT DESCRIPTION

2.1 Introduction

Kenya Electricity Transmission Company - KETRACO (the Client) has identified priority projects under the Least Cost Power Development Planning process and through feasibility studies. The transmission projects will provide reliability, enhance security of supply to the existing demand hubs in the country; expand transmission capacity necessary to enhance electrification initiatives and reduce technical losses in areas currently served by long medium voltage lines. The client plans to conduct detailed design, environmental and social studies on selected priority projects for development. The transmission lines have been divided into three separate packages for ease of work execution. The three packages and sub-components are as shown below;

Package 1

1. Approximately 140km 132kV Rumuruti-Maralal double circuit line and new substation at Maralal
2. Approximately 40km 132kV Kilgoris -Kehancha double circuit line and new 132/33kV substation at Kehancha
3. Installation of 1X23 MVA 132/33kV transformers at the existing Narok and Bomet substations.

Package 2

1. Approximately 111km 132kV Kabarnet-Rumuruti double circuit and associated substation extensions
2. Approximately 70km 132kV Menengai-Olkalou-Rumuruti double circuit line and new 132/33kV substation at Olkalou
3. Installation of a 1X110 MVA 220/132kV transformer at the existing Kitale substation

Package 3

1. Approximately 76 KM 220kV Malindi-Kilifi double circuit line and new 220/132kV substation at Kilifi
2. Approximately 80km 132kV Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala
3. Installation of 1X23 MVA 132/33kV transformers at existing Kyeni, Mwingi and Malindi substations.,

The Government of Kenya (GoK) is seeking financial support of US $ 370 million from the World Bank (WB) for the Kenya Electricity System Improvement Project (KESIP). This project is for a proposed implementation period of 5 years, from 2019 to 2024. The project aims to improve the power systems and electricity access and reliability in line with the Kenya Growth and Development Strategy. Under the Least Cost Power Development Plan (LCPDP) process and through feasibility studies, the Kenya Electricity Transmission Company Limited (KETRACO) and Kenya Power have identified priority projects for implementation through WB financing.

2.2 About Package 3

Package 3 subcomponents are as outlined in section 2.1. The map below shows the exact location of the proposed Package 3 transmission lines.

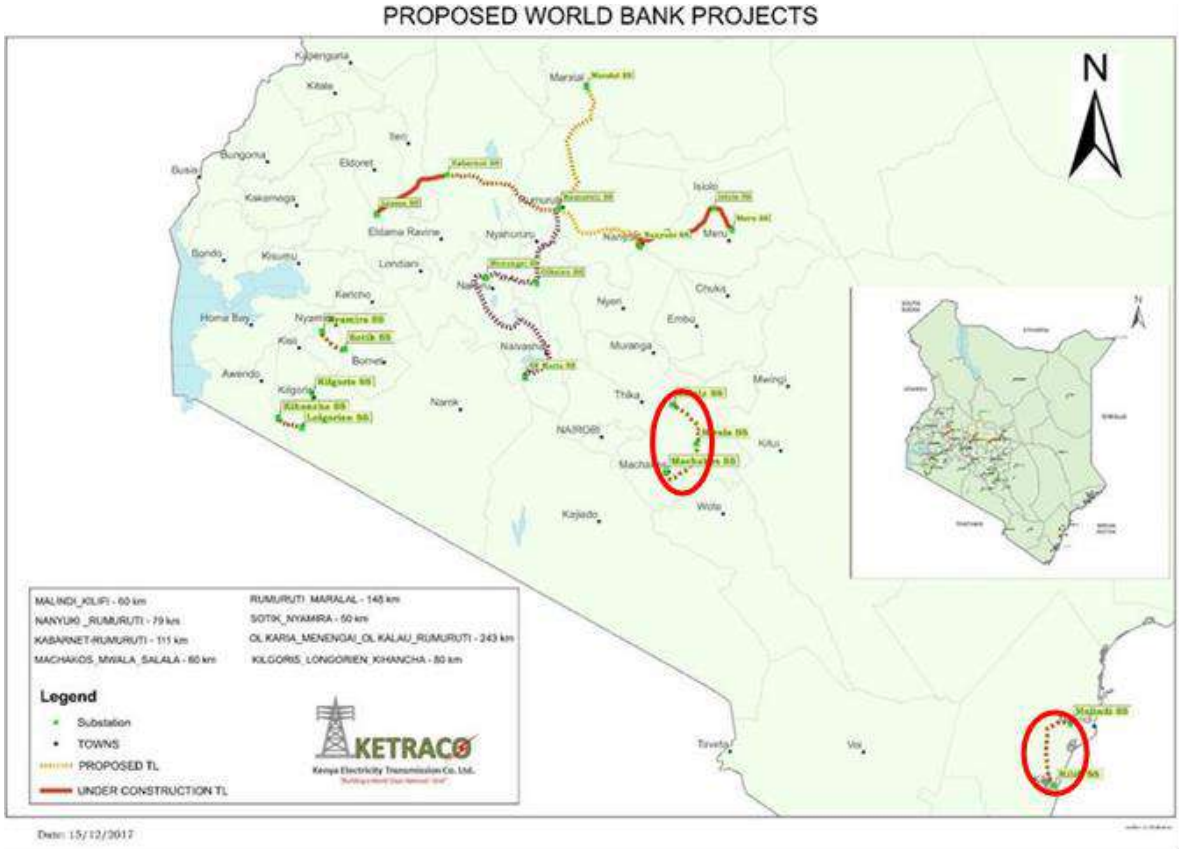


Figure 2-1 Approximate location of the two transmission lines
Source – KESIP TOR

This ESIA study has been prepared under package three (3) sub-project specifically for the approximately 80km 132kV Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala

2.3 The Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala;

The 132kV Machakos-Mwala-Ekalakala double circuit line measures 80 Kilometres with a way leave of 30 meters – 15 meters on both sides from the centre line. The line has 20 Angle Points (AP) highlighted in table 2-1. The line has five (5) major road crossings which include C97, C98, C 99, C 100 and A3 roads (figure 2-2). It also traverses through Athi River (figure 2-3) and other streams.

The subproject proposes a double circuit 132 kV transmission line to be established between Machakos 132/33kV substation to the existing Kindaruma - Mangu 132kV transmission line, with a new 132/33kV substation at Mwala, and extension of 132 kV substations at Machakos to introduce two 132kV line bays. The estimated capital cost of this sub-project is USD 44.34 million. The feasibility report notes that the economic benefits of supply do not seem to outweigh the project costs. The Survey report notes that the rationale for a transmission project in Machakos area is under-pinned by the following:

- Provision of alternative and shorter route for power evacuation from the Eastern Hydros complex to Machakos 132/33kV substation and onwards to Juja - Rabai 132 kV line which supplies the critical Kenya Pipeline Company pumping stations among other loads.
- Establishment of 132/33kV transformation capacity at Mwala substation will establish feeders to electrify new areas and meet currently unserved demand between Mwala and Kithimani while reinforcing the 33kV feeder supplying Matuu Ex. Mwingi 132/33kV substation as well as the Ngoliba/Kantafu and Kithimani areas currently on 11kV line Ex Muka Mukuu 33/11kV substation. In addition, this will relieve the long 33kV Masii feeder Ex Machakos 132/33kV substation that is inefficiently utilised, while reinforcing this

network with a robust 33kV system by shortening the distance by supplying it from Mwala as well as introducing additional feeders for the area.

Table 2-1 80km 132kV Machakos-Mwala-Ekalakala Angle points

Angle Point (AP)	Easting	Northing	County
MACHAKOS SSTN	304887.04	9827330.87	Machakos
AP1	306093.08	9826994.95	Machakos
AP2	307545.64	9826694.46	Machakos
AP3	312147.74	9827719.75	Machakos
AP4	314011.10	9828168.68	Machakos
AP5	319101.52	9831531.49	Machakos
AP6	319633.09	9832344.55	Machakos
AP7	320516.02	9834179.75	Machakos
AP8	324587.52	9839220.76	Machakos
AP9	325125.63	9840289.98	Machakos
AP10	326148.71	9842148.56	Machakos
AP11	327390.01	9843636.57	Machakos
MWALA SSTN	326872.22	9849853.34	Machakos
AP12	325819.06	9854978.82	Machakos
AP13	328987.90	9859942.50	Machakos
AP14	330117.07	9865464.87	Machakos
AP15	330936.32	9867491.25	Machakos
AP16	330623.51	9874182.93	Machakos
AP17	327608.06	9876803.88	Machakos
AP18	324046.47	9878493.60	Machakos
AP19	322283.91	9881797.10	Machakos
AP20	321320.62	9885298.45	Murang'a
T-OFF (@EKALAKALA	321320.62	9885298.45	Murang'a

Source: KETRACO, 2019.

Figure 2-2 80km 132kV Machakos-Mwala-Ekalakala – A3 Road crossing point

Source: AWEMAC

Figure 2-3 80km 132kV Machakos-Mwala-Ekalakala - Athi River crossing point

Source: AWEMAC

Plate 2-1 Machakos sub-station (SS)
Source: AWEMAC field survey

2.3.1 Project Location for Machakos-Mwala-Ekalakala double circuit line

The Machakos-Mwala-Ekalakala double circuit line and new 132/33kV substation at Mwala and Ekalakala is located in both Machakos and Murang'a County. The line commences at Machakos County with the last approximately 1.5Km of the line terminating in Murang'a County. The section ending at Murang'a is highlighted in red in the map below.

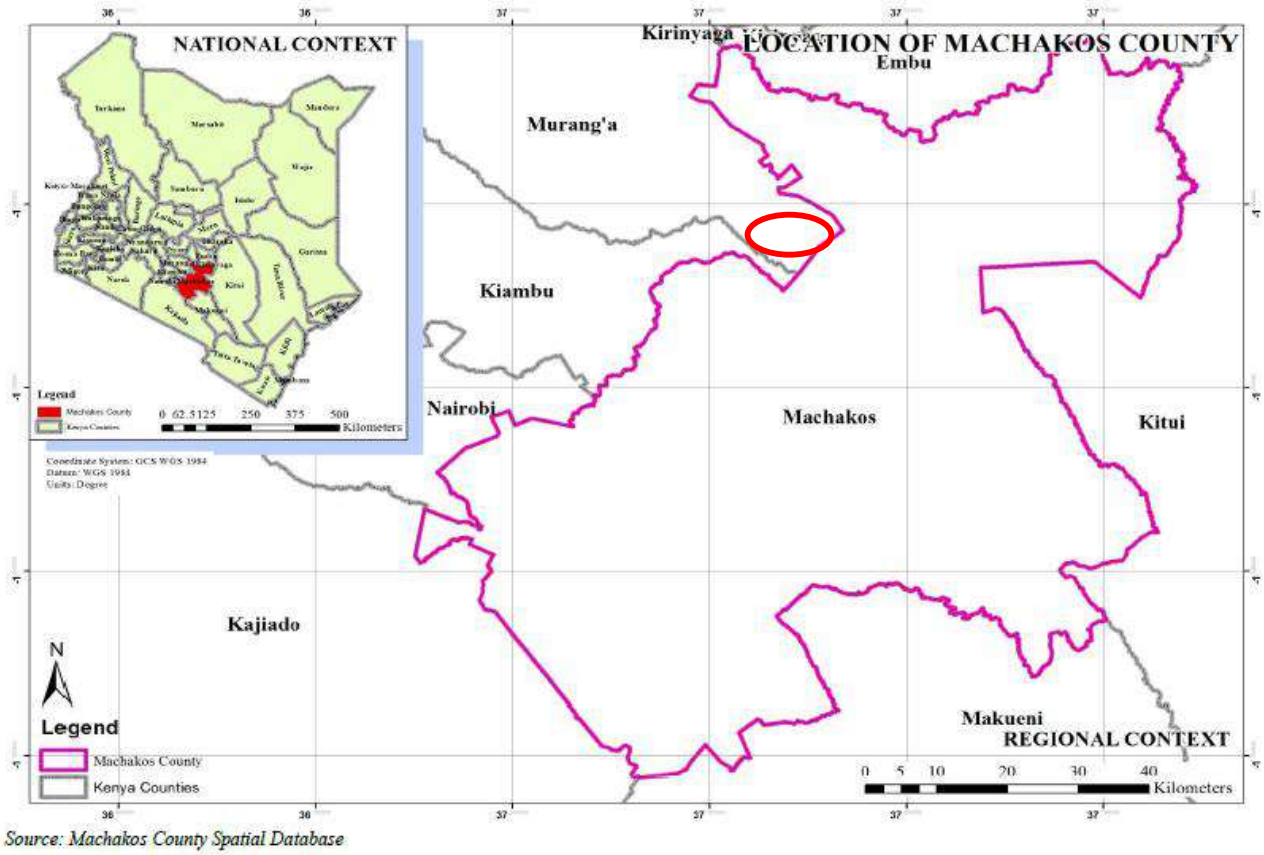


Figure 2-4 Machakos County and Murang'a County Map
Source: Machakos CIDP 2018-2022

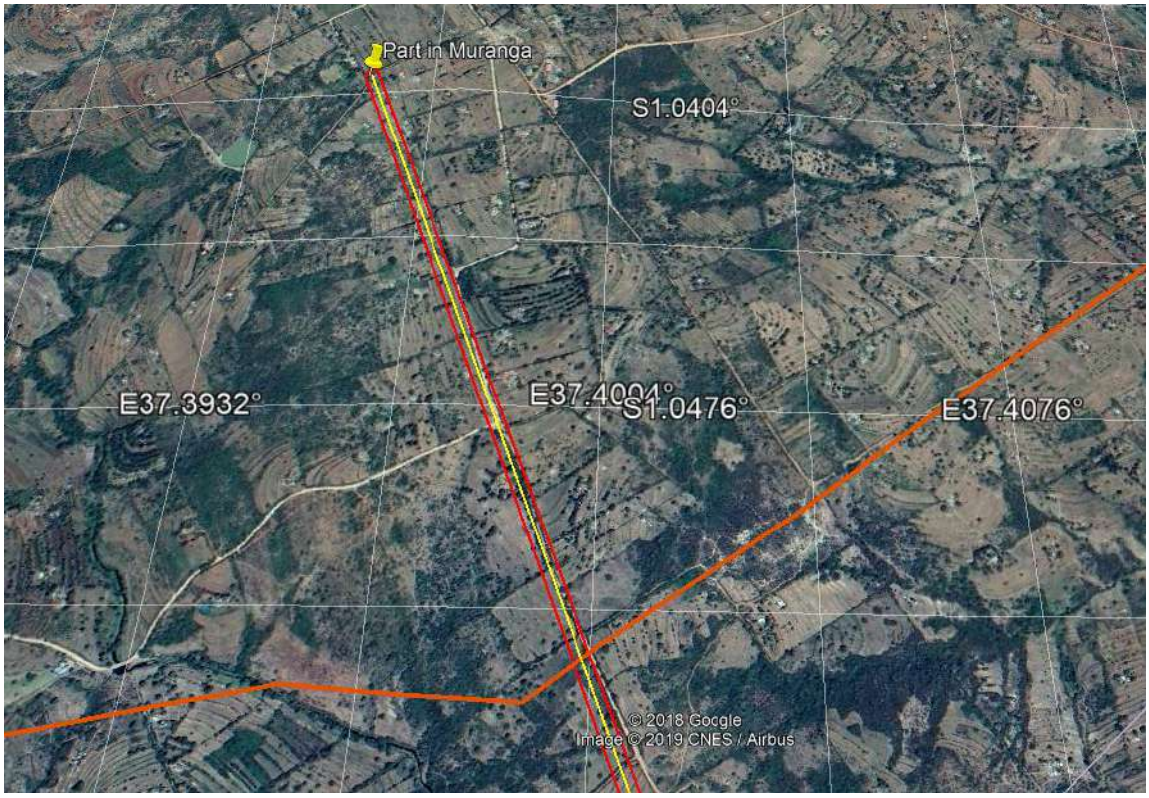


Figure 2-5 Part of Machakos KETRACO line in Murang'a County, 1.5km into Murang'a, near Kabati Area.

Source: AWEMAC GIS

2.3.2 Brief description of the transmission line

The line commences at the existing 132kV Machakos substation (SS) located off Machakos -Wote road within Katotoni area on the southern end of Machakos Town. The SS area is neighboured by Machakos dumping site, Machakos cemetery and former International Council for Research in Agroforestry (ICRAF) offices. Apart from being in the neighbourhood, the facilities are not within the right of way (RoW) hence not affected by the proposed transmission line. Instead, the proposed transmission line traverses the neighbouring land primarily used for agriculture with the vast of it under private ownership.

AP1 to AP5 denotes two basic land use structures which are rural and semi-urban. Rural set ups highlights presence of agriculture (arable) whereas the semi-urban showed characteristics of residential and semi-commercial zones mostly along the sections traversed by public utility roads. A few sections with woodlots were observed between AP1 and AP4

Agricultural land use zones were also noted at Ithanga area near Angle Point 6 (AP6) with several terracing notable from the hilly terrain. The area was also characterised by several parcels due to high subdivisions of land and settlements in the area. Within Kithimani area (AP14), the transmission line traverses hills dotted with shrubs and scanty thickets.

The community living between AP11 and AP12 are involved in livestock rearing / grazing and crop farming under small-scale irrigation. Irrigation in this area was noted to be carried out from existing seasonal rivers and streams traversed by the proposed transmission line. For instance, River Mui in Kitie Village has a sand dam constructed across it, approximately 500m from the proposed wayleave for use during the dry seasons.

Shrubs and bushes were noted within AP14 and AP15. The communities along the line mainly rely on shrubs as a source of fuelwood for cooking and charcoal production. Fruit trees noted were mainly mangoes, oranges and tangerines. There is also existence of both indigenous and exotic tree species. Some key species observed included different types of acacia.

Based on the Machakos – Ekalakala Keyhole Markup Language Zipped (KMZ) maps, the vegetation along the route is highly modified dry savannah due to human activities (settlements and agricultural activities). Forest / woodland segments are found between Kithimani and end of the proposed transmission line in Murang'a County. The line route was noted to likely harbour very low wildlife biodiversity due to its highly altered nature. No wildlife conservation parks, or reserves are located along this route. The transmission route line is mainly inhabited by small wildlife such as snakes, hares, with a variety of birdlife.

Evidently, the line traverses both Machakos County (from AP 1 to AP 19) and Murang'a County at AP 20. The main communities along the route include the Agikuyu and AKamba. The Akamba community are the most prevalent along transmission RoW. However, populations from other tribes including Luhya, Luo, Mbeere, and Meru can be found engaging in businesses in nearby towns and market centres such as Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Mukundi and Kambi Mawe. There are sparingly rural households within the ROW. Most of the structures are built of loam bricks with iron roofing. The study identified approximately 651 structures and a total of 591 land parcels that will be affected by the ROW of the proposed transmission line and associated facilities. The proposed transmission line traverses; the locations, sub-locations and villages as shown in table 2-2; -

Table 2-2 Locations, sub-locations and villages traversed by the proposed transmission line

SN.	County	Locations	Sub-Locations	Villages
1.	Machakos	Katheka Kai	▪ Mkuyu	Mkuyu
2.	Machakos	Kimutwa	▪ Kimutwa ▪ Kyansazu ▪ Kaathi	Love, Kitulu, Kyanzasu, Lower Kaathi, Upper Kaathi, Kamweleni, Kithuiyani, Kivutini, Malindi, Mwania, Makakoi
3.	Machakos	Iveti	▪ Kaani	Kaiani, Kasioni, Mathanthini, Mwenyea
4.	Machakos	Masii	▪ Kithangaini ▪ Mithini ▪ Utithini	Ithanga, Kasioni, Kikuyu, Kasaki, Kithangaini, Kitooni, Kivandini, Kyaaka, Kyaka, Masimbani, Mumoni
5.	Machakos	Mango	▪ Kyanganga	Kyanganga, Kitia, Kithaathai, Kathuma, Mwasua
6.	Machakos	Mwala	▪ Kamwala ▪ Kibau ▪ Mnyanyani	Ikalaasa, Kitie, Kivulusa, Kwa-Ngunzu, Kyoimbe, Kanduu, Mithumo, Mutuyu, Yanthooko, Ndiuni.
7.	Machakos	Mbiuni	▪ Kabaa ▪ Mumbini	Kalenga, Kamuya, Kitw'amba, Kyangii, Mavindini, Munyiiki
8.	Machakos	Kithimani	▪ Kambi-ya-Ndege ▪ Kithendi	Languni Kauthuilini, Kiaoni, Kwa-kitema, Kwa-kithembe, Kwa Muutu, Nguliba, Scheme, Utumo Utheke, Kyumbuni.
9.	Machakos	Ndalani	▪ Mamba	Ndivu, Mavia-atuta, Mamba, Languni, Kathangathini, Veto
10.	Machakos	Mavoloni	▪ Mavoloni	Mbuno, Kithuiani, Wendano wa Mitini, utithini, Muusini, Vomboni.
11.	Murang'a	Kakuzi	▪ Gituamba	Mukundi, Kwa Mukundi

Source - AWEMAC field Survey

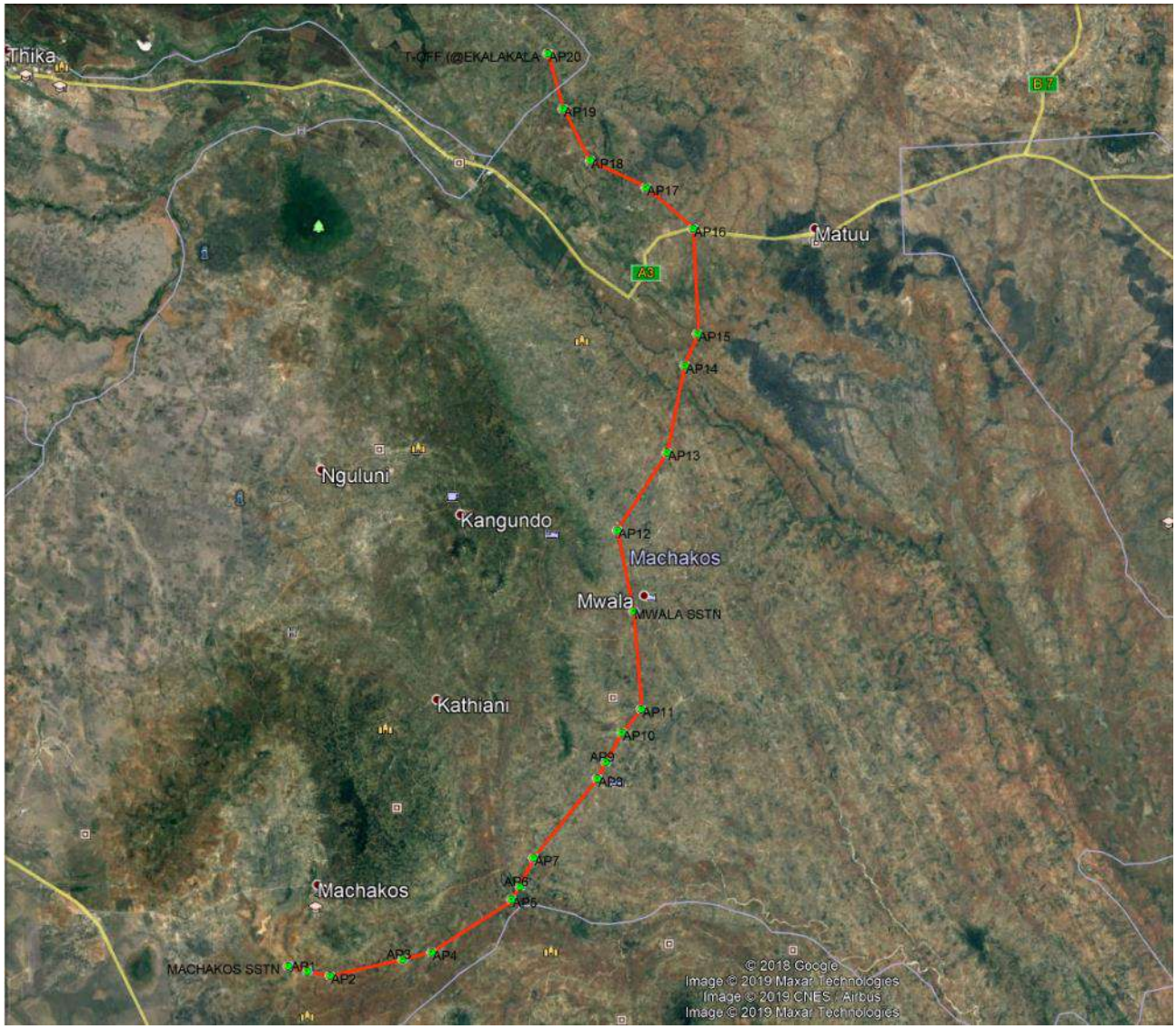


Figure 2-6 Machakos-Mwala-Ekalakala Transmission route (in red)

Source: AWEMAC GIS

2.4 Major activities, inputs and Outputs

The major activities, inputs and outputs involved in laying down the power transmission line and substation in the construction, operation, and decommissioning
phases of the project are as highlighted in table 2-3.

Table 2-3 Activities inputs and outputs during the project

Phase	Inputs / Products	Key Activities	Outputs / By products
Construction	• A construction labour force (of both skilled, semi-skilled and unskilled workers). • General(Raw construction materials e.g. sand, cement, natural building stone blocks, hard core, gravel, concrete among others; Timber (e.g. doors and frames, fixed furniture, etc.) for substations, Paints, solvents, white wash, etc.) • Land (Substation site and Row) • Construction materials (Electrical Power transformers; Instrument transformers; Conductors& Insulators; Isolators; Power control equipment; Lightning arresters; Circuit breakers; Capacitor banks and miscellaneous equipment) • Transmission Line (Transmission tower / Pylons; Circuits; Insulators Conductors; Bundled conductors; Insulated conductors and cable)	• Construction of sub-station: These involve clearing and excavation of soil layer to create a stable stratum for the transformers. Vegetation on the sites would be cleared. • Delivery of construction materials and fittings to the construction site • Manual and mechanical excavation at project site • Temporary stockpiling of soils, sub-soils and stones • Delivery of material for bedding of concrete joints and associated steel(e.g. sand, cement, and concrete) • Construction of Right-of-Way (ROW) (Way leave): clearing of tall vegetation is undertaken along designated RoW. • Relocation of households and land Easements • Grading of the landscape might be done to allow vehicles to drop equipment along the power line. • Vegetation would be destroyed along the proposed power line and access roads. • Anchoring of pylons: excavation of corner holes for anchoring pylons is done throughout the proposed power line. • Areas where pylons will be anchored would be affected through removal of vegetation and soils. • Operation of vehicles and other construction machinery: transportation of equipment and material to site	• Liquid Waste (Hazardous Waste, Sewage) • Solid Waste (Metallic, Steel, packaging Materials, Food waste, Organic / vegetation Waste) • Emissions from vehicles include CO, NOx, SO2, and VOCs. •
Operation	• An Operation and Maintenance labour force	• Repair and maintenance of the transmission line • Bush and vegetation clearing along RoW	• Energy Transmission

Phase	Inputs / Products	Key Activities	Outputs / By products
	(of both skilled, semi-skilled and unskilled workers). • Maintenance materials Transmission tower / Pylons; Circuits; Insulators Conductors; Bundled conductors; Insulated conductors and cable)	• Control of human population encroachment along the RoW • Repair of damaged pylons and conductors • Operation of substation and power transmission lines:	• Solid Waste Liquid Waste (Hazardous Waste, Sewage) • Solid Waste (Metallic, Steel, packaging Materials, Food waste, Organic / vegetation Waste) • Emissions from vehicles include CO, NOx, SO2, and VOCs
Decommissioning	• Skilled, semi-skilled and Non-skilled Labour • Decommissioning materials	• Excavation works • Temporary stockpiling of soils, sub-soils and stones along the trenches • Demolition of concrete joints and other civil works • Transportation of removed conductors • Removal of solid wastes (i.e. earth material and civil wastes) from the RoW • Rehabilitation of the RoW	• Solid Waste Liquid Waste (Hazardous Waste, Sewage) • Solid Waste (Metallic, Steel, packaging Materials, Food waste, Organic / vegetation Waste) • Emissions from vehicles include CO, NOx, SO2, and VOCs • Demolition wastes; Excavated soils and vegetation; Construction equipment maintenance wastes; Dusts; Packaging materials, etc.

Source - AWEMAC

3 BASELINE INFORMATION

3.1 Introduction

This chapter describes the current environmental and socio-cultural setting along route proposed for the transmission line. The information presented here has been obtained from primary and secondary sources. The Consultant has assembled, evaluated and presented baseline data on the relevant environmental and socio-economic characteristics of the transmission route and surrounding areas of influence. This section highlights data obtained during the detailed baseline survey. In brief the chapter is outlined as follows;

- Physical Environment – topography, landforms, geology, soils climate and meteorology, air quality, hydrology etc.;
- Biological Environment - i.e. fauna and flora types and diversity, endangered species, sensitive habitats, wildlife within protected areas and other dispersal areas etc.; and
- Social and cultural environment (including present and projected, where appropriate) - i.e., population, land use, planned development activities within the subproject area, community structure, employment and labour market, sources and distribution of income, cultural properties etc.

3.2 Physical Environment

The physical environment describes the topography, landforms geology, soils, climate and meteorology, air quality, and hydrology.

3.2.1 Topographic Features and soils

Machakos County has very unique physical and topographical features. Hills and a small plateau rising to 1800-2100m above sea level constitute the Central part of the County. To the West, the County has a large plateau elevated to about 1700m which slopes to the South-East. The County rises from 790 to 1594 m above sea level. In the North West the County has stand-alone hills. Machakos County is home to the Yatta plateau.

Murang'a County lies between 3,353m above sea level, in the West along the slopes of Aberdare Mountains and 914m ASL in the East. The western highlands have deep dissected topography and drain into various rivers. These rivers flow from Aberdare ranges to the West, South Eastward and drain into Tana River. The County's geology and basement system comprises of volcanic rocks of the Pleistocene age and Achaean rock type respectively (Murang'a CIDP 2018-2022).

The topography of the proposed transmission line alignment can be divided into highland and lowland areas with altitude ranging from 400m and 1800m above sea level. AP1 to AP7, which are within the vicinity Machakos and Masii towns, are characterized by hilly ridges separated by wide, low lying areas with an elevation of between 1319m and 1531m above sea level. However, yatta region, which stretches from AP13 to AP17, is generally a flat land with a topography of between 1175m-1197m a.s.l. Well drained soils are notable as you approach Kakuzi location, Kwa Mukundi village in Murang'a County (AP 20). The hilltops along the transmission line alignment forms the main relief features and affect the rainfall regimes within the transmission alignment. The Yatta plateau, which stretches from the north to the south separating the Athi and Tana River basins, forms another relief feature. The plateau is almost plain with wide shallow spaced valleys. The proposed transmission line alignment receives varying amounts of rains with high altitude areas such as from AP1 to AP7 receiving relatively high amount of rains. In the plains, the soils are well-drained, shallow, dark and red clay soils.

The proposed project area is characterised by steep hills and valleys between AP1 and AP13. Because of the slopes, soils are prone to erosion thus the locals have adopted terraces on their farms to prevent this. Some households were not easily accessible, and infrastructure development has been obstructed by different terrain features in the project area. The topography in the project area has aggravated some natural hazards such as intense floods during rainy season, which is attributed to presence of many dry rivers and streams. Also, the landscape in some parts of the

proposed project corridor is spread with rock outcrops, this has limited meaningful socio-economic activities.

Plate 3-1 Terraces characterizing most of the hilly landscapes in the proposed project area
Source – AWEMAC Field Survey

Mua Hills, Mutituni, Ngelani, Mita Boni, Kakuyuni, Vyulya, Mwala, Wamunyu, Yathui, Muthetheni, Masii, Kakuzi, Mavoloni, Ikaatini, Kakuzi and Kangonde have got well drained, Migamatte rock. This indicates that well drained, Migamatte rock covers large area in Machakos County. Intermediate Igneous rock is mostly found along Athi River and some parts of Kanzalu, Kyanzavi and Mbiuni. Poorly drained, Quartzite is found at Konza, Mikuyu, Masaku and Mumbuni (figure 3-1).

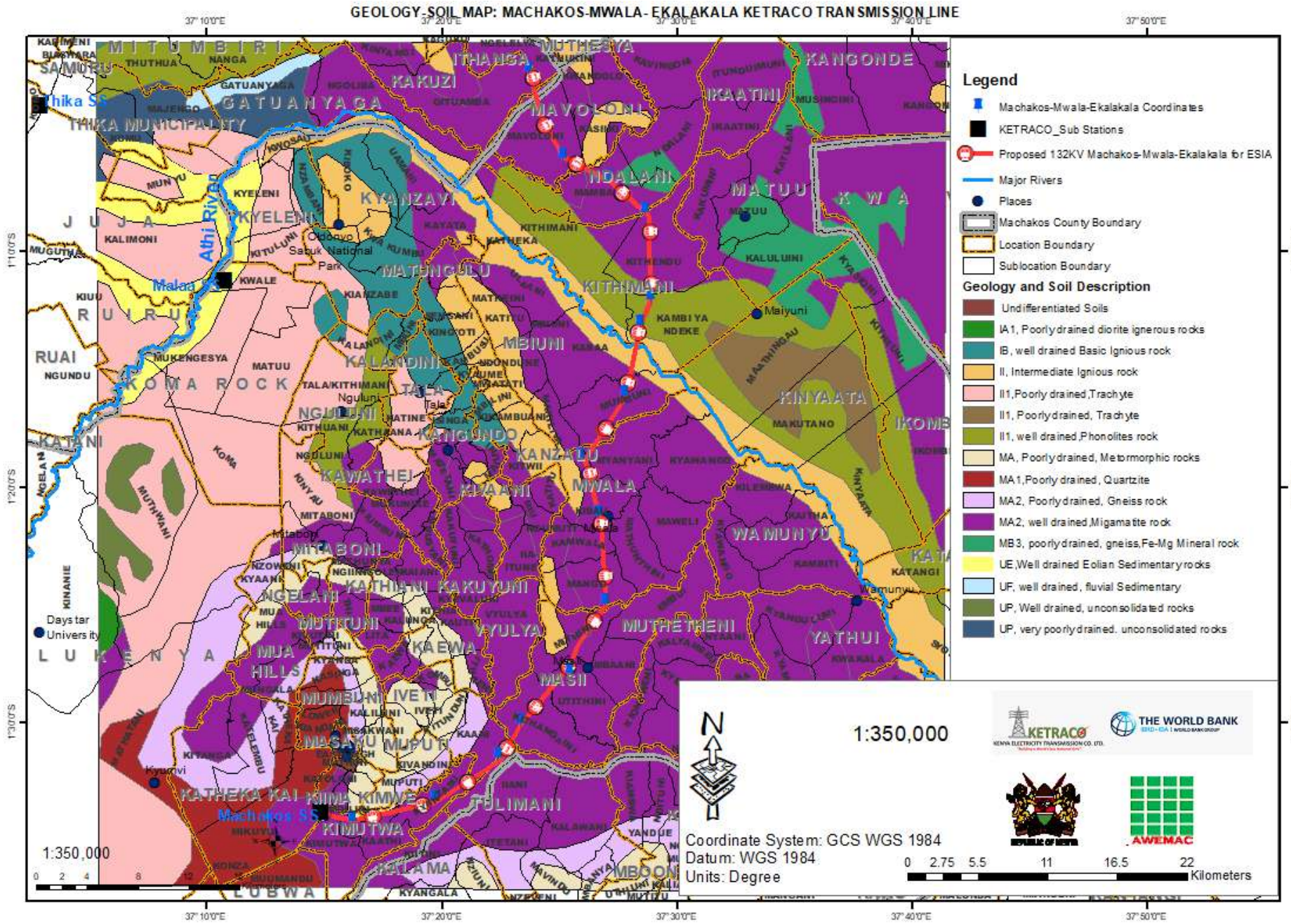


Figure 3-1: Geology and soil along the proposed project area

Source: AWEMAC GIS

Mua Hills, Mutituni, Ngelani, Mita Boni, Kakuyuni, Vyulya, Mwala, Wamunyu, Yathui, Muthetheni, Masii, Kakuzi, Mavoloni, Ikaatini, Kakuzi and Kangonde have got well drained, Migamatte rock. This indicates that well drained Migamatte rock covers a large area in Machakos County. Intermediate Ignious rock is mostly found along Athi River and some parts of Kanzalu, Kyanzavi and Mbiuni. Poorly drained, Quartzite is found at Konza, Mikuyu, Masaku and Mumbuni.

Plate 3-2: Mavoloni Hills in Mavoloni Location at the neighbourhood of AP18
Source – AWEMAC Field Survey

3.2.2 Drainage flow

Athi and Thika River form the main drainage basins along the transmission line alignment. Virtually all of the permanent and seasonal rivers such as Thwake, Muthini, Mukewo, Kamula, Kitulu, Kyalui, Ikiwe, Uvila, Kathuluni amongst others drain into the Athi or Thika river. Permanent rivers such as Athi and Thika are characterized by moderate flows and very high flows during the dry and wet seasons respectively. Seasonal rivers are characterized by low or no flows (base flows) in dry season and high flows during rainy seasons, i.e. April-May and November-December. Most of the ephemeral streams generally become dry within one month after the rainy season (Borst and De Haas, 2006). The flows are usually fast and turbid due to high sediment concentration associated with soil erosion in the catchment area (Machakos CIDP 2018-2022).

Areas such as Oldonyo Sabok, Lita, Kaliluni, Kivutini, Mumbuni, Mua Hills and Kimwe exhibit high Digital terrain value as compared to Mumbuni, Mwala, Wamuyu, Mbiuni, Ikombe and Matuu that manifest low Digital terrain value. The general flow is North _West to South East as indicated by Athi River which dissects the proposed power line around Kambi ya Ndege area in Kithimani location (figure 3-2)

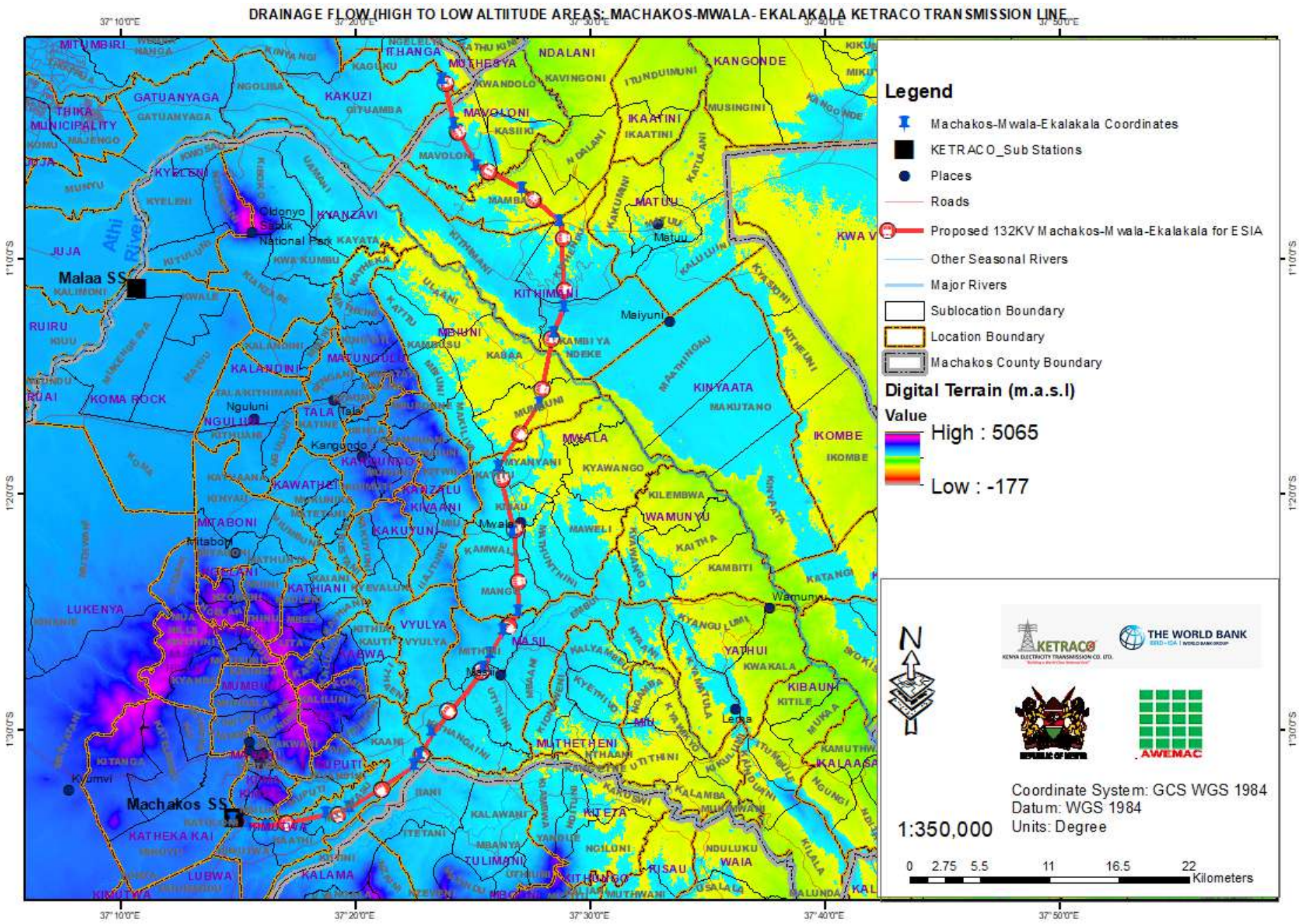


Figure 3-2 Drainage flow along the proposed project area

Source: AWEMAC GIS

3.2.3 Climatic Conditions – (Rainfall, temperature)

The climate of the proposed project area is hot and dry with low-moderate rainfall depending on the altitude. The area has two rainy seasons with two peaks in April-May (long rains) and November-December (short rains). The rest of the year is hot and dry. The rainfall ranges from 500 mm to 1050 mm with 40-percent reliability. Air temperature ranges between 16°C and 34°C with mean maxima of 28°C and minima of 22°C. Relatively lower temperatures are experienced between June and August while high temperatures are experienced in January-March and September-October, peaking just before the onset of rains. The highest temperatures are experienced in February. The prevailing wind is generally easterly but its direction at the site is often influenced by the many small hills found in its immediate vicinity. Wind speed is approximately 15 km hr^{-1} (Machakos CIDP 2018-2022).

Murang'a County has three climatic regions: the western region with an equatorial type of climate, the central region with a sub-tropical climate and the eastern part with semi-arid conditions. The Western region where the proposed line terminates covering Gatanga, is generally wet and humid (Murang'a CIDP 2018-2022).

3.2.4 Water

This section describes existing water resources, status, water sources and water supply schemes, in Machakos County.

3.2.4.1 Water Resources

Machakos County is a water scarce County with its water situation levels below the national natural endowment of 647m^3 per capita per year. Its arid and semi-arid areas are critically limited in water endowment. The water stress adversely affects food production and often disrupts economic development. Water resources in the County are mainly seasonal rivers, dams and springs. In addition, there are two perennial rivers: Athi River and Tana River at boundary with Embu and Tharaka Nithi counties. The major dams include Maruba and Masinga dams. Maruba is the main source of water consumed in Machakos town whereas Masinga dam along Tana River is shared between Machakos and Embu counties. There are several earth dams and springs across the County which serve as water resources. Underground water sources (boreholes and wells) supplement surface water sources. Most of these water sources are under threat of pollution from agricultural chemicals, urban and industrial wastes. For instance, Athi River which is traversed by the proposed transmission line is highly susceptible to pollution from Nairobi city and adjacent towns. The water resources are also under pressure for use in agricultural irrigation, domestic, industrial and use for hydroelectric power generation (Machakos CIDP 2018-2022).

Murang'a County's water resources are rivers, shallow wells, springs, dams, boreholes and roof catchment. There are 10 permanent rivers, 400 shallow wells, 75 springs, 30 dams and 100 bore holes that supply water for domestic and agricultural use in the county. All these sources supply 60 per cent of the county population with clean and safe drinking water (Murang'a CIDP 2018-2022).

Plate 3-3 A section of Athi River in the neighbourhood of AP14
Source – AWEMAC Field Survey

There are several water resources found along the proposed transmission line (fig 3-3). These resources include rivers (seasonal and perennial), canal, streams, swamps, springs, dams, water pans, and boreholes.

The proposed transmission route traverses several seasonal rivers such as river Mwania, Kyangama, Mikuyuni, Kilwalwa, Ikiwe, Thwake, Mutitu, Mithini, Iwe, Mui, Ilui, Kambaithe, Kyanganga, Ndumboli, Nditha, Kavoke, Muti and Kavoke. River Mwania serves Mwania, Love and Kathi villages in kalama Ward. Ikiwe River serves Malindi, Kasioni and Mwenyea villages. River Mwania -Ikiwe running through Machakos Central, Kimutwa location was noted to be one of the largest seasonal rivers in the project area. Ilui River crosses through Makakoi, Malindi and Kamweleni villages. Kauthuluni stream meanders along the proposed RoW in Kauthuluni village and traverses Nguliva and Utumo-Utheke villages. River Kavoke, a seasonal stream, separates Muliluni and Kithuiani villages in Mavoloni Location. Muti River separates Kithuiani and kithambioni villages in Mavoloni location. Kavoke stream is also found in Muliluni and Kithunguni villages in Mavoloni Location. River Nditha forms part of the boundary of Mumbuni and Kabaa sub-locations. River Mukeuo forms part of the boundary of Kyanzasu and Kamweleni villages.

The seasonal rivers are mainly utilised by the locals for both irrigation and domestic use. Locals noted that the seasonal rivers are prone to flooding during rainy periods and drying during drought seasons. The major perennial rivers traversed by the transmission line include Athi River and Thika River. River Thika is the main source of water for Yatta Canal found within the project area. The Canal supplies water for irrigation and domestic use to households Kithendu and Kambi ya Ndege sub-locations in Kithimani location along the proposed transmission line area.

Due to the arid and semi-arid nature of the proposed transmission route project area, the residents undertake various water harvesting techniques for both domestic and irrigation purposes. The water harvesting techniques include constructing earth dams, check dams, water pans, ponds and investment in rainwater harvesting tanks. Some of the dams include Kitulu dam in Kyanzasu village, Mutitu dam in Kayani village, Masimba dam in Masimba village and Kwa Mbuno dam in Ikalaasa village. Kitulu dam in Kyanzasu village is a community dam that was constructed in 1954 by the British during the colonial period. Water drinking points for livestock and a dysfunctional water dip were observed a few metres from Kitulu dam. Mutitu dam serves Kayani village in Kaani

Sub-location whereas Masimba dam serves Masimba village. Kwa Mbuno dam (Plate 3-4) in Ikalaasa village (near AP 18) in Mwala Sub-county, is privately owned and used for irrigation. A sand dam constructed on Mui River in Kitie village was also noted mainly used by residents as source of water for growing vegetables.

Plate 3-4 Kwa Mbuno Dam in Mavoloni Location
Source – AWEMAC Field Survey

There was presence of a borehole in Kyanzasu (GPS coordinates -1.544556, 37.346333) in Kitulu dam's vicinity. The locals noted that it was constructed by the area's Member of Parliament while the community members developed the pipeline for domestic use. The water is charged at the rate of 5 Kenyan Shillings for a 20-litre container. Kitulu borehole is also a source of water in Kyanzasu sub-location found adjacent the proposed RoW. It was noted during the locals' interviews and public participation exercise, that Kwangunzu and Kithooko villages in Kibau sub-location, Mwala location, were characterized by a high-water table. This facilitated the locals to easily access underground water through wells and boreholes. Presence of springs was noted in some areas of Mithini Sub-location. Several water ponds were observed in Kyanganga village. The residents noted that the water ponds were constructed by the National Irrigation Board for the locals to enhance farming activities in the area. Field observations and local elders' consultations indicated, residents in the region embrace rainwater harvesting and have installed water tanks that draw water from rooftops during the rainy season.

Plate 3-5 A community water borehole with a storage tank in Kyanzasu village
Source – AWEMAC Field Survey

As per the socio-economic baseline survey, rivers, streams, ponds, dams and water canal were highlighted as the main sources of water at 68.3% within the proposed transmission route. The boreholes accounts for approximately 21% (table 3-1).

Table 3-1 Source of water over the past one year

Main source of water	Count	Count as a Percentage
Borehole	57	21.0%
Bottled Water	1	0.4%
Cart with small Tank/Drum	4	1.5%
Piped into dwelling	5	1.8%
Piped into Plot/Yard	5	1.8%
Protected Spring	1	0.4%
Protected Well	6	2.2%
River/Stream/Pond/Dam/Canal	185	68.3%
Tanker Truck	3	1.1%
Unprotected Well	4	1.5%
Grand Total	271	100%

Source – AWEMAC Field Survey

Notably the proposed transmission line traverses water sources including rivers (seasonal and perennial), canal, streams, swamps, springs, dams, water pans, and boreholes. The water resources in the project area are used for both domestic and irrigation. Taking into consideration water accessibility in the County, it will be prudent for the project contractor to establish and use sources of water such as digging boreholes that will avert any competition with the local community or be a potential for water resource conflict between residents, livelihood sources (livestock, irrigation, cropping) and the transmission project. Sourcing of water from the rivers and streams should be done in line with the legal requirements without compromising the local community accessibility and usage. Establishing of water sources (boreholes) should also be preferably done in mind of community needs. Notably, elders highlighted the appreciation of transferring boreholes for use by local community after the project.

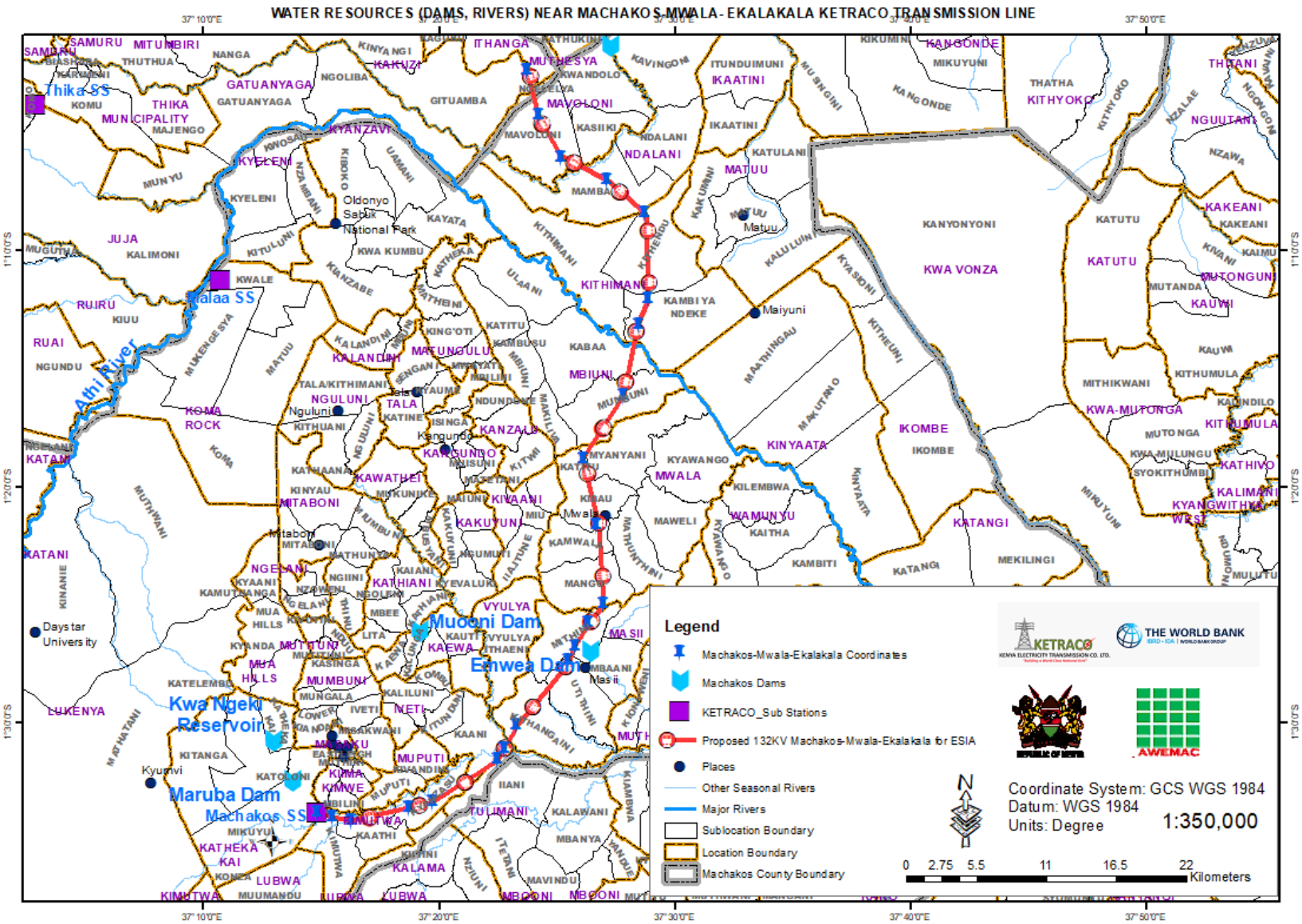


Figure 3-3 Water resources along the proposed project area

Source: AWEMAC GIS

3.2.4.2 Water Supply Schemes

There are various water supply schemes managed by water companies in Machakos County. These are Machakos Water & Sewerage Company (MACHWASCO); Mavoko Water & Sewerage Company (MAVWASCO), Yatta Water Company (YAWACO), Matungulu-Kangundo Water & Sanitation Company (MAKAWASCO), Mwala Water & Sanitation Company (MWAWASCO), Kathiani Water & Sanitation Company Ltd (KAWASCO) and other various community water supply schemes. Water companies, also known as Water Service Providers (WSPs) are officially under the County Government as per the Water Act 2016 (Machakos CIDP 2018-2022).

Climate change factor has played a major role in increasing the average distance to the nearest water source especially in rural areas. Previously, the overall average distance to the nearest water source was six (6) kilometres but with the implementation of county water programme, this has reduced to an average of one (1) kilometre.

In Murang'a County water supply schemes are managed by three different entities. There are some which are managed by the water companies, the department of water and others by the community members through water project committee. In the county, the mean distance to the nearest water point is 3 Km with about 29.4per cent of the households taking five to 14 minutes. Water supply schemes such as the Gatanga community water schemes supply water directly to households at reasonable cost (Murang'a CIDP 2018-2022).

The socio-economic survey identified that approximately 25.6% of households buy water at an average of 5 (five) Kenya Shillings, making it the most common price per a 20 litre Jerrican of water. 73% of the respondents' fetch water per day while only 3% fetch water per month. 95% of the respondents walk about a kilometre to access water sources. This is well within the (WHO, 2003) recommendation of within 1000metres.

Table 3-2 Price of water per twenty litre jerrican

Cost (Ksh.)/20 litres	Number of Buyers	Number as a Percentage
3	16	9.1%
5	45	25.6%
10	35	19.9%
15	5	2.8%
20	43	24.4%
25	22	12.5%
30	8	4.5%
50	1	0.6%
60	1	0.6%
Grand Total	176	100%

Source – AWEMAC Field Survey

Table 3-3 Frequency of fetching water

Frequency	Number of times	Number as a Percentage
Per Day	198	73%
Per Month	7	3%
Per Week	66	24%
Grand Total	271	100%

Source – AWEMAC Field Survey

Table 3-4 Distance covered to a water source

Distance	Number of respondents covering distance
0	5
0.1	4
0.2	5
0.3	14
0.4	2
0.5	12
0.6	5
0.7	1
0.8	2
0.9	1
1	95
1.2	1
1.5	3
2	67
2.5	1
3	16
4	5
5	16
6	1
10	1
12	2
16	1
20	1
Total: 88.7KM	261

Source – AWEMAC Field Survey

Plate 3-6 A water kiosks used in the proposed project area
Source – AWEMAC Field Survey

3.2.5 Land Ownership Categories/ Classification

Land is a very important factor of production in the economy. It is mostly used for agriculture, livestock keeping, ranching, industrialization, mining, forestry, government reserve, housing and urban development. The absence of a county spatial planning framework in Machakos has led to the proliferation of informal settlements, congestion, environmental degradation, unplanned urban centers, pressure on agricultural land and land use conflicts.

According to Kenya Integrated Household Budget Survey (KIHBS) 2015/2016, Machakos County has 57.4% of proportion of parcels with title deeds. The most affected administrative wards without title deeds are Athi River, Machakos Central and Kathiani Central. This has led to land ownership conflicts among interested parties. Most landlessness incidences are prevalent in urban areas such as some parts of Machakos Town, Mavoko and Matungulu Sub-counties. Landlessness in the County is being contributed by high population and urbanization (Machakos CIDP 2018-2022). Murang'a County is predominantly agricultural therefore, land holding is considered important. It is estimated that about 33,000 farmers (13.2%) have title deeds with a population of about 250,000 farmers (Murang'a CIDP 2018-2022).

Qualitative sources of information confirmed that most land and property owners in the project area have legal land ownership documents, while a number lack ownership documents. Those without land ownership were attributed to delayed subdivision from inheritance. The key respondent also alleged that land disputes might be common amongst families due to contested land tenure: indications that although they live on the land by history, they do not have formal land ownership documents. This was also echoed during socio-economic survey with locals expressing fear that they do not hold title deeds to their land which might hinder compensation. Land disputes and lack of land ownership documents may pose a challenge of ownership confirmation during RAP implementation which might delay compensation of some of the PAPs. According to NLC, lack of title deeds can be attributed to many counties (Machakos and Murang'a County included) which are yet to develop County Spatial Plans due to limitation of funds and capacity to undertake development of the Spatial Plans. Other main challenges to registration include budgetary constraints, inadequate capacity especially in technical areas of survey and planning, and ethnic and clan differences in areas of community land, among others.

The Kenyan Constitution 2010 notes that all land in Kenya belongs to the people of Kenya collectively as a nation, as communities, and as individuals. Land in Kenya including both Machakos and Murang'a Counties is classified as public, community, or private. The proposed transmission line traverses two categories of land (private and public) with the most affected being privately owned land. Some parcels of land with public facilities such as Mikuyuni Primary School whose section of the playing ground and school gate are within the RoW. Akamba Peace Museum in Kyanzasu, though privately owned, it is said to be of community benefit. Although falling under private land, there are Self-Help Groups such as Wumiisyo and Kyeni, whose structures are affected. Some public schools such as Kamweleni Primary and Secondary School, Kyanganga Primary, and Secondary Schools are approximately one (1) kilometre away from the project corridor hence it is likely they could be indirectly affected by some of the project activities.

According to the draft RAP report for Machakos -Mwala - Ekalakala Transmission Line, members of self -help groups including officials/leaders attended community PAPs meetings and signed attendance sheets. For the 4 self-help groups affected by the project, the compensation will be paid to the association account. Self Help Groups-;

1. Ndalani Location: Unity Self Help Group-Mamba Settlement Scheme/10. Affected land only
2. Mavoloni Location: Beach View Self Help Group-Machakos/Ndalani/411. Affected land only
3. Iveti Location: Umisyo Self Help Group-Machakos/Kaani/616. Affected land, structure and business
4. Iveti Location: Kyani Self Help Group-Machakos/Kaani/616 Affected land, structure and business

Notably, members of Self-Help Groups attended the PAP meetings where issue of compensation via association account was discussed, and they were comfortable with it. Table below shows the total number of project affected persons (PAPs) physical structures affected per county and location, respectively.

Table 3-5 The total number of structures affected

County	Location	Permanent	Semi-permanent	Temporary	Services (watering points)	Burial sites	Wells	Total
Machakos	Kimutwa	26	39	22	-	1	-	**88**
Machakos	Iveti	15	47	22	-	-	-	**84**
Machakos	Masii	9	58	22	2	-	-	**91**
Machakos	Mango	0	29	2	-	-	-	**31**
Machakos	Mwala	4	84	21	1	5	1	**117**
Machakos	Mbiuni	8	52	15	-	-	-	**75**
Machakos	Kithimani	19	62	13	-	-	-	**94**
Machakos	Ndalani	3	15	1	-	-	-	**19**
Machakos	Mavoloni	3	24	13	-	-	-	**40**
Murang'a	Kakuzi	1	8	3	-	-	-	**12**
	Total	**88**	**418**	**134**	**3**	**6**	**1**	**651**

Source – Draft RAP report for Machakos -Mwala - Ekalakala Transmission Line

There are diverse business enterprises within the proposed transmission line alignment. The most affected are small-scale household farming which includes growing of crops and woodlots. These should be considered explicitly for compensation during the RAP implementation. Other enterprises affected by the project are retail shops mainly owned by households. These too should be compensated under wayleaves compensation.

Table 3-6 Summary of business structures affected-:

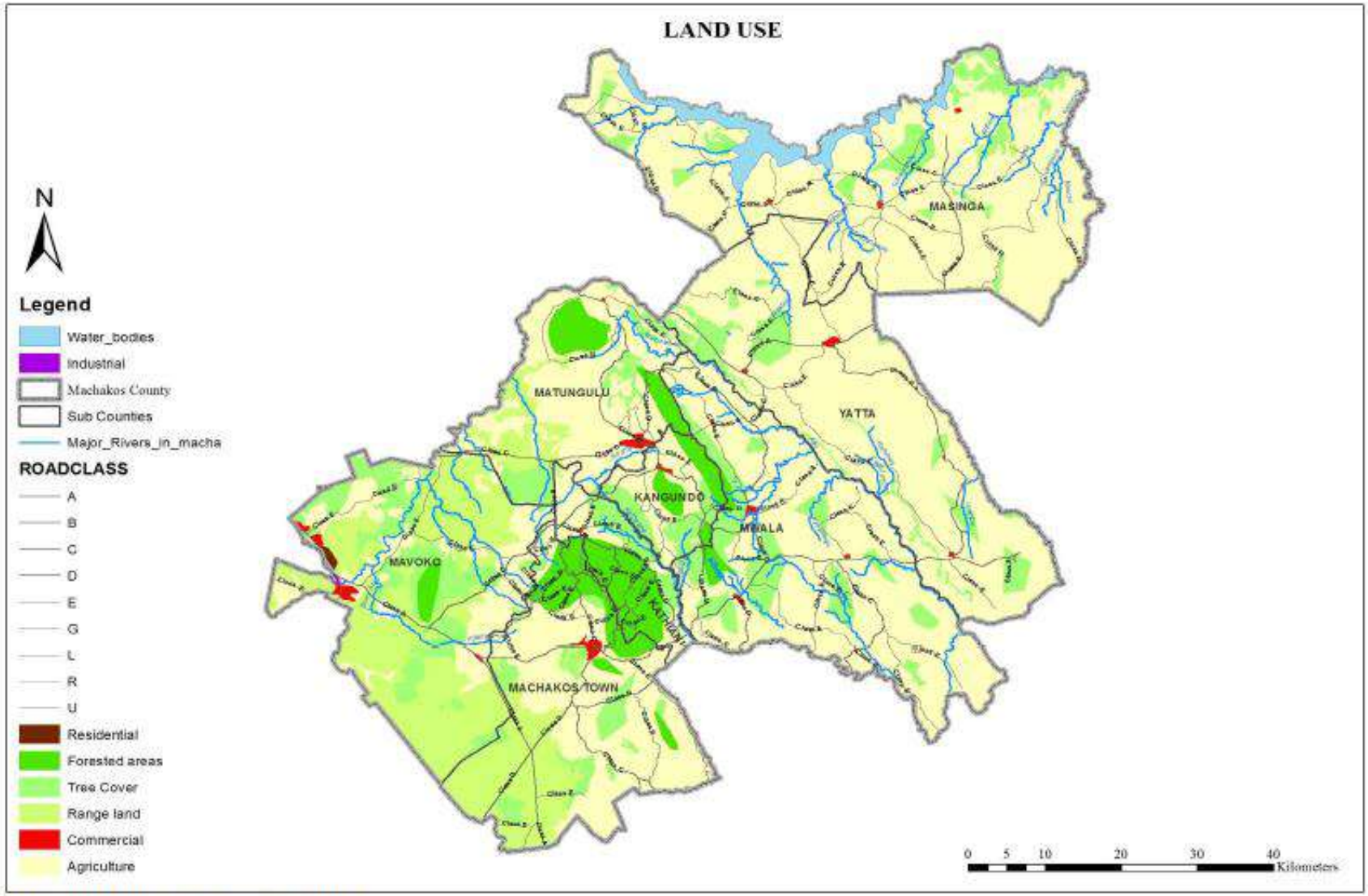
County	Location	Permanent	Semi-Permanent	Temporary
Machakos	Katheka-Kai	-	-	-
Machakos	Kimutwa	-	-	-
Machakos	Iveti	5	-	-
Machakos	Masii	-	-	-
Machakos	Mango	-	-	-
Machakos	Mwala	-	-	-
Machakos	Mbiuni	-	-	-
Machakos	Kithimani	-	-	-
Machakos	Ndalani	-	-	-
Machakos	Mavoloni	-	-	-
Murang'a	Kakuzi	-	-	-
	TOTAL	**5**	**0**	**0**

Source – Draft RAP report for Machakos -Mwala - Ekalakala Transmission Line

3.2.6 Land Use

Land use in Machakos County urban centres is generally mixed development (fig 3-4). There are no clear-cut zones for specific land uses in the county. This is because all the existing physical development plans except Machakos New Town Local Physical Development Plan are outdated hence not in force. There is no well-defined zoning policy in the county that guides land use development in all its urban centres sometimes leading to overlaps and mixing of incompatible land uses. There are 2 basic land use structures which are rural and urban. Rural: Agriculture (arable), Urban: residential, commercial, industrial, recreational, wildlife, rangeland (Machakos CIDP 2018-2022).

- *Agriculture Land Use:* Agriculture is the dominant land use in Machakos County with over 75% of the land in Machakos County is used for agricultural purpose. About 20% of the total land of Machakos County is cultivated. Most people live on their farms and sub-divide them for different uses.
- *Residential Land Use:* In general, the residential land use in the County is mainly concentrated in urban centres. Low-density residential land use is mainly observed as one moves away from the urban centres. The current growth of the residential land use is largely informal since most developments do not seek development permits. However, the rural setting that dominates Machakos County presents a scenario where people live on a portion of land where they do their farming.
- *Commercial Land Use:* The commercial activities are mainly concentrated along the main roads and highways passing through the urban centres, rural centres and market centres forming a linear pattern. The commercial activities here include retail outlets, stalls and street traders, hotels/restaurants. Similarly, more pockets of commercial nodes are emerging within some of the residential areas but in an informal trend.
- *Industrial Land Use:* Most of the heavy industries in Machakos County are concentrated in Mavoko Sub County. The other towns mainly have light industrial establishments. Machakos County has a potential for agricultural and fruit processing plants mainly for maize and other grains grown as well as indigenous and exotic mango fruits.
- *Educational Land Use:* There are more than 896 public primary schools, 301 public secondary schools, 147 private primary schools, 73 private secondary schools, village polytechnics, colleges and universities such as Daystar University.
- *Recreational Facilities Land Use:* Most of the County's urban centres have inadequate recreational facilities. The open spaces in existence are not easily accessible and lack the necessary facilities for recreation purposes with exception of Machakos People's Park in Machakos Town which is open to the public for range of recreational activities such as boat ridding, children games, events, zip-line, filming etc.



- *Source: Machakos County Spatial Database*

Figure 3-4 Land use in Machakos County

Murang'a county has a total area of 2,558.9Km2, of which 11.2Km2 is water mass. The arable land is, 2,135 Km2 while non-arable land is 163.3 Km2. The gazetted forest covers an area of 254.4 Km2 while approximately 20 Km2 is urban area. The average farm size under large-scale holdings is 6.4 ha. Total acreage under food crop farming is 180,225 ha while that under cash crop farming is 42,980 ha. The land under soil conservation is 55,780 ha; farm forestry is 108,352 ha while area under organic farming is 11,156 ha. The main land use activities in Murang'a County are cash crop farming, subsistence farming, livestock keeping, fish farming, housing and forestry. Notably crop farming and subsistence farming of maize, beans are the most common agricultural practise on the approximately 1.5 kilometres stretch of the proposed line that terminates in Murang'a County.

Plate 3-7: Agricultural land use and residential households at Ithanga area

Source – AWEMAC Field Survey

At the site earmarked for Mwala substation, it was evident that the community adjacent is involved in livestock rearing / grazing. The impact of the project on land will vary as some households will no longer be able to utilize the land parcel area in the wayleave for certain farming activities such as growing trees and fruits that grow over (12ft) 3.65 m tall. Some households will only be affected during construction, and afterward they will be able to continue utilizing the portion of land in the area as before, e.g. for crop farming and animal grazing. As noted earlier, the proposed project will require a corridor of 30m width. Within the 30m corridor, no structures or (12ft) 3.65 m tall trees are allowed. All other forms of land use including grazing and farming will be allowed hence minimized loss of land. For households where transmission line towers will be constructed on their land, the affected portion of land will remain unutilized for the entire period of existence of the transmission line. Other households will suffer loss of secondary assets such as water tanks, gates, animal sheds, lavatories, fences, etc while others will be displaced from their dwellings, businesses or loss of income. Summary of project impacts in terms of the number of project affected households per location is presented in table overleaf -:

Table 3-7 Summary of project affected households based on land uses

County	Location	Landowners	Structure owners	Large scale Business operators	Small scale business operators
Machakos	Katheka-Kai	1	-	-	-
Machakos	Kimutwa	145	88	-	-
Machakos	Iveti	74	84	-	5
Machakos	Masii	122	91	-	-
Machakos	Mango	46	31	-	-
Machakos	Mwala	110	117	-	-
Machakos	Mbiuni	90	75	-	-
Machakos	Kithimani	147	97	-	-
Machakos	Ndalani	81	19	-	-
Machakos	Mavoloni	78	40	-	-
Murang'a	Kakuzi	20	12	-	-
	TOTAL	**914**	**654**	-	**5**

Source – Draft RAP report for Machakos -Mwala - Ekalakala Transmission Line

Plate 3-8: Agricultural land use zone at Kathuma Village

Source – AWEMAC Field Survey

The study estimated that approximately 232.504 Ha or 637.293 Acres will be required for the way leave. An estimated total of 591 land parcels will be affected with Kimutwa, Kithimani and Masii Locations having most land parcels. The impacts of land acquisition will vary from one affected person or entity to another but may include partial or full land acquisition. Only about 1% of the landowners will have their land parcels fully affected. Full impact entails land parcels affected more

than 70% of the total parcel area. The most extreme impacts will be felt by the approximate 1% of landowners who will have to relinquish all or most of their land and other property and move to other areas away from the affected project area.

Nonetheless, the study identified that the location of the Transmission line traverses almost 99.9% in rural setting, which is a major advantage in terms of resettlement and land availability. This largely means that although communities have settled along the route, the prospects including adequacy, quality of land and accessibility of resettlement land (where compensation is provided) in the vicinity (cost allowing) will not be a major challenge. This means social support systems and networks will not be greatly disrupted, affected persons can still consider themselves as part of their current communities and still access the same services and advantages from the original areas. Since the project is rural, coupled with its inherent nature that only requires wayleave instead of land acquisition to pave the way for the transmission line, no significant full resettlement is envisaged.

In both cases -full impact (total displacement) and partial impact - after signing wayleaves agreements for the affected parcels of land; households, communities' groups, and investment companies will continue to own the affected parcels of land but will utilize the RoW area in activities that would not interfere with the operation of the proposed transmission line. Table below highlights the number of affected land parcels per location along the transmission line.

Table 3-8 Number of Affected Land Parcels

County	Location	No. of land parcels
Machakos	Kimutwa	86
Machakos	Iveti	36
Machakos	Masii	65
Machakos	Mango	24
Machakos	Mwala	72
Machakos	Mbiuni	60
Machakos	Kithimani	108
Machakos	Ndalani	56
Machakos	Mavoloni	67
Murang'a	Kakuzi	17
	Total	**591**

Source – Draft RAP report for Machakos -Mwala - Ekalakala Transmission Line

3.3 Biological Environment

3.3.1 Ecological Conditions

The detailed ecological survey (Annex 3) carried out during the ESIA study revealed a relatively plant and animal biodiversity rich region. The area surveyed has generally been classified as arid and semi-arid (ASAL). The areas have a diverse array of indigenous plants, small mammals, reptiles (snakes and other lizards), birds and some fish species in the main Athi River. Interviews and discussions with members of the local communities indicated existence of a collection of plants and animal species of critical social and cultural values. Some of the social values include medicinal plants which underscores the conservation value of the species.

The proposed transmission line alignment traverses across a landscape characterized by natural ecosystems (terrestrial and aquatic ecosystems) and artificial ecosystems (agro-ecosystems). Both natural and artificial ecosystems are known to play various ecological, socio-cultural and economic roles. From AP1 to AP4 the landscape takes a highland morphology characterized by uneven terrain and predominated by hilltops and rock outcrops. From AP4 to AP13, the landscape takes a lowland morphology. From AP13 to AP17, the landscape takes a plateau morphology dominated by typical savannah woodland. From AP18 to AP19, the landscape changes from a flat land to uneven terrain characterized by hilltops and rock outcrops. At AP20, the landscape reverts to a lowland with no prominent physical features.

Riparian habitats exist where seasonal streams and perennial rivers such as Athi River and Tana River cross the proposed transmission line alignment. The riparian zones are habitats an array of plants and animals. Usually, species occurring in different habitats have a broader ecological tolerance that require a mosaic of habitat types as noted along the proposed transmission line alignment. Such tolerances and preferences result to formation of different plant formations or mosaics and animal guilds/associations in each habitat. The habitats at the proposed transmission line alignment are complex webs of organisms that include plants, animals, microorganism amongst others. The woodland habitat that occur on sections of the proposed transmission route is typically composed of a complexity of life; both plants and animals interacting with the physical environment.

3.3.2 Vegetation

Plant community structure in the area surveyed is diverse and reflects the general savannah vegetation nature predominant in this region. Plant communities encountered include: Acacia sp. dominated woodlands, savannah grasslands, bushlands and shrub-lands, dryland thickets and planted exotic trees. Dominant indigenous trees and other vegetation were identified and are presented in the ecological survey report (Annex 3). The dominant exotic trees found along the proposed transmission line vicinity include *Gravillea robusta*, Eucalyptus sp., and Bamboo sp. There appears to be a gradient in vegetation type with vegetation type characteristic of more arid areas (thickets and shrublands) predominating as one moves from AP 1 towards AP20. The thick thorny thickets could slow down the progress of construction.

The natural vegetation along the areas surveyed has also been highly modified as a result of agricultural activities. Various land-use activities occur along the proposed transmission route and include both traditional subsistence and modest commercial agricultural activities.

Six different habitat types were observed and studied during the ESIA exercise along the proposed project area. These include Terrestrial habitat: Savannah grassland, Terrestrial habitats: Hilltops and Rock outcrops, Forestry, The closed woodland, Wooded bushland/shrubland habitat and Riverine/Aquatic habitat (Annex 3).

Tree species serve ecological, economic and socio-cultural roles. Tree species that provide critical resources or services to the environment and the local community are categorized as high value species and as such are given high conservation priority. During the field work, species of conservation value identified were *Kigelia Africana, Dalbergia melanoxylon, Terminalia brownii, Acacia tortilis, Acacia mellifera, Acacia drepanolobium, Acacia xanthophloea (*plate 3-9*), Balanites aegyptica, Commiphora holticiana* and *Ficus sycomorus*.

Plate 3-9 Acacia xanthophloea- Acacia drepanolobium formation in the neighbourhood of AP8
Source – AWEMAC Field Survey

3.3.3 Forests

The total forest cover in Machakos County is 3.37% while the national cover is 6.99%. The Kenyan Constitution, Vision 2030 and international standards require at least 10% forest cover for sustainable development. Forests in Machakos County are State, County and privately owned. The forests are managed by the Kenya Forests Services (KFS), the County Government and private owners. The State forests in Machakos are namely Iveti forest 364.07Ha, Muumandu forest 139.22Ha, Uuni Hill 92.7Ha and Kiteta Hill 11.0Ha. Machakos County forests include Kalimanzalu Hill forest 110.0Ha, Mango Hill forest 45.0Ha, Kibauni Hill forest 1619.4Ha, Nguluni forest 28.8 Ha, Matetani-Muisuni forest 42Ha and Kithatani forest 12Ha translating to a total forest area of 2,516.19Ha (Machakos CIDP 2018-2022).

Murang'a County has five indigenous gazetted forests covering a total area of 254.4 Km2. They are Gatare, Karua, Kimakia, Kiambicho and Wanjerere forests. Residents also engage in farm forestry in privately owned plantation with an average number 105 trees per farm (Murang'a CIDP 2018-2022).

The main forest products for both Machakos and Murang'a Counties are firewood, charcoal, poles, posts and timber for building and construction. Others include wood carvings and apiculture for domestic and commercial purposes. The communities along the line mainly rely on trees as a source of fuelwood for cooking and charcoal production. Fruit trees were also noted, mainly mangoes. There is also existence of both indigenous and exotic tree species. Some key indigenous species observed included different types of acacia; Acacia-Acacia, Acacia-Croton, Acacia-Commiphora, Acacia-Terminalia and Acacia-Rhus formations.

Transect walks were conducted to ascertain the plant types (trees, grasses, shrubs), species and vegetation details along the proposed transmission route. This aided in impact identification and analysis. Plant species of conservation importance were noted and identified (rare species, endangered species, species of economic importance etc) in the detailed ecological survey report (Annex 3). Based on the Machakos –Ekalakala KMZ maps route, the vegetation along the route is highly modified dry savannah due to human activities (settlements and agricultural activities. Forest / woodland segments are found between Kithimani and end of the line in Murang'a County. Notably, the transmission line alignment affects patches of privately owned natural forests and plantation forests. The natural forests were noted in grazing fields along the alignment while the plantations are on farmlands. The plantations are mainly patchy, small and restricted in zones with highland like landscape as well as near water bodies. For instance, at the neighbourhood of Athi river (0328809, 9863842), a small and patchy plantation of Eucalyptus grandis (Plate 3-10) exist in a farmland. Similar plantations of *Eucalyptus grandis*, *Eucalyptus camadulensis* and *Grevillea robusta* are common in the highland-like landscape from AP1 to AP4.

Plate 3-10 Small and patchy plantation of Eucalyptus grandis within the proposed project environs

Source – AWEMAC Field Survey

The Proposed Machakos-Mwala-Ekalakala transmission line will cut across agricultural areas and deviates off the areas under large plantations, dense bushland, Oldonyo Sabuk National Sanctuary and National Park. The nearest forest, 7km to the East of the proposed line is Iveti forest (figure 3-5).

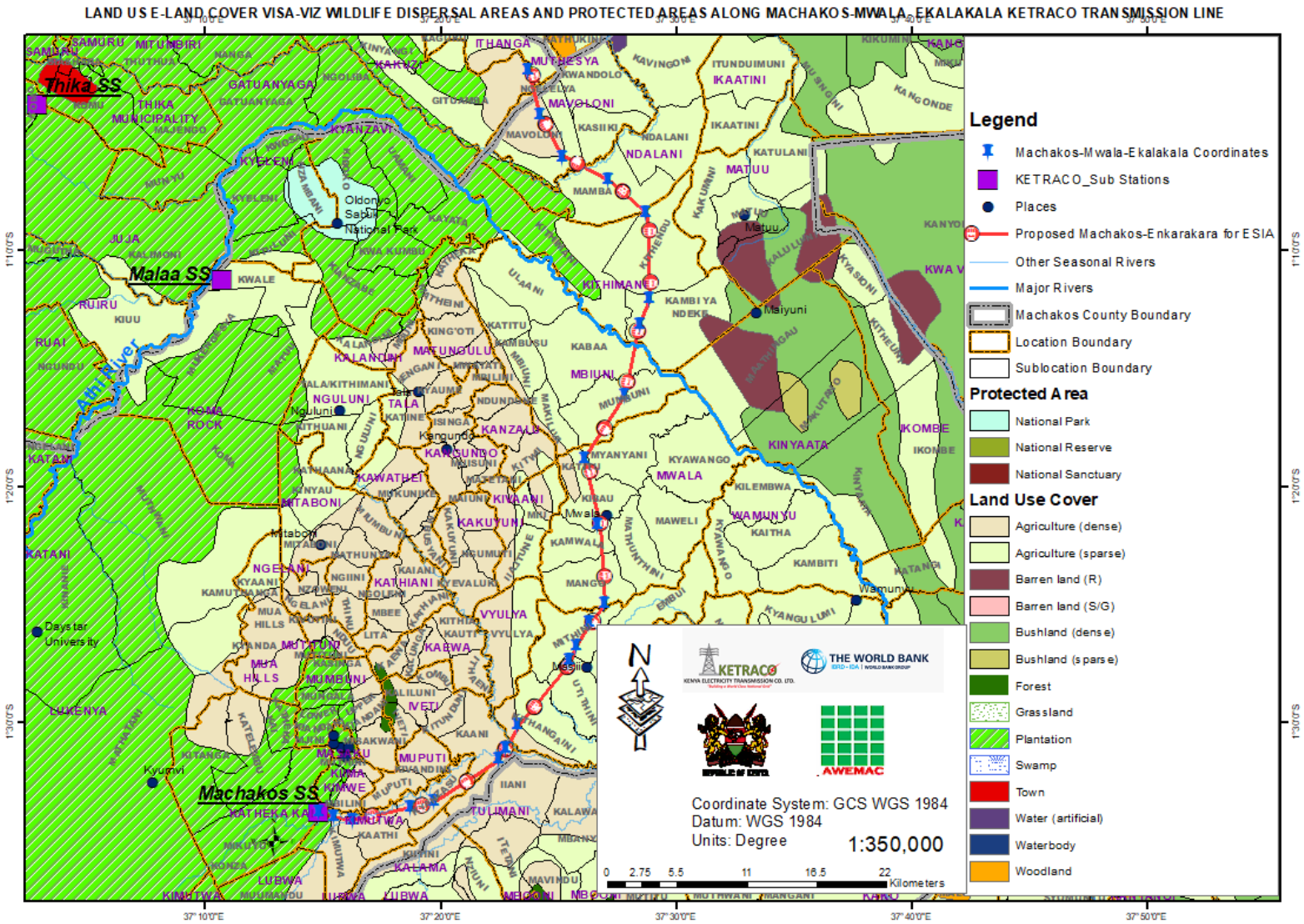


Figure 3-5 Land cover showing protected areas in the proposed project area

Source: AWEMAC GIS

3.3.4 Wildlife

The wildlife in both Machakos and Murang'a Counties include antelopes, zebras, wildebeests, elands, giraffes, thomson's gazelles, grant gazelles, elephants, hippopotamus, buffaloes, waterbucks, lions, cheetahs, leopards, warthogs, ostriches, impalas, dik-diks, hyena, monkeys reedbucks and a variety of birds. Nonetheless, the transmission route line is mainly inhabited by small wildlife such as snakes, hares, with a variety of birdlife. Burrows were observed along the proposed project area which the locals confirmed to be used by porcupines (plate 3-11) and squirrels. Kyanzalu hill, which provides a beautiful visual scene in Kyanzalu village, acts as a habitat to eagles and snakes.

Plate 3-11 A porcupine skin spotted in the proposed project area

Source – AWEMAC Field Survey

The Machakos–Ekalakala route is likely to harbour low wildlife biodiversity due to its highly altered nature. No wildlife conservation parks, or reserves are located along this route. Large charismatic mammal species were generally not observed during the ecological survey. Mammals listed here were either observed physically or evidence of their presence and / or activities noticed e.g. droppings (scatts), footprints and dwellings. The proposed transmission line traverses a zone devoid of large wild game but relatively rich in small wild game. The lines pass in private lands that have over the years been fragmented. Typically, large wild game prefers large unfragmented ecosystems devoid of human activities for habitation. However, small wild game can survive in small and fragmented ecosystems. From AP1 to AP12 along the transmission line, the landholding is generally small, population is high and generally most of the land has been converted for food crop growing leaving patchy areas under natural ecosystems. The number of small wild game is

relatively low in this zone due to lack of habitation areas and extensive human activities. Key small game in this zone include squirrels, rabbits, dikdiks, moles amongst others. As you cross Athi River and enter the Yatta plateau, the number of small wild game increases. The increment is partially attributed to the relatively large landholding in the zone and existence of relatively large natural ecosystem. The plateau stretches from AP15 to the neighbourhood of AP18.

Plate 3-12 A caterpillar observed in Kithuiyani village

Source – AWEMAC Field Survey

Historically and according to local people, the Yatta plateau used to be a home of both large and small game especially when it was a typical savannah grassland especially during the early stages of ecological succession. Large game such as elephants, buffaloes, giraffes, zebras, kudus, antelopes, lions, hyenas amongst others used to roam freely in the extensive savannah. Most of the big game were moved to Mwea National park in 1970s and 1980s as people settled in the Yatta plateau and land started being fragmented. Currently, the Yatta plateau has remnant small game such as antelopes, impalas, wild dogs, baboons, vervet monkeys, bush babies, squirrels (plate 3-13), dikdiks, and porcupines, bats (Chiroptera), African hare, Spring hare, Aardvark and mole rats. Leopards *(Panthera pardus*) and Hyenas (*Crocuta crocuta*) have been reported to be occasionally spotted in the forested acacia woodlands. In AP18 and AP20 in Mavoloni locality, baboons and *Colubus guezeras* are a major nuisance to local farmers. The riverine habitats of Thika River including Athi River provide safe habitats to the baboons and other monkey species. In farmlands along the proposed transmission line alignment, traps (Plate 3-12) for small wild game such as squirrels were observed.

Plate 3-13 A squirrel trapped in a farmland along the transmission line

Source – AWEMAC Field Survey

3.3.4.1 Avifauna

The twenty observation points along the transmission line are rich in bird species. While some of the bird species such as the Yellow golden palm weaver are native in the proposed project area, there are other non-resident bird species who visit the areas for foraging. The ecological survey report (Annex 3) under the ESIA study identified non-resident vultures flying from Masinga Dam to Mwala-Machakos region and back with their route mapped (figure 3-6). Notably, the proposed line is also in proximity to Important Bird Areas (IBA) such as Machakos Valleys (approximately 3.2 Km near Machakos SS). Other IBA in the proposed transmission line region include Masinga Dam approximately (5.2 Km near Ekalakala) and Protected areas (Mwea National Reserve (32Km Northwest of Ekalakala) and Ol Donyo Sabuk National Park (17 near Mavoloni)) (figure 3-7). The proposed transmission line also passes key birdlife habitats notably water bodies, valleys, permanent / seasonal rivers and several artificial sand dams that are known to attract birdlife.

Some of the bird species acts as predators in farmlands. As such, traps/snarls are common in farmlands along the transmission line alignment. For instance, the trap below (Plate 3-14), noted along the transmission line, is used to trap problematic bird species in farmland such as Guinea fowl, quails, dove amongst others.

Plate 3-14 A trap for avifauna observed in Mango Location

Source – AWEMAC Field Survey

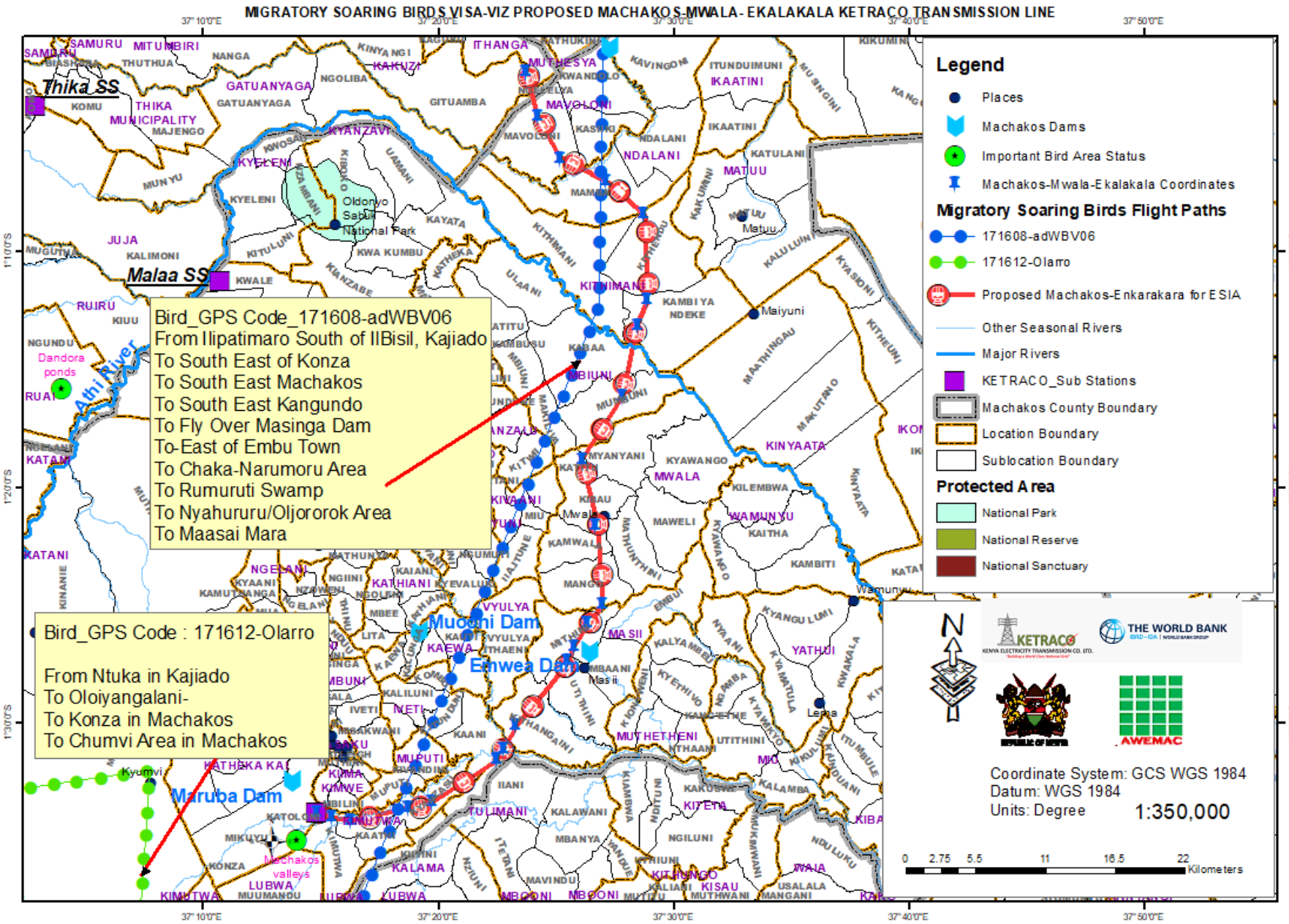


Figure 3-6: Birds migratory routes in the proposed project area

Source: AWEMAC GIS

Machakos Valleys - Important Bird Area (IBA)

This area comprises river and stream valleys in the catchment of the Ikiwe and Ngwani rivers, south of Machakos town, draining eastwards into the Athi river system. The land slopes gradually down from the Athi-Kapiti plains in the west, with an intricate system of river valleys draining between small hills. Most of the streams and rivers are seasonal, with shallow valleys. The riverbeds consist of sand and rock, with a dense band of bush and thicket (dominated by *Grewia trichocarpa* with *Teclea* and *Aspilia* species) for about 10 m on either side, grading into open *Acacia hockii* and *A. xanthophloea* woodland. The land is owned by a number of large ranches, including Potha, Kilima and Kimutwa, some of which have been divided up into small agricultural plots. The boundaries of the IBA are presently undefined, requiring further survey work; it includes sections of the Ikiwe, Kimutwa, Love, Makilu, Mwania, Potha, Syuuni, Wamua and Wamui rivers (*BirdLife International (2019) Important Bird Areas factsheet: Machakos valleys*).

The riverine thickets and woodland shelter the globally threatened *Turdoides hindei*, which has a very restricted range in central Kenya (Kianyaga, Mukurweini and Machakos). This is one of the few sites where it is known to occur in natural habitat, although at relatively low densities (c.2 birds/km of watercourse; a total of around 60 birds in 14 groups estimated for the IBA during 2000). Densities in Machakos were substantially lower (0.81 individuals per km) than in Kianyaga and Mukurweini (3.8 and 3.0 individuals per km respectively) (Njoroge & Bennun, 2000). The babblers are commonest in the higher parts of the IBA, and are likely to occur in river valleys immediately to the south as well. The rest of the avifauna is characteristic of semi-arid areas in Kenya, with 18 species from the Somali–Masai biome (*BirdLife International (2019) Important Bird Areas factsheet: Machakos valleys*).

The area is mainly ranch land, but (as in other marginal land in Kenya) agriculture is increasing, with attendant destruction of habitat. Of particular concern is the subdivision of large ranches into small parcels of land that are then cleared of all natural vegetation. The riverine woodland and thickets, which provide suitable habitat for *Turdoides hindei*, are particularly vulnerable. Because of the babblers' low densities, which imply large home ranges (mean territory length estimated as 1.25 km of watercourse), even moderate habitat loss might lead to serious population declines (contrast the situation in the higher rainfall areas of Kianyaga and Mukurweini, IBAs KE002 and KE006). A 2000 survey found signs of recent bush clearing and tree felling along all the watercourses surveyed. Subsistence hunting is also likely to be a threat to the babblers in this area. More survey work is needed to establish the extent of distribution of the babblers in this area, to investigate land holdings and land tenure, and to establish what conservation measures may be feasible (*BirdLife International (2019) Important Bird Areas factsheet: Machakos valleys*). Hinde's Babbler occurs in only one small protected area; its conservation within a severely modified agricultural landscape is a substantial challenge that calls for innovative approaches (Njoroge & Bennun, 2000). The figure below shows the existing migratory routes in the proposed project area and how they co-relate with the proposed transmission line wayleave. IBAs in relation to the proposed project area have been mapped in figure 3-7 below.

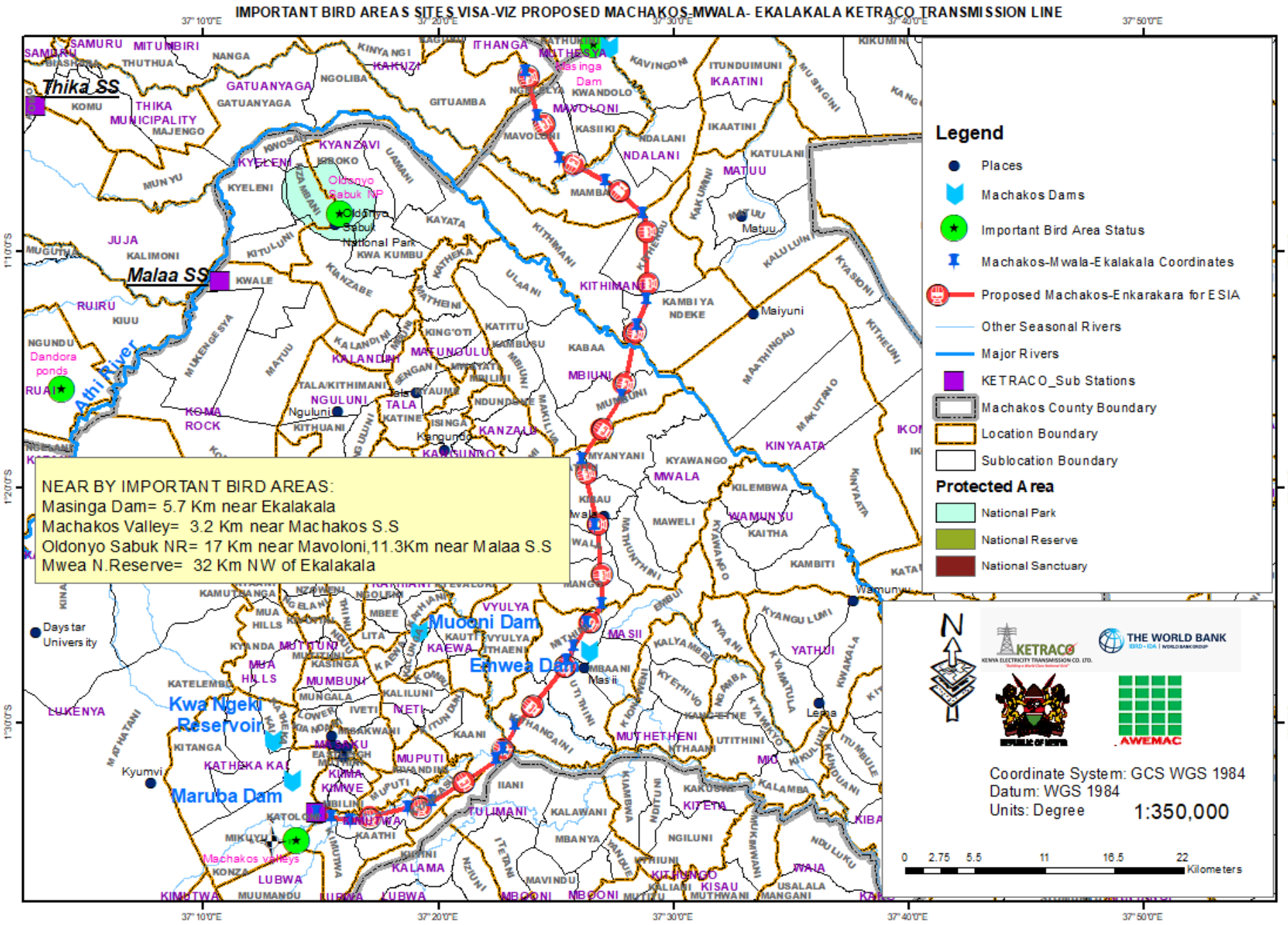


Figure 3-7: IBA sites Vis-a-vis the proposed transmission line

Source: AWEMAC GIS

Important bird species

Key bird species in the proposed transmission line alignment and its environs include *Turdoides hindei,* Hada Ibis (*Bestruchia hagedesh*) (aquatic bird), Stilts (Recurovirostidae) (aquatic bird), Avocet (Recurovirostidae) (aquatic bird), Heron (Ardeidae) (aquatic bird), Wild ducks (Anatidae) (aquatic bird), Weaver birds (Ploceidae), Sunbird (Nectarinia), African fish eagle (*Haliaeetus vocifer)*, 'Kanyangi' (migratory bird), Helmeted Guinea fowl (*Numida meleagris*), Baya weaver (*Ploceus philippinus*), Nubian Woodpecker *(Campethera nubica),* White-throated Bee-eater *(Merops albicollis),* Grey-headed Kingfisher *(Halcyon leucocephala),* Laughing Dove *(Streptopelia senegalensis),* Ring-necked Dove *(Streptopelia capicola),* Speckled Pigeon *(Columba guinea),* Emerald-spotted Wood-Dove *(Turtur chalcospilos),* Namaqua Dove *(Oena capensis),* White-headed Mousebird *(Colius leucocephalus),* Yellow-billed Stork *(Mycteria ibis),* African Open bill *(Anastomus lamelligerus),* Red-billed Hornbill *(Tockus erythrorhynchus),* Yellow-necked Francolin *(Pternistis leucoscepus),* Crowned Lapwing *(Vanellus coronatus),* African Spoonbill *(Platalea alba)* including assorted vulture and eagle species.

Plate 3-15 Birds' nests as observed on several trees along the proposed project area

Source – AWEMAC Field Survey

3.3.4.2 Aquatic Species (Fishes, hippos, crocodiles)

Fish farming (aquaculture) was introduced in Machakos County under the economic stimulus programme and the project picked up well. The main challenge has been inadequate supply of water and high cost of inputs. The main types of fish cultured are tilapia, catfish and ornamental fish. The annual average fish production from aquaculture currently stands at 30,704 kilograms. The main capture fisheries activities (fishing activities) are carried out in Masinga & Kamburu dams and Athi, Tana & Thika Rivers. There are three gazetted fish landing sites in Masinga dam

(Ekalakala, Mananja, Tumutumu) and one in Kamburu dam (Kisumu ndogo). The main species harvested from the dams and rivers are common carp, tilapia and catfish estimated at 300 tonnes per annum. Kamuthanga fish farm serves as a tourist attraction and education facility for fisheries students. Maruba dam is the major source of water for Machakos town; it is also a tourist attraction site offering boat riding for visitors at the Machakos People's Park (Machakos CIDP 2018-2022).

Aquaculture is an emerging fisheries enterprise in Murang'a County. However, there is a great potential in aquaculture, given the county's vast water resources and high demand for some of the indigenous fish species in both the local and regional market. Aquaculture fish include; tilapia, African catfish, rainbow trout, ornamental fish. Common capture fisheries reared from Murang'a County Rivers and dams are tilapia, rainbow trout and common carp.

Based on the ecological studies, (Annex 3, Ecological survey report) there are various aquatic species at Athi river – traversed by the proposed transmission line - which include Nile tilapia - *Oreochromis niloticus* (fish), African Catfish – *Clarias gariepinus, and o*ther cyprinid fish species. The Nile crocodile (*Crocodylus niloticus*) and The African hippo (*Hippopotamus amphibious*) are also found at Athi River.

Aquatic animals such as crocodiles, hippos and fish are restricted in permanent rivers such as Athi and Thika rivers. Hippos cause extensive damage of irrigated crops along Thika and Athi River. According to residents, farmers are forced to guard their farmlands during the night since hippos are nocturnal animals. The crocodiles pose a threat to both humans and livestock especially goats and sheep. Several species of fish such as tilapia and mud fish exist in both Athi and Thika River. Fishing (Plate 3-16) supports livelihoods of local fishermen. Small dug-out canoes are used by local fishermen as observed in Athi River. Seasonal streams and rivers house a wide range of small aquatic animals such as frogs, toads, amongst others.

Plate 3-16 Mature Nile Tilapia (Oreochromis niloticus) fish from Athi River

Source – AWEMAC Field Survey

3.3.4.3 Hepertofauna

Incidences of reptiles and amphibians were reported in observation points along the transmission line. Population indices such as droppings, shed skins, nests amongst others were also noted. Common hepertofauna along the transmission line include tortoises, frogs, tadpoles, snakes, lizards, geckos amongst others. For instance, near AP12 at GPS picking of 0326042, 9854819 and elevation of 1247m a.s.l, a frog (Plate 3-17) was observed.

Plate 3-17 A frog spotted in Utithini Sub-Location
Source – AWEMAC Field Survey

Tortoises (Plate 3-18) were noted to be common along the proposed transmission line alignment. Habitats for such reptiles are likely to be affected by construction works.

Plate 3-18 A tortoise spotted along the proposed project alignment
Source – AWEMAC Field Survey

Indicators of snake presence such as shed skin (Plate 3-19) were also observed in some sections of the transmission line alignment.

Plate 3-19 A snake shed skin in one of the farmlands along the proposed project area
Source – AWEMAC Field Survey

3.4 Social and cultural environment

This section describes the current socio-economic and cultural conditions of the proposed project area. The information presented is obtained from primary and secondary sources.

The various social economic and cultural aspects (demography, economic conditions, land acquisition, infrastructure, sanitation, agricultural activities, social protection and cultural issues) of the baseline survey were integral to the study and aimed to inform in the proposed project planning and implementation. The obtained quantitative and qualitative data was analysed and applied in different contexts and settings to reach informed decisions. This assisted to build on local knowledge and participatory processes.

Demographic data on ethnic presentation gave a highlight of the expected cultural values and norms whereas marital status, gender and age underlined the need for equal opportunity based on vulnerability status, inclusion, and sustainability in the project setting. Religion and cultural analysis helped to inform the beliefs, norms of the locals and character in both Machakos and Murang'a County, their socialization and potential to reinforce protective influences and resilience. This also aided to reflect on diversity in culture and values held by locals within the project area. Education analysis gave a synopsis of the local capacity, empowerment and social capital. It helped to inform on the availability of key aspects such as local labour ranging from both skilled, semi-skilled and non-skilled. Land acquisition assessment helped to understand the existing land ownership, social ties as well as inform on risks and opportunities relating to acquisition land parcels for the right-of-way (RoW) in the proposed project alignment. The infrastructure development assessment aimed to understand the existing support facilities for the project such as key access roads, and existing communication & technologies. An assessment of the housing infrastructure informed on the expected typologies of housing along the proposed project alignment. Analysis of social protection issues gave an understanding of vulnerable population that would be important to enhance respect and promote human rights during the project planning and implementation.

3.4.1 Demography

The total population of Machakos County is 1,421,932 as per the 2019 Kenya Population and Housing Census. Of this, 710,707 are male, 711,191 are female and 34 are intersex. The total number of households in Machakos County is 402,466 with an average household size of 3.5. The population density and distribution in the County is mainly determined by the economic activities carried out in the specific sub-counties. As per the 2019 Kenya Population and Housing Census, the County had a population density of 235 per km² (Machakos CIDP 2018-2022). The proposed power line cuts across areas with sparse to less densely populated regions (figure 3-8).

Murang'a County population is 1,056,640 (2019 Kenya Population and Housing Census) with an average household size of 4. The male to female sex ratio for the county is 48:52. The higher female population in relation to male is attributed to high male emigration to other counties and towns in search of employment and business opportunities.

3.4.1.1 Distribution of Sample Population

Human settlement patterns in both Machakos County and Murang'a County vary from town to town due to various reasons, which include socio-cultural basis, topographic characteristics, and economic output of the areas. Linear Settlements along lines such as major roads are common mainly in suburban areas. People tend to cluster within town centres while rural areas are sparsely populated.

Stratified random sampling or stratification, was used to collect the sample along the proposed transmission line on a radius of approximately one (1) kilometre from the centre of the line. The groups were based on both Machakos County and Murang'a County. This was further subdivided to respective sub-counties (table 3-9) and strata / groups of locations (table 3-10) traversed by the proposed line. To this end, a total of 271 household heads were interviewed in the proposed project alignment.

Table 3-9 Household Distribution based on Sub-county

County	Sub County	Number of Respondents	Number as a Percentage
Murang'a	Gatanga	1	0.4%
Machakos	Kathiani	14	5.2%
Machakos	Machakos	25	9.2%
Machakos	Mwala	134	49.4%
Machakos	Yatta	97	35.8%
Grand Total		**271**	**100%**

Source – AWEMAC Field Survey

Mwala Sub County had the highest number of respondents with 134 out of the total sample size of 271 respondents, which translates to 49.4% of the grand total. Gatanga Sub County in Murang'a County had the only 1 respondent which was 0.4% of the total sample respondents. This also accounts for the small proposition of the transmission line that terminates in Murang'a County.

Kithimani location had the highest number of respondents with 61 out of the total sample size of 271 respondents, which translates to 22.45% of the grand total. Kakuzi Location in Murang'a County had only 1 respondent which was 0.4% of the total sample respondents (Table 3-10).

Table 3-10 Distribution based on Location

County	Location	Number of Respondents	Number as a Percentage	**Number of PAPs
Machakos	Iveti	14	5.2%	248
Murang'a	Kakuzi	1	0.4%	35
Machakos	Kimutwa	25	9.2%	379
Machakos	Kithimani	61	22.5%	750
Machakos	Mango	23	8.5%	241
Machakos	Masii	36	13.3%	638
Machakos	Mavoloni	15	5.5%	230
Machakos	Mbiuni	45	16.6%	698
Machakos	Mwala	30	11.1%	492
Machakos	Ndalani	21	7.7%	251
Grand Total		**271**	**100%**	**3962**

***Number of PAPs / Population of PAPs has been obtained from the draft RAP report for Machakos Mwala Ekalakala*

Source – AWEMAC Field Survey

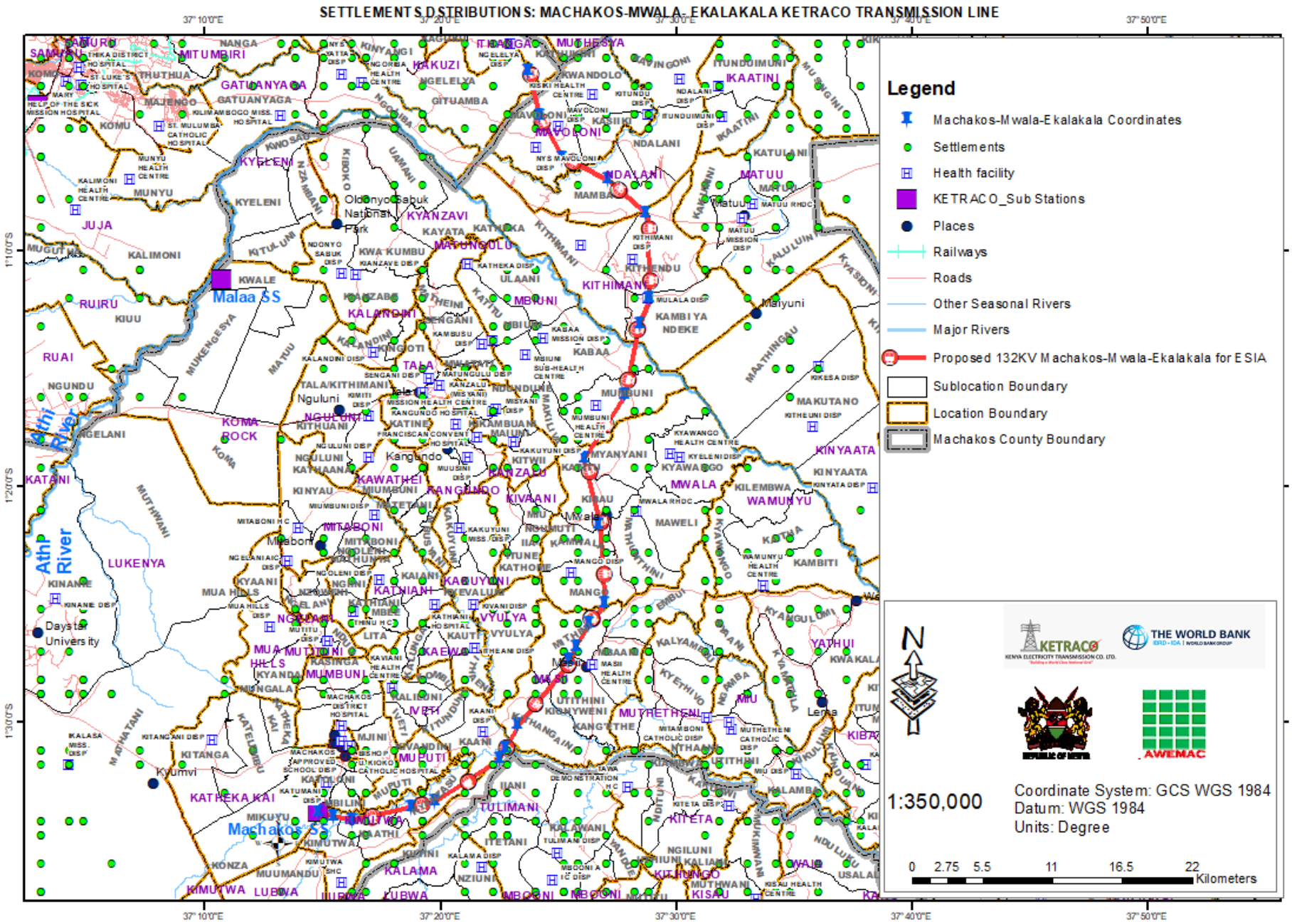


Figure 3-8 Settlement distribution in the proposed project area

Source: AWEMAC GIS

3.4.1.2 Ethnic presentation

Most of the respondents, 95%, are affiliated to the Akamba community while the remaining 5% of the sample population comprised of the Agikuyu.

However, populations from other tribes such as Luhya, Luo, Mbeere, and Meru can be found undertaking businesses in nearby towns and market centres such as Kwa Mwau, Makaveti, Kaani, Masii, Mwala, Mbiuni, Ndalani, Mukundi and Kambi Mawe.

3.4.1.3 Gender and age

55% of the respondents were comprised of male while 42% were female. In terms of age, most of the respondents, 25.5%, were 61 years and above. This was because most of the youthful population had gone to work while the children were in school (Table 3-11).

Table 3-11 Distribution based on age-group

Age	Number of Respondents	Number as a percentage
19-30	49	18.1%
31-40	44	16.2%
41-50	54	19.9%
51-60	55	20.3%
61 and Above	69	25.5%
Grand Total	271	100.0%

Source – AWEMAC Field Survey

33% of household members are between 19 and 35 years making it the most popular age group (Table 3-12).

Table 3-12 Household composition by age group

Age Group	Maximum members per household	Total household members	As a Percentage
0-18 Years	10	343	29%
19-35 Years	10	392	33%
36-59 Years	8	321	27%
60 and above years	3	118	10%
Grand Total		1174	100%

Source – AWEMAC Field Survey

3.4.1.4 Marital Status

73% of respondents are married with 3% of those married being polygamous. 11% of respondents are widowed. Those that are divorced or separated are 2%, while those who have never married are 14%. A substantial proportion of 11% is widowed (Table 3-13).

Table 3-13 Distribution based on marital status

Marital Status	Number of respondents	Number as a Percentage
Married Monogamous	189	70%
Married Polygyny	8	3%
Never married	38	14%
Separated	6	2%
Widowed	30	11%
Grand Total	271	100%

Source – AWEMAC Field Survey

3.4.1.5 Religion and Cultural Practices

Most of the respondents are Christians of the protestant faith 52%, while those of the Catholic faith were 47.2%. There was a presence of Muslim faithful in Mavoloni location where a mosque was observed adjacent A3 highway. Muslims formed 0.4% of the respondents (Table 3-14).

Table 3-14 Distribution based on religion

Religion	Number of respondents	Number as a Percentage
Catholic	128	47.2%
Muslim	1	0.4%
Other Christian	1	0.4%
Protestant	141	52.0%
Grand Total	271	100%

Source – AWEMAC Field Survey

Akamba community has diverse socio-cultural values, believes, and norms, however, according to a local assistant chief the contemporary generation has been reluctant in practicing the beliefs. The social assessment team observed some of cultural artefacts at Akamba Community Peace Museum in Kyanzasu village Iveti Location where one of the village elders confirmed that the museum is used by the community as a socio-cultural amenity not only to showcase and celebrate their cultural heritage, but also for inter-ethnic exchange and tourist attraction.

3.4.1.6 Education

A majority of the respondents, 49.8%, have primary education. Only 2.6% of those interviewed have attained university level. However, a small proportion of those interviewed, 6.3%, have no education. Other educational attainments are presented in Table 3-15 below.

Table 3-15 Education Attainment

Highest Educational Level	Count	Count as Percentage
College (Middle-Level)	19	7.0%
No Education	17	6.3%
Other Specify	2	0.7%
Post -Primary, Vocational	4	1.5%
Pre-Primary	2	0.7%
Primary	135	49.8%
Secondary	85	31.4%
University Undergraduate	7	2.6%
Grand Total	271	100%

Source – AWEMAC Field Survey

The primary school enrolment in the project area is commendable according to a key respondent familiar with education issues. Also, the respondent alleged that the pupil-teacher ratio is improving, for instance, indicating that their primary school currently has a ratio of 1:28 pupils-teachers ratio (PTR) against the recommended PTR in Kenya of 40:1. The respondent also thought that the project area generally has a low enrolment of Orphans and Vulnerable Children (OVC) as well as those living with disabilities due to high poverty levels of the parents/caregivers. Further, the respondent noted that of an estimated 22 OVC and disabled children in the project area, only 5 presenting 22.7% were enrolled to schools.

3.4.2 Economic Conditions and Sources of Livelihood

Most of the interviewed households, 34%, are self-employed businessmen. 15% were employed while 27% were unemployed. The table below presents the main occupation activities of the interviewed households along the proposed project area (Table 3-16).

Table 3-16 Main occupational activities

Main occupation	Number	As a Percentage
Casual Labourer	43	16%
Civil Servant	10	4%
Employed in Public Sector	6	2%
Employee in Private Sector	25	9%
Other	21	8%
Self Employed/Business	93	34%
Unemployed	73	27%
Grand Total	271	100%

Source – AWEMAC Field Survey

Most of the respondents, 50.6%, estimated their monthly income to be less than 10,000 (ten thousand) Kenya Shillings. Other respondents' income distributions are presented in the table below.

Table 3-17 Average monthly incomes

Income Groups	Number	As a Percentage
0-10,000	137	50.6%
10,001-20,000	72	26.6%
20,001-30,000	31	11.4%
30,001-40,000	11	4.1%
40,001-50,000	12	4.4%
50,001-100,000	2	0.7%
Over 100,000	6	2.2%
Grand Total	271	100%

Source – AWEMAC Field Survey

3.4.3 Mode of land acquisition

Of the interviewed households, 66% of the respondents inherited the land they are living on. Other modes of acquisition such as allocation through Allotment letters, purchases and others (land agreements and donations) are presented in the table below. Nonetheless cases of lack of proof of land ownership documents categorised as squatters were identified through the RAP process whereby approximately 18 households did not have ownership documents. Notably, the squatters cut across the entire RoW hence no specific area. RAP report further notes that there were also cases of absentee landowners more in the hilly sections between Katoloni and Masii. Nonetheless follow up were done and details obtained through local village elders and chiefs.

Table 3-18 Mode of Acquisition for the current property/plot property/plot

Mode of Acquisition	Count	As a Percentage
Allocation ***(Allotment letters)***	20	7%
Inherited	178	66%
Other specify ***(****land* ***agreements****, donation****)***	2	1%
Purchased	71	26%
Grand Total	271	100%

Source – AWEMAC Field Survey

3.4.4 Infrastructure Development

3.4.4.1 Roads and Rail Network Ports and Airports, Airstrips and Jetties

Machakos County has an averagely good road network. Major roads include the Mombasa Highway, Machakos – Kitui, Machakos – Wote, Garissa and Kangundo roads, among others. The County Government has successfully constructed the following roads among others, the Mwala – Kithimani road, Kathiani – Kangundo road and Athi river road. It has also upgraded most access roads within the County. There are ongoing road initiatives in the County through partnership with the national government and other development partners. These include dualing of Mombasa road (Namanga road interchange to Makutano Kyumbi), Koma – Konza, Matuu – Ekalakala, Kenol – Kaseve, Tala – Oldonyo Sabuk roads, among others (Machakos CIDP 2018-2022).

Murang'a County has several road categories, with its mandate restricted to the unclassified category. The roads Authority plans to undertake GIS mapping of the roads to counter the challenge of data inadequacy, which the sector faces (Murang'a CIDP 2018-2022).

The proposed transmission line will cross some of the main roads in Machakos County (figure 3-8); C99 (Machakos-Wote Road) approximately 500m before AP1, C97 (Machakos-Kitui Road) between AP7 and AP8, C98 (Kangundo Road) between AP11 and and AP 12 about a kilometre from the proposed Mwala substation site, C100 (Kithimani-Makutano Junction) approximately 600m from AP13 and A3 (Thika-Garissa highway) near AP16 (figure 3-9).

Plate 3-20: Access road to site earmarked for Mwala Sub-station (SS)
Source – AWEMAC Field Survey

Interviewed households had various means of transport; though, most of the respondents, 41.7%, indicated use of matatu as their primary mode of transport. Other transport means mentioned by respondents are shown in the table below (table 3-19). Accessing some of the areas in the proposed project area would require the roads to be graded as some of the roads are inaccessible. At some areas the wayleave is meters away from the road, this is to mean many farms will be crossed in ferrying materials through.

Table 3-19 Main mode of transportation

Main mode of transportation	**Number**	**As a Percentage**
Bicycle/Motorbike (*Bodaboda*)	99	36.5%
Matatu	113	41.7%
Own Bicycle	2	0.7%
Own Motorbike	8	3.0%
Private Vehicle	9	3.3%
Probox	1	0.4%
Tuk-Tuk	5	1.8%
Walk	34	12.5%
Grand Total	271	100%

Source – AWEMAC Field Survey

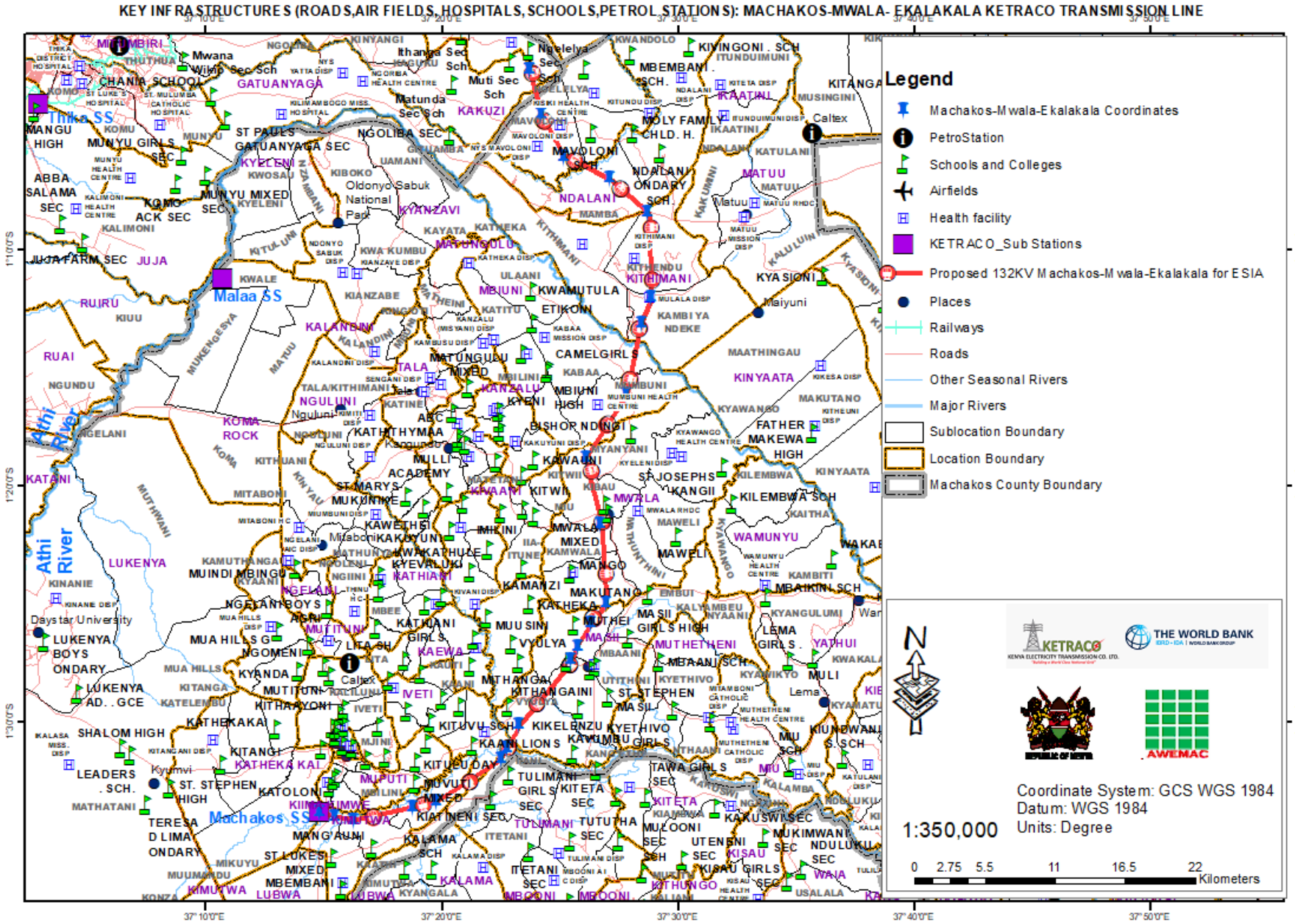


Figure 3-9 Key infrastructure along the proposed project area.

Source: AWEMAC GIS

3.4.4.2 Information, Communication & Technology; and Power Utilities

Machakos County has an estimated mobile network coverage of about 85% with good internet connectivity supported by both the mobile network and fibre optic cable. According to 2009 Kenya population and Housing census, Machakos County was ranked position 11 out of 47 with 67.7% of households owning mobile phones. However, Mwala, Kibauni, Yathui and Kalama are some of the areas with poor network coverage (Machakos CIDP 2018-2022).

Murang'a County has high mobile network coverage of about 97% of the area with Safaricom, Equitel, Jamii Telkom, Airtel Kenya, and Telkom Kenya as the main service providers. There are six post offices, three sub-post offices, a Huduma Centre, and four courier services operating in the county. The county is served by all national mainstream TV and Radio stations with more than 6 of the radio stations and 5 TV stations broadcasting in the local language. Two radio stations that have their studios in the county are Kangema FM (Ranet FM) in Kangema Town, and Radio Maria in Murang'a Town (Murang'a CIDP 2018-2022).

All the households interviewed use mobile phones as their primary mode of communication. The proposed Machakos-Mwala-Ekalakala transmission line meets the existing 132kV Power line at Mavoloni. It also meets the existing 220 kV power lines at Ngelelya and the planned, 400 kV, Lamu_Malaa at around Kambi ya Ndeke (figure 3-10).

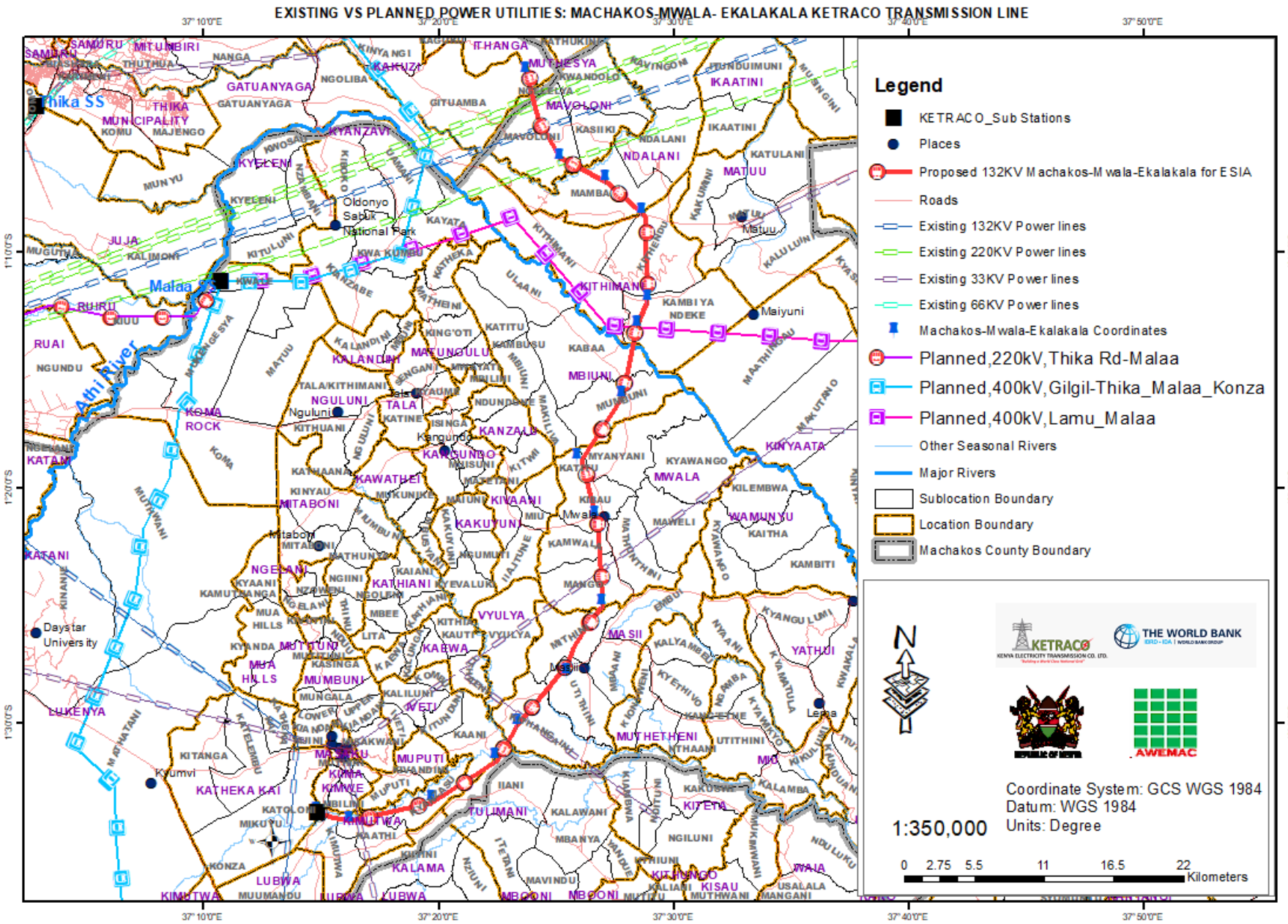


Figure 3-10 Existing & planned power utilities along the proposed project area

Source: AWEMAC GIS

3.4.4.3 Irrigation Infrastructure and Schemes

Irrigation Potential

Machakos County has a great potential for new irrigation schemes and enlargement of the existing ones. There are 15 proposed new irrigation schemes, which sum to 1,725 acres spread across six sub-counties (Machakos CIDP 2018-2022). Currently, Machakos County has 12 irrigation schemes established by both the National and County Governments. In addition, there are small scale irrigation schemes at household levels. The total area under irrigation is 3,220 acres (Machakos CIDP 2018-2022). Four of these are large scale, namely: Yatta Furrow – 1,000 acres; Kabaa Irrigation Scheme – 750 acres; Kamuthambya Irrigation Scheme – 500 acres and Kayatta Irrigation Scheme – 400 acres.

Murang'a County has a total of about 230,000 ha irrigation potential out of which only 23,000Ha has been exploited. Therefore, there is a huge irrigation potential which is yet to be exploited. Smallholder community irrigation schemes and individual/private schemes are the two main categories of irrigation schemes. Smallholder community irrigation schemes are initiated, owned, operated and managed by the scheme members. Water for these schemes is usually abstracted from the rivers and conveyed to the farms by gravity through closed conduits for ultimate use. The most common water application method is the sprinkler system. Individual/private schemes are managed by companies or individual farmers. These private schemes are normally large-scale farms that grow high value crops like cut-flowers, French beans, pineapples, coffee, etc. These schemes include: Delmonte Ltd, Kakuzi Ltd, Enkarsiti Farm, Simbi Roses, Aberdare/Thuita Farm, Bendor Farm in Gatanga Sub-county and Everest Farm Maragua Sub- County. The total irrigated area by the private/individual schemes is about 200 ha. Most of these schemes use pump-fed sprinkler and/or drip system (Murang'a CIDP 2018-2022).

As a result of persistent drought in section of Machakos County, a substantial number of farmers embrace irrigation and have joined hands to set up irrigation schemes such as Kabaa Irrigation Scheme in Kithimani, Yatta region largely in Kitw'amba village where residents have installed drip irrigation in their farms and save water and fertiliser by allowing them to drip into roots of the crops through a network of underground pipes, valves, and emitters. The pipes draw water from River Athi. This is viewed as an alternative to relying on rainfall for farming. As such, spate and drip irrigations were commonly observed in several areas of the project corridor. However, in other parts of the project alignment there are established irrigation schemes. Most of the farmers along the proposed alignment practice irrigation farming where water is mainly sourced from the local rivers, dams and boreholes. In Ndivu village, Ndalani location, various green vegetables were observed to be farmed through irrigation. Various fruits such as avocados, mangoes, oranges, tangerines and papaws are being cultivated in Kauthulini village by use of irrigation along Yatta furrow (Plate 3-21) and Kambiti stream. Production of high value crops along Thika River is also carried out through irrigation and weeding done by organised women groups. Kauthulini, Nguliva and Utumo-utheke villages use Kauthulini stream for irrigating pawpaw farms.

Plate 3-21 The Yatta Canal which cuts across the kambi ya Ndeke sub location used for irrigation

Source – AWEMAC Field Survey

Irrigation was noted to be widely practiced along the proposed project alignment both in Machakos and Murang'a Counties to supplement rainfall for various farming activities. The locals made use of the numerous streams and rivers found in their locality as sources of water. Irrigation from dams and boreholes was also noted. Majority, 75%, of the respondents who irrigate their farms use rivers. The table below shows the main sources of water for irrigation in the proposed project alignment area.

Table 3-20 Main sources of water for irrigation

Main Source	Count	As a Percentage
Bore Hole/Tube well	4	7%
Dam/Reservoir	7	12%
Municipal water supply	1	2%
Other (Specify)	1	2%
River	44	75%
Shallow/deep well	2	3%
Grand Total	59	100%

Source – AWEMAC Field Survey

3.4.4.4 Housing and Development

Most of the interviewed households, 55%, have permanent houses, Temporary houses were noted to be 28%. Only 18% were noted to have semi-permanent houses (Table 3-21).

Table 3-21 Types of structures

Main type of the structures	Number	As a percentage
Permanent	137	55%
Semi-permanent	44	18%
Temporary	70	28%
Grand Total	251	100%

Source – AWEMAC Field Survey

There are sparingly rural households within the proposed RoW. Most of the structures are built of loam bricks with iron roofing (Plate 3-22).

Plate 3-22: Households along the ROW near Mbuuni (AP8)

Source – AWEMAC Field Survey

The project area is characterised with sparsely populated human settlement in an undulating topography. Dispersed settlements with homes that are built far apart were observed. Small fragmented and scattered land holding is also common.

3.4.5 Energy Access

The main source of energy for cooking and lighting is wood and electricity respectively. Other sources of energy across Machakos County are solar, wind, biogas, gas, charcoal and paraffin. Masinga dam is one of the Seven Folks dams, which produce hydroelectric power for the national electricity grid. There is increasing connectivity to the national grid across Machakos County because of the implementation of 'last mile' power project by the national government (Machakos CIDP 2018-2022).

In Murang'a County, about 1% of the households use solar energy. The Last Mile Connection Project envisages connecting more than 85% of the Murang'a households. Other main sources of energy commonly used in the county are firewood, paraffin, charcoal, and LPG gas (Murang'a CIDP 2018-2022).

Based on the socio-economic survey, 60.5% of the respondents both in Machakos and Murang'a Counties use solar energy making it the most popular source of energy as compared to electricity

at 17.3%. It is anticipated that transmission of the power would support Government of Kenya social objective of universal access to electricity. Specifically it will support Kenya Power in increasing its connection capacity hence indirectly benefit the local region that include households and businesses that will be connected to the electricity network for the first time and whose use of electricity will replace consumption of kerosene and other fuels for lighting. This will enable productive activities thus contributing to economic growth. Other beneficiaries will be the existing electricity consumers that include business customers of Kenya Power for whom the quality and reliability of electricity service will improve.

The table below shows the sources of energy used for lighting along the proposed project area.

Table 3-22 Sources of lighting

Main source of lighting	Number	As a Percentage
Battery Lamp/Torch	2	0.7%
Electricity	47	17.3%
Other Specify	1	0.4%
Paraffin Lantern	33	12.2%
Paraffin Pressure Lamp	2	0.7%
Paraffin Tin Lamp	22	8.1%
Solar Energy	164	60.5%
Grand Total	271	100%

Source – AWEMAC Field Survey

Respondents had various combinations of sources of energy but 62.4% of respondents use firewood as their main source of energy for cooking making it the most popular cooking energy source. Only 17% of the sample respondents are connected to the main electricity grid. Households that are not connected to the main electricity grid cited numerous reasons; however, a majority, 46% claimed that the connection and wiring fee is unaffordable. Other reasons mentioned are presented in the table below.

Table 3-23 Reasons for lack of connection to the main electricity grid

Main reason	Number	As a Percentage
Application pending	48	21.2%
Connection/Wiring Fee Unaffordable	104	46.0%
Dwelling Inappropriate for connection	1	0.4%
Line was disconnected	2	0.9%
No need for electricity	1	0.4%
Other Specify (Did not Apply)	1	0.4%
Transformer Capacity Limited	2	0.9%
Transformer too far	67	29.6%
Grand Total	226	100%

Source – AWEMAC Field Survey

3.4.6 Sanitation

The County Government of Machakos has improved sanitation through provision of clean and free toilets in public places such as bus parks and market centres across the County. This aims to make Machakos County an open defecation free County. There are two sewer lines in Machakos and Athi River towns. However, the former is partially connected to sewer lines- this includes parts of Kariobangi and Mjini where more than 50% use pit latrines (Machakos CIDP 2018-2022).

In Murang'a County, about 99.78% of the households use toilet facilities. Out of these, 4.97 %use flush toilets, 3.97 % use ventilated improved pit latrine (VIP) latrines while the others use ordinary pit latrines. Most people living in the market and trading centres use ordinary pit latrines.

In terms of sanitation along the proposed project alignment, most of the households interviewed, 89.6%, use pit latrines forming the majority while 9.3% of the respondents use VIP. Other facilities are as shown in the table below.

Table 3-24 Type of toilet Facilities

Facility	Number of Respondents	As a Percentage
Bucket Toilet	1	0.4%
Flush to Piped Sewer System	1	0.4%
Flush to Pit (Latrine)	1	0.4%
Pit Latrine with Slab	134	49.6%
Pit Latrine without Slab/Open Pit	108	40.0%
Ventilated Improved Pit Latrine (VIP)	25	9.3%
Grand Total	270	100%

Source – AWEMAC Field Survey

From the households interviewed, 38% of respondents share toilet facilities while the majority, 62%, prefer not to share. 26% of the respondents indicated that they have a hand washing place while 74% did not have this in place.

3.4.7 Garbage Disposal

With regards to garbage disposal, most of the respondents, 53.9%, burn garbage in open places, 28.4% dump in the homestead compound, while 16.2% bury their waste. Only 1.1% of the respondents' dump waste in vacant plots.

3.4.8 Health access

The construction of health facilities programme through Economic Stimulus Programme (ESP) and Constituency Development Fund (CDF) led to increase in health facilities in all sub-counties in Machakos County. The County Government has greatly improved the health facilities with one Level 5 hospital located at Machakos town and four Level 4 hospitals in Kathiani, Mwala, Matuu and Kangundo. Other health facilities by ownership include 193 under the County Government, 32 owned by Faith Based Organisations (FBOs), 9 owned by NGOs and 128 private owned. The total health facilities in the County are 367. Most of the health facilities are found in the urban areas. Patients/clients in rural areas travel longer distances to access health services. In response, the County Government has instituted measures to ensure access to well-equipped health centres within the wards (Machakos CIDP 2018-2022).

Murang'a County has 272 health facilities serving a population of 959,701. It has one County referral hospitals and six sub-county hospitals, three mission and one private hospital. There are 26 public health centres, 114 dispensaries (89 public and 25 mission/NGO) and 137 private clinics. The most prevalent diseases in Murang'a County are malaria/fever (2%), flu (20.64 %) diarrhoea (11.45 %), respiratory tract infections (10.86 %) and stomach-ache (6.54 %).

As per the socio-economic survey, 80%of respondents seek medical services in government health facilities whereas a considerable proportion of 18% visit private hospitals/clinics (table 3.25).

Table 3-25 Type of Health facility

Type of medical facility	Number	As a Percentage
Faith-based (Church, mission, Hospital/Clinic)	1	2%
Government Dispensary	5	6%
Government Health centre	15	19%
Government Hospital	42	55%
Private Hospital/Clinic	14	18%
Grand Total	77	100%

Source – AWEMAC Field Survey

Malaria was the most prevalent disease reported by the respondents. Blood pressure and arthritis were also reported to have a substantial occurrence among the households in the proposed project area. 73% of the respondents had their illness diagnosed by a Health worker at a hospital as compared to 4% who diagnosed themselves as shown in the table below.

Table 3-26 Illness diagnosis

Who diagnosed?	Number	As a Percentage
Health Worker at other health facility	15	19%
Health worker at the Hospital	56	73%
Household Member	2	3%
Non-Household member (Not Medical)	1	1%
Self	3	4%
Grand Total	77	100%

Source – AWEMAC Field Survey

An assistant chief through an interview claimed that residents largely rely on Over the Counter (OTC) drugs in nearby shops or chemists when they fall sick. Suggesting shortage of medical facilities. The respondent further estimated that about 70% of the community members would walk an average of 3km to access the nearest medical facility in case the sickness becomes more severe. A medical officer in the project area alleged that the Machakos County patient-doctor ratio is well below the recommended WHO ratio while indicating that malaria cases are on a raise, maternal health access are major issues facing the health sector in the region. The respondent had this to say;

"Currently Machakos County has a major challenge of doctors or even medical officers to attend to the increasing numbers of patients being received from various villages. In fact, our current statistics for patient-doctor ratio is worrying. You would imagine one clinical officer attending to more than 70 patients a day and some of these patients seriously needs doctor's attention. Yet the doctor is far away. Though, we are glad that the births delivered at a health facility are increasing".

Some of the health facilities in the project area are; Machakos Level 5 Hospital, Mwala District Hospital, Kithimani Medical Clinic, Kaani Dispensary.

3.4.8.1 HIV/AIDS Prevalence Rates and Related Services

HIV prevalence rate in Kenya is 6%, an average of 1.6 million people. The HIV prevalence in Machakos County stands at 4.50% with females being the most affected at 6.10%. Percentage of those who have never been tested for HIV is high among males at 27% compared to 13% among females. The estimated new annual infections are 1,872 and are more prevalent among young women. The estimated population of adults and children living with HIV according to the 2016 data is 30,529 and 2,082 respectively. The County has put in efforts to promote use of ARVs among

the infected. Currently, the proportion of PLHIV on ARV treatment is 83% and 82.6% for those on treatment and are immune suppressed (Table 3-27) *(Machakos CIDP 2018-2022)*.

Table 3-27 HIV/AIDS Prevalence Rates in Machakos County

Indicator		Indicator	
HIV Prevalence	4.50%	Estimated annual new infections	1,872
HIV Prevalence (Males)	2.70%	Est. Pop. Living with HIV (adults)	30,529
HIV Prevalence (females)	6.10%	Est. Pop. Living with HIV (children)	2,082
% of females who have never been tested for HIV	13%	Proportion of people living with HIV on ARV treatment	83%
% of males who have never been tested for HIV	27%	% of people living with HIV who are on treatment and are Immune suppressed	82.6

Source –National Aids Control Council, 2016

The prevalence rate in Murang'a County is 5.2% with an average of about 58,666 persons. HIV prevalence rate in females and males is 9.8% and 1.2% respectively (Murang'a County CIDP 2018-2022).

The HIV prevalence rate in both Murang'a County (5.2%) and Machakos County (4.5%) is below the average Kenyan prevalence rate (6%); however, the statistics are high compared to the global HIV prevalence of 0.8% among adults. This may not directly affect project implementation but it informs the need for concerted effort with existing national and county government health agencies such as National AIDS Control Council (NACC), including NGOS (AHF Kenya), and CBOs (youth, men and women groups) in order to minimize the spread of new HIV infections during the project implementation (construction and operation stages).

3.4.9 Agricultural activities

The socio-economic survey identified that 88% of the total respondents practice subsistence agriculture.

3.4.9.1 Main Crops Produced

Approximately 60% of total land area in Machakos is arable. Agriculture is the main activity carried out in most of the sub-counties. Most of the farms on hilly terrains are characterised by terraces for controlling soil erosion. One of the village elders in the project corridor mentioned "Sloping terraced farmland" to be a common terracing method practiced by farmers. The elder says that residents use this method in a bid to slow down the movement of water downstream, which tends to carry away soil, hence losing fertility. Generally, farmers mound up soil on the hillside creating a level area with a short steep back slope down to the next level. The top, flat area can still be farmed with crops. The short steep back slopes are seeded with perennial grasses. The roots of these perennial grasses assist hold the slope in place.

The main cash crops are coffee, mangoes, citrus, french beans, pineapples, flowers, sorghum and vegetables (Plate 3-23). Near AP 18, a coffee farm was spotted in Mbuno Village, Mavoloni sub-location. In Ikalaasa village-Mwala location, a tobacco farm was spotted. The food crops grown include maize, beans, pigeon peas, green grams, cowpeas and cassava which are cultivated in small scale. Most of the subsistence farmers in the proposed project area own large pieces of land for farming. Majority of the households in the proposed project area do not rely on rain fed agriculture but rather practice irrigation. In kitie and Ikalaasa village, for example, farms of grafted mangoes and orange plantations were observed. Several farms of grafted mangoes were also observed in Kwangunzu, Kyanganga and Kathuma villages-Mango location (Plate 3-24). Production of arrowroots and bananas was noted to be common in farms along Thika River. Khat farming was observed in Mamba village, Ndalani Location.

Plate 3-23 Commercial vegetables farming in Kitw'amba village

Source – AWEMAC Field Survey

Machakos County aims to increase the productivity of arable land through use of quality farm inputs, appropriate mechanization, irrigation and good agricultural practices. Maize and beans are the main food crops grown across the Machakos County while; mangoes and coffee are the major cash crops. Machakos County is experiencing a constant decline in arable land due to climatic change risks. The dominant features of hill farming were observed in the project area where locals engage in mixed-crop subsistence farming with dominant crops being maize, peas, beans, and vegetables, especially during rainy seasons. In flatland regions, residents have heavily cultivated their lands with grafted mangoes, pawpaw, oranges, lemons, and tangerine. A prominent farmer claimed that many families depend on fruit-trees, particularly grafted mangoes not only as a source of income but also as a source food

Plate 3-24 Grafted mangoes common in the proposed project area

Source – AWEMAC Field Survey

In Murang'a County, the major cash crops include tea, coffee, avocado, mangoes, macadamia and horticulture crops, among others. Horticultural crops include tomatoes, cabbages, kales, spinach and French beans while food crops include maize, beans, bananas, sweet potatoes and cassava (Murang'a CIDP 2018-2022).

3.4.9.2 Main Livestock Breeds

The main livestock kept in Machakos County are indigenous chicken, beef cattle, goats, sheep and dairy cattle. Between 2013 and 2017 there was a general increase in livestock populations with indigenous chicken registering the highest growth in numbers. This is attributed to free indigenous chicks' program being implemented by the Department of Agriculture, Livestock and Fisheries. There are 14 livestock markets distributed across 6 sub-counties in Machakos County where large-scale livestock trading takes place. Most of the households along the proposed project transmission route practice zero grazing, free range farming and tethering (Machakos CIDP 2018-2022).

The main livestock bred in Murang'a County are cattle, pigs, goat, sheep, rabbits and chicken. Exotic cattle breeds are found in the upper parts of the county while indigenous cattle breeds are found in the lower parts of the county. Dairy and indigenous goats are spread all over Murang'a County, but they thrive well in the lower parts. Pigs are of different varieties and reared all over the county due to readily available market. Rabbits and chicken are reared in response to demand for white meat (Murang'a CIDP 2018-2022).

The socio-economic survey noted that 80% of the respondents practice livestock keeping while 78% of them do poultry farming. Only 3% of respondents indicated to be practicing bee keeping. Out of the 80% that rear livestock, majority of them keep indigenous cattle at 43.1%. Other types of livestock kept are presented in the table 3-28.

Table 3-28 Types of livestock kept

Livestock Reared	Number	As a Percentage
Indigenous Cattle	180	43.1%
Exotic sheep	5	1.2%
Exotic Cattle-Dairy	22	5.3%
Exotic Cattle-Beef	0	0.0%
Indigenous goat	148	35.4%
Dairy goat	10	2.4%
Indigenous sheep	35	8.4%
Camel	1	0.2%
Donkey	15	3.6%
Rabbit	1	0.2%
Pig	1	0.2%
Grand Total	418	100%

Source – AWEMAC Field Survey

Plate 3-25 Livestock found in the proposed project alignment

Source – AWEMAC Field Survey

3.4.9.3 Apiculture

Mavoko and Machakos Sub-counties have the highest honey and wax yields and income while the lowest yields and income are in Kathiani and Mwala Sub-counties. The highest honey price is in Kangundo at a unit price of Kshs 800 while the highest wax price is in Kathiani at a unit price of Kshs 500 (Machakos CIDP 2018-2022). In Murang'a County apiculture is underutilized with concerted efforts to improve it. Currently, there are approximately 11,962 beehives in the entire county. Bee keeping was observed in Mwala Location, Kitie and Ikalaasa villages of Machakos County (Plate 3-27).

Plate 3-26 Bee keeping in Kitie village

Source – AWEMAC Field Survey

Taking into cognizant the existence of sparsely located beehives along the proposed transmission line areas mainly within Mwala sub-county in Kitie and Ikalaasa villages, it will be important where possible to avoid any interference of the beehives if outside the RoW. Studies on frequency of electromagnetic fields (EMF) on Honeybees (Shepherd S et al. 2018), found out that honeybees exposure on EMF was found to reduce learning, alter flight dynamics, reduce the success of foraging flights towards food sources, and feeding. The results suggest that EMFs emitted from power lines may represent a prominent environmental stressor for honeybees. The study notes that transient exposure to EMF reduces a bee's ability to learn, reduces their memory retention, and affects flight and foraging behaviour all of which could potentially reduce their ability to pollinate. As a precaution, it is recommended that beehives should not be placed directly on the proposed transmission line RoW. Measures such as relocation, and compensation of the beehives for affected households should be considered for proposed transmission line alignment.

3.4.10 Mining

The major mineral deposits within Machakos County are limestone, granite and sand. Most of the major cement factories in Kenya are located in Mavoko Sub-county namely Bamburi Cement, East Africa Portland, Mombasa Cement, Ndovu Cement, Simba Cement, Athi River Mining and Savannah Cement (Machakos CIDP 2018-2022).

Major mining activities in Murang'a County include quarrying that entails extraction of stone, ballast, sand, and gravel mainly for housing and road construction. However, there is scanty information on the same with efforts to create a database to capture the majorly informal mining activities (Murang'a CIDP 2018-2022).

Sand is mostly harvested along the riverbeds by private individuals and later sold for construction purposes. A common feature of the areas surveyed is the presence of rock outcrops interspersing the savannah vegetation. There was evidence of these rock outcrops being exploited as quarries to provide building materials (Plate 3-28). A quarry site with rock crushing facilities was spotted in Mathithini village, Mavoloni Sub-location.

Plate 3-27 Quarrying of construction materials in Mavoloni location

Source – AWEMAC Field Survey

3.4.11 Social protection Issues

3.4.11.1 Vulnerable Population

8% of the households interviewed have people living with disability out of which 48% of them are registered with the national government. A majority of the interviewed households did not specify the type of disability but 26% indicated they have lame people in their household while 13% responded to have a household member with a missing hand. 18% of the households had an elderly person of which 61% were reported to be registered and receiving Cash Transfer for the Elderly from Government.

Based on the vulnerable population likely to be encountered along the transmission alignment, the project should ensure key measures are established. This should include identifying the individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status in order to ensure they have access to development benefits and opportunities. Further the compensation process should be well managed to ensure the vulnerable especially orphans, PLWD, widows and elderly are clearly identified and receive funds without losing them to care givers.

3.4.11.2Number of Orphans and Vulnerable Children (OVCs)

Machakos County has over 169,000 orphans and vulnerable children. The total number of cash transfer beneficiaries in Machakos County is 33,300 (OVC) or 8,325 households (Machakos CIDP 2018-2022) as shown in the table below. Murang'a County Orphans and Vulnerable Children Cash Transfer (OVC-CT) program has 8,000 beneficiaries (Murang'a CIDP 2018-2022).

Table 3-29 Orphans and Vulnerable Children in Machakos County

Sub-county	Total no. of Households	Estimated no. of OVC
Machakos	1,275	5,100
Mwala	990	3,960
Kangundo	733	2,932
Athi River	441	1,764
Kathiani	1,348	5,392
Matungulu	789	3,156
Yatta	1,559	6,236
Masinga	1,190	4,760
TOTAL	**8,325**	**33,300**

Source: Directorate of social welfare, 2018

The socio-economic survey sowed 15 (fifteen) out of the interviewed households had orphans of which the total number of boys were 16 while the total number of girls were 11, thus total number of 27 orphans.

3.4.11.3Cases of Street Children

In Machakos County, most of the children and youth living and working on the streets are in the urban centres. A large number of them are school dropouts who come to the streets during the day and return home in the evening. Murang'a County has no pronounced cases of street children since the department of social and interior department co-work to ensure the professional handling of arising cases (Murang'a CIDP 2018-2022).

3.4.11.4Child Care Facilities and Institutions by Sub-county

There are 30 privately owned children's homes registered with the Children's Department in Machakos County. Amongst them is one National Government Girls' rescue centre and a rehabilitation centre for street children (boys). Social welfare section runs the county programmes on children while the department of children arbitrates on issues of children and has offices in all the sub-counties (Machakos CIDP 2018-2022). Murang'a County has 8 children offices located in each Sub County. The county has a children home in Kandara, Koimbi, and Murang'a Juvenile Centre (Murang'a CIDP 2018-2022).

3.4.11.5Social Safety Net Programmes in the County

The national government offers social safety net programmes in both Machakos County and Murang'a County namely Cash Transfer for Orphans and Vulnerable Children (CT-OVC), Cash Transfer for Older Persons above 70 years (CT-OP) and Cash Transfer for Persons with Severe Disabilities (CT-PWSD).

3.4.11.6 Gender Based Violence (GBV) – Sexual Exploitation and Abuse /Sexual Harassment

Gender Based Violence (GBV) is a public health concern across the world. It is a significant risk factor for poor health impacting on individuals' physical, sexual and psychological health, as well as their social and economic well-being. Vision 2030, through its social pillar, commits Kenya to invest in its people to improve the quality of life for all Kenyans by targeting a cross section of human and social welfare projects and programmes, including gender equality programmes. Furthermore, in addition to the constitutional guarantees of equality for all before the law (Chapter 4 on the Bill of Rights), Kenya subscribes to the Millennium Development Goals (which have been transformed into the Sustainable Development Goals), including Goal 3 – Promote Gender Equality and Empower Women. Kenya has therefore committed itself to eliminating gender-based violence and to protecting survivors through robust legislation, policy frameworks, and commitment to regional and international conventions and instruments on GBV.

In Machakos County GBV including domestic violence stands at 4.6% of the Machakos County Crimes Outlook (2018). However, LVCT Health – a Kenyan NGO notes that GBV cases including sexual abuse are mostly resolved through local mechanisms such as clans and elders' meetings. Machakos County has stepped up its fight against GBV by establishing a Gender Based Violence Secretariat that is currently housed at the Ministry of Education and Social Welfare to coordinate different stakeholders as well as national government efforts. The secretariat comprises of an 18 member-committee drawn from different sectors which include, civil society and faith-based organizations, Government departments as well as persons living with disabilities. The County government has initiated programmes spearheaded by the Department of Education and social development." The committee envisions working closer to the people by establishing structures in all the eight sub counties to bring more stakeholders on board. According to Director of the GBV Secretariat, one of the challenges encountered by the county is that there is no data available specifically for the county despite the high prevalence of GBV in the area. Preliminary findings from a research conducted by LVCT Health reveal that intimate partner violence is prevalent at 41.3% physical violence accounts for 31%; psychological violence at 35% while Sexual Gender Based Violence accounts for 22%

In Murang'a County GBV including domestic violence stands at 9.1% of the Murang'a County Crimes Outlook (2018). Gender based violence involves a wide variety of agents from intimate partners and family members, to strangers and institutional actors such as teachers, pastors, office managers and police. The commonest forms of GBV mentioned by men and women included inflicting bodily harm, physical assault, verbal abuse and rape. The most fundamental cause of GBV is the traditional belief about men's dominance over women.

Based on the socio-economic survey, locals claimed that the 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 would cause animosities between the locals and the outsiders, degenerating into conflicts and scramble for scarce resources such as accommodation, water, and food as well as job opportunities. This might result in social and cultural impacts such as child abuse, teen pregnancies, and pupils dropping out of school to take up jobs, gender-based violence (GBV) as spouses fight over-compensation, and sexual exploitation and abuse (SEA).

Interviews with key informants in both Machakos and Murang'a Counties also noted the possibility of sexual harassment (SH) between workers / staff working on the project. The key informant stated that unwelcome sexual advances, requests for sexual favours, and other unwanted verbal or physical conduct of a sexual nature might arise at the project workplaces. The informants noted that the potential perpetrators of SH can be any individuals associated with the proposed project including construction workers and other personnel of the contractor, consultants supervising the project or undertaking technical assistance activities relating to the project or even the security personnel hired for the project.

3.4.11.7Child and Forced labour

Kenya has made some commendable moves towards eliminating child labour, primarily through the National Policy on the Elimination of Child Labour, and most recently the Computer and Cybercrime Bill with its provisions on child sexual exploitation. And worth mentioning is the Children's Act which domesticated most international and continental conventions to enhance child rights and protection. Kenya has ratified most key international conventions concerning child labour including Minimum Age, Worst Forms of Child Labour, Optional Protocol on Armed Conflict, Palermo Protocol on Trafficking in Persons. The Constitution of Kenya also prohibits forced labour. Although child abuse and exploitation including forced labour is prohibited by the Kenyan constitution, many children not yet in their teens, are forced to work in farms, as sand harvesters, street hawkers, domestic workers, drug peddling and most piteously, as sex workers. Children also engage in child labour in agriculture.

According to a report by Plan International featured on Citizen Tv Digital (2015), Machakos County is experiencing an increase in child labour, early pregnancies, early marriages, rape and

defilement which affects children education. The intervention of Plan International has seen many offenders arrested and charged with most cases being recorded at the Kithimani courts in Yatta. Plan International notes that child labour has seen many children drop out of school for sand harvesting and bodaboda transport business in Machakos County. This is connected to high poverty levels being experienced in the county.

According to a study by ANPPCAN, a pan-African child rights organization featured by CMI (2015), in Murang'a County children are engaged in child labour working in agriculture fields, mainly coffee farms. Findings suggest that child labour is apparently more common in rural than in urban settings with commercial agriculture was cited as the greatest consumer of child labour in rural areas while domestic labour demands the use of child labour mainly in urban areas. A key informant in Murang'a noted that in rural areas, poverty drives some families to engage in trafficking children for domestic work in urban centers. Further children in Kenya scavenge dumpsites and streets for scrap material, including metal and glass while often risking injury and exposing themselves to infectious diseases.

A key respondent in the project area, familiar with children matters stated that most orphans and vulnerable children in the project area are likely to be exposed to child victimisations such as forced early marriages, child labour as well as child neglect. The informant observed that there is need for proper and continuous consultations with the entire community to sensitise on respecting the rights and welfare of children and refrain from violating them.

3.4.12 Museums, Heritage and Cultural sites

Machakos County has one museum in Kalama. It also has seven heritage and culture sites namely Wamunyu and Muliluni handcrafts in Mwala Sub-county; Second World War platters, Masaku and Muindi Mbingu grave sites in Machakos; Paul Ngei grave site in Kangundo and African heritage house in Mavoko Sub-county (Machakos CIDP 2018-2022).

Murang'a County has various cultural sites among them; Mukurwe-wa-Nyagathanga in Kiharu, Tuthu Cultural Site (Karuri WA Gakure) in Kangema, and Mugo (Chege) WA Kibiru Cultural Centre in Gatanga (Murang'a CIDP 2018-2022).

During the ESIA study exercise, Akamba Peace Museum was identified in Kyanzasu, Kimutwa Location. Interviews with the centre management highlighted that it was established in the year 2001 and mainly frequented by students and tourists as a cultural resource centre in the area. The centre disseminates information to visitors on Akamba culture. Akamba traditional artefacts are displayed here (Plate 3-29) and occasionally, cultural festivals are held here. Within the resource centre, *ex-situ* conservation of tree species with known cultural values to the Akamba community is being practiced. Some of the observed species include *Terminalia brownii, Balanite aegyptica* (Plate 3-30)*, Erythrina abysinnica, Ficus sycomorus, Olea africana* amongst others. The indigenous tree species grown in its compound are symbolical for peace making. Worth noting, the Akamba Peace Museum in Kyanzasu is privately owned though it holds community artefacts and history which are of great benefit to the locals. Therefore, the museum is a community cultural resource given its communal utilization. However, it remains private property even though it plays a communal role. The centre, which lies at GPS picking of 0316302, 9829294 and an elevation of 1395m a.s.l, has a small section of its total area lying within the proposed RoW.

Plate 3-28 A show room in Akamba Peace Museum

Source – AWEMAC Field Survey

Plate 3-29 ***Balanites aegyptica protected in Akamba Peace Museum***

Source – AWEMAC Field Survey

Shrines, locally known as *Mathembos*, are common in Mwala Sub-County but none was noted to be traversed by the proposed transmission line and its associated facilities. For instance, a shrine was observed in Mithumo village about 500m off the proposed Row. Kwa Mbule shrine was also observed in Kyoimbi village near Muvwana River. These shrines were noted to be characterized by sacred indigenous trees.

Six (6) grave sites were noted to be within the proposed RoW; five (5) within Mwala Location in Kitie village and one (1) in Kimutwa Location– Machakos County. Based on the local interviews with an officer from Machakos County Culture department officer, cultural sites such as shrines and sacred trees should be avoided through route re-alignment and/or siting of the towers away from them to enhance their preservation. This was further echoed by locals in both Machakos County and Murang'a County who noted that the proposed project should avoid any interference with the existing graves either during construction works or clearing access routes, since the graves hold cultural values and social ties to the bereaved.

3.5 Environmental Parameters Quality Assessment

The ESIA study covered into detail the key environmental parameters which included; Air Quality Assessment; Water Quality Assessment and Noise Level Assessment

3.5.1 Water Quality Assessment

Water quality samples were collected during the environmental baseline data collection to provide data that will act as a reference for monitoring water resources in the project area influence in future (Annex 4). The concentration levels of the analysed parameters were compared with the first, third and ninth schedule on water quality standards (GOK 2006). Water quality parameters were determined and analysed from River Mwania, River Ikiwe, Kwa Mbuno Dam, Thika River and Athi River. These water bodies will be traversed by the proposed transmission line (Table 3-30).

The water quality parameters analysed, showed that some had variations from the NEMA standards/guideline values and World Health Organization standards (WHO). Several parameters such as pH range, chloride, fluoride, nitrite, sulphate and total dissolved solids were within the acceptable levels in the samples collected (Table 3-30). Nonetheless, the sources of samples collected do not conform to EMCA (Water Quality) Regulations, of 2006 standards for Sources of Domestic Water, Effluent Discharge into The Environment and Irrigation Water. This is due to:

- River Mwania being coloured, turbid water with high Iron content and; bacteriologically contaminated with *E. Coli*, Legionella ssp and total coliforms
- River Ikiwe being coloured, turbid water with high Iron content and; bacteriologically contaminated with *E. Coli*, Legionella ssp and total coliforms
- Kwa Mbuno Dam being coloured, turbid water with high Manganese content and; bacteriologically contaminated with *E. Coli*, Legionella ssp and total coliforms
- Thika River being coloured, turbid water with high Iron and Manganese level and; bacteriologically contaminated with *E. Coli*, Legionella ssp and total coliforms and;
- Athi River being coloured, turbid water with high Iron content and; bacteriologically contaminated with *E. Coli*, Legionella ssp and total coliforms

It was evidenced through observations during the ESIA field work that some of these water sources were heavily polluted. For instance, Athi River near AP14 was polluted with plastic packaging materials and plastic bottles. A bad odour was also noted coming from it depicting release of pollutants into this water source from up stream. It is also essential to note that the ESIA field exercise had stretched into the rainfall season of Machakos County and the Country at large, thus a contributing factor to the high colour and turbidity of these water sources along the proposed project area. There is need for the responsible persons and organizations to ensure these water sources are not polluted by release of household and industrial wastes. Nevertheless, these sources of water need to be treated and disinfected before being used for domestic or irrigation purposes.

Notably, direct impact of the proposed transmission on water quality is expected to be minimal since the power transmission pylons will be approximately 45 metres above ground and

specifically anchored to avoid water bodies. However, there will be a potential increase in the generation of wastewater and sewage during the construction phase of the project. The increases will take place at construction sites, workers camp sites and in various towns that will host construction workers located along the transmission route. Mitigation measures have been established to mitigate discharge of wastewater and sewage to water bodies.

Table 3-30 Comparison of water sample results against WHO Standards and NEMA Guidelines

Parameters	Unit	Analytical Method	Results for *River Mwania at Katoloni Village*	*Results for River Ikiwe at Kaani Village*	*Results for Kwa Mbuno Dam in Mavoloni*	*Results for Thika River at Kiwanza Village-Mavoloni*	*Results for Athi River at Mwala*	KS EAS 12:2018 STANDARDS (MAX.) / WHO Standards	NEMA Quality Standards for Sources of Domestic Water	NEMA Standards for Effluent Discharge into The Environment	NEMA Standards for Irrigation Water
Physical-Chemical											
pH	pH Scale	APHA 4500-H^+ B	**7.9**	**7.8**	**8.2**	**6.3**	**7.2**	5.5-9.5 (6.5-8.5)*	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5
Colour	mgPt/L	APHA 2120 B	**150**	**150**	**100**	**175**	**225**	50(15)*		15	
Turbidity	N.T.U	APHA 2130 B	**72**	**474**	**5.9**	**33**	**87**	25(5)*			
Conductivity (25^0C)	µS/cm	APHA 2510 B	**643**	**307**	**786**	**114**	**473**	2500(1500)*			
Iron	Mg/L	APHA 3500-Fe B	**2.4**	**4.4**	**0.3**	**1.8**	**2.2**	0.3		10	1
Manganese	Mg/L	APHA 3500-Mn B	**-**	**-**	**1.2**	**0.4**	**0.18**	0.1			
Calcium	Mg/L	APHA 3500-Ca B	**44**	**30**	**24**	**11**	**34**	150			
Magnesium	Mg/L	APHA 3500-Mg B	**16**	**2.9**	**11**	**<0.01**	**0.5**	100			
Sodium	Mg/L	APHA 3500-Na B	**60**	**23**	**130**	**13**	**65**	200			
Potassium	Mg/L	APHA 3500-K B	**12**	**12**	**4.0**	**1.6**	**6.1**	50			
Total Hardness	$MgCaCO_3$/L	APHA 2340 C	**176**	**86**	**106**	**28**	**88**	600(300)*			
Total Alkalinity	$MgCaCO_3$/L	APHA 2320 B	**160**	**70**	**240**	**54**	**156**	500*			
Chloride	Mg/L	APHA 4500-CL^- B	**91**	**41**	**49**	**7**	**42**	250		250	0.01
Fluoride	Mg/L	APHA 4500-F^- C	**1.0**	**0.6**	**1.0**	**0.2**	**0.2**	1.5	1.5	1.5	1.0
Nitrate	mgNO_3^-/L	APHA 4500-NO_3^- D	**10**	**4.2**	**<0.01**	**0.8**	**3.1**	45(50)*	10		

Parameters	Unit	Analytical Method	Results for *River Mwania at Katoloni Village*	*Results for River Ikiwe at Kaani Village*	*Results for Kwa Mbuno Dam in Mavoloni*	*Results for Thika River at Kiwanza Village-Mavoloni*	*Results for Athi River at Mwala*	KS EAS 12:2018 STANDARDS (MAX.) / WHO Standards	NEMA Quality Standards for Sources of Domestic Water	NEMA Standards for Effluent Discharge into The Environment	NEMA Standards for Irrigation Water
Nitrite	mgNO_2^--N/L	APHA 4500-NO_2^- B	**0.26**	**0.1**	**<0.01**	**0.04**	**0.4**	0.9(3)*	3		
Sulphate	Mg/L	APHA 4500-SO_4^{2-} E	**21**	**ND**	**74**	**0.6**	**8.3**	400			
Free Carbon Dioxide	Mg/L	APHA 4500-CO2 C	**18**	**8**	**4**	**4**	**28**	-			
Total dissolved solids,	Mg/L	APHA 2510 A	**399**	**190**	**487**	**71**	**402**	1500(1000)*	1200	1200	1200
Biological											
Total Coliforms	MPN 100/mL	APHA 9223 A	**980**	**1986**	**2420**	**>2420**	**1203**	Not detectable		30	
E. Coli	MPN 100/mL	APHA 9223 A	**251**	**1120**	**866**	**1046**	**219**	Not detectable	Nil/100 ml	Nil/100 ml	Nil/100 ml
Legionella ssp	CFU 100/mL	APHA 9260 J	**-**	**-**	**-**	**-**	**-**	Not detectable			
Free residual chlorine	Mg/L	APHA 4500-Cl G	**-**	**-**	**-**	**-**	**-**	0.2-0.5		0.10	

**WHO maximum guideline value; APHA: American Public Health Association (2005)-Standard methods for the examination of water & wastewater; "<": Value below method detection limit*

Source – AWEMAC Field Survey

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3.5.2 Noise quality measurements

During the baseline study and survey conducted, there were no significant noise polluting activities within the proposed project area. For instance, there are no industries along the proposed project area which could otherwise pose noise pollution. Vehicle traffic within the proposed project RoW is also low hence does not pose noise pollution. However, commercial areas like Kimutwa, Makaveti trading centre, Kaani market, Masii market, Mwala trading centre, Mumbuni market, Sofia market, Kambi Mawe market and Mukundi market in Murang'a County should be monitored due to the numerous activities and settlements within these areas.

During construction noise will be a temporary phenomenon. Possible noise pollution from the proposed project construction period is likely to be encountered during excavations and heavy moving machinery. Nonetheless, at the construction stage, it is expected that background noise levels will be monitored periodically at sensitive areas such as near schools. Sound level values will be computed and compared with the legal standard permissible limits. Nonetheless, noise sampling was undertaken in nine areas along the RoW. The main purpose of the noise sampling was to obtain baseline information and act as a reference for monitoring hum or buzz effect caused by transmission in the project area influence in future. The baseline noise survey results will compare noise levels after the TL is operational and to monitor whether the hum affects baseline levels at these locations. It is anticipated that as part of project monitoring noise quality assessment will be done to assess how far the hum or buzz is heard and whether it will affect residential units. It's worth noting that the acoustic noise produced by transmission lines is greater with high voltage power lines (400-800 kilo volts [Kv]) and even greater with ultra-high voltage lines (1000 Kv and higher) . However, the proposed Machakos Mwala Ekalakala transmission line has a voltage of 132kV with a 30 meters way leave hence the acoustic noise is expected to negligible. 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 of 30 metres - 10 metres on both sides from centre line -the buzzing noise is expected to be very minimal.

Table 3-31 below gives the baseline noise measurements obtained from sample areas along the RoW. The results, except one, indicated that the noise levels were within the allowable limits as provided by the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the World Bank IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines - Environmental Noise Management. The highest reading was recorded in Kithendu Sub-location near AP 16. The mean value was higher than the allowable noise limits. This was because to its proximity to A3 highway which had a number of passenger and commercial vehicles plying that route. The high noise recorded was as a result of vehicular movement. The lowest measurements were recorded in Kathuma and Mwenyea villages. The areas were generally silent comprised of vast farms and scattered settlements.
Noise and vibrations from the proposed project has however been considered and mitigated under the environmental and social management plan and hence will be of minimal impact.

Table 3-31 ***Noise Measurement levels***

S/N	Location	Coordinates	Time	Measured Noise Level in dB(A)	L_{EQ} dB(A)	Standard measured in dB(A)		Remarks
						Noise Regulations, 2009 (Daytime) Leq,14 h	IFC Guidelines	
1.	Kalala Centre Mwenyea in Kaani Sub-location, Iveti Location	-1.535253, 37.361266	10:30 10:45	L_{max}: 48.8 L_{min}: 40.7	44.75	55	55	Reading taken in a sparsely populated area with numerous terraced farms at approximately 70m from the proposed transmission line and 2.3km from C97 (Machakos-Kitui) road.
2.	Utithini Sub-location in Masii location	-1.458589, 37.424659	11:40 11:55	L_{max}: 64.3 L_{min}:44.4	54.4	55	55	Reading taken 180m from the proposed transmission line near AP8. 300m from C97 (Machakos-Kitui) road and approximately 1km from Masii town centre.
3.	Kathuma village, Kyanganga Sub-location, Mango location	-1.416289, 37.448581	14:17 14:31	L_{max}: 45.2 L_{min}:35.3	40.3	55	55	Reading taken 100m from AP11, 1.65km from C97 (Machakos-Kitui) road and 2.5km from Makutano trading centre
4.	Makutano/ Mwala SS	-1.360652, 37.444761	13:39 13:44	L_{max}: 55.5 L_{min}: 42.3	48.9	55	55	Reading taken at proposed site for Mwala SS approx. 1.25km from Mwala town centre
5.	Kwa Ndoo Village in Mwala (Kwa-Ndoo Mbiuni road)	-1.314275, 37.435327	12:30 12:45	L_{max}: 67.7 L_{min}: 34.1	50.9	55	55	Reading taken at AP12

6.	Kabaa Sub-location in Mbiuni Location	-1.231404, 37.435366	13:00 13:15	L_{max}: 67.2 L_{min}:38.8	53.0	55	55	Reading taken at the banks of Athi River approximately 1km from the proposed transmission line and 1.9km from AP14
7.	Kithendu Sub-location in Kithimani location	-1.139773, 37.477997	16:32 1647	L_{max}: 69.4 L_{min}:53.3	61.4	55	55	Reading taken 115m from AP16 and approximately 70m from A3 (Thika-Garissa) road
8.	Mwiendei village, Mavoloni sub-location in Mavoloni location	-1.095999, 37.418667	14:45 15:00	L_{max}: 63.5 L_{min}:42.8	53.2	55	55	Reading taken approximately 300m from the proposed transmission line at Kwa mbuno dam.
9.	Gituamba sub-location in Kakuzi location	-1.040180, 37.394818	14:45 15:00	L_{max}: 59.5 L_{min}:35.3	47.4	55	55	Reading taken at AP20

Source – AWEMAC Field Survey

3.5.3 Air Quality Assessment

The baseline study and survey conducted established that there were no current air polluting activities within the project RoW. For instance, vehicle traffic within the project RoW is low hence does not pose air quality risk. Further, there are no industries along the project RoW which could otherwise pose air quality risks. The only possible air quality contaminants from the project route are minimal dust emissions and greenhouse gases likely to occur during the construction phase and are therefore not an ephemeral or permanent source of air pollution. Dust emissions would be attributed to land excavations and heavy moving machinery whereas greenhouse gases are likely to be emitted from the combustion of fossil fuel used in heavy machinery that will transport construction materials. These will however be mitigated under the environmental management plan and hence be of minimal impact. Nonetheless, it is expected that the effects will not adversely affect the baseline air quality of the project area.

3.5.4 Radiological baseline measurements

The earth contains natural background radiations originating from terrestrial and cosmic sources. National radiation levels can be significantly modified by human activities. The modified levels can impact adversely on human health and the environment. In Kenya, research on levels of radionuclides has shown both high and low background radiation levels in different parts of the country. Natural radioactivity varies from one place to another and in other places, there are wider deviations of radioactivity from the normal levels because of abundance of minerals and local geology of each region (UNSCEAR, 2000; Mohanty et. al., 2004). The presence of naturally occurring radionuclides in the environment may result to an external and internal dose received by a population exposed to them directly and via the ingestion and inhalation pathways. Studies (Mohanty et al., 2004) have shown that there are few regions in the world, which are known for high background radiation due to the local geology and geochemical effects that cause enhanced levels of terrestrial radiation.

Radioactivity measurement in the environment is important in setting the standards and guidelines for the use of soil, building materials, water and vegetation and in assessing the radiation hazard associated with them. The potential health effects associated with exposure to high levels of ionizing radiations have made it necessary for continuous environmental monitoring to ascertain the radioactivity concentrations of ^{226}Ra, ^{232}Th, ^{238}U and ^{40}K in the environment to create awareness to the public and policy makers to ensure that exposure to radiation is as low as reasonably achievable. Due to the absence of existing baseline radiological data in the region, the analysis of the Kenya geological map (1942) showed that there is granitic intrusion on the southern slopes of Nyambene ranges. As such, the geology of the area suggests that the Machakos-Mwala-Ekalakala double circuit transmission line will not trigger any known radiological impacts. However, should any radionuclides be detected along the project area RoW due diligence will be followed as per existing legal requirements.

3.6 Environment and Climate Change

3.6.1 Major Contributors to Environmental Degradation

Environmental degradation is a concern in Machakos County. Unsustainable and rampant sand harvesting has contributed negatively to the environment through reduced water retention capacity in water bodies. This has caused drying of rivers resulting to water scarcity for both domestic and commercial use. The quality of water has been compromised through discharges of industrial wastes into the rivers upstream. Moreover, emissions from industries have led to air pollution related negative effects. Most of the Machakos County residents use unsustainable cooking methods such as firewood and charcoal as the major source of fuel. This has resulted to deforestation in most areas leading to rampant and expansive soil erosion and; negatively affected attraction of rain across the County.

Emissions from factories and industries have caused airborne related illnesses to the part of population that live in these areas. Moreover, pollution of rivers through discharge of industrial wastes has negatively affected aquatic life and quality of agricultural yields produced through irrigation farming along the rivers.

Murang'a County CIDP (2018-2022) notes that the main environmental pollutants are emissions from Green House Gases (GHGs), agrochemicals from agricultural activities and factories, quarrying activities, and various other activities that pollute the environment through human induced activities and solid wastes from towns and markets. The GHGs disrupt atmospheric balance and global warming therefore heating the earth surface.

Solid wastes include plastic and polythene papers (banned), glass, human waste, animal waste, organic plant matter, synthetic materials, rubber and medical waste. Dumping and management of solid waste to the environment remains a major challenge for the County. Only Murang'a Town has a sewerage treatment plant. Makuyu, Maragua, Kangari and Kangema Towns as well as Kiria-ini, Kahatia, Kandara, Kenol and Kigumo Markets are in dire need of solid waste management facilities.

3.6.2 Climate Change and its Effects

The negative impacts of climate change have the potential to reverse progress made in attaining Sustainable Development Goals (SDGs) and Kenya Vision 2030 for both Machakos and Murang'a Counties. These effects are prolonged periods of drought, erratic rainfalls and rise in average temperatures which have led to low agricultural production.

3.6.3 Climate Change Mitigation Measures and Adaptation Strategies

Climate change is a global concern that requires concerted efforts to mitigate against and adapt to its effects. Both Machakos County and Murang'a County have put in place several strategies towards the same, which range from policies, strategies and programmes. Mitigation strategies include afforestation, re-afforestation, and promotion of clean cooking and use of green energy. The adaptation strategies include livestock and crop zoning and introduction of drought resistant crops and livestock breeds. The proposed transmission line and its associated facilities is in line with this through ensuring availability of sufficient and reliable clean energy for both domestic and industrial purposes.

4 CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

Kenya has in place a wide range of institutional, policy, and legislative framework to address the major causes of environmental degradation and negative impacts on ecosystems emanating from industrial and economic development programmes. This chapter includes a summary of the policies, laws, regulations and institutional setup relevant to environmental and social management in Kenya and pertinent to this project. A review of the most pertinent regulations and standards governing health and safety has been included. In addition, analysis for international good practice (World Bank Safeguard Policies and MEAs) and their applicability to the proposed project were reviewed and presented to guide the proponent. Reference was equally made to diverse instruments under World Bank Group in identifying and mitigating potential impacts. Some of the tools are: General and Power Transmission Environmental, Health and Safety (EHS) Guidelines and Environmental Assessments Sourcebooks, etc.

4.2 KETRACO Guiding Frameworks

4.2.1 Environmental and Social Management Framework (ESMF).

The ESMF was prepared by the KETRACO to address the environmental and social impacts of the portion of the Kenya Electricity System Improvement Project (KESIP) where this proposed project falls. The ESMF sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts of subprojects prepared during Project implementation. It includes guidelines to prepare measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts of subprojects, provisions for estimating and budgeting the costs of such measures, and information on the agencies responsible for addressing project impacts. The ESMF is a key guiding document for preparation of the ESIA.

4.2.2 Resettlement Policy Framework (RPF)

The Resettlement Policy Framework (RPF) was prepared by the KETRACO to address the resettlement and compensation principles of the portion of the Kenya Electricity System Improvement Project (KESIP) where this proposed project falls. The aim of this RPF is to establish the resettlement and compensation principles, which include the process for undertaking socio-economic surveys and a census of the project affected persons (PAPs), a description of eligibility criteria for accessing compensation under the project, cut-off date for inclusion of PAPs in the Resettlement Action Plan or Abbreviated Resettlement Action Plan (RAP/ARAP), organizational arrangements for implementation of the RAP/ARAP (to be prepared in accordance with this RPF), and the design criteria to be applied to meet the needs of the people who may be affected by the various subprojects, whether or not PAPs have to physically move. The objective of this RPF is to establish the principles, procedures, entitlements and eligibility criteria, organizational arrangements, and provisions for monitoring and evaluation (M&E), the framework for stakeholder and PAPs participation, as well as the mechanisms for addressing grievances which will be applied to the proposed transmission project. It provides guidelines on how the project will avoid, manage or mitigate all project related displacement risks. The RPF is a key guiding document for preparation of the RAP.

4.2.3 Vulnerable and Marginalized Groups Framework (VMGF)

The Vulnerable and Marginalized Groups Framework (VMGF) describes the policy requirements and planning procedures that should be used during the preparation and implementation of the project components, especially those identified as occurring in areas where IPs/VMGs are present. The VMGF highlights the need for screening to be done to assess and confirm the presence of VMGs. VMGF highlights that a site-specific social assessment (SA) should be prepared that should inform the preparation of individual VMGPs as set out in the Framework and further public consultations and stakeholder engagements should be conducted. The VMGF by KETRACO is therefore a key guiding document for preparation of the social assessment and VMGPs if need arises.

4.3 National Policy framework

4.3.1 Constitution of Kenya

The Constitution of Kenya is the country's supreme legislation and has Environmental provisions in Chapter Four, under 'Rights and Fundamental Freedoms', Chapter Five, under 'Environment and Natural Resources', and Chapter Ten, under 'Judicial Authority and Legal System'. The Fourth Schedule also includes environmental provisions under 'Distribution of functions between National and County Governments' and the Fifth Schedule titled 'Legislation to be enacted by Parliament'. Environmental rights and freedoms are presented in Article 42 of the new constitution, which states: Every person has the right to a clean and healthy environment, which includes the right –

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

The Kenyan constitution also gives prominence to public participation, as a general national value in environmental protection. Article 69(1) states that the State shall encourage public participation in the management, protection, and conservation of the environment. Chapter 5 Part II - Environment and Natural Resources - Article 69 (1) of the Constitution of Kenya, 2010 commits the State to:

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

Article 69 (II) states that "Every person has a duty to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources." Moreover, the Constitution includes aspects around land acquisition and compensation. It also mandates the development of a national land policy to implement the principles and establishes the National Land Commission.

4.3.2 Policies, Plans, and Strategies

Table 4-1 Policies, Plans and Strategies

Policies, Plans and Strategies	Key areas of application
The Big Four Agenda	▪ The Big Four Agenda (GOK, 2017) was launched during the 54th Jamhuri Day Celebrations on 12 December 2017 and elaborates the specific agenda and measures the Jubilee administration will focus on over the period 2018-2022. ▪ The areas of focus set out are -food security, affordable housing, manufacturing and universal healthcare. *The proposed project will see an increase in energy / electricity supply, quality, reliability and a reduction of power cost in the country, one of the key enablers of economic growth critical for achieving the Big Four Agenda on sustainable development.*

Policies, Plans and Strategies	Key areas of application
Kenya Vision 2030	▪ Vision 2030 (GOK, 2007) is divided into three fundamental pillars: economic, social and political. The social pillar aims at realising a just and cohesive society enjoying equitable social development in a clean and secure environment. ▪ These pillars are anchored on the following foundations: macroeconomic stability; continuity in governance reforms; enhanced equity and wealth creation opportunities for the poor; infrastructure; energy; science, technology and innovation; land reform; human resources development; security and public sector reforms. ▪ The Vision 2030 aims at transforming Kenya into a globally competitive, newly industrialized, middle income and prosperous country. The growth objectives underpinning the Vision 2030 require a sustainable annual economic growth rate of more than 10% supported by industry, agriculture and services. ▪ Efficient, accessible and reliable infrastructure has been identified as an enabler for achieving sustained economic growth, development and poverty reduction by lowering cost of doing business and improving the country's global competitiveness. *The proposed Project aims to support creation of transmission and distribution infrastructure to enhance electricity service provision in Kenya in tandem with Vision 2030 on energy as a key enabler.*
Third Medium Term Plan (MTP III) (2018-2022)	▪ The Third Medium Term Plan (MTP III) (GOK, 2018) of the Kenya Vision 2030 outlines the main policies, legal and institutional reforms as well as programmes and projects that the Government plans to implement during the period 2018-2022. It builds on the achievements of the first and second MTPs and prioritizes implementation of the Big Four Agenda initiatives. ▪ Under infrastructure, the Plan aims to meet the demands of a growing population through the following programmes and projects: ➢ Increased electricity generation capacity from 2,699 MW in FY 2017/18 to 5,221 MW in FY 2021/22 ➢ Connect 5 million new households and 15,739 public institutions to electricity through the Last Mile Connectivity Programme *The proposed project is hence in line with the MTP III as it will support the transmission of electricity geared towards power for the last mile connectivity programme.*
Sessional Paper No. 10 of 2014 on the National Environment Policy	▪ The policy seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. ➢ The broad objectives of the national environmental policy in Kenya are: -To ensure optimal use of natural resources while improving environmental quality. ➢ To conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same. ➢ To develop awareness that inculcates environmental stewardship among the citizenship of the country. ➢ To integrate environmental conservation and socio-economic aspects in the development process.

Policies, Plans and Strategies	Key areas of application
	➢ To ensure that national environmental goals contribute to international obligations on environmental management and social integrity. ➢ To achieve the above policy objectives, it is a policy directive that appropriate reviews and evaluations of all forms of developmental project plans and operations are carried out to ensure compliance with the environmental policy and legal frameworks. ▪ It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support achievement of desired objectives and goals. ▪ In chapter 4 on Management of Ecosystems and Sustainable Use of Natural Resources the policy notes that ecosystems provide a wide range of goods and services which include provisioning, regulating, cultural and supporting services. Despite the services they provide, ecosystems are under pressure from human activities. ▪ The most critical ecosystems in Kenya include forests, freshwaters, wetlands, coastal and marine, mountains, arid, semi-arid and spectacularly diverse wildlife populations. Within these ecosystems are key natural and cultural heritage resources which support diverse biodiversity and provide natural capital for economic development and support livelihoods. *The proposed project will traverse within farm forestry and urban forestry hence is expected to ensure sustainable management of natural resources.*
Sessional Paper No. 1 of 2017 on National Land Policy	▪ The overall goal of the national land use policy is to provide legal, administrative, institutional and technological framework for optimal utilization and productivity of land related resources in a sustainable and desirable manner at national, county and community levels. ▪ The Policy is premised on the philosophy of economic productivity, social responsibility, environmental sustainability and cultural conservation. ▪ Key principles informing it include efficiency, access to land use information, equity, elimination of discrimination and public benefit sharing. ▪ Amongst the key principles envisioned by the policy include; ➢ Land use planning, resource allocation and resource management for sustainable development to promote public good and general welfare; ➢ Environmental management and sustainable production in the utilization of land resources; ➢ Coordination and integration of institutional linkages in planning at sectoral and cross-sectoral levels to foster collaboration and decision making among different land users; ➢ Equitable utilization of land resources to meet governance, social-economic and cultural obligations of the people of Kenya;

Policies, Plans and Strategies	Key areas of application
	The proposed project will need to be consistent with the provisions of this Policy in order to avoid conflicts. Among the issues that will have to be addressed, are the modalities for the acquisition of land for PAPs.
Sessional Paper No. 6 of 1999 on Environment and Sustainable Development Policy.	▪ The policy defines approaches that will be pursued by the Government in mainstreaming environment into development. ▪ The policy harmonized environmental and developmental objectives with the broad goal of achieving sustainable development. **T***he policy paper also provided guidelines and strategies for government action regarding environment and development. This policy is relevant to the proposed transmission line project in view of the potential impacts on the environment and involvement of the public in project planning.*
3rd Draft National Energy Policy, 2012	▪ The level and the intensity of energy use in a country is a key indicator of economic growth and development. The Kenya Vision 2030 identified energy as one of the infrastructure enablers of its social economic pillar. Sustainable, affordable and reliable energy for all citizens is a key factor in realization of the Vision. ▪ The overall objective of the energy policy is to ensure affordable, sustainable and reliable supply to meet national and county development needs, while protecting and conserving the environment. ▪ Specifically, the policy aims to; ➢ Utilize energy as a tool to accelerate economic empowerment for the National and County Governments as well as urban and rural development. ➢ **Improve access to quality, reliable and affordable energy services.** ➢ **Ensure that prudent environmental, social, health and safety considerations are factored in energy sector developments.** ➢ Promote diversification of energy supply sources to ensure supply security ➢ Provide for the phased transfer of provision of energy services to the Counties in *The proposed project is hence in line with the tenets of the energy policy and should ensure prudent environmental, social, health and safety considerations are factored in the development.*
National Policy on Gender and Development (NPGD), 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 should hence ensure gender concerns are mainstreamed into the development to ensure that the needs and interests of each gender are addressed.*
Kenya National Youth Policy (2016)	▪ 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.

Policies, Plans and Strategies	Key areas of application
	It is expected the proposed project will identify the needs and concerns of youth and include their views.
National Policy on Older Persons and Ageing, 2009	▪ The older people are often discriminated and neglected. They are also prone to risks as are children, women, youth and the PLWDs. ▪ The policy aims to facilitate the integration and mainstreaming of the needs and concerns of older persons in national development. ▪ The policy, among other issues, emphasises on social protection in old age through either non-contributory benefit focused on reducing poverty and vulnerability, or contributory benefits aimed at maintaining the income of individuals. *The national policy for older persons and ageing lays basis for the intervention and involvement of the elderly in development matters.*
Sessional Paper No. 2 of May 2006 on Gender Equality and Development	▪ The Sessional Paper provides a framework for gender mainstreaming and recognizes that socio-cultural attitudes held by men and women, and socialization process are of great significance in determining the unequal status between men and women. ▪ It also recognizes that development initiatives impact differently on men and women and in turn women and men impact differently on development process. *The proposed project should hence ensure gender equality concerns are mainstreamed into the development.*
HIV/AIDS Policy of 2009	▪ The policy identifies HIV/AIDS as a global crisis that constitutes one of the most formidable challenges to development and social progress. ▪ The Pandemic heavily affects the Kenyan economy through loss of skilled and experienced manpower due to deaths, loss of man hours due to prolonged illnesses, absenteeism, reduced performance, increased stress, stigma, discrimination and loss of institutional memories, among others. *Due to the large of number of workers who will be involved in the proposed project and the associated social issues with projects of such as scale, HIV/AIDS has been considered as one of the proposed impacts, hence adequate mitigation measures will require to be proposed to that effect.*
National Forest Policy, 2014	▪ This Forest Policy provides a framework for improved forest governance, resource allocation, partnerships and collaboration with the state and non-state actors to enable the sector to contribute in meeting the country's growth and poverty alleviation goals within a sustainable environment. ▪ The Policy aim to enhance management of forest resources for conservation of soil, water biodiversity and environmental stability. *Although the project does not traverse any protected forest, it is expected to traverse both farm and urban forest which has trees vegetation. The project should hence ensure all forest resources are managed sustainably to yield social, economic and ecological goods and services for the current generation without compromising similar rights of future generations;*
National Water Policy, 2012	▪ The National Water Policy, 2012 has been developed in line with the mandate, vision and mission of the Ministry responsible for water affairs in Kenya. This Policy is compliant with the Constitution of Kenya 2010 and the Vision 2030 besides considering the targets of Sustainable Development Goals (SDGs).

Policies, Plans and Strategies	Key areas of application
	▪ The Policy is built on the premises of Integrated Water Resources Management (IWRM). The Policy aims at guiding the development of strategies for water management and utilization by water sector stakeholders. ▪ This policy recognizes the great expectation of population regarding access to freshwater supplies and use for domestic, livestock, agriculture and other production purposes. *It is therefore expected that the proposed project will ensure adequate protection of water resources for population access such River Galana /Athi and River Mwania which traverses near the boundary of the project.*
The National Climate Change Response Strategy (NCCRS), 2010	▪ NCCRS has the following key recommendations: adaptation and mitigation measures in key sectors; necessary policy, legislative and institutional adjustments; enhancing climate change awareness, education and communication in the country; capacity building requirements; enhancing research and development as well as technology development and transfer in areas that respond to climate change, among many others. ▪ It is prudent to **ensure that the proposed project infrastructure design is climate-proof over its lifespan**, which includes carrying out geotechnical site investigations (GSIs) to determine appropriate sites for infrastructure development; factoring a maintenance component into all infrastructural development funds; and designing infrastructure that can withstand the prevailing climatic conditions, e.g. structures that can withstand strong winds, tides.
The National Biodiversity Strategy, and Action Plan (NBSAP) 2000	▪ NBSAP was formulated to enable Kenya address national and international commitments defined in Article 6 of the Convention on Biological Diversity (CBD). ▪ The strategy is a national framework of action for ensuring that the present rate of biodiversity loss is reversed, and present levels of biological resources are maintained at sustainable levels for posterity. *It is therefore prudent to ensure the proposed project objectives are in line with the strategy to conserve Kenya's biodiversity; and to sustainably use its components.*
Least Cost Power Development Plan, 2017-2037	▪ This is a long term 20 year rolling plan covering the period 2017-2037. It integrates Feed-In-Tariff Policy approvals and provides a focus on the Government Big 4 Agenda in which energy is expected to be a central enabler of the programme. ▪ The report covers a comprehensive load forecast, addresses the committed generation projects between 2017 - 2024 and also the expansion programme for the period 2025-2037. ▪ The main objective of the plan and its update (from 2011 -2030) is to take into account new assumptions, reflect on emerging technologies as well as market dynamics that may influence future power expansion plan and accommodate new Government policy guidance on renewable energy expansion in the immediate long term. ▪ A key objective of the plan is to simulate the generation plants; - and prepare a Transmission System expansion plan in line with the generation expansion

Policies, Plans and Strategies	Key areas of application
	In transmission the report covers the target network for the period 2017-2037 ensuring that the target network is adequate, secure and cost effective.
Machakos County Integrated Development Plan, 2018-2022	▪ The CIDP seeks to build on the gains made and meditated upon lessons learnt in implementation of the first CIDP (2013-2017). It has been prepared through a participatory approach that sought views of development priorities from key stakeholders and the public. ▪ The plan therefore carries the aspirations of the people of Machakos County and guides county planning and budgeting processes for the next five years (2018 – 2022). ▪ The CIDP (2018 – 2022) shows linkage with other national and international development plans such as Agenda 2063, Vision 2030, MTP III, SDGs and Machakos County Manifesto (2017 – 2022) among other development plans. ▪ The CIDP has the Energy, Infrastructure and ICT Sector. On energy the sector seeks to ensure enhancement of power supply and distribution. This will provide connectivity to major towns and open up unconnected regions for trade and investment. This is critical in opening opportunities for employment and wealth creation with a view towards making Machakos County "the place to be" *It is envisioned that the proposed project will support adequate transmission of power for the last mile Connectivity programme within Machakos County aimed at expanding electricity infrastructure through the rural electrification programmes.*
Murang'a County Integrated Development Plan, 2018-2022	▪ Apart from providing comprehensive guidelines in project identification, implementation and evaluation; the CIDP also facilitates proper coordination with the national government and other stakeholders in order to improve the well-being of the county citizens. ▪ In addition, the integrated development planning framework formulated will enhance linkage between policy, planning and budgeting. ▪ The projects and programmes in this CIDP were identified through various consultative forums at the county level. ▪ Under the Roads, Transport, Energy, and Public Works sector, the CIDP aims to increase connectivity, supply & installation of transformers as well as lowering of connectivity cost. *The proposed project will therefore support adequate transmission of power for the last mile Connectivity programme within Murang'a County aimed at increasing connectivity through rural electrification programmes.*

Source – AWEMAC

4.4 National legal and regulatory framework

The Republic of Kenya has numerous laws and regulations that guide environmental management and conservation in the country. Most of these laws are sector specific and cover a wide range of issues including public health, soil conservation, protected areas conservation, endangered species, public participation, water rights, water quality, air quality, excessive noise control, vibration control, land use, among others. The relevant legislations are described in sections 4.4.

Table 4-2 Laws and Regulations

Laws and Regulations	Key areas of application	Permit / license Requirements
Environmental Management and Coordination Act (EMCA, Cap 387) and relevant amendments	▪ EMCA Cap 387 is the principal law in Kenya that governs the management, use and regulation of environmental resources including natural capital. ▪ The law provides for a number of policy and institutional arrangements aimed at ensuring that Kenya's environmental resources are utilized in a sustainable and equitable manner. ▪ EMCA establishes among others the following institutions; National Environment Management Authority, National Environment Complaints Committee, National Environment Tribunal, National Environment Action Plan Committees, and County Environment Committees. ' ▪ The National Environment Management Authority (NEMA) was established as the principal instrument of government charged with the implementation of all policies relating to the environment, and to exercise general supervision and coordination over all matters relating to the environment. ▪ In consultation with the lead agencies, NEMA is empowered to develop regulations, prescribe measures and standards and, issue guidelines for the management and conservation of natural resources and the environment. The Act provides for environmental protection through; ➢ Environmental impact assessment ➢ Environmental audit and monitoring ➢ Environmental restoration orders, conservation orders, and easements. ▪ 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 (amendments 2019) provides details on projects that require Environmental Impact Assessment by categorizing the projects into Low Risk Projects; Medium Risk Projects and High-	▪ Obtain EIA License prior to commencement of the project

	Risk Projects. The High-Risk Projects include any activity out of character with its surrounding; and any structure of a scale not in keeping with its surrounding. High risk projects also include other projects of high magnitudes such as high voltage transmission lines. *This project is listed under High Risk Project as power and infrastructure projects, specifically (a) high voltage electrical transmission lines; for which an Integrated Environmental and Social Impact Assessment study report is prepared. Through EMCA, various regulations have also been gazetted which the proponent is expected to abide as discussed in numerical below*;	
a) The Environmental Impact (Assessment and Auditing) Regulations, 2003 and (Amendment) Regulations, 2016 (L.N 149) & 2019 (L.N 32)	▪ Environmental Impact Assessment under the EMCA Cap 387 Act is guided by the Environmental Impact Assessment (Assessment and Auditing) *Regulations of the year 2003, which is given under legal notice no. 101 and (Amendment) Regulations, 2016 (L.N 149) & 2019 (L.N 32)* ▪ The regulations stipulate the ways in which environment impact assessment and audits should be conducted. The project falls under the second schedule of EMCA, Cap 387 High Risk Project that requires an Environmental Impact Assessment Study be undertaken to provide baseline information upon which subsequent environmental control audit shall be based. ▪ 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 public meetings with the affected parties and communities. *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.*	▪ Undertake Annual Environmental Audit (EA) of the project during operation
b) Environmental Management and Coordination (Water Quality)	▪ 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	▪ Quarterly effluent discharge quality and quantity monitoring

	Regulations, 2006	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. *Everyone including the proposed project proponent 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 Cap 387.*	through sampling. ▪ Apply for an effluent discharge license (EDL) (for campsites and substations)
c)	Environmental Management and Coordination (Waste Management) Regulations, 2006	▪ These 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. *The Proponent shall observe the guidelines as set out in the environmental management plan laid out in this report as well as the recommendation provided for mitigation /minimization /avoidance of adverse impacts arising from the Project activities.*	▪ Obtain waste transportation and disposal Permit or Contract a licenced waste transport and disposal company
d)	Environmental Management and Coordination of Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)	▪ This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements. ▪ The regulations stipulate that controlled substances must be clearly labelled with among other words, "Controlled Substance-Not ozone friendly") to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer." ▪ Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless a	▪ Undertake a Free Prior Informed consultation

	material safety data sheet accompanies the controlled substance. ▪ NEMA must license manufacturers, exporters or importers of controlled substances. Further, NEMA must authorize any person wishing to dispose of a controlled substance. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. *These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a permit from NEMA.*	
e) EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations 2006	▪ Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. ▪ In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection. ▪ The country has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning. *These regulations apply to the proposed project based on the biological diversity along the RoW hence integration of biodiversity concerns into development planning. Mitigation measures have been developed to ensure reduced impacts*	▪ Obtain EIA License prior to commencement of the project since it may have an adverse impact on the ecosystem.
f) 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;	▪ Obtain Noise and Excessive Vibration permit

	➢ 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 that the level of noise causes no harmful vibrations. 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 *Noise is expected during construction phase therefore, contractor is required to implement the provisions of the ESMMP, to ensure noise reduction. In addition, he shall be required to adhere to the provisions of maximum permissible levels for construction sites.* *The Proponent/management shall observe policy and regulatory requirements and implement the measures proposed in this documenting an effort to comply with the provisions of the Regulations.*	
g) Environmental Management and Coordination (Air Quality) Regulations, 2014	▪ The objective this regulation is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. ▪ It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles). ▪ 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. *Although impacts on air pollution is listed minor, the Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document to comply with the provisions of these Regulations on abatement of air pollution.*	▪ Conduct ambient air quality analysis of the generators as recommended under the third schedule of the regulations.
Building Code, 2000;	▪ This law recognizes the county governments as the leading planning agencies. It compels potential developers to submit development applications for the approval. ▪ The county governments are hence empowered to approve or disapprove any	▪ Obtain County approval of Building plans (such as campsites and substation offices)

	plans if they do or don't comply with the law, respectively. ▪ Any developer who intends to erect a building must give the respective local authority a notice of inspection before the erection of the structure. ▪ On completion of the structure, a notice of completion shall be issued by the local authority to facilitate final inspection and approval. ▪ No person therefore shall occupy a building whose certificate of completion has not been issued by the county government. *In the development of the project, the proponent will have to comply with the provisions of this Act by complying to the Building code provisions in specific sites where buildings or support facilities will be required***.**	▪ Obtain certificate of completion for buildings (such as campsites and substation offices)
Civil Aviation Act No. 21 of 2013;	▪ This Act establishes the Kenya Civil Aviation Authority (KCAA) with the objective and purpose to economically and efficiently plan, develop and manage civil aviation, regulate and operate a safe civil aviation system in Kenya in accordance with the provisions of this Act. *The transmission line construction project must obtain a permit for towers to be erected from the Kenya Civil Aviation Authority.*	▪ Obtain a permit for erection of Towers
Energy Act, 2019;	▪ The energy Act aims to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, **supply and use of electricity and other energy forms; and for connected purposes** ▪ The Act establishes the **Energy and Petroleum Regulatory Authority** to ensure generation, importation, exportation, transmission, distribution, supply and use of electrical energy with the exception of licensing of nuclear facilities; ▪ Article 177 of the Act gives liability to the transmission licensee to make compensation to the owner or occupier of any land or the agents, workmen or servants of the owner or occupier of any land which is the subject of the provisions of this Act, for damage or loss caused by the exercise or use of any power or authority conferred by this Act or by any irregularity, trespass or other wrongful	▪ Obtain Permit and License to carry out electrical installation work (for contractor) ▪ Ensure electrical workers have a certificate for electrical works.

	proceeding in the execution of this Act or by the loss or damage or breaking of any energy infrastructure or by reason of any defect in such infrastructure. ▪ **A RAP will be conducted to assist in compensation of the PAPs and affected property.** ▪ **Article 178 of the act gives provisions for installation of energy infrastructure** along roads, and railways, government property, including forests, National parks, reserves and heritage sites, for the purpose of the production, conveyance and supply of energy. ▪ **Article 179, gives the Cabinet Secretary compulsory acquisition of land for purposes of constructing**, modifying or operating any energy infrastructure or for incidental purposes where reasonable attempts to acquire the land had failed. ▪ Article 193, gives the County Governments power to ensure efficient use of energy and its conservation ▪ Article 148 highlights that a person who wishes to carry out electrical installation work must be licensed as an electrical contractor by the Authority.	
Forest Conservation and Management Act, No. 34 of 2016;	▪ The Forest Conservation and Management Act, 2016 gives effect to Article 69 of the Kenyan 2010 Constitution about forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio-economic development of the country and for connected purposes. ▪ The Act applies to all forests on public, community and private lands. The principles of the Act lay emphasis on (a) good governance in accordance with Article 10 of the Constitution; (b) public participation and community involvement in the management of forests; (c) consultation and co-operation between the national and county governments; (d) the values and principles of public service in accordance with Article 232 of the Constitution; (e) protection of indigenous knowledge and intellectual property rights of forests resources; and (f) international best practices in management and conservation of forests. ▪ Further, the act forms the baseline to develop a national forest policy and formulate a public forest strategy for the	▪ -

	sustainable use of forests and forest resources. ▪ In addition, the Act, establishes the Kenya Forest Service to conserve, protect and manage all public forests in accordance with the provisions of this Act. *The power transmission project traverses' patchy, and restricted forest plantations, urban and farm forestry, therefore it is important to ensure community participation as provided for under the Act. The most appropriate would be initiation of participatory forest management in these forest sections so that the local community can have a significant input with Kenya Forest Service (KFS) office playing a coordination role.* *Further, the project as such will need to ensure that disruption of the environment in forested areas is minimised and appropriate mitigation measures are established and implemented*	
Kenya Roads Act, 2007;	▪ This is an Act of Parliament that provided for the establishment of Kenya Road Agencies i.e. Kenya National Roads Authority (KeNHA), the Kenya Urban Roads Authority (KURA) and the Kenya Rural Roads Authority (KeRRA) and provided powers and functions of the authorities. ▪ The Rural Roads Authority has the responsibility for the management, development, rehabilitation and maintenance of rural roads. KeRRA functions and duties include (a) constructing, upgrading, rehabilitating and maintaining roads under its control; and (b) controlling reserves for rural roads and access to roadside developments. *The various Roads Authorities will be key stakeholders in the development of the project and most important during construction phases for development and maintenance of road access within the project corridor.*	▪ Obtain Written Permission to construct Transmission lines over Roads
The Land Registration Act, 2012	▪ This is an Act of Parliament that revises, consolidates and rationalizes the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. ▪ The act requires that proper marking and maintenance of boundaries. ▪ An interested person who has made an application to the Registrar for his/her boundaries to be ascertained, the Registrar shall give notice to the owners and occupiers of the land adjoining the boundaries in question of the intention to ascertain and fix the boundaries.	▪ Give notice to the owners and occupiers of the land along RoW

	▪ With regard to the maintenance of boundaries, the Act requires every proprietor of land to maintain in good order the fences, hedges, stones, pillars, beacons, walls and other features that demarcate the boundaries, pursuant to the requirements of any written law. *The proposed project will require landowners and specifically PAPs to identify their land boundaries which are within the RoW.*	
The Land Act, 2012; and The Land Laws (Amendment) Act,2016	▪ The Land Act was enacted by 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 Act applies to all land declared as (a) public land under Article 62 of the Constitution; (b) private land under Article 64 of the Constitution; and (c) community land under Article 63 of the Constitution and any other written law relating to community land. ▪ The Land Act guarantees security of tenure for land under (a) freehold; (b) leasehold; (c) such forms of partial interest as may be defined under the Act and other law, including but not limited to easements; and (d) customary land rights, where consistent with the Constitution and guarantees equal recognition and enforcement of land rights arising under all tenure systems and non-discrimination in ownership of, and access to land under all tenure systems. *Under the Lands Act 2012, Sections 28 and 29 allow for Compulsory Acquisition as an option in acquiring land for public utility*.	▪ -
National Land Commission Act, No. 5 of 2012;	▪ The National Land Commission of Kenya is an independent government commission established by the act and provided for by Constitution of Kenya to, amongst other duties, manage public land on behalf of the national and county governments, initiate investigations into present or historical land injustices, recommend appropriate redress, monitor and have oversight responsibilities over land use planning throughout the country. ▪ The mandate of the National Land Commission is drawn from the National Land Policy of 2009 (Rev 2017), Constitution of Kenya 2010, National Land Commission Act, 2012, the Land Act 2012 and the Land Registration Act of 2012.	▪ -

	▪ Under the National Land Commission Act, the Commission shall among other duties monitor the registration of all rights and interests in land and ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations. *The commission is required to manage and administer all unregistered community land on behalf of the county government and develop and encourage alternative dispute resolution mechanisms in land dispute handling and management. The Commission is also required in consultation and cooperation with the national and county governments, to establish county land management boards for the purposes of managing public land.*	
The Valuers Act cap 532, 1985	▪ The revised edition 1985 of the Valuers Act Cap 532 makes provisions for the relevant charges and conducts of valuers in relation to valuation of assets. ▪ The Act also provides the relevant regulations and guidelines in the undertaking of the valuation works. *The Act requires that adequate valuation is carried out to help meet the actual compensation measures and the market rates and reduce any acts of malice in the exercise.* *A competent valuer will have to be deployed to site to carry out the professional valuation of assets for compensation along the RoW.*	▪ Certificate of registration for the valuer to undertake land valuation.
Occupational Safety and Health Act, No. 15 of 2007;	▪ The Occupational Safety and Health Act 2007applies to all workplaces where any person is at work, whether temporarily or permanently. ▪ The purpose of the act is to secure the safety, health and welfare of persons at work and protect persons other than persons at work against risks to safety and health arising out of, or regarding, the activities of persons at work. ▪ Section (3) Every occupier shall carry out appropriate risk assessments in relation to the safety and health of persons employed and, on the basis of these results, adopt preventive and protective measures ▪ Section 9.(1) Every occupier shall establish a safety and health committee at the workplace in accordance with OSH Committee regulations. ▪ Section 11. (1) requires the occupier of a workplace to cause a thorough safety and health audit of his workplace to be carried	▪ Obtain Registration of Workplace Certificate for workplaces (Campsites, substation offices etc) ▪ Undertake Annual Safety and health Audit ▪ Establish a Safety and Health Committee ▪ Undertake appropriate risk assessment of the Workplace

	out at least once in every period of twelve months by a safety and health advisor. ▪ Section 16 provides that no person shall engage in any improper activity or behaviour at the workplace, which might create or constitute a hazard to that person or any other person. ▪ Section 19 of the Act provides that an occupier of any premises likely to emit poisonous, harmful, injurious or offensive substances, into the atmosphere shall use the best practicable means to prevent such emissions into the atmosphere and render harmless and inoffensive the substances which may be emitted. ▪ Section 44. (1) requires before a person occupies or uses any premises as a workplace, he shall apply for the registration of the premises by sending to the Director a written notice containing the particulars set out in the Fourth Schedule. *It is thus recommended that all Sections of the Act related to this project, such as provision of protective clothing, clean water, and insurance cover are observed to protect all from work related injuries or other health hazards*.	
Penal Code Act (Cap 63);	▪ The Penal Code (Cap. 63) chapter on "Offences against Health and Conveniences" strictly prohibits violation of the atmosphere at any place, to make it noxious to health of persons in general dwelling or carrying out business in the neighbourhood or passing along public ways is guilty of misdemeanour and shall be subjected to imprisonment not exceeding two years with no option of fine. ▪ Under this code, any person who for trade or otherwise makes loud noise or offensive awful smell in such places and circumstances as to annoy any considerable number of persons in the exercise of their rights, commits an offence, and is liable to be punished. *The contractor of the proposed transmission line will therefore need to ensure that all emissions are controlled during the construction phase of the project to avoid interference on health of the local communities and the workers.*	▪ -
Physical and Land use Planning Act, 2019;	▪ This Physical and Land Use Planning Act, 2019 make provision for the planning, use, regulation and development of land and for connected purposes. ▪ Article 5 of the Act under Principles and norms of physical and land use planning notes that every person engaged in physical	▪ Subject the project to environmental and social impact assessment –

	and land use planning development activities shall be in a manner that integrates economic, social and environmental needs of present and future generations. ▪ Section 55 of the Act provides for development control to protect and conserve the environment and to ensure orderly physical and land use development amongst others. These includes process and procedures for processing of easements and way-leaves; siting of base transmission station, power generation Plants, et. ▪ The 3rd Schedule of the Act Article 1 gives considerations for Easements and Wayleaves of base transmission stations. Article 4 notes major developments should be subjected to environmental and social impact assessment. *The proponent and contractors of the proposed transmission line should ensure compliance with the provisions of the act and land use planning. Public participation has been conducted to ensure the involvement of stakeholders in the planning process.*	issuance of an EIA license ▪ Processing of easements and way-leaves;
Public Health Act (Cap 242);	▪ The Public Health Act (Chapter 242) is an Act of Parliament that provides for securing and maintaining good health of citizens. ▪ The Act contains directives that are focused on ensuring protection of human health. There are provisions within the Act that deal with water, air and noise quality as they pertain to human health. ▪ An environmental nuisance includes the emission from premises of waste waters, gases and smoke which could be regarded as injurious to health. ▪ The owner and/or occupier of premises responsible for such nuisances are liable to prosecution under the Act. *The construction of the proposed transmission line has potential pollution risks related to water siltation in sections near water sources such as near River Galana.* *The contractor will need to ensure that water pollution is controlled and does not affect residents.*	▪ -
Climate Change Act, 2016;	▪ The Act provide for a regulatory framework for enhanced response to climate change; to provide for mechanism and measures to achieve low carbon climate development, and for connected purposes. ▪ The Act should be applied for the development, management, implementation and regulation of mechanisms to enhance	▪ -

	climate change resilience and low carbon development for the sustainable development of Kenya. ▪ The Act should be applied in all sectors of the economy by the national and county governments to— ➢ Mainstream climate change responses into development planning, decision making and implementation; ➢ Build resilience and enhance adaptive capacity to the impacts of climate change; ➢ Mainstream the principle of sustainable development into the planning for and decision making on climate change response; and ➢ Integrate climate change into the exercise of power and functions of all levels of governance, and to enhance cooperative climate *The proposed project should therefore ensure that infrastructure design is climate-proof over its lifespan and undertaken as per provisions of the act specifically on planning and implementation stages.*	
County Governments Act, No. 17 of 2012; together with its Amendment Act, 2016	▪ This is an Act of parliament to give effect to Chapter Eleven of the Kenyan Constitution; to provide for County government's powers, functions and responsibilities to deliver services and for connected purposes. ▪ 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 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 equity resource allocation, among others. ▪ Section 103 of the Act sets out the prime objective of county planning which aligned to the bill of rights and the constitution of Kenya. ▪ Section 113 of the Act makes public participation in County planning processes compulsory ▪ 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. *In the execution of the proposed project, the County Government of Machakos and Murang'a forms a key stakeholder in project planning in ensuring equal allocation of the resource in question and ensuring public participation***.**	
Employment Act, No 11, 2007;	▪ The Employment Act, 2007 defines the fundamental rights of employees including the basic conditions of employment of workers. It also regulates employment of children. ▪ The contractor on site will have to employ casual labourers probably from the communities where the transmission traverses during construction. *The basic conditions of employees should be observed to avoid unnecessary conflicts during the construction works. The Contractor shall pay the entire amount of the wages earned by or payable to the workers. Payment of such wages should be done at the end of a working day at or near the place of work. The Contractor shall also ensure that all statutory deductions are submitted without delay to appropriate government agencies e.g. Kenya Revenue Authority, NSSF, NHIF, among others.*	▪ Ensure Statutory deductions without delay to appropriate government agencies e.g. Kenya Revenue Authority, NSSF, NHIF
Water Act, 2016;	▪ The Water Act No. 43 of 2016 repealed the water Act 2002. The enactment of this law aimed at aligning national water management and water services provision with the requirements of the Constitution of Kenya 2010 particularly on the clauses devolving water and sanitation services to the county governments. ▪ The act highlights regulation of Water Rights and Works with Section of 36 of the act requiring a water permit be obtained for any use of water from a water resource, except as provided by section 37; ▪ Section 40 stipulates procedures for obtaining a water permit including subject of public consultation and, where applicable, of environmental impact	▪ Apply for Water Extraction Permit ▪ Obtain EIA license prior to digging boreholes

	assessment in accordance with the requirements of the Environmental Management and Coordination Act, 1999 (No. 8 of 1999). ▪ Section 55 highlights abstraction of ground water. The Fourth Schedule has effect with respect to the abstraction of ground water and respective works including application for a permit. ▪ Consequently, the new law retained some and established other new institutional arrangements including; ➢ Ministry of Water and Irrigation as the sector coordinator, ➢ Water Services Regulatory Board (WASREB) for regulation of water services' providers, ➢ Water Resources Regulatory Authority (WRA formerly WRMA) for water resource use regulation, ➢ National Water Harvesting and Storage Authority for major water infrastructural development, ➢ Water Tribunal for dispute resolution, ➢ Water Sector Trust Fund for water services development towards the un-served and poor segments of the society in peri-urban and rural areas, ➢ Water Works Development Agencies to replace the Water Service Boards, and ➢ Basin Water Resources Committees to replace Catchment Advisory Committees (CAACs) *The Act vests provision of water and sanitation services with the county governments through Water Services Providers (WSPs) whose operations must be in accordance with a Service Agreement entered between each WSP and WASREB. During the entire project lifecycle, regulations and guidelines as per the Water Act provision should be considered.*	
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. ▪ Public awareness shall be achieved through education, public campaigns even at workplaces. *This Act's provisions then give the guidelines unto which the project shall follow in educating workers and staff and providing of incentives to combat HIV/AIDs. The proposed project should adopt the guidelines as set in the provisions of the act to enhance public awareness and rights to people living with HIV/AIDS*	▪ -

The Sexual Offences Act, 2006 and its amendment 2012	▪ 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 committed within the view of a child or person with mental disabilities. ➢ Defilement. ➢ Attempted defilement. ➢ Gang rape. ➢ Indecent act with child or adult. ➢ Promotion of sexual offences with a child. ➢ Child trafficking. ➢ Child sex tourism. ➢ Child prostitution. ➢ Child pornography. ➢ Exploitation of prostitution. ➢ Trafficking for sexual exploitation. ➢ Prostitution of persons with mental disabilities. ➢ Incest by male persons. ➢ Incest by female persons. ➢ Sexual harassment. ➢ Sexual offences relating to position of authority and persons in position of trust. ➢ Sexual relationship which pre-date position of authority or trust. ➢ Deliberate transmission of HIV or any other life threatening sexually transmitted disease. ➢ Administering a substance with intent. ➢ Distribution of substance by juristic persons. ➢ Cultural and religious sexual offences. ➢ Non-disclosure of conviction of sexual offences. ➢ Vulnerable witnesses. ➢ Vulnerable witnesses to be notified of protective measures. ➢ Evidence of surrounding circumstances and impact of sexual offence. *Ample working environment should prevail in all workplaces in the project, to be enhanced*	▪ -

	through implementation of a Sexual Misconduct Policy.	
Alcoholic Drinks Control Act, 2010.	▪ The Alcoholic Drinks Control Act is an act of Parliament to regulate the production, sale, and consumption of alcoholic drinks, to repeal the Chang'aa Prohibition Act, the Liquor Licensing Act and for connected purposes. The Act seeks to: ➢ To protect the health of individuals by providing a legal framework to control sale, production & consumption of alcoholic drinks ➢ To protect consumers of alcohol products from misleading inducements to use alcohol ➢ To protect young people (those below 18 years) by restricting their access to alcoholic products ➢ To educate the public on the dangers of alcohol use (economic, social & health) ➢ To protect the government by dealing with illicit trade ➢ To promote and provide for treatment & rehab programmes for the addicted ➢ To promote research and dissemination of information especially of health risks *The proposed project is therefore expected to be in the forefront to ensure the public i.e. students are informed and sensitized on the dangers of alcohol use (economic, social & health) impacts.*	▪ -
Persons with Disabilities Act, 2003;	▪ This act protects the rights of people with disabilities ensuring they are not marginalized and that they enjoy all the necessities of life without discrimination. ▪ The act guarantees that ➢ No person shall deny a person with a disability access to opportunities for suitable employment. ➢ A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees. ➢ An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment. *A person with disability is entitled to exemptions which apply with respect to exemptions and deductions as described in Schedule 42 subsection (2) of the act, among*	▪ -

	other provisions within this act that should be complied with all parties involved.	
The National Gender and Equality Act, 2011	▪ National Gender Equality Commission is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution. ▪ NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEC Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination. *Gender mainstreaming in projects ensures that the concerns of women and men form an integral dimension of the project design, implementation, operation and the monitoring and evaluation ensures that women and men benefit equally, and that inequality is not perpetuated.*	▪ -
Protection of Traditional Knowledge and Cultural Expressions Act, 2016;	▪ The Act of parliament provides a framework for the protection and promotion of traditional knowledge and cultural expressions which gives effect to Articles ll, 40 and 69(L) (c) of the Constitution ▪ The Act requires a person who uses traditional knowledge or cultural expressions beyond its traditional context should indicate source of the knowledge or expression and where possible, the origin of the knowledge or expression, and use such knowledge or expression in a manner that respects the cultural values of the holders. ▪ Article 2 of Act requires that traditional knowledge or cultural expressions shall not, without the prior and informed consultation of the owners, be used for-(a) the reproduction of the traditional knowledge or cultural expressions; (b) the publication of the traditional knowledge or cultural expressions. ▪ Based on this the consultants / proponent will require to ensure provisions of the act such as a free prior and informed consultation of the locals is undertaken.	▪ -
Work Injury Benefits Act, 2007;	▪ The Work Injury Compensation Benefit Act 2007 provides guideline for compensating employees on work-related injuries and diseases contacted in the course of employment. ▪ The Act also requires provision of compulsory insurance for all employees. ▪ The Act defines an employee as any worker on contract of service with employer.	▪ Provision of compulsory insurance for all employees

	It will be important for the proponent of the proposed project to ensure that all workers contracted during the project implementation phase are provided with appropriate insurance covers so that they can be compensated in case they get injured while working	
National Museums and Heritage Act, No. 6 of 2006;	▪ The Act consolidates all the laws relating to national museums and heritage; and provides for the establishment control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya. The act repeals the Antiquities and Monuments Act and the National Museums Act. *The proposed project should ensure as per the National Museums Act; any monuments and antiquities should be protected and conserved to promote cultural resources in the context of social and economic development of the Country.*	▪ -
Wildlife Conservation and Management Act, No. 47 of 2013.	▪ The Wildlife and Conservation Act deals with the conservation and management of wildlife in Kenya. ▪ The Act provides that wildlife should be conserved so as to yield optimum returns in terms of cultural, aesthetic, scientific and economic benefits. ▪ The Act requires that full account be taken of the inter-relationship between wildlife conservation and land use. ▪ The Act controls activities within the national parks, which may lead to the disturbance of wild animals. Unauthorized entry, residence, burning, damage to objects of scientific interest, introduction of plants and animals and damage to structure are prohibited under this law. ▪ The proposed power transmission traverses farm forestry and urban forestry which could be a wildlife dispersal area. *During construction of the power transmission line the proponent will need to create a free passage of wildlife. To ensure wildlife is not affected negatively.*	▪ -
The Agriculture, Fisheries and Food Authority Act of 2013	▪ The Act provides for the establishment of the Agriculture, Fisheries and Food Authority, the administration of matters of agriculture and the preservation, utilization and development of agricultural land and related matters. "Agriculture" in this Act means cultivation of land and the use of land and water for any purpose of husbandry, aquaculture and food production and includes cultivation of crops and horticultural practice, breeding of aquatic	▪ -

	animals and plants, the use of land, fish harvesting and (e) the use of land for agroforestry. ▪ The Act requires the Authority in consultation with the county governments to among others promote best practices. ▪ Each county government is required to keep a register of land development orders and land preservation orders, which they may issue under this Act. *Meanwhile the project shall ensure sustainable development principles are adopted throughout the entire project cycle, with the local community enjoying the benefit of natural resources they have been bestowed with.*	
Security Laws (Amendment) Act, 2014	▪ This act entails a legal framework and jurisdiction on security matters. It is a constitutional entitlement to live and feel secure from agents that may compromise ones' life and safety. ▪ Security measures are vital in this project following past terrorist experiences reported in the area; the contractor shall embark on a community policing program to be executed by a competent security firm. *It is recommended that the government takes keen in providing adequate support to enhance the security of persons involved in this project and the community at large, which will translate to provision of critical intelligence that will trigger a review of the existing security measures and tactics, among other advantages such as security expertise and artillery*.	▪ -
The Traffic Act Cap 403	▪ The Traffic Act reserves the use of the road corridor for road facilities only. Encroachment along the project corridor roads will have to be checked especially during the construction and operational phase of the project. ▪ Part III of the act deals with Licensing of Vehicles with section 15 (1) noting that no person shall own or possess a motor vehicle or trailer, or use it on a road, unless such vehicle or trailer is licensed under the act. ▪ Part IVof the act deals with - Driving Licences with section 30 (1) stipulating that no person shall drive a motor vehicle of any class on a road unless he is the holder of a valid driving licence or a provisional licence endorsed in respect of that class of vehicle *The Act also spells out conditions for use of roads by motorists, among others. The contractor's vehicles shall comply to all traffic rules in Kenya*.	▪ Motor vehicles and trailers to be licensed. ▪ Drivers must hold Valid driving licence

Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012,	▪ The Act makes provision for the prevention, protection and provision of assistance to internally displaced persons and affected communities as per the United Nations Guiding Principles on Internal Displacement and for connected purposes. ▪ The Government and any other organization, body or individual when responding to a situation of internal displacement and the needs of internally displaced persons under this Act, shall consider their rights and freedoms as set out in the Bill of Rights of the Constitution. ▪ The Government shall protect every human being against arbitrary displacement ▪ The Government shall put into place measures for assistance and protection needs of internally displaced persons with particular regard to displaced communities with a special dependency on and attachment to their lands and the protection needs of women, children, persons with disabilities, the elderly and other persons with special needs ▪ The Government shall create the conditions for and provide internally displaced persons with a durable and sustainable solution in safety and dignity and shall respect and ensure respect for the right of internally displaced persons to make an informed and voluntary decision on whether to return, locally integrate or resettle elsewhere in the country. ▪ The procedure for resettlement of internally displaced persons and the standards applicable to such resettlement shall be as prescribed *It is therefore recommended displaced persons and communities are protected and assisted in line with the Principles on internal displacement established by the Act*	▪ -

Source – AWEMAC

4.5 County legislations

The proposed project is within the jurisdiction of Machakos and Murang'a County which under the Kenyan Constitution – Chapter eleven – has powers, functions and responsibilities to deliver services and for connected purposes and establish relevant laws and regulations. This sub-section has reviewed the most applicable and relevant laws to the proposed project.

Table 4-3 **Machakos County Legislations**

Laws and Regulations	Key areas of application
The Machakos County Finance Act, 2018.	▪ AN ACT of the County Assembly of Machakos to regulate and govern taxes, duties, levies, charges and fees; to amend and align certain written laws relating to the collection and management of county revenues; to give effect to Article 209(3) and (4) of the Constitution and section 132 of the Public Finance Management Act; to set out county revenue raising measures; and connected purpose ▪ Article 156 provides for provision of toilets for every place where workers are employed shall provide enough latrines for the use of the inhabitants and workers in the building or place, and such accommodation shall be conveniently sited ▪ Article 329 gives provisions for waste transportation and management within the county. The county government shall make provision for the registration of waste transporters. ▪ Article 332. (1) Waste shall be disposed off only in permitted disposal areas or at an approved disposal facility. ▪ ***It is therefore expected that the contractor of the project will require comply with various relevant provisions of the act and obtain appropriate county licenses and permits through payment of the requisite fees under the County Finance Act***
Machakos County E-waste Management Act, 2015.	▪ AN ACT of the County Assembly of Machakos to give effect to Section 2 (g) of Part 2 of the Fourth Schedule to the Constitution; to establish the institutional framework for the management of e-waste; and for connected purposes a) establish the institutional framework necessary for purposes of b) ensuring an efficient e-waste management in the county; c) promote an environmentally friendly county that reduces health risks associated with e-waste; d) encourage citizens to take responsibility for their environment; e) to put in place a mechanism of effective public awareness on issues related to e-waste and its management; f) to create an enabling environment for promotion of public and private investments in e-waste management; and g) to establish appropriate strategies for End of Life (EOL) management of electrical and electronic equipment ***It is therefore expected that the contractor of the project will comply with various relevant provisions of the act***
Machakos County HIV and AIDS Management Act, 2015.	▪ AN ACT of the County Assembly of Machakos to provide for the rights and responsibilities on HIV and AIDS; provide measures for prevention, control and management of HIV and AIDS; to provide an institutional framework for t ▪ 3. (1) The object and purpose of this Act is to— (a) promote the realization of rights and fundamental freedoms of persons living with HIV and AIDS; (b) provide for the responsibilities for different organs on matter relating to HIV and Aids; (c)provide for co-operation among agencies and inclusion of the community in HIV and AIDs management; (d)establish an efficient institutional framework for the management of HIV and AIDS; (e)promote public awareness about the transmission, management and control of HIV and AIDS; (f)provide for a framework for co-operation between the national government and the county government on matters relating to HIV and AIDS; and (g) Provide for mobilization of resources for prevention, management and control of HIV. ***It is expected that the contractor of the project comply with various relevant provisions of the act***

Table 4-4 Murang'a County Legislations

Laws and Regulations	Key areas of application
The Murang'a County Finance Act, 2013	▪ AN ACT of the County Assembly of Murangá to imposition of various fees, charges, licences, rents, or rates for services and matters incidental thereto. ▪ ***It is therefore expected that the contractor of the project will require comply with various relevant provisions of the act and obtain appropriate county licenses and permits through payment of the requisite fees under the County Finance Act***
The Murang'a County Water Act 2014	AN ACT of the Murang'a County Assembly to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services and for related purposes. ***It is therefore expected that the contractor of the project will comply with various relevant provisions of the act prior to utilization of any water resources in the county.***

Source – AWEMAC

4.6 International Policies and Good Practice

4.6.1 World Bank Operational Policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for Bank and borrower staff in the identification, preparation, and implementation of programs and projects. Operational policies have often provided a platform for the participation of stakeholders in project design and have been an important instrument for building ownership among local populations.

The proposed project is classified as Category A (Full Assessment) in accordance with the World Bank Safeguards Policy OP 4.01 (Environment Assessment). Reference has also been made to the World Bank Safeguard Policies, and the World Bank Environmental Assessment Source Book Volume II, which provides the relevant sectoral guidelines including the Banks Operation Policies/Bank Procedures. A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. As per these premise, the ESIA for the proposed power transmission project 'Category A' examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

All World Bank safeguard policies are listed in table 4-5 with descriptions for policies applicable to the Project: An analysis of WB Safeguard Policies against the proposed power transmission project indicates that 7 out of 11 WB safeguards are applicable. The applicable WB operational policies and relevance to the proposed project are discussed in table 4-6.

Table 4-5 An analysis of applicable World Bank safeguard policies

World Bank Safeguard Policy	Applicable	Remarks
Environmental Assessment (OP4.01)	Yes	Project must undergo mandatory full study ESIA Report as specified by OP 4.01 Annex B - Content of an Environmental Assessment Report for a Category A Project
Natural Habitats (OP 4.04)	Yes	Project passes a wildlife dispersal area
Forestry (OP 4.36)	Yes	Project affects patches of privately owned natural forests and plantation forests. The natural forests are found in grazing fields along the alignment while the plantations are on farmlands.
Pest Management (OP 4.09)	No	Project has no known interaction with OP 4.09
Physical Cultural Resources (OP 4.11)	Yes	Project likely to affect areas of cultural and religion importance
Indigenous Peoples / Vulnerable and Marginalised Groups - IPs/VMGs (OP4.10)	No	There are no indigenous communities identified along the project route.
Involuntary Resettlement (OP 4.12)	Yes	There are people's homesteads and others earning their livelihood on the ROW, which require to be physically relocated or may lose their livelihoods due to project activities. Project will also acquire land for the RoW and associated facilities respectively.
Safety of Dams (OP 4.37)	No	Project will not involve construction of dams
Projects on International Waters (OP 7.50)	No	Project activities do not involve International Waters
Projects in Disputed Areas (OP.60)	No	There are no internationally disputed sites in the project area.

Table 4-6 Review of relevant World Bank Operational Policies

SN	Policy	Relevance
1.	Bank Operational Policy 4.01-Environmental Assessment	▪ The environmental assessment process provides insights to ascertain the applicability of other World Bank safeguard policies to specific projects. This is especially the case for the policies on natural habitats, pest management, and physical cultural resources that are typically considered within the Environmental Assessment (EA) process. ▪ The policy describes an EA process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale, and potential environmental impact of the proposed project. ▪ The policy favours preventive measures over mitigatory or compensatory measures, whenever feasible. The operational principles of the policy require the environmental assessment process to undertake the following: ➢ Evaluate adequacy of existing legal and institution frameworks, including applicable international environmental agreements. This policy aims to ensure that projects contravening the agreements are not financed; ➢ Stakeholder consultation before and during project implementation; ➢ Engage service of independent experts to undertake the environmental assessment; ➢ Provide measures to link the environmental process and findings with studies of economics, financial, institutional, social and technical analysis of the proposed project; ➢ Develop programmes for strengthening of institutional capacity in environmental management. *The requirements of the policy are like those of EMCA Cap 387, which aim at ensuring sustainable project implementation. Most of the requirements of this safeguard policy have been responded to in this report, by evaluating the impact of the project, its alternatives, existing legislative framework and, conducting public consultations and by proposing mitigation measures for the potential impacts identified.*
2.	Bank Operational Policy 4.04-Natural Habitats	▪ This operational policy requires that the EIA study applies the precautionary principle approach to natural resource management to ensure environmental sustainability. ▪ The policy requires conservation of critical habitat during project development. To ensure conservation and project sustainability, the policy requires project alternatives to be sought when working in fragile environment areas and key stakeholders to be engaged in project design, implementation, monitoring and evaluation including mitigation planning. ▪ The requirements of this policy were observed as much as possible during the EIA study. ▪ The consulting team engaged several stakeholders during project impact assessment process so as to incorporate their concerns and views in the ESIA and Environmental and Social Management Plan. This policy is important because some sections of the proposed project route traverse farm and urban forestry

SN	Policy	Relevance
3.	Bank Operational Policy 4.11-Physical Cultural Resources	▪ This policy guides in preserving physical cultural resources and helps reduce chances of their destruction or damage. The policy considers Physical Cultural Resources (PCR) to be resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic or other cultural significance. ▪ OP 4.11 is applicable to the project since there are cultural resources such as burial sites found along the RoW. ▪ The Contractor is responsible for familiarizing themselves with the following "Chance Finds Procedures", in case culturally valuable materials are uncovered during excavation. The measures entail: ➢ Stop work immediately following the discovery of any materials with possible archaeological, historical, paleontological, or other cultural value, announce findings to project manager and notify relevant authorities; ➢ Protect artefacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, ➢ Prevent and penalize any unauthorized access to the artefacts ➢ Restart construction works only upon the authorization of the relevant authorities. *OP 4.11 Physical Cultural Resources - is applicable due to presence of cultural resources such as burial sites along the RoW.*
4.	Bank Operational Policy 4.12-Involuntary Resettlement	▪ The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs to avoid resettlement. This policy is applicable in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. ▪ This policy covers direct economic and social impacts that both result from Bank-assisted investment projects. ▪ The policy is applicable if there will be (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets, or (iii) loss of income sources or means of livelihood, whether the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. ▪ The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to project appraisal of proposed projects. The objective of this policy to avoid where feasible, or minimize, or explore all viable alternative project designs, to avoid resettlement. ▪ The policy requires the displaced persons and their communities, and any host communities receiving them, are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement.

SN	Policy	Relevance
		▪ Appropriate and accessible grievance mechanisms should be established for these groups. In new resettlement sites or host communities, infrastructure and public services are provided as necessary to improve, restore, or maintain accessibility and levels of service for the displaced persons and host communities. *This policy is applicable since the project will cause the involuntary taking of land and other assets resulting in:* ➢ *Relocation or loss of shelter;* ➢ *Loss of assets or access to assets;* ➢ *Loss of income sources or means of livelihood, whether the affected persons must move to another location;* ➢ *Loss of land.* *A full RAP study should be undertaken for this project as it falls under category A with significant impacts*
5.	Forestry (OP 4.36)	• The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. • Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. • The Bank assists borrowers with the establishment of environmentally appropriate, socially beneficial and economically viable forest plantations to help meet growing demands for forest goods and services. • This policy is applicable whenever any Bank-financed investment project (i) has the potential to have impacts on the health and quality of forests or the rights and welfare of people and their level of dependence upon or interaction with forests; or (ii) aims to bring about changes in the management, protection or utilization of natural forests or plantations ▪ *Notably, project affects patches of privately owned natural forests and plantation forests. The natural forests are found in grazing fields along the alignment while the plantations are on farmlands.*
6.	World Bank policy on access to information	▪ The World Bank Policy on Access to Information sets out the policy of the World Bank on public access to information in its possession. This Policy supersedes the World Bank Policy on Disclosure of Information and took effect on July 1, 2010. ▪ This Policy is based on five principles: ➢ Maximizing access to information; ➢ Setting out a clear list of expectations; ➢ Safeguarding the deliberative process; ➢ Providing clear procedures for making information available; ➢ Recognizing requester's right to an appeals process; *In disclosing information related to member countries/borrowers in the case of documents prepared or commissioned by a member country/ borrower (in this instance, safeguards assessments and plans related to environment and resettlement: OP 4.01, Environmental Assessments, and OP 4.12 Involuntary*

SN	Policy	Relevance
		Resettlement) the Bank takes the approach that the Country/Borrower provides such documents to the Bank with the understanding that the Bank will make them available to the public.

Source – AWEMAC

4.6.2 Alignment of WB and GOK Polices relevant to this ESIA

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

i. Both require screening of subproject investments in order to determine if further environmental assessments (ESIAs) is needed
ii. Both require Environmental Impact Assessment before project design and implementation. This also includes an assessment of social impacts.
iii. Both require public disclosure of ESIA reports and stakeholder consultation during preparation.
iv. While OP 4.01 of World Bank stipulates different scales of ESIA for different category of projects, Amendment of the Second Schedule of EMCA 1999 (30th April 2019), and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 requires EIA based on various sizes / risk of projects – low, medium and high - listed in the Schedule 2.
v. Where EMCA Cap 387 requires Strategic Environmental Assessments, OP 4.01 requires that environmental impact assessment (EIA), regional or sectoral EA, strategic environmental and social assessment (SESA), environmental audit, hazard or risk assessment, environmental management plan (EMP) and environmental and social management framework (ESMF) be conducted depending on the project category.
vi. EMCA recognizes other sectorial laws while WB has safeguards for specific interests;
vii. 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.
viii. Additionally, statutory annual environmental audits are required by EMCA.

In Kenya, it is a mandatory requirement under EMCA Cap 387 for all development projects (listed in Schedule Two) to be subjected to an EIA study. Following amendments of legal notice 150 amendment to 2003 the EIA/EA regulation which classified projects under schedule into High risk, Medium risk and low risk it is now possible to determine whether a subproject will require a full scale ESIA is necessary or not. Thus, under the Laws of Kenya, environmental assessment is fully mainstreamed in all development process consistent with World Bank policies. However, since EMCA provides no minimum size threshold, all projects are screened at identification stage to determine level of environmental assessment required under EMCA. Further, to fully insure against World Bank safeguard policies, individual investments are screened against each policy as part of the EIA Study.

4.6.3 Gaps between applicable World Bank Safeguards policies and Kenyan Laws

The applicable WB Safeguard Policies include; OP 4.01: Environmental Assessment, OP 4.04: Natural Habitats, OP 4.12: Involuntary Resettlement and OP4.11: Physical Cultural Resources. A detailed comparison and gap analysis between the applicable World Bank safeguard policies and Kenyan Laws is provided in Annex 5.

4.6.4 World Bank General Environmental, Health, and Safety (EHS) Guidelines

The General Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They define acceptable pollution prevention and abatement measures and emission levels in World Bank financed projects. These General EHS Guidelines have been designed to be used

together with the 'Guidelines for Electric Power Transmission and Distribution' which provide specific guidance to users on EHS issues in power transmission sector. The applicability of the EHS Guidelines has been tailored to the hazards and risks established during the environmental assessment. The applicability of specific technical recommendations has also been based on the professional opinion of qualified and experienced Environment, Social, Health and Safety experts. Where Kenyan regulations differ from the levels and measures presented in the EHS Guidelines; the proposed project has adopted whichever is more stringent. The general EHS guidelines adopted in the ESIA study for the proposed project can be summarized as follows;

a) **Environmental**: Effective management of the environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations in an organized, hierarchical approach. This section has provided guidance on Environmental issues in the construction double circuit line that includes Air Emissions and Ambient Air Quality, Energy Conservation, Wastewater and Ambient Water Quality, Water Conservation, hazardous Materials Management, Waste Management, Noise, Contaminated Land, and Occupational Health and Safety.

b) **Occupational Health and Safety:** Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. This section has provided guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety in accordance to the IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution. The measures will apply to construction, operation and decommissioning activities. This guideline has provided guidance on issues related to General Facility Design and Operation; Communication and Training; Physical Hazards; Chemical Hazards; Biological Hazards; Radiological Hazards; Personal Protective Equipment (PPE); Special Hazard Environments; and Monitoring.

c) **Community Health and Safety**: This section complements the guidance provided in the preceding environmental and occupational health and safety sections, specifically addressing some aspects of project activities as may be applicable on a project basis. Community Health and Safety issues may arise at any stage of a project life cycle and can have an impact beyond the life of the project. They include; water quality and availability, structural safety of project infrastructure, life and fire safety, traffic safety, transport of hazardous materials, disease prevention, emergency preparedness and response.

d) **Construction and Decommissioning**: These guidelines provide additional guidance on prevention and control of Environment, Occupational Health & Safety and community health & safety impacts that may occur during the proposed ouble circuit line development or at the end of the project lifecycle.

4.6.5 Guidelines for Electric Power Transmission and Distribution

The EHS Guidelines for Electric Power Transmission and Distribution includes information relevant to power transmission between a generation facility and a substation located within an electricity grid. The applicability of the IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution has been based on the professional opinion of qualified and experienced Environment, Health and Safety experts. The guidelines have been adopted based on industry specific impacts and management and in performance indicators and monitoring.

4.7 International Environmental Agreements, conventions and Treaties

Kenya has signed a number of 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 4-7 Multilateral Environmental Agreements

Multilateral Environmental Agreements	Key areas of application
United Nations Framework Convention on Climate Change (UNFCC)	▪ 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. *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.*
Vienna Convention for the Protection of the Ozone Layer	▪ 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 the Conservation of Migratory Species	▪ The convention on migratory species (CMS) was adopted to conserve migratory species of wild animals given that migratory species are an international resource. ▪ Such species may be terrestrial or marine. ▪ The convention's agreement on the conservation of African-Eurasian migratory water birds is specific on the need to protect the feeding, breeding, and wintering habitats, the main ones being wetlands and open water bodies. ▪ *This convention has been domesticated in the Wildlife (Management and Conservation) Act (2013) hence its tenets should be implemented in the proposed project. The proposed line is also in proximity to Important Bird Areas (IBA) such as Machakos Valleys, Masinga Dam and Protected areas (Mwea National Reserve and Ol Donyo Sabuk National Park). The boundaries of the Machakos Valleys IBA are presently undefined, but includes sections of the Ikiwe, Kimutwa, Love, Makilu, Mwania, Potha, Syuuni, Wamua and Wamui rivers some of which the proposed transmission line traverses.*
Convention on Biological Diversity (CBD)	▪ 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. *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*.

Multilateral Environmental Agreements	Key areas of application
African Convention on the Conservation of Nature and Natural Resources	▪ The convention was adopted in Algiers on 15th September 1968 and came into force on 16th June 1969. *This convention reaffirms the importance of natural resources both renewable and non-renewable, particularly the soil, water, flora and fauna.* *The main objective is to facilitate sustainable use of the above resources.*
Rio Declaration on Environment and Development	▪ The Rio Declaration on Environment and Development, often shortened to Rio Declaration, was a short document produced at the 1992 United Nations "Conference on Environment and Development" (UNCED), informally known as the Earth Summit. ▪ The declaration aimed at establishing a new and equitable global partnership through the creation of new levels of co-operation among States, key sectors of societies and people, working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system, recognizing the integral and interdependent nature of the Earth, our home. ▪ The Rio Declaration consisted of 27 principles intended to guide countries in future sustainable development. It was signed by over 170 countries. *Principle 17 of the Rio Declaration provides key relevance to the proposed project; the principle denotes 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.*
Earth Summit on Sustainable Development Agenda 21	▪ 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. *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.*

Multilateral Environmental Agreements	Key areas of application
The World Commission on Environment and Development (The Brundtland Commission of 1987)	▪ 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. ▪ 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. *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*.
The 1992 United Nations Framework Convention on Climate Change (UNFCCC)	▪ 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 August1994. NEMA is the focal point for the Convention. *The proposed project should ensure minimizing emission of the greenhouse gases.*
The Paris Agreement	▪ 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. *The proposed project should ensure all activities re in line with the tenets of the Paris Agreement to minimize greenhouse gas emission.*
Convention on the Elimination of all forms of Discrimination against Women	▪ 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.

Multilateral Environmental Agreements	Key areas of application
	▪ 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	▪ 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: ➢ 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:** i. Equal Remuneration Convention (1951) (No. 100) - Calls for equal **pay and benefits for men and women for work of equal value**. ii. 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. iii. 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. iv. Worst Forms of Child Labour Convention (1999) (No. 182) - **Calls for immediate and effective measures to secure the prohibition and 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.
Sustainable Development Goals (SDGs)	▪ 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 ➢ 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

Multilateral Environmental Agreements	Key areas of application
	➢ 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. *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.*

Source – AWEMAC

4.8 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 4-8 Key National Institutions on Environmental Management in Kenya

Institutions / Departments	Key Mandate
The Ministry of Energy	▪ 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 ➢ 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. *MOE will be the coordinating agency for the proposed project.*

Ministry of Lands and Physical Planning (MOLPP)	▪ The Directorate of Land is charged with the responsibility of ensuring efficient administration and sustainable management of the land resource in the country. *The MoLPP is responsible for, among others: lands policy management, physical planning, land transactions, land adjudication, settlement matters, land registration, as well as land and property valuation services which is important in acquisition and resettlement issues for the proposed project, as well as urban planning.*
Ministry of Environment and Natural Resource	▪ 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). *The proposed project is expected to align with the policies and programs of this Ministry***.**
National Environmental Tribunal	▪ The National Environment Tribunal (NET) created under Section 125 of EMCA Cap 387 has the following functions: ➢ 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 favourable ruling from the NET, an appeal may be lodged in the Environment and Land Court.
National Environment Complaints Committee	▪ The National Environment Complaints Committee performs the following functions: ➢ Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the 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. *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.*
National Environment Management Authority (NEMA)	▪ 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. *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.
Machakos and Murang'a County Governments	▪ The proposed project lies within the jurisdiction of both Machakos and Murang'a County Governments ▪ The County governments are expected to enact legislation as well as collaborate on physical planning. *Liaison with* both *Machakos and Murang'a County Government authorities will be required for functions that fall under their jurisdiction.*
The County and Sub-County Environment Committees	▪ Governors shall by notice in the gazette constitute a County Environment Committee that shall be responsible for the proper management of the environment within the County for which it is appointed. ▪ 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. *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 Machakos County level to create awareness and obtain local institutional ownership.*
Kenya Forest Service (KFS),	▪ Kenya Forest Service is a corporate body established under the Forest Conservation and Management Act no 34 of 2016. ▪ The Act, which was operationalized on 31st March 2017, gave the Service's mandate as "to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country and for connected purposes." *KFS will hence play a critical role on providing information on i Forest land that will be traversed by the proposed line. KFS is bound to Conserve, protect and manage all public forests in accordance with the provisions of the Act;*
Kenya Wildlife Services (KWS),	▪ Kenya Wildlife Service is a state corporation that was established by an Act of Parliament (Cap 376), repealed by Wildlife Conservation and Management Act (WCMA 2013), with the following mandate of among others: conserve and manage national parks, wildlife conservation areas, and sanctuaries under its jurisdiction. ▪ KWS undertakes conservation and management of wildlife resources across all protected areas systems in collaboration with stakeholders. *KWS will be key on wildlife management found within the ROW of the proposed transmission line.*
Water Resources Authority (WRA)	▪ 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). *WRA will provide the necessary water extraction permits envisioned / required for the project.*
The Directorate of Occupational Safety and Health Services (DOSHS)	▪ 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. *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.*
The National Land Commission	▪ The National Land Commission: ➢ Manages public land at the community level on behalf of the national and county governments ➢ Advises the national government on a comprehensive programme for the registration of land titles ➢ Investigates present or historical land injustices, and recommends appropriate redress ➢ Encourages the application of traditional dispute resolution mechanisms in land conflicts ➢ Monitors/oversees land use planning throughout the country ➢ Ensures that public land/land under the management of designated state agencies is sustainably managed ➢ Develops and encourages alternative dispute resolution mechanisms in land dispute handling and management. ▪ The land Act No. 6 of 2012-Gives the definition of an easement and wayleave. Also details the procedure of application of wayleave through the NLC. ▪ It will take up the issues of verification of ownership after the completion of the RAP Study. It will set out clear procedures for land acquisition considering project impacts and land rights. The exercise will be part of the verification of ownership of property before compensation is paid and relocation carried out. KETRACO will share the Final RAP Report to NLC with a schedule of lands to be affected for ownership verification and gazettement for "acquisition." The "acquisition" process will take 45 days (30 days for the notice and 15 days for the Public inquiry). *The National Land Commission (NLC) will be engaged in the project on matters related to land acquisition as a result of physical displacement and will facilitate the acquisition of all land to be acquired in accordance with the Land Act 2012.*
Kenya Civil Aviation Authority (KCAA)	▪ Kenya Civil Aviation Authority is a state corporation of Kenya that is responsible for regulating the aviation industry in Kenya and for providing air navigation services in the Kenya flight region. *Erecting transmission line towers requires a permit from the Kenya Civil Aviation Authority hence the proponent will be required to obtain permits and clearance from KCAA.*

National Museums of Kenya (NMK)	▪ The National Museums of Kenya is a state corporation that manages museums, sites and monuments in Kenya. It carries out heritage research, and has expertise in subjects ranging from paleontology, ethnography and biodiversity research and conservation. *NMK will be a key institution to be engaged if the proposed project finds any important cultural heritage sites and/or archaeological sites.*
Nature Kenya	▪ Nature Kenya—the East Africa Natural History Society (EANHS)—is Africa's oldest environmental Society, established in 1909 to promote the study and conservation of nature in eastern Africa. ▪ Nature Kenya has identified and designated Important Bird Areas (IBAs) for Kenya, in collaboration with the National Museums; and documented the plants, animals and other biodiversity of Eastern Africa as a contribution to expanding the taxonomic scope of priority setting from IBAs to Key Biodiversity Areas (KBAs). Since IBAs are KBAs based on birds, they are today referred to as Important Bird and Biodiversity Areas. *Nature Kenya will be a key institution to be engaged to assist in identifying birds/raptors migratory routes to facilitate in mitigation against their electrocution and collision among other biodiversity concerns.*

Source – AWEMAC

4.9 Administrative framework for the proposed project

The Project will be an Investment Finance operation processed under World Bank Operational Policy 10.00. The Republic of Kenya will be the Borrower, and the Ministry of Energy and Petroleum (MoEP) will be the Executing Agency and beneficiary of the proposed loan. KPLC and KETRACO will serve as implementing agencies.

4.9.1 Kenya Electricity Transmission Company- KETRACO

KETRACO was incorporated in 2008 through an Act of parliament to plan, design, construct, operate and maintain high voltage electricity transmission lines in Kenya. Since its establishment, KETRACO has sought to resource itself and build the institutional capacity required to carry out its mandate. KETRACO's mandate is to plan, design, and construct, own, operate and maintain high voltage electricity transmission grid and regional power interconnectors that will form the backbone of the National Transmission Grid. In carrying out this mandate, the Company is expected to develop a new and robust grid system in order to:

1. Improve quality and reliability of electricity supply throughout the country
2. Transmit electricity to areas that are currently not supplied from the national grid
3. Evacuate power from planned generation plants
4. Provide a link with the neighbouring countries in order to facilitate power exchange and develop electricity trade in the region
5. Reduce transmission losses that currently cost the country heavily every year and
6. Reduce the cost of electricity to the consumer by absorbing the capital cost of transmission infrastructure

Project Implementation Team

KETRACO has established a dedicated Project Implementation Team (PIT) to implement the Project. The PIT will be assisted by a consultant with experience in undertaking similar projects in the region. The PIT reports to the KETRACO Board Committee that will oversee project implementation, including the review of annual work plans and budgets. The consultant will prepare the technical specification and draft bid documents for transmission lines and substations.

The PIT will include a project engineer, three site managers, one civil engineer, one accountant, one procurement expert, one socio-economist and one environmentalist. The organogram for project Implementation team is shown below.

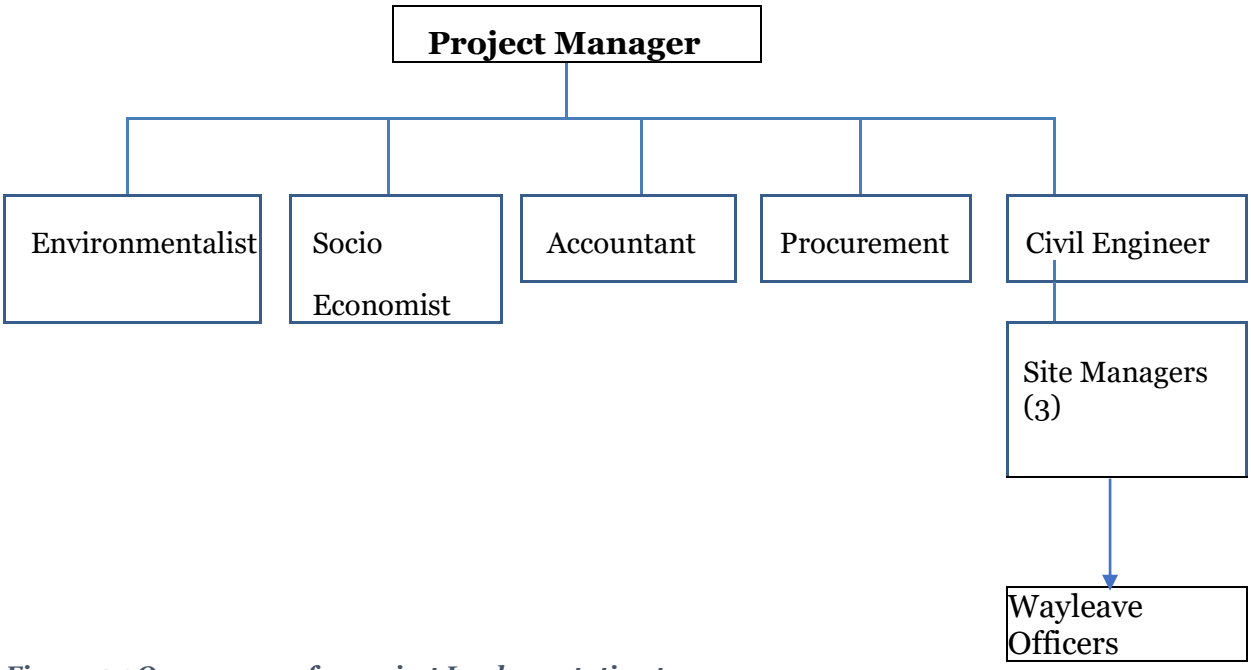

Figure 4-1 Organogram for project Implementation team

Source – KESIP ESMF

KETRACO will at all times remain responsible for the overall performance of all ESMPs. KETRACO will also be responsible for the implementation of the ESMF, RPF and VMGF. Currently, KETRACO has 7 NEMA and Environmental Institute of Kenya (EIK) registered professionals, 12 socio-economists, 14 land surveyors, 3 safety officers and 14 land valuers/economists.

Roles and Responsibilities of KETRACO ES Unit

The Environmental and Social division of KETRACO will monitor compliance of the project to applicable environmental and social standards. The unit will be responsible for;

- Timely preparation of TORs for the ESIAs, ESMPs, RAPs and VMGPs for review and clearance by the Bank;
- Timely preparation of environmental and social screening forms for all the sub-project;
- Prior review and coordination for clearance of subproject ESIAs and ESMPs by the Bank and NEMA;
- Monitoring of ESMP implementation, including monitoring of mitigation measures and monitoring of contractors environmental and social performance;
- Training of project staff, implementing partners, and contractors;
- Preparation of quarterly reports summarizing monitoring results, to be included in the Project's
- Quarterly Reports to the World Bank and NEMA Providing E&S monitoring oversight.
- Ensuring compliance to the WB safeguards standards and ESHS guidelines;
- Ensuring availability of adequate E&S resources to supervise and enforce compliance; Managing the Grievance redress mechanism
- Reviewing Contractor Management Plans (especially the Migrant Labor Management Plan) conduct independent E&S audits by appointing independent expert
- Hold responsibility to specialist studies required to examine wildlife crossings, and their locations, in consultation with the KWS.

- Hold responsibility to baseline studies for those areas that qualify as Critical Habitat to ensure conformance to WB 4.04.
- Hold responsibility to ensure adequate consultation with vulnerable and marginalized groups.

KETRACO safety unit has developed tools and handbooks to guide contractors in safe work management. The safety unit role will be to carry out screening and background checks prior to the appointment of contractors to check previous safety records and performance. The safety unit will also support the E&S unit to carry out contractor inductions before commencement in relation to;

- Community health and safety to address social pathologies in communities affected by the project through promoting education and awareness programs for contractors.
- Practical construction measures e.g. batching, using fire extinguishers etc.
- Cultural sensitivity issues to address contractor behaviour in relation to community resources and assets.

The KETRACO E&S department is well trained and capable to ensure monitoring of the project. From the consultant perspective KETRACO has the capacity to monitor implementation of the Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMnP) developed for the project. The department also has the capacity to undertake training and build the capacity of the contractor to implement both the ESMP and ESMnP.

4.9.2 Contractors

Contractors will be expected to develop own ESMP which identifies his specific obligations and activities and correlates these with the work schedule. This should be approved by the KETRACO safeguards. The contractor should employ a qualified officer responsible for implementation of social/environmental requirements. This person will maintain regular contact with KETRACO's environment and social focal point.

It is also recommended that the contractor should establish and appoint an E&S team prior to approval of the contract. The E&S team should be trained on implementation of contractors ESMP and ESMnP. The trained E&S team should be responsible for ensuring full implementation of the contractors ESMP and ESMnP.

4.9.3 The World Bank

The World Bank will lay the benchmarks for all environmental and social safeguard issues concerned with the development and implementation of the project. It will provide overall supervision, facilitation and co-ordination of the project. It will also monitor funds and funds allocations; and project performance indicators. The World Bank will assess the implementation of the ESMF and recommend additional measures for strengthening the management framework and implementation performance, where need be. The reporting framework, screening procedures and preparation of management and mitigation plans shall be discussed and agreed by the Bank team and PIU during the early part of project implementation.

The World Bank Task Team will review site-specific safeguards instruments, e.g. ESMPs, ESIAs and RAPs to ensure that their scope and quality are satisfactory to the Bank. The World Bank will also monitor the implementation of the different prepared instruments through regular supervision missions (which will include an environmental and/or social specialist) during which document reviews, and site visits and spot-checks will be conducted as needed.

5 CONSULTATION AND PUBLIC PARTICIPATION

5.1 Introduction

The Consultation and Public Participation (CPP) and; disclosures Process is a policy requirement by the Government of Kenya which is enshrined in the Constitution of Kenya and a mandatory procedure as stipulated by the Environmental (Impact Assessment and Audit) Regulations, 2003 (Part III, section 17) and EMCA (Cap 387) section 59 on ESIA for the purpose of achieving the fundamental principles of sustainable development. World Bank also requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project.

It is an important process through which stakeholders including beneficiaries and members of the public living in proposed project areas (both public and private), are given an opportunity to contribute to the overall project design by making recommendations and raising concerns on proposed projects before they are implemented. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation. Public Consultation and disclosure requirement has been emphasized in the ESIA study through the developed project frameworks such as Environmental And Social Management Framework (ESMF), Resettlement Plan Framework (RPF) and Vulnerable and Marginalized Groups Framework (VMGF) which have been prepared in accordance to Kenyan national laws and World Bank) guidelines.

This chapter describes the process of the public participation and consultation that was adopted in order to identify the key issues of the proposed transmission line and associated facilities. Views and concerns from the local residents, local leaders, and surrounding institutions, who in one way or another would be affected or have interest in the proposed transmission line and associated facilities, was sought through interviews, key stakeholders' meeting and public meetings.

5.2 Objectives of the Consultation and Public Participation

Consultation and Public Participation is an important process through which stakeholders including beneficiaries and members of the public living along the proposed project route (both public and private), are given an opportunity to contribute to the overall project design by making recommendations and raising concerns on the project before it is implemented. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation.

The key objectives of the consultation and public participation for the proposed transmission line and associated facilities will be:

1. ***Inform:*** Promote stakeholder understanding of issues about the proposed project with special reference to its key components and description, problems, alternatives, opportunities and solutions through balanced and objective information sharing;
2. ***Consult:*** To obtain feedback and acknowledge concerns and aspirations of stakeholders and interested parties on analysis, alternatives, and decisions regarding the proposed project;
3. ***Engage:*** Work directly with stakeholders to ensure that their concerns and aspirations are understood and considered in the ESIA study report and to assure them that their concerns / aspirations would be directly reflected in the developed alternatives; and that feedback will be provided on how their input influenced the final decision.
4. ***Empower:*** Make stakeholders partners in each aspect of the decision, including development of alternatives and identification of preferred solution to ensure ownership of subprojects at grassroots level.

In addition, the process enabled the establishment of a communication channel among the stakeholders, the team of consultants, the project proponent and the Government. The consultation and public participation also offered a platform for concerns of the stakeholders to be known to the decision-making bodies at an early phase of project development. Further, to

ensure that all stakeholders are meaningfully engaged and consulted throughout the project cycle; a Stakeholder Engagement Plan (SEP) (Annex 14 – Section 3.14) has been designed.

5.3 Methodology in Consultation and Public Participation

In order to ensure effective stakeholders' consultation and public participation, stakeholders' mapping was conducted, and a database created consisting of likely interested, affected individuals and relevant institutions. Assessment tools were prepared for effective and systematic interviews by the environmental and social consultants assisted by a team of technical field assistants. The tools included; key informant interview schedules, mapping, sampling of the areas to be assessed, field visits and observations; and triangulation of field data which focused specifically on the communities who stay within and neighbouring the proposed transmission line and associated facilities.

Various methods and instruments were identified and used for effective and efficient public consultation and participation. They include;

- Administration of Public Consultation Questionnaires
- Key Informant Interviews
- Public community meetings
- Stakeholders' workshop
- Baraza's targeting PAPs
- Meetings with Vulnerable persons

5.3.1 Administration of Public Consultation Questionnaires

The purpose for administering questionnaires was to identify the positive and negative impacts and subsequently gather proposals on the best practices to be adopted and mitigate the negative impacts respectively. This also helped in identifying any other miscellaneous issues, which may bring conflicts in case the proposed transmission line and associated facilities implementation proceeds as planned. Eight (8) field assistants, most of whom had a background in environmental education, assisted the team of consultants and technical officers in administering the questionnaires (*Annex 6*). The information gathered enabled the identification of the specific issues from the respondents, which provided the basis upon which the aspects of the Environmental and Social Impact Assessment was undertaken. Among the stakeholders who were consulted through administration of ESIA questionnaires included project affected persons (PAPs), and local community members neighbouring the proposed transmission line RoW and associated facilities. A total of one hundred and three (103) ESIA questionnaires were administered during the consultative public participation exercise (See Annex 7 – ESIA Public Consultation Questionnaires).

Plate 5-1 An interview/questionnaire administration with a local community member
Source – AWEMAC Field Survey

5.3.2 Key Informant Interviews

Some key respondents were sampled in the project area to give more resourceful information on the environmental and social assessment for the proposed transmission line and associated facilities. The key informant interviews were held with county and sub-county administrators of various departments such as environment, social services and energy. Also, school heads, administrators of local NGOs/CBOs, and chiefs were consulted as well. The consultant sought opinions from these project area leaders regarding environmental and social aspects of the proposed transmission line and associated facilities.

Plate 5-2: Consultations with Kithimani location's Chief and Assistant Chiefs
Source – AWEMAC Field Survey

The table below categorizes and highlights various stakeholders engaged during the ESIA study exercise.

Table 5-1 List of stakeholders engaged during the ESIA study

SN.	Category	Stakeholder
1.	Government Institutions	• Kenya Electricity Transmission Company (KETRACO) • Department of Water, Irrigation & Natural Resources – Machakos County & Murang'a County • Department of Lands, Energy, Housing & Urban Development • Department of Energy & Electrification – Machakos County& Murang'a County • Water Resources Authority – Athi Catchment Area • Department of Culture – Machakos County • National Environment Management Authority (NEMA) – Machakos County & Murang'a County • Directorate of Occupational Safety & Health Services – Machakos County& Murang'a County • Department of Social Development – Machakos County & Murang'a County • Department of Health & Emergency Planning – Machakos County • Department of Agriculture – Machakos County & Murang'a County

SN.	Category	Stakeholder
		• Department of Economic & Planning – Machakos County • Department of Education Skills & Training – Machakos County • County Government of Machakos – Office of the Governor • Machakos & Murang'a County County Commissioners • Kenya Wildlife Services (KWS) – Machakos & Murang'a County • Kenya Forest Service (KFS) – Machakos • Kenya Agricultural & Livestock Research Organisation (KALRO) – Katumani • National Museums of Kenya • Kenya Civil Aviation Authority
2.	Private Institutions and Community Based Organisations (CBOs)	• Nature Kenya • World Vision – Mwala Development Program • Plan International Machakos Programme Unit – Matuu • Kabaa Irrigation Scheme • Mwala Youth Group
3.	Learning Institutions	• Machakos University • South Eastern Kenya University • Machakos Institute of Technology • Kyanganga Primary School
4.	The General Public	Local community members, Chiefs, Assistant Chiefs, Village Elders and *Nyumba Kumi* elders belonging to the following project affected locations in Machakos and Murang'a County: • Katheka Kai Location • Kimutwa Location • Iveti Location • Masii Location • Mango Location • Mwala Location • Mbiuni Location • Kithimani Location • Ndalani Location • Mavoloni Location • Kakuzi Location

Source – AWEMAC

5.3.3 Public Community Meetings

A total of nine (9) public community meetings were conducted and covered eleven (11) administrative locations in Machakos and Murang'a counties along the transmission line. These locations include Katheka Kai, Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani and Mavoloni in Machakos; and Kakuzi in Murang'a. Courtesy calls were made to the respective local administration leaders (Chiefs and Assistant chiefs) to advice on the most suitable venues for holding public meetings (*See Annex 8i for a list of the Chiefs and Assistant Chiefs engaged during the ESIA exercise*). The selection of the public meeting venues was also done in consultation with the village elders (*See Annex 8ii – List of Village Elders*). The venues' selection was based on proximity to the proposed project's wayleave, ease of site accessibility, population, and renowned venues for holding public meetings in the respective project areas. All the affected locations and

villages along proposed line were covered during the public consultation meetings as the venues were spread out equally along the proposed project area (figure 5-1). Public meeting notices were delivered to 11 (eleven) chiefs, 17 (seventeen) assistant chiefs and 70 (seventy) village managers; local leaders/elders, local community members, local schools, organisations and/or institutions at least seven (7) days prior to commencement (*See a sample Notice in Annex 10)*. These notices were also displayed and announced at public places including Chief's offices, Assistant Chief's offices, trading centres, places of worship and water collection points.

The public meetings were chaired by the Locational Chiefs assisted by their Sub-locational Assistant Chiefs whose administrative areas were affected by the transmission line. The meetings involved introductions, presentations on the nature, construction, operation and likely impacts of transmission line by the KETRACO and Consultants, open discussions that involved questions and answers, expressions of concerns, comments and suggestions.

The meetings were held to engage a wider audience in information sharing and discussion. The meetings increased awareness of the proposed transmission line and associated facilities and were an ongoing means of engaging further public involvement. Participants were provided with a chance to voice their concerns, issues, and ideas. These meetings also created avenues for providing opportunities for exploring alternative strategies and building consensus. This contributed to giving the proposed transmission line a social license to operate in the respective locations in Machakos and Murang'a Counties.

Consultative meetings were continuously held during the ESIA Study exercise to deliberate on the positive impacts, negative impacts and mitigation measures for the proposed transmission line and associated facilities as well as capturing issues raised by the project affected persons. The nine (9) public meetings were held on various dates in September 2019, with the local community members, *Nyumba Kumi* Elders, Village Managers, Chiefs, Assistant Chiefs, County Officials, and institutions/organisations' representatives in attendance. More than one thousand one hundred and seventy six (1,176) people were engaged during the public meetings meeting that were held to ensure a comprehensive public participation exercise.

In all the meetings held, the following project information was shared.

- The project description (Machakos-Mwala-Ekalakala 132KV Double Circuit Transmission Line).
- Purpose of the ESIA
- Purpose of the public community meetings
- Role and contribution of the community in the assessment
- Importance/benefits of the proposed project to the community
- Impacts of the proposed project
- Public rights and entitlements e.g. on compensation, right to accept or reject the project

The ESIA public meetings were also used as sensitization avenues for the forthcoming RAP exercise. The participants at the meeting were briefly sensitized about the PAPs compensation procedures and encouraged to attend the scheduled RAP meetings for detailed RAP information. A summary of the public meetings held is shown in the Table 5-2 below. Recorded minutes with their attendance sheets for the meetings held are attached as appendices to this report. (*see annex 11*). Notably, despite thorough public consultation and information, a few people decided / chose not to sign or input thumb prints in the attendance sheets. Failure to input signatures and thumb prints was attributed to PAPs fear that their signatures might be misused for compensation without their consultation. Further, the ESIA meetings were the initial public consultation meetings hence the locals still had project misconception, and sensitivity on displacement of households including wayleave acquisition. However, with continued stakeholders' engagement and consultation including planned PAPs RAP meeting, the misconception would be managed.

Table 5-2 Schedule of Public Meetings held during the ESIA study

S/N	Meeting Venue	Date & Time	Total
1.	Kwa Mwau Market in Kimutwa Location	Tuesday 24th September 2019 9:00AM	116
2.	Makaveti Trading Centre in Kimutwa Location	Tuesday 24th September 2019 2:30PM	164
3.	Kaani Market Centre in Iveti Location	Wednesday 25th September 2019, 9:00AM	128
4.	Masii Chief's Office Grounds near Masii market, Masii location	Wednesday 25th September 2019, 2:30PM	163
5.	Mwala Multi-purpose Social Hall in Mwala Location	Thursday 26th September 2019 9:00AM	108
6.	Mumbuni Market in Mbiuni Location	Thursday 26th September 2019 2:30PM	124
7.	Sofia Market in Kithimani Location	Friday 27th September 2019 9:00AM	124
8.	Mukundi Market in Kakuzi Location, Murang'a County	Friday 27th September 2019 2:30PM	81
9.	Kambi Mawe Market in Mavoloni Location, Machakos County	Tuesday 1st October 2019 9:30AM	130
	Total Participants		**1176**

Source – AWEMAC

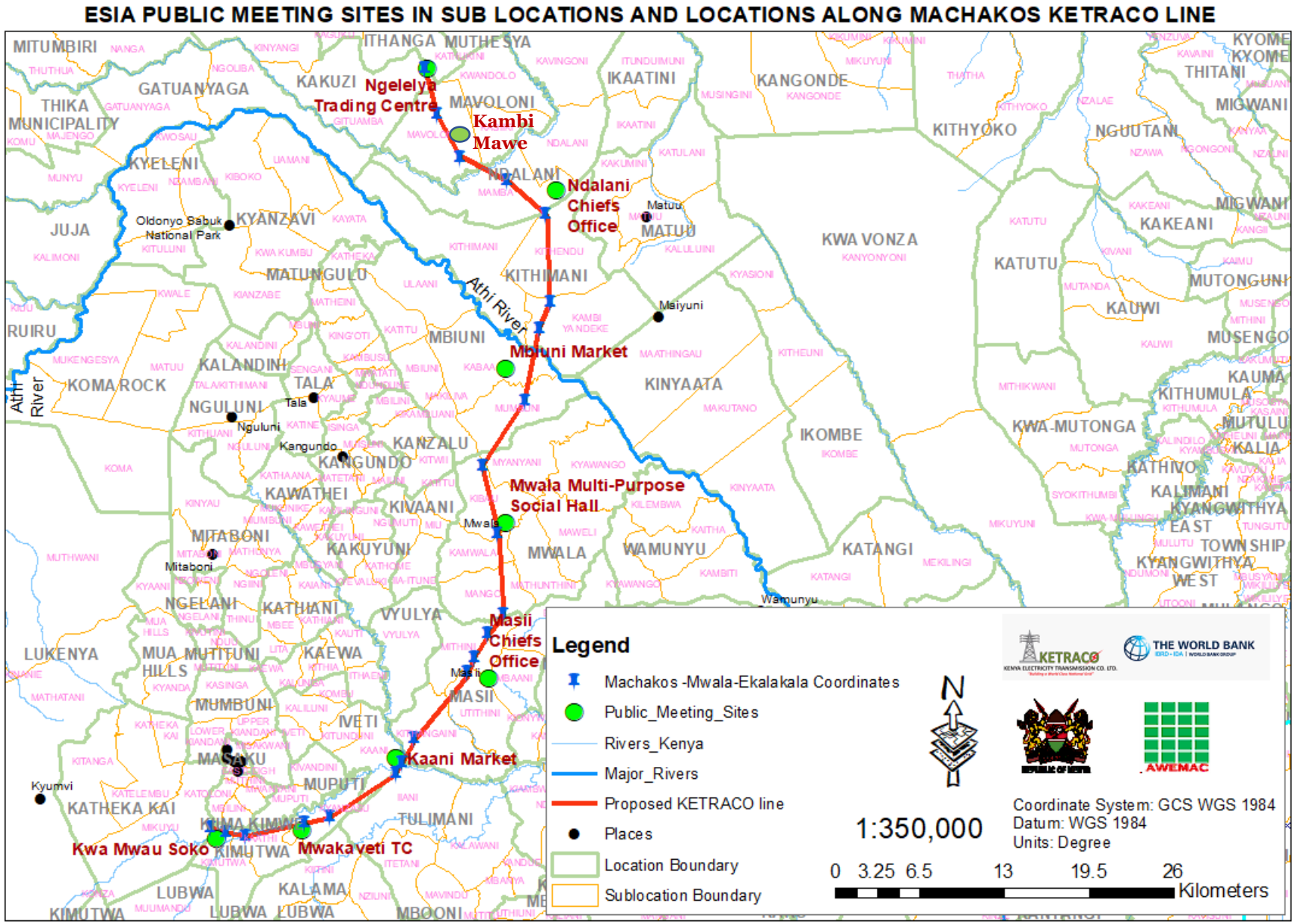

Figure 5-1 Proposed transmission route showing administrative locations traversed and ESIA public meeting venues

Source: AWEMAC GIS

The following plates below (5:3 to 5:11) depict the nine (9) public meetings held along the proposed project area.

Plate 5-3 A public meeting in Kwa Mwau market, Kimutwa location
Source – AWEMAC Field Survey

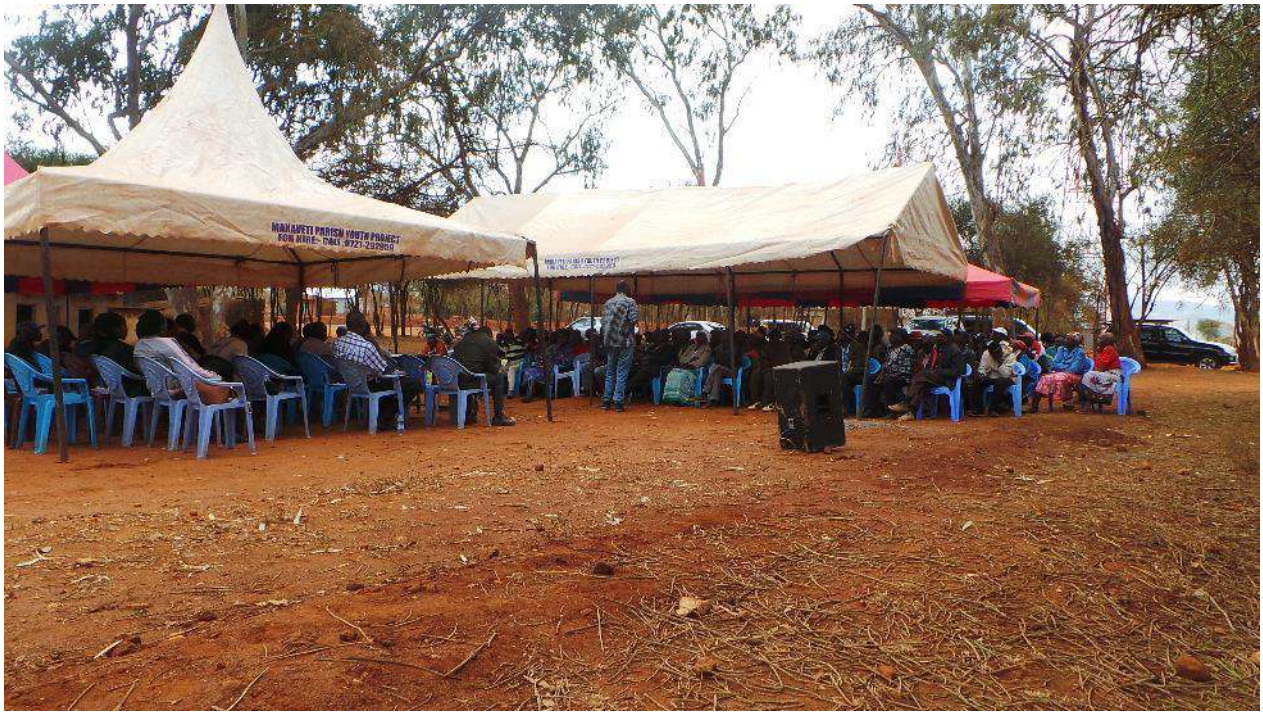

Plate 5-4 A public meeting in Makaveti trading centre
Source – AWEMAC Field Survey

Plate 5-5 A public meeting in Kaani market centre, Iveti location
Source – AWEMAC Field Survey

Plate 5-6 A public meeting at Masii location chief's office grounds in Masii market
Source – AWEMAC Field Survey

Plate 5-7: A public meeting in progress at Mwala Multi-Purpose Social Hall in Mwala Location, Machakos County
Source – AWEMAC Field Survey

Plate 5-8: A public meeting in progress at Mumbuni market centre in Mbiuni Location, Machakos County
Source – AWEMAC Field Survey

Plate 5-9 A public meeting in Sofia market, Kithimani location
Source – AWEMAC Field Survey

Plate 5-10 A public meeting in Mukundi market, Kakuzi location – Murang'a County
Source – AWEMAC Field Survey

Plate 5-11 A public meeting in Kambi Mawe market, Mavoloni location
Source – AWEMAC Field Survey

5.3.4 Key stakeholders' Meeting / Workshop

This engagement was conducted to incorporate key stakeholders' opinions to the ESIA study as well as ensure full representation of the respective County players in the project (plate 5-12). Invitation letters were delivered to respective persons, organisations and/or institutions seven (7) days prior to the key stakeholders' workshop (*See a sample invitation letter in Annex 12)*

A key stakeholders' meeting was convened on 12th November 2019 at Tea Tot Hotel in Machakos town with a total of 28 (twenty-eight) attendees (Table 5-3). This was carried out in form of a workshop in order to engage the technocrats and professionals' in a more exhaustive way as they have direct interest and contact with key issues identified on the ground. It also focussed on those who have access to people and/or key resources needed for the ESIA exercise. The workshop was held to:

- Add more input to the ESIA analysis findings;
- Fill information gaps identified during the ESIA study;
- Better understand the proposed project area context; and
- Assist in prioritising challenges that need to be addressed and communication channels;

The attendees mostly included representatives from: various government departments and parastatals; Non-governmental Organisations, Community Based Organisations, Private entities, Institutions of higher learning among others as indicated in table 5.1. Minutes of the key stakeholders' meeting and attendance sheets are attached in the appendices (*Annex 13*).

Table 5-3 Key Stakeholders' Meeting held during the ESIA study

S/N	Meeting Venue	Date & Time	Targeted group	Attendance		
				Male	Female	Total
1.	Tea Tot Hotel	Tuesday 12th November 2019 9:30AM – 1:00PM	▪ Key stakeholders in Machakos County	23	5	28

Source – AWEMAC Field Survey

Plate 5-12: Key stakeholders' meeting held at Tea Tot Hotel in Machakos town on 12/11/2019
Source – AWEMAC Field Survey

Some of the comments and suggestions given by the key stakeholders are as highlighted below:

(a) An officer from Nature Kenya stated that the proposed project may eliminate some biodiversity of conservation concern. For instance, the *Hinde's babbler,* an endemic bird species, from Masinga reservoir. He added that such a project could cause electrocution and collusions of migratory birds such as 4 of the 8 Kenyan vultures which are critically endangered.

Suggestions proposed were; the need for comprehensive study of birds and bats by KETRACO in consultation with National Museums of Kenya and Nature Kenya; rehabilitation of affected habitats; and placing of visible markers on the transmission lines to enhance their identification by birds in order to reduce collusions and electrocutions.

(b) A representative from Machakos University stated that the proposed project would lead to increased business activities and industries; creation of employment opportunities to the local youth and; increased electricity connection coverage in Machakos County. Negative impacts were reported to be reduction of tree cover along the proposed RoW; soil erosion during construction activities e.g. excavation and; social ills from workers including extra-marital affairs.

Mitigation measures proposed included: ensuring the right PAPs are compensated; educating the PAPs on how to manage compensation funds; educating the workers

on good morals to minimize social ills; install structures that prevent soil erosion and; continued surveillance of affected environment e.g. replanted trees in conjunction with KFS.

(c) A KFS representative stated that the proposed project would create employment opportunities for the local communities and economic growth in Machakos County as a result of availability of reliable and sufficient electricity energy. She added that the negative impacts anticipated were loss of PAPs livelihoods due to disturbance of established farming systems; interference of family lifestyles due to displacement; noise pollution during the construction stage; clearing of trees and destruction of vegetation in the proposed wayleave and; increase in soil erosion due to lose of trees and vegetation.

The proposed mitigation measures were: the proponent to carry out tree planting programmes in the surrounding areas to replace lost trees as a CSR activity; provide tree seedlings to the local community to enhance reforestation; set up tree nurseries for continued environmental conservation support and; employ the local youth to ensure the community benefits from the project;

(d) The acting director for Machakos County culture department stated that during the construction stage of the proposed project, cultural sites e.g. graves and shrines may be encountered. She added that some of the indigenous trees in the area are sacred and of conservation concern thus may be lost during clearing of the way leave.

She suggested that cultural sites and sacred trees should be avoided through route re-alignment and/or siting of the towers away from them to enhance their preservation.

(e) Views from WRA regional manager were also sought and included: clearance of vegetation in the proposed way leave including riparian zones during the construction stage of the proposed project; increased soil erosion in the proposed project area and; sedimentation of nearby water resources such as rivers during the construction stage.

He suggested that the riparian zones which will be affected should be vegetated; clearing of short vegetation to be avoided; destruction of vegetation outside the way leave to be avoided and land should not be left bare after construction activities.

5.3.5 PAPs Baraza's /Meetings

A total of 10 Baraza's targeting the project affected persons (PAPs) were held attracting a total of 1,021 attendants. The PAPs baraza's were held in the following areas: Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, and Kakuzi. Present were resettlement/RAP expert, local administrator/Chief and any interested stakeholder.

The objectives of the PAPs Baraza's were to

1. Gather comments, suggestions and concerns of project affected persons and incorporate them in the Environmental and Social Impact Assessment (ESIA) and Resettlement Action report.
2. Elaborate on the procedures and requirements for valuation, compensation and resettlement action plan (RAP) for households that will be directly affected by the transmission line project
3. Finalize the mechanisms for addressing grievances from project affected persons by constituting locational Grievances Resolution Committee (GRC) through election of representatives of PAPs, Village managers, local CBO/NGOs, churches, men and women, youth and people leaving with disability.

Table 5-4 Schedule of Project Affected Persons Baraza's Meetings.

SN.	Venue/Location	Participants	County	Day, Date and time	Attendance
1.	Chief's Office Grounds Kimutwa Location, Kimutwa Market	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Monday 11th November 2019 9:00 AM	211
2.	Chief's Office Grounds Iveti Location, Kaani Market	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Monday 11th November 2019 2:00 PM	58
3.	Chief's Office Grounds, Masii Location, Masii Town, Masii Location	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Tuesday 12th November 2019 9:00 AM	130
4.	Assistant Chief's Office Grounds, Kyanganga Sublocation, Mulolongo Market, Mango Location	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Tuesday 12th November 2019 2:00 PM	64
5.	Mwala Multipurpose Hall, Mwala Location, Mwala Town	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Wednesday 13th November 2019 9:00 AM	125
6.	Assistant Chief's Office Grounds Mumbuni Sublocation, Mumbuni Market, Mbiuni Location	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Wednesday 13th November 2019 2:00 PM	133
7.	Chief's Office Grounds Kithimani Location, Kimangu Market	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Thursday 14th November 2019 9:00 AM	156
8.	Assistant Chief's Office Grounds Mamba Sublocation, Mamba Market, Ndalani Location	• Consultant • PAPs • Local Administratio • KETRACO	Machakos	Thursday 14th November 2019 2:00 PM	54
9.	Assistant Chief's Office Grounds Mavoloni Sublocation, Kambi Mawe Market, Mavoloni Location	• Consultant • PAPs • Local Administration • KETRACO	Machakos	Friday 15th November 2019 9:00 AM	66
10.	Assistant Chief's Office Grounds Gitwamba Sublocation, Muti Market, Kakuzi Location	• Consultant • PAPs • Local Administration KETRACO	Murang'a	Friday 15th November 2019 2:00 PM	24
	Total		2		**1,021**

Source – Draft RAP report for Machakos Mwala Ekalakala Transmission Line

5.3.6 Vulnerable Persons meetings

A total of 10 meetings were held with vulnerable persons to establish their overall group opinion, concerns, and suggestions along the transmission alignment. Nine (9) in respective locations in Machakos county, (Chief's Office Grounds in Kimutwa Location; Chief's Office Grounds in Iveti Location; Chief's Office Grounds in Masii Location; Kyanganga Primary School in Mango Location; Mwala Multipurpose Hall in Mwala Location; Mumbuni Catholic Church in Mbiuni Location; Chief's Office Grounds-Kimangu in Kithimani Location; Chief's Office Grounds-Mamba in Ndalani Location; Chief's Office Grounds in Mavoloni Location while one was held in Muti Primary School in Kakuzi Location, Murang'a County. Amongst those in attendance were various Vulnerable Individuals and HouseholdsVulnerable individuals and households such as people living with disabilities, caregiver of the OVCs, elderly, and widows. Local chiefs, village managers were used to inform the vulnerable of the planned meetings based on a schedule of meetings *(Annex 9 i – Vulnerable Individuals and HouseholdsVulnerable individuals and households Schedule of meetings)* as well as the venues. In addition, ESIA and RAP meetings had been used to communicate information to the target Vulnerable Individuals and HouseholdsVulnerable individuals and households.

Relevant key stakeholders and institutions were sampled both in Machakos County and Murang'a County and along the project transmission route to give resourceful information on the social issues facing Vulnerable Individuals and HouseholdsVulnerable individuals and households. The key informant interviews were held with respective county and sub-county administers of various departments such as social security and child welfare services *(Annex 9 ii – List of key stakeholders consulted).* Key informant interview guides were used during the discussions.

In each meeting venue, the vulnerable persons were disintegrated into various focus groups such as PLWD, Widows, Elderly and Care givers of orphans, to effectively capture each groups views and concerns during the discussion. The key discussion issues focused on identifying project stakeholders, obtaining perception, and general views of vulnerable people based on the proposed projects' positive and adverse impacts. Other issues discussed on the vulnerable persons included: mitigation measures, and social issues affecting them. A summary of the meetings held with vulnerable people is shown in table below whereas the minutes and respective attendance sheets are attached *(Annex 9 iii– Vulnerable Persons Minutes and Attendance Sheets).* Photo observations and illustration of the various meetings with vulnerable persons are illustrated in plates below.

Table 5-5 Schedule of meeting *held with Vulnerable P*ersons

No.	Location/Venue	County	Date	PLWD	Widow/ Women	Elderly	Total
1	Chief's Office Grounds Kimutwa Location	Machakos	11-Nov-2019	11	18	20	49
2	Chief's Office Grounds Iveti Location	Machakos	11-Nov-2019	3	6	4	13
3	Chief's Office Grounds Masii Location	Machakos	12-Nov-2019	2	14	7	22
4	Kyanganga Primary School-Mango Location	Machakos	12-Nov-2019	0	5	7	12
5	Mwala Multipurpose Hall Mwala Location	Machakos	13-Nov-2019	0	6	5	11
6	Mumbuni Catholic Church Mbiuni Location	Machakos	13-Nov-2019	4	10	6	20

7	Chief's Office Grounds-Kimangu Kithimani Location	Machakos	14-Nov-2019	1	15	8	24
8	Chief's Office Grounds-Mamba Ndalani Location	Machakos	14-Nov-2019	2	6	4	12
9	Chief's Office Grounds Mavoloni Location	Machakos	15-Nov-2019	1	6	5	12
10	Muti Primary School Kakuzi Location	Murang'a	15-Nov-2019	0	3	6	9

Source – AWEMAC Field Survey

Plates below show the ten (10) meetings held during Vulnerable persons consultations.

Plate 5-13 Vulnerable Persons Meeting *at Chief's Office Grounds -Kimutwa Location*
Source – AWEMAC Field Survey

Plate 5-14 Vulnerable Persons meeting *at Chief's Office Grounds – Iveti Location*
Source – AWEMAC Field Survey

Plate 5-15 Vulnerable Persons meeting at Chief's Office Grounds-Masii Location
Source – AWEMAC Field Survey

Plate 5-16 Vulnerable Persons meeting at Kyanganga Primary School-Mango Location
Source – AWEMAC Field Survey

Plate 5-17 Vulnerable Persons meeting at Mwala Multipurpose Hall -Mwala Location
Source – AWEMAC Field Survey

Plate 5-18 Vulnerable Persons meeting Mumbuni Catholic Church- Mbiuni Location
Source – AWEMAC Field Survey

Plate 5-19 Vulnerable Persons meeting at Chief's Office Grounds-Kimangu-Kithimani Location
Source – AWEMAC Field Survey

Plate 5-20 Vulnerable Persons meeting at Chief's Office Grounds-Mamba -Ndalani Location
Source – AWEMAC Field Survey

Plate 5-21 Vulnerable Persons meeting at Chief's Office Grounds -Mavoloni Location
Source – AWEMAC Field Survey

Plate 5-22 Vulnerable Persons meeting at – Muti Primary School -Kakuzi Location
Source – AWEMAC Field Survey

5.3.6.1 Concerns Raised during meetings with Vulnerable persons

Vulnerable persons felt that the project implementation would bring development to the region. During consultations, these groups raised array of issues; of particular concern were; how they would benefit from the project; whether they would be considered for job opportunities; plans for future community consultations; if the project would consider CSR initiatives that could benefit the vulnerable; and the adverse impacts of the project (displacements, weakened family ties, disputes). Views, comments, concerns, and suggestions are captured in the attached minutes with Vulnerable persons (Annex 9iii). Key concerns that were cited during the meetings with vulnerable persons and responses from the consultant are summarised in table below

Table 5-6 Concerns raised during meetings *with vulnerable* persons

Issue / Concern Raised	Response
Is this the only meeting, or will there be other meetings for follow up?	▪ This is the initial meeting specifically targeting vulnerable persons however there has been other meetings; notably public meetings on ESIA and Baraza with PAPs based on Machakos Mwala Ekalakala project. However, a series of more meetings will be organized based on the project activities. Prior communication will be done in advance to ensure vulnerable persons are consulted.
In case of property owned by a self-help group, who will receive the compensations	▪ The registered officials of the self-help group or any other officials the group will advise will be the ones to receive compensation on behalf of the members.
Will homes owned by vulnerable persons be connected to power automatically?	▪ KETRACO deals with transmission of high voltage power whereas Kenya Power deals with connection. The Kenya power has a procedure for connecting homes with power. As of today, we cannot guarantee but, in our report, we shall recommend that Kenya power considers the homes of vulnerable people when connecting people in this community to the power grid.

Issue / Concern Raised	Response
When will the project construction commence?	▪ KETRACO will await to receive all reports, approvals and licenses, complete compensation of affected persons and relocation of structures by affected persons before commencing on the project.
Shall we be considered for employment?	▪ The contractor and the GRC will assess to determine the appropriate opportunities that can be reserved for Vulnerable Individuals and HouseholdsVulnerable individuals and households.
What will happen to graves that are in the wayleave?	▪ Graves will not be affected. Towers / pylons spans will be adjusted accordingly to avoid being erected on the graves. The people should help to identify graves and share with the contractor staff.
Shall we have presentation in the GRC?	▪ Yes, one member of the GRC will be a vulnerable person
Will Irrigation schemes be affected	▪ No irrigation scheme infrastructure will be negatively affected, however where there is displacement, the owner will be compensated.
How will compensation be made where there is dispute	▪ The disputing parties will be given time to resolve on their own. If they fail the matter will be reported to the GRC. If the GRC fails it will escalate the matter to KETRACO. If this fails, the matter can be taken to court. In the meantime, the compensation will be withheld by KETRACO in an interest earning escrow account pending resolution.
Will the project have special Compensation for Vulnerable persons	▪ There is no special compensation, however critically vulnerable people will be assisted by KETRACO to relocate/salvage their properties.
What if the project Stalls	▪ KETRACO will communicate on any hitches.
Who will be the project contractor?	▪ The project contractor will be communicated by KETRACO
Will the project allow all members of the affected families be involved in the process of compensation?	▪ The project encourages families to discuss among themselves and agree how best to receive and distribute the compensation funds to prevent misuse and family conflicts. ▪ Families are encouraged to open joint accounts to get both spouses involved
Will women residents be allowed to participate in casual jobs emanating from project activities?	▪ The project contractor will give equal treatment to both men and women during recruitment. ▪ The Transmission line contractors will also be encouraged to uphold equal treatment of men and women during recruitment. In this regard, a local recruitment plan and gender mainstreaming plan will be prepared for implementation.

Source – AWEMAC

5.4 Issues Raised during the public consultation meetings and Baraza's with PAPs:

The public meetings and the key stakeholders' meeting enabled all stakeholders to express their views and perceptions about the proposed transmission line and associated facilities. In the meetings; various opinions, other information and recommendations were captured. In all the meetings held, the following project information was shared.

There was good support for the proposed project in all the meetings held. Adequate time was allowed for the participants to make contributions, suggestions, recommendations and ask questions after presentation of the proposed transmission line and associated facilities information. The Consultants and KETRACO Project Team responded and made clarifications to the questions and suggestions raised by participants. In all the public meetings, the issues raised were almost similar given the homogeneous nature of the people in the project area. The most prominent environmental and social issues are depicted in the Table below. All the issues raised during the ESIA meetings are captured in their respective minutes (Annex 11).

Table 5-7 ***Issues raised during public meetings***

SN.	Issues raised by the members	Brief explanation	Response
1.	Loss of trees	The local community members raised concerns of loss of trees along the RoW which will be cut for the proposed transmission line to be set up. They stated fruit trees, medicinal trees and trees grown for timber products as resources found along the project's RoW.	The members were informed that compensation for every tree cut down will be done according to, maturity and economic value of the tree with regards to KFS rates.
2.	Loss of crops	Some of the areas traversed by the proposed transmission line are agricultural farms. Due to this, farmers in the areas expressed fears of losing crops.	Farmers were informed that compensation for destroyed crops will be done according to the Ministry of Agriculture rates as per respective counties.
3.	Community health and safety	The local residents were concerned of their health and safety from having a high voltage transmission line passing through their neighbourhood. This included concerns on whether there will be health implications to those living next to the proposed transmission line's RoW as a result of Electro-Magnetic Forces and cases of electrocution where a transmission line develops faults or falls off.	The public was informed that PAPs will be compensated to resettle outside the proposed project's 30m wayleave for their safety. They were also informed of use of new technology in the proposed project by use of proper insulated transmission lines, earthing, and emergency shutdown systems where a fault occurs, or a transmission line falls off to prevent electrocutions. The Environmental and Social Coordinator added that the ongoing ESIA study has proposed for safety awareness programmes to be carried out

SN.	Issues raised by the members	Brief explanation	Response
			in the proposed project affected areas.
4.	Electrocution of birds	White egrets that fly to Konza from Machakos town and back in the evenings may be electrocuted by the proposed high voltage transmission lines during their movements.	The local community members were informed of the use of new technology in the proposed project by use of marker balls, bird diverters and perch management techniques, earthing, and emergency shutdown systems where a fault occurs or a transmission line falls off to prevent electrocutions.
5.	Noise pollution	Local community members raised noise concerns that will be experienced during the construction phase from the machines and equipment used.	The community members were informed that proposed transmission line has been located away from residential areas as much as possible to minimize noise impacts. They were also informed that noise mitigation measures will be put in place during the construction stage by use of well serviced machines and equipment; installation of canopy silencers on noisy machines and; working will be restricted to only daytime hours when most of the surrounding households have gone to work and out of their homes.
6.	Social ills	Members of the public in attendance to the public meetings stated that project contractors bring social ills in their villages for instance an increase in theft cases, teenage pregnancies and extramarital affairs causing marital disputes.	Awareness and training programmes will be carried out as proposed in the ongoing ESIA study. These should be done for both the community members and proposed project contractor staff. That proponent should ensure strict monitoring of the contractor's activities in relation to the local communities.

Source – AWEMAC

5.5 Project impacts raised during the consultative public participation

The following section provides a summary of the positive and adverse impacts of the proposed transmission line and associated facilities as expressed by those consulted during the ESIA public participation exercise:

5.5.1 Positive impacts

5.5.1.1 Creation of employment opportunities

The residents expressed that the construction and operation of the Machakos-Mwala-Ekalakala Double Circuit power line would create job opportunities for the locals. During construction, drivers, masons, engineers, steel-fixers and carpenters will get employment. The local community members expressed that priority of employment opportunities for semi-skilled and unskilled labour should, be given to the locals. Women highly expressed interest to supply vegetables and prepare food for the workers within the project site, a significant number indicated as having equal skills and hence should be considered for all available existing opportunities. In any of the cases, where local community does not have adequate or none of the semi-skilled labour, the communities agreed that such can be sourced from outside the region. The community members recommended that recruitment of workers for the transmission line be done through the offices of Locational and Sub-locational Chiefs and not through those of political leaders for purposes of fairness and equity.

5.5.1.2 Compensation benefits

Most of the respondents, especially the PAPs, expressed great support for the proposed transmission line since they are aware of a compensation phase for those who will be affected. They were very supportive and welcomed the proposed project as they had witnessed an improved financial status and livelihood on those who had been compensated due to infrastructural development in other areas.

5.5.1.3 Increased business opportunities

The respondents and participants were optimistic that business opportunities will increase during construction and operation of the proposed transmission line and associated facilities. Small scale businessmen such as food vendors and kiosk owners will benefit greatly during construction stage due to the expected population influx. The customer base for existing businesses will rise due to an influx of people and activities in the area as a result of the proposed development. Local suppliers of construction materials are likely to benefit from contracts during construction. During operation stage, in the long run the locals will be able to undertake various business activities that require electricity.

5.5.1.4 Improved power distribution

The local community was of the opinion that with the expected increase amount and stability of power distribution and establishment of substations, there will be an increase in the number of households connected to the electricity grid.

5.5.1.5 Transfer of skills

The public was optimistic that the construction of the Machakos-Mwala-Ekalakala Double Circuit transmission line will bring people of different professions and skills to the area. They noted that skills such as electrical engineering, electronics engineering, project management, machines and equipment operations would be transferred to the local youth in the area, especially those being trained on technical courses in local vocational training institutes. Suggestions were also put forth for scholarships and trainings to be offered for the locals by the contractor.

5.5.1.6 Benefits to the education sector in Machakos County

The locals expressed that improved access to electricity at the homestead level and schools will create opportunities for students to have extended hours of study. They expressed hope that technical schools in the project area will be connected to improved power supply for practical projects that require electricity. Power shortages and blackout that would last for long periods was of major concern in learning institutions in the proposed project area. In case the communities and schools along the proposed project area are connected to improved power, students will use it for educational purposes. This benefit will imply that educational performance in the project area will likely improve in the long term.

5.5.1.7 Better standards of living

Improved energy sector, health, and educational achievement as well as economic activity as a result of the proposed project, implies that the locals, mainly the poor and vulnerable persons will, in the long run, have better standards of living. Access to electricity by households will transform the standard of living of the locals since they will start using better home appliances and equipment that might improve their health, sanitation, and information access. For instance, if power supply is improved, people in the project area will use television sets and computers to access information, and refrigerators to preserve perishable goods. Also, reduction in the use of kerosene lumps will reduce prevalence level of respiratory-related diseases.

5.5.2 Negative impacts

5.5.2.1 Loss of trees

The public stated that the proposed Machakos-Mwala-Ekalakala Double Circuit transmission line will lead to clearance of trees along its wayleave. They pointed out that some of the indigenous trees are sources of fruits, traditional medicine and construction materials. Some of the type of trees that will be affected include mango trees, pawpaw trees *Muuku, Mutithi, Mulaa, Kisewa, Kilulwe Kihuku, Msanduku, Mubingu, Ndau, Muthega, muthika, Mgegeta, Mubisya, Msemei, Mukena,* Moringa and Neem trees.

5.5.2.2 Noise pollution

The public stated that construction activities would result to noise pollution. Vibrations and noise from the construction machinery may be excessive and result into noise around and within the area. Also, the proposed transmission line would cause a noise nuisance. The locals described the noise nuisance as a buzzing sound emanating from a similar transmission line in the areas of Machakos town and Ekalakala. This they expressed to be more pronounced during the rainfall seasons when humidity rates are high. This buzzing sound is due to a phenomenon called corona discharge that occurs when a fluid (like air) surrounding an electrically charged conductor becomes ionized.

5.5.2.3 Cases of electrocution

Members of the local communities expressed their concerns on cases of electrocution in the proposed project area. They stated that children while playing or those mentally unstable might climb the towers and accidentally come into contact with the high voltage transmission lines and end up getting electrocuted. They also feared that in case where a transmission line develops faults and get cut off accidentally, it may electrocute the nearby locals.

5.5.2.4 Community Health and Safety Impacts

The local residents articulated their fears of negative health impacts as a result of electro-magnetic forces (EMF) from the proposed transmission lines. They stated that they are not aware on which health implications are as a result of exposure to EMF thus feared for their health having such a project being set up near their areas of residence.

5.5.2.5 Displacement of local communities

Some of the respondents stated displacement of PAPs and loss of property as one of the negative impacts of the proposed transmission line. That this may cause disruptions of the PAPs lifestyle as they may relocate to a location that does not favour/support some of their initial livelihood activities such as farming or other commercial activities.

5.5.2.6 Social ills

The respondents pointed out that there will be an increase in social vices due to an influx of population in the project area as a result of contractor's work force. The social ills anticipated by the locals includes theft cases, teenage pregnancies, cases of school dropouts, extra-marital affairs and introduction of illicit behaviour in the proposed project areas; such as Makaveti Trading Centre, Masii Centre, Mwala Centre, Kithimani trading centre and Machakos town.

5.5.2.7 Loss of birds and wild animals

The participants raised concern over possible displacement of local birds and wild animals by clearing of trees for the transmission line. The birds that may be affected include *Kanyangi*, *Mangoa*, Turkey, Hawks, Owls, *Ngune*, *Masau*, Guinea fowl, *Magongo* and *Mbaa*. Some of the animals that might be displaced include Monkeys**,** Baboons, Squirrel, rabbits, antelope, Dikdik, and *gakeera*. The clearance of the way leave may also displace snakes that may be forced to move closer to homesteads presenting a health hazard to residents.

5.6 Suggestions from the respondents

The following are the suggestions proposed by the respondents during the ESIA study consultative public participation exercise;

- Give priority to the local youth in the proposed project area(s) for employment opportunities in semi-skilled and unskilled job categories.
- Replace lost trees along the proposed wayleave by planting more outside and providing the locals with tree seedlings,
- Ensure community health and safety from construction, EMF and electrical hazards
- Give enough notice period to PAPs to enable them to have ample resettlement period,
- Compensate for affected assets sufficiently to enable PAPs maintain, if not improve, their living standards,
- Carry out and promote community health and safety awareness programmes in the proposed project affected areas,
- Proponent to ensure contractor(s) adheres to good morals and ethical behaviour.
- Proponent to strictly monitor the contractor's(s) interaction with the local communities and put in place strict penalties where a contractor breaches a community's social-culturally accepted behaviour.
- The community desires the project to be implemented as per the international standards and practices acceptable to the community to minimize any negative environmental and social impacts that might arise during construction and operation stages.
- Ensure valuation and compensation are done above board and professionally to prevent corruption and manipulation that may disadvantage the affected households
- The proposed project to ensure excavation of graves is avoided during construction given the value the families attach to them.
- Compensation process should be well managed to ensure the vulnerable especially orphans, PLWD, widows and elderly are identified and receive funds without losing them to care givers.
- Ensure crops and trees damaged during construction are compensated well and access roads are restored.
- Project proponent to form a joint committee with Location and Sub-location Chiefs to monitor the project for enhanced safety and conflict resolution

During the public meetings, residents raised several questions and made suggestions on the project and its possible impacts. The consultants and KETRACO staff gave relevant explanations to the satisfaction of participants. The feedback is summarized in the table below

Table 5-8 Summary of Questions and Suggestions by Participants and Responses by KETRACO and Consultants in Nine (9) Public Meetings

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
1.	Targeting women for jobs	How will women residents benefit from employment and business opportunities from the project?	KETRACO will give equal treatment to both men and women recruitment and doing business with the community. The Transmission line contractors will be expected to implement Labour Management Plan *section 3.13 of annex 14* and uphold equal treatment of men and women during recruitment. The project will also develop a local recruitment plan that is fair, transparent and socially inclusive.
2.	Existing transmission line	What happens when the new transmission line passes through the same land with another existing high voltage line?	All affected persons will be compensated, and level of compensation will vary with impact in terms of proportion of land to be occupied by the wayleave.
3.	Benefits to locals	What guarantees can be given that the local community will benefit from the construction and commissioning of the transmission line?	The direct and indirect benefits were explained to the participants including stabilization of power supply to minimize outages, short term construction jobs and expanded opportunities for local business to supply the project during construction with various goods and services.
4.	Observing standards	Will project be implemented to standards and practices acceptable to the community?	The contractor will be guided by recommendations of the ESIA and RAP to ensure minimal disturbance to the normal lives of affected residents and local environment. There will be local meetings and committees to streamline any emerging issues from the affected persons and local community. National Environment Management Authority (NEMA) staff are expected to regularly visit the project sites to ensure compliance with recommendations of ESIA and the existing environment laws. The contractor will be expected to always display the NEMA license
5.	Transparency in compensation	Can the community be assured that the valuation and	All activities of KETRACO are guided by Kenyan laws and international standards and best practices and no

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
		compensation will not be corruptly manipulated to disadvantage the affected households?	single affected person will be disadvantaged. KETRACO is also implementing similar projects countrywide and has not been cited for corruption or application of double standards/
6.	Project coordination	Who will be managing the project and liaison with PAPs?	The project proponent has put together a Project Implementation Team of various specialties and there will be a Grievances Redress Committees (GRC) with representation from the community. This will ensure efficient project implementation. Community Liaison Officers (CLOs) will be engaged to ensure Stakeholders Engagement Plan (SEP) is well implemented. KETRACO will also engage local persons as Wayleave Officers to work with the contractor, to ensure the project is implemented smoothly. The telephone contacts of the KETRACO project implementation team will also be shared with residents to encourage continuous communications and transparency.
7.	Increased land prices	In the project affected areas, lands might appreciate and be much more expensive by the time compensation	Determination on compensation amount for land will be based on the current land market prices as per Machakos and Murang'a County Lands' registry.
8.	Duration of project	When will the project be started and concluded?	KETRACO will await to receive all reports, approvals and licenses, complete compensation of affected persons and relocation of structures by affected persons before embarking on the project.
9.	Access to electricity for domestic use	Will residents benefit from direct connections to the power by virtue of transmission line passing through the land?	The mandate for domestic connections of power is by Kenya Power company and is separate from the transmission function of KETRACO.
10.	Delayed compensation and refusal to give way	There are stories in the media about Kenyans' properties to pave way	It was clarified that it is up to project affected persons to have their land and property ownership documents ready as well as an agreed plan on how

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
		for public utilities without compensation	compensation funds will be received and shared. When these are not sorted early, it may cause delays in payments or sometimes compulsory acquisition is pursued by the state to the disadvantage of the affected households
11.	Land valuation	Participants wanted to know who does valuation for land and if such a person is independent and will not be influenced	The Project proponent utilizes services of independent and private valuers. In addition, the valuation and compensation will be overseen by the KETRACO valuation staff. In case of dispute with the results of valuation and compensation, affected persons can hire services of independent valuers for comparison and negotiation with KETRACO
12.	Distance of construction from transmission line	How far from the transmission line can residents erect buildings	The Wayleave will be 30 metres wide and 15 metres on either side of the transmission line. It is safe to build structures outside the Wayleave distances.
13.	Compensation for erection of towers	Will erection of towers attract additional compensation above the land values?	The compensation package will be complete with no additional funds for any use of the Wayleave land by KETRACO.
14.	Compensation according to level of displacement	Will those who lose a large portion of their land to the transmission be compensated to relocate?	As a policy, KETRACO will compensate up to 95% of the value of the land to void outright purchase and still the PAPs will utilize the land for farming
15.	Graves, shrines and cultural sites	Participants raised concerns about the likely damages to graves of their family members and shrines along the proposed transmission line during excavation and construction	The team of experts conducting the census will identify and document graves along the wayleave to avoid excavation during construction. The line has also been surveyed to avoid passing through religious and cultural sites important to local communities The mapping of graves, shrines, cultural sites and all areas of cultural importance will be undertaken in consultation with elders, community members, relevant institutions and local leadership.
16.	Forms of compensation	Will KETRACO provide alternative compensation like land purchase, building of demolished houses besides the monetary payments?	On monetary payments will be made through bank accounts of registered and validated land and property owners.

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
17.	Maintenance of Wayleave	Who will be responsible for maintenance of the Wayleave after commissioning?	The KETRACO Department of Operation and Maintenance will be responsible for any works on the Wayleave after commissioning.
18.	Local project coordination committee	Residents proposed the project proponent form a joint committee with Chief and Assistant Chiefs to monitor the project for enhanced safety and conflict resolution	Grievances Redress Committee (GRC) in every Administrative Location will be formed and chaired by the Chief and comprise representatives of PAPs, village managers, church leaders, women, youth and people with disabilities (PWDs).
19.	Orphans and compensation	Cases of orphaned children whose parents who owned affected land that may be exploited by relatives by denying them access to compensation funds	KETRACO will work with the GRCs to identify estate administrators and in extreme case make payments directly to schools, colleges and other institutions of the affected orphans.
20.	Theft of wires and steel bars by scrap metal dealers	There were fears scrap metal dealers may attempt to unscrew and cut away towers for possible sale	The towers are constructed with antitheft technologies and erected 45 meters above ground to discourage theft. Also the lines are controlled by automated systems from various substations and have power surge cutout that switch of the power in case of physical interference. But these cases are seldom.
21.	Social ills	Participants expressed fear of family breakups, spread of venereal diseases especially HIV/AIDS and unplanned pregnancies due extra-marital affairs and sexual exploitation of young girls' workers during construction.	The proponent will ensure contractors establish campsite(s) away from the residential areas to monitor and restrict movement of workers. Public awareness will be conducted to promote responsible social relations and minimize any negative social impacts from interactions between project workers and residents Proponent will ensure training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women. KETRACO will introduce a worker code of conduct as part of the employment contract, and including sanctions for non-compliance (e.g., termination)

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
			Proponent will adopt and implement a grievance redress mechanism for PAPs and project area community to address all emerging complaints including risks related to social ills such as Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH).
22.	Radiation, health and safety issues from high voltage of the transmission	Will the high voltage cause health problems for residents near the transmission line?	The line is erected 45 meters above ground too far high to cause any potential health effects or be accessed by children or persons with mental disabilities. Besides there is no documented cases of residents in existing high voltage lines suffering any illnesses
23.	Roads and crops damaged by contractor	Will access and private roads damaged and crops by contactor during construction be compensated?	The Wayleave officer will document such damage and file report with KETRACO for consideration for compensation
24.	Displacement of business and loss of farm investments	Will compensation be provided for displacement of businesses and loss of farm investments (such as terraces, landscaping, wells and irrigation systems) in areas affected by clearance of wayleave?	All assets on affected lands will be rightly valued and compensation made.
25.	Reforestation	Will trees cut by the contractor be replaced by planting to protect the area from deforestation?	KETRACO will liaise with local schools to support tree planting within the school grounds to restore lost trees destroyed during clearing of the Wayleave. There will be Cash Compensation for each tree based on compensation schedules prepared by the Kenya Forest Service (KFS) for various species depending on age and its future potential to encourage famers to replant the cut trees in rest of the land.
26.	Family involvement in compensation	Will all members of the affected families be involved in discussion and sharing of compensation funds	KETRACO encourages families to discuss among themselves and agree how best to receive and utilize share the compensation funds to prevent misuse and family conflicts. Families are encouraged to open joint accounts to get both spouses involved.

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
27.	Investment of compensation funds	Will beneficiaries of compensation funds be assisted to make wise investment decisions including registration and payments for insurance, pension and small-scale business enterprises?	KETRACO will conduct meetings with PAPs on compensation of their land and properties. They will work local Chiefs to organize events to sensitize beneficiaries on use of funds received from compensation to prevent misuse and family conflicts that may leave households worse than they were before the project.
28.	Compensation for 1 Community land	Will community land, water and materials utilized for construction of the transmission line be compensated by KETRACO?	KETRACO will apply either to the National Land Commission for alienation and allocation and advise on any payments on compensation. In addition KETRACO will consult with the appropriate clan, the designated chiefs, subchiefs, elders and PAPs to ensure that the compensation (including any materials) and relocation/allocation of land meets with the above traditional administrations. Since unregistered community land is held in trust by respective County Governments on behalf of communities; in case of compensation, the monies will be held in an interest earning account until communities and community land are registered.
29.	Identification of affected persons	Participants wanted to know who among the residents will be directly affected by the transmission line passing through their land	Currently, the surveyor has already identified the plot numbers of most of the affected households. In addition, it was explained that following the public meetings, a team will conduct a census of the lands, persons, crops and trees and buildings affected by the line from Machakos up to Murang'a counties.
30.	How will the affected persons without land titles be compensated	Participants expressed fear that most of them do not hold title deeds to their land which might hinder compensation for the land falling on the transmission line	The project proponent together with the Grievance Redress Committees (GRC) will help identify the true owners of the land and property. In addition to title deeds, sale agreements will also be considered for those who may have not yet received their land ownership documents after initiating the registration process with

1 Although a community member referred to community land during the Q&A session, the TL does not traverse community land in the project area. Land tenure systems identified are public and private.

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
			the help of the Chiefs and Village elders. In cases where registered land and property owners are deceased, KETRACO will work through the GRCs to identify rightful beneficiaries for compensation. The family will be required to submit the relevant Death Certificate for confirmation.
31.	Use of land before compensation	Will landowners be free to build on wayleave until compensation id fully settled?	On completion of the census of affected land and buildings, respected will not be allowed to put up new buildings for they will not be compensated
32.	Disruption of Water supply lines	Will the existing water supply lines be affected by construction of the transmission line?	No disruption expected as the land through which the transmission line passes can continue to be used for other activities except major excavations, building and tree planting.
33.	Lawyers and brokers during compensation	Will land brokers and lawyers be needed to negotiate for compensation from KETRACO?	KETRACO will deal directly with affected persons with help local chiefs and village managers and not through third parties.
34.	Rumours and sensational reports	The line might finally take a different route from the proposed one denying residents the opportunity to be compensated by the project	The planning and implementation of the transmission line remains as publicly shared. Any changes necessitated by unforeseen circumstances will be communicated and a new census of affected persons conducted.
35.	Corporate Social Responsibility (CSR)	Will KETRACO help in the construct of extra classrooms at General Mulinge Secondary School and expansion of Kasioni dispensary as part of the corporate social responsibility from the project?	KETRACO will not engage in any infrastructure project as part of its CSR but will consider providing support for supplies and movable items for institutions identified by the community. The community can also discuss with KETRACO on possibility of donation of any facilities used by the contractor at the conclusion of the project such buildings, machines and other movable items.
36.	Use of materials from demolished buildings and cut trees	Will Contractor or KETRACO carry away materials from demolished buildings or trees cut during construction?	All materials and trees resulting from clearance of the Wayleave remain property of the affected households.

SN.	Issues Raised by Meeting Participants	Brief Explanation	Response by KETRACO and Consultants
37.	Commissioning of Construction	What is the expected date of start of construction of the transmission line?	The commissioning of the constructed will be influenced by the completion, submission and approval of ESIA and RAP reports and conclusion of compensation for the affected land
38.	Relocation of buildings	Are affected persons whose buildings fall on the line expected to move away to another location?	The Team clarified to participants that building structures can be constructed so long as they are 15 meters away from either side of the transmission line
39.	Compensation phases	Will compensation funds be sent annually or at once to the affected persons?	Compensation for land and crops will be done at once while that for buildings will be 70% percent initially and 30 percent paid after confirmed reconstruction of houses by the affected persons. An additional 15% disturbance allowance will be paid for demolition and relocation of buildings
40.	Standards of measurement and valuation	What metric and monetary units to measure land area and compensation for affected persons?	All measurements are done using international standard units of meters while compensation values will be estimated at prevailing market rates
41.	Squatters	Will squatters be compensated	Squatters will only be compensated for buildings affected but not for land.
42.	Role of Land boards	Will the Land Control Boards have a role in survey, valuation and compensation?	KETRACO will rely of register of land titles to confirm ownership. Land in disputes will be addressed by the GRCs except those facing court litigation that must wait conclusion of the cases
43.	Notice of removal of structures	The three months' notice for demolition may be short for affected households to identify alternative land for reconstruction of houses	KETRACO will work will only start construction of the transmission line when all affected households have been compensated and vacated the wayleave.

Source – AWEMAC

5.7 Corporate Social Responsibility (CSR) Proposals

In all the public meetings and engagements, the public expressed some of the challenges encountered in the project area. They proposed CSR activities for their villages which included:

- Carry out tree planting programmes in the surrounding areas to replace lost trees
- Provide tree seedlings to the local community to enhance reforestation
- Set up tree nurseries for continued environmental conservation support
- Construction of classrooms,
- Rehabilitation of roads
- Construction of dispensaries
- Construction of extra classrooms and dormitory at Kaloleni Primary School,

- Water supply to Kambi Mawe Market centre
- Build bridges across some of the local streams for safety of school children

Nonetheless, KETRACO informed they will not engage in any infrastructure project as part of its CSR but will consider providing support for supplies and movable items for institutions or sectors identified by the community. The proponent also noted that there would be deliberations on donation of any facilities used by the contractor at the conclusion of the project such as buildings, and boreholes.

6 ENVIRONMENTAL IMPACTS IDENTIFICATION AND ANALYSIS

6.1 Introduction

The proposed power transmission project will have both positive and negative environmental effects. Impacts were identified and analysed through intensive and extensive field surveys; key stakeholder consultation and public participation forums; and literature review and professional judgement. The impacts were categorised according to different phases/timing of the project as follows; 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 the 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 Environment:
- Population characteristics.
- Settlement trends.
- Land use patterns.
- Health and Safety.
- Culture.

III. Economic Issues:
- Trade and industries.
- Transportation and communication.
- Income generation activities.

6.2 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. In order 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 6-1 Levels of Scale used in analysing 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 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.

Source – AWEMAC

6.3 Environmental impacts during construction phase

The environmental impacts have been discussed into detail including; Biodiversity related Impacts, and Cumulative Impacts.

6.3.1 Positive environmental impacts

The following are the expected positive environmental impacts for the proposed project during the construction phase:

6.3.1.1 Reforestation

The proponent will compensate the PAPs for the lost trees to enable them to re-plant outside the RoW. As a corporate social responsibility (CSR) the proponent collaborate with KFS to replant trees in protected forest areas / gazetted areas through purchasing seedlings and nurturing the trees for a period of 3years. This program will assist to offset carbon emissions from trees cut during the project. This impact will be moderate hence a value of **2.**

6.3.1.2 Control of invasive species

Invasive species were observed in both terrestrial and aquatic habitats along the proposed transmission line alignment. Some of the key invasive species observed included *lantana camara* - the most dominant invasive species -, *psidium guajava* and *eichhornia crassipes* commonly called water hyacinth. Although certain invasive species such as *lantana camara* are known to be aggressive with ability to occupy any existing gaps the proponent / contractor will ensure only indigenous tree species / vegetation is re-planted after clearance of the right of way. The control of invasive species is therefore expected to be indirect since the motif of cutting trees will be for wayleave acquisition.

Preference will be given to exotic tree species such as *Kigelia Africana* (The species is locally referred to as Muatine), *Dalbergia melanoxylon* (Locally known as Muvingo and is a hardwood), *Terminalia brownie* (The species is locally known as Muuku and it is a hardwood), *Acacia tortilis* (Locally known as Mulaa), *Acacia mellifera, Acacia drepanolobium, Acacia xanthophloea, Balanites aegyptica, Commiphora holticiana, Ficus sycomorus* (Fig tree). This will ensure invasive species are controlled. This impact will be moderate hence a value of **2.**

6.3.2 Negative environmental impacts

The likely negative environmental impacts during the construction phase of the project are as discussed below:

6.3.2.1 Noise pollution and excessive vibrations

The excavation of tower foundations and construction works is likely to lead to increased noise levels and vibrations in the project area. Noise and vibrations will emanate from transportation vehicles, construction machinery, metal grinding and cutting equipment, and among others. Excavation works will also cause vibration and noise. This will be mostly felt in densely populated residential areas along the proposed transmission line. Some of these densely populated areas include Massi Location, Kithimani Location, Mbiuni Location and Mwala Location. This impact will also be felt by schools such as Kithianioni primary school, kwandoo primary school, Kitwamba primary school, Kyanganga primary school and Kyanganga secondary school, and Mikiyuni primary school which are located less than 500 metres from the proposed power line RoW. The same applies to Kithimani and Mavoloni dispensary. This impact will be moderate hence value of **2**.

6.3.2.2 Air pollution due to dust and exhaust emissions

In the construction phase, the excavations for tower foundations and transportation of building materials will result in dust emissions from the access roads along the project route to the surrounding areas. The transportation of construction machines will also contribute to dust emissions. Dust and exhaust emissions may impact vegetation growth rate and horticultural farms especially in areas near River Athi, Mavoloni farm and water harvesting dams such as Mbuno dam, and other sand dams in Kwangunzu village which neighbour the proposed RoW. Dust and exhaust emissions from transportation vehicles may also bring about respiratory infections especially to locals living in villages traversed by the proposed transmission line such as Ithanga, Kasioni, Languni, Kiaoni, Muutu, Utheke, Kalenga, Kamuya, Love, and Mwania. This impact will be moderate hence value of **2**.

6.3.2.3 Increased generation of solid waste

Solid wastes such as cement, metal cuttings (copper etc.), oil filters, waste tyres, wooden waste from the pellets and conductor drums, will be produced during the construction phase of the project development. The solid waste materials will be generated as overburden from earth moving during foundation activities for transmission towers. Solid waste generation is also expected from workers' campsites (organic waste, metallic waste (tins), glass waste, e-waste and plastic waste); vegetation waste is expected from the clearance of RoW for fixing towers. The contractor would need to ensure that all solid wastes are collected and disposed appropriately to promote a clean

and healthy environment along the transmission route corridor. This impact will be high hence a value of **3.**

6.3.2.4 Increased energy consumption / fossil fuels

The construction of the proposed Machakos-Mwala-Ekalakala double circuit transmission line is expected to cause an increase in energy consumption especially from construction campsites, and specific work sites. The campsites and worksites (offices) will require energy for lighting and operating electrical equipment.

It is also expected that there will be increased consumption of fossil fuel particularly petrol and diesel in operation of vehicles due to movement of workers, transportation of construction equipment and machinery. Increased fossil fuels are expected to lead to contribution of greenhouse gases (GHGs). However, the contribution of the GHGs against the available carbon sinks in the project area is expected to be insignificant. This impact will be moderate hence a value of 2.

6.3.2.5 Increased discharge of wastewater, sewage and degradation of water quality

Direct impact of the proposed transmission on water quality is expected to be minimal since the power transmission pylons will be approximately 45 metres above ground and specifically anchored to avoid water bodies. However, there will be a potential increase in the generation of wastewater and sewage during the construction phase of the project. The increases will take place at construction sites, workers camp sites and in various towns that will host construction workers located along the transmission route. Some of this towns will include, Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Kambi Mawe in Machakos County and Mukundi town in Murang'a County. The towns lack basic infrastructure systems such as wastewater drainage and sewer line system hence population influx could affect sanitation of the areas. Surface and underground water sources (including aquifers) can be at risk of degradation mainly in wet seasons attributed to increased water infiltration and surface run offs. In addition, there will be potential impact of water degradation attributed to poor disposal practices of used oil, oil filters from vehicles and equipment after-service during the construction of the project. Mitigation measures will be established hence this impact will be moderate thus a value of **2.**

6.3.2.6 Increased water abstraction and consumption

During the construction of the transmission line there will be increased abstraction of water from groundwater resources for use in construction and for domestic use by workers. The increased water abstraction from both surface drainage systems such as River Athi, River Thika and streams including River Miu, River Muvwana, River Mithini, River Thwake, and River Ikiwe and any dug boreholes may lead to competition of the scarce resource with the locals. This may further reduce availability of water, as discussed in chapter 3 including possibility of reduction in base flows in rivers and stream. This impact will be moderate hence a value of **2.**

6.3.2.7 Modification of hydrology

The increased water abstraction from surface drainage systems such as River Athi, River Thika and streams including River Miu, River Muvwana, River Mithini, River Thwake, and River Ikiwe may modify the hydrological characteristics of these water bodies if the abstraction is uncontrolled. Also, surface runoff may also accumulate along the sides of the access routes and transportation roads preventing direct flow to the water bodies. Machakos being synonymous with storm water harvesting, some of the sand dams along the proposed transmission route such as Masimbani, Kivandini, and Mbuno may be affected by over abstraction or surface runoff. This impact will however be minimal hence a value of **1**.

6.3.2.8 Aquatic Habitat Alteration

Main aquatic habitats existing along or in the vicinity of the transmission line are permanent rivers e.g. the Athi River, seasonal rivers and streams (Thwake, Muthini, Mukewo, Kamula, Kitulu,

Kyalui, Ikiwe, Uvila, Kathuluni) and man-made dams (Mbuno Dam). During the ecological survey, the proposed power transmission line transverses across or very close to the aquatic ecosystems. Envisaged impacts to these water bodies include construction activities of heavy machinery causing soil to be susceptible to run off hence causing siltation of the aquatic systems especially the lacustrine dams and reservoirs. During rainy season, downstream are normally affected by sediment loads from upstream areas. Erosion may occur on areas with weak soil during rainy season. Fishing activities mainly in sections where the proposed line traverses River Athi and River Thika may also be affected by excessive siltation or surface runoffs from the construction routes. Construction activities might demand water and any attempts of water extraction from the resources could probably drain water that serves ecological role in the area. The dams also serve livestock and domestic uses. This may lead to additional, sediment and erosion from construction activities and storm water runoff may increase turbidity of surface water courses however mitigation measures will be employed. This impact will be high hence a value of **3.**

6.3.2.9 Increased generation of storm water and impact on drainage

Widening and compaction of access roads reduces infiltration of the soil / increases the amount of impermeable surface area. This results to an increase in the rate of surface water runoff resulting to storm water. The improvement of access roads in the project route is critical to the success of the project, however such improvement may also be accompanied by increased generation of storm water if storm drainage systems are not well designed. Also, the storm water generated on the road may be contaminated with oil and grease, metals (e.g. lead, zinc, copper, cadmium, chromium, and nickel), particulate matter and other pollutants released by transportation vehicles on the roads. Such runoff / storm water may find its way into water resources leading to degradation of such reservoirs. Nonetheless, mitigation measures will be enacted hence this impact will be minimal thus a value of **1**.

6.3.2.10 Increased soil erosion risk and soil quality degradation

Construction of foundations for the transmission towers mainly along the AP1 to AP7 (outskirts of Masii and Machakos towns) which are characterized by hilly ridges and inherent sloppy nature, will lead to increased generation of surface runoff. Where the towers are fitted to bare steep slopes with loose soil, it can lead to soil erosion problems. Sediment and erosion from construction activities may also increase turbidity of surface waters. This impact will however be moderate (value of **2**) along the other section in view of the gentle nature of the landscape through which the transmission line will pass.

6.3.2.11Loss of vegetation cover and biodiversity

During the construction phase of the project, there will be clearance of vegetation in some sections along the corridor to pave way for the proposed transmission line. River Athi and River Thika sections which are along the project route have thick bushes and shrubs which will require clearance of vegetation. Trees such as *Kigelia Africana* (The species is locally referred to as Muatine), *Dalbergia melanoxylon* (Locally known as Muvingo and is a hardwood), *Terminalia brownie* (The species is locally known as Muuku and it is a hardwood), and various types of acacia will be cut down along the proposed transmission line's RoW.

Notably, the transmission line alignment affects patches of privately owned natural forests and plantation forests. The natural forests are found in grazing fields along the alignment while the plantations are on farmlands. The plantations are mainly patchy, very small and restricted in zones with highland like landscape as well as near water bodies. For instance, at the neighbourhood of Athi river (0328809, 9863842), a small and patchy plantation of *Eucalyptus grandis* exist in a farmland. Similar plantations of *Eucalyptus grandis, Eucalyptus camadulensis and Grevillea robusta* are common in the highland-like landscape from AP1 to AP4. In some grazing fields along the proposed transmission line alignment, patches of natural forests formed closed canopy acacia dominated plant formation. For instance, at GPS pickings of 0317708 and 9830223, the proposed line traverses through a closed *canopy acacia-acacia plant formation. The w*oodlands play critical ecological roles such as habitat for wildlife, nutrient cycling, water catchment, erosion control, removal of pollutants among others. In the proposed transmission line alignment, the dominant

plant formation is the Acacia-acacia formation and the Acacia-Croton Plant formations/mosaics/associations in AP8 and its environs.

The communities along the line mainly rely on indigenous trees as a source of fuelwood for cooking and charcoal production. Fruit trees noted were mainly mangoes, oranges and tangerines. These trees and bushes are also home to various fauna such as birds, insects and snakes. It is also expected that the project will require quantities of materials such as ballast, murram, stones, conglomerates / aggregate, sand, gravel, and soil, among others. In addition, the contractors require camp sites for workers and materials storage which will need vegetation clearance. The proponent is going to ensure that campsites are constructed in areas that are not high in vegetation density. Due to the need to clear vegetation, building of campsites will need to undergo a separate Environmental and Impact Assessment Study to ensure there will be no major negative impacts from them. Common problems with soil compaction include:

- Short, stunted roots.
- Increased water runoff and decreased availability of water to roots
- Limited air infiltration, which leads to high levels of carbon dioxide in soils, causing shallow and less stable root systems.
- Increased root conflicts with surface infrastructure and landscaping
- Reduced drought tolerance

The impact of logging vis a vis the existing vegetation is not expected to be significant; however, right-of-way construction activities may affect the biodiversity depending on the characteristics of existing vegetation, topographic features, and installed height of the transmission lines. Examples of habitat alteration from these activities includes fragmentation of forested habitat; loss of small wildlife habitat (hares) , including for nesting for birds; establishment of non-native invasive plant species; and visual and auditory disturbance due to the presence of machinery, construction workers, transmission towers, and associated equipment. Although mitigation measures will be established loss of vegetation cover and biodiversity will be high hence a value of **3.**

6.3.2.12 Terrestrial Habitat Alteration

As noted, the transmission line alignment affects patches of privately owned natural forests and plantation forests. The natural forests are found in grazing fields along the alignment while the plantations are on farmlands. The plantations are mainly patchy, very small and restricted in zones with highland like landscape as well as near water bodies. The natural forests are found in grazing fields along the alignment while the plantations are on farmlands. The savannah closed woodlots characterized by predominant plant mosaics/associations of *Acacia-Acacia, Acacia-Croton, Acacia-Commiphora, Acacia-Terminalia and Acacia-Rhus* formations are the dominant habitat type at the proposed transmission line alignment. Woodlands are known to play critical ecological roles such as habitat for wildlife, nutrient cycling, water catchment, erosion control, and removal of pollutants among others characterized by predominant plant mosaics/associations mainly made of the climax species best suited for the locality. The wooded bushland habitat also characterized some sections of the proposed transmission line alignment especially where the landscape changed from highland landscape to lowland. *Solanum incanum* was common in AP4 especially at GPS pickings of 0314072, 9827842 and 0314111, 9827873 where open quarries exist.

Construction of the right-of-way normally involves clearing of vegetation or to some extent grading rugged terrain. The savannah closed woodlots and the wooded bushland habitat that characterise the transmission line will be affected mainly during clearing of the right of way (RoW). Envisaged ecological impacts include loss of indigenous trees e.g. *Acacia sp. and Croton sp.* that take long to mature. There will also be loss of important commercial crops like grafted mangoes and oranges noted in several farmlands along the proposed transmission route. The clearing of the RoW will therefore bring disconnection of small habitats and creating an environment conducive to proliferation and persistence of invasive species and visual/auditory disturbance due to the presence of machinery and associated equipment. Although mitigation measures will be instituted, it will affect a relatively high area hence a value of **3.**

6.3.2.13 Cumulative Environmental Impacts

Cumulative impacts are impacts which result from the incremental impact of a proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. The ESMF for KESIP notes that for most part, cumulative impacts or aspects are too uncertain to be quantifiable, due to mainly lack of data availability and accuracy. This is particularly true of cumulative impacts arising from potential or future projects, the design, or details of which may not be finalized or available and the direct and indirect impacts of which have not yet been assessed. Given the limited detail available regarding such future developments, the analysis may be of a generic nature but should focus on key issues and sensitivities for the project and how these might be influenced by cumulative impacts with other activities. Impacts on resources such as habitat alteration within the region might arise due to the needs for the simultaneous construction of other public facilities as development continues within the region. As per the ESMF for KESIP, the potential cumulative impact associated with proposed project including the Machakos Mwala Ekalakala transmission line is the potential loss of biodiversity through a decrease in vegetation and faunal habitat. 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 may result in a decrease in biodiversity and suitable habitat for fauna. The proposed transmission line and associated substations is likely to exacerbate the loss of biodiversity through the direct loss of natural vegetation within the right of way, as well as indirectly through enabling the further construction of the ring feed powerlines and providing an additional supply of electricity to the area which may facilitate further development initiatives. However, with the implementation of the proposed mitigation recommendations the cumulative impact is anticipated to be minimal hence value of 1.

6.3.2.14 Pollution from Hazardous materials

Use of engines (construction vehicles) and other equipment on along the proposed transmission RoW line has the potential to lead to spillage of petroleum products. Most of hazardous waste during the construction phase consist of spent oils, solvents, used oil from equipment and vehicle servicing, and highly refined mineral insulating oils used to cool transformers and provide electrical insulation between live components. This type of waste will typically be found in the largest quantities at electrical substations and maintenance garages.

Hazardous solid waste is also expected from welding materials as well as the hazardous waste packaging. Any accidental spillage of lubricant, fuel, cement and other chemicals during laying of the pylons could affect the soil condition. Pollution in soils can further impact on the quality of surface water runoffs. Nonetheless, mitigation measures will be instituted at key sections (garages and repairs & maintenance areas) thus the impact is anticipated to be moderate hence a value of **2.**

6.3.2.15 Introduction of Alien Invasive Plant Species

Clearing vegetation may provide opportunity for emergence of alien species which otherwise are often outcompeted by the habitat's natural vegetation. New ecological succession may result from clearing of vegetation along the way leave. For instance, invasive species were observed along the proposed transmission line alignment in both terrestrial and aquatic habitats. The most dominant invasive species at the proposed transmission line alignment being *lantana camara* in AP12 along Kwa Ndoo-Mbiuni road at GPS pickings of 0326042, 9854819 and at elevation of 1247m a.s.l. Similar thickets of Lantana camara were observed in AP18 at Kwa Mbuno earth pan (0324115, 9878797, 1284m a.s.l). At AP20 (0321423, 9884973, 1316m) where an existing high voltage power transmission line exist, heavy thickets of *Lantana camara* exist along the wayleave including road reserves. In addition, there is existence of guava *(Psidium guajava)* an invasive species near Kitulu earth dam at GPS pickings of 0315764, 9828985 and a general elevation of 1435m a.s.l. Heavy invasion by Psidium guajava was also observed at AP20 within an existing high voltage transmission line. Water Hyacinth (Eichhornia crassipe) was predominant in aquatic habitat of Athi River at GPS pickings of 0328807, 9863842 and elevation of 1175m a.s.l. Such invasive species tend to alter the ecological and economic roles of respective ecosystems. The invasive species may be imported to other non-affected areas as a result of movement of construction

equipment e.g. cranes and vehicles and even construction personnel. This impact is anticipated to be moderate hence a value of 2.

6.3.2.16 Human wildlife conflict / Temporary obstruction of movement of wild herbivores

Large charismatic herbivores were not observed during the ecological survey. However, evidence of presence of small herbivores such as hares, aardvark and squirrels were deduced. The proposed transmission line traverses in private lands that have over the years been fragmented. Typically, large wild game prefers large unfragmented ecosystems devoid of human activities for habitation. However, small wild game can survive in small and fragmented ecosystems. From AP1 to AP12 along the transmission line, the landholding is generally small, population is high and generally most of the land has been converted for food crop growing leaving patchy areas under natural ecosystems. The number of small wild game is relatively low in this zone due to lack of habitation areas and extensive human activities. Key small game in this zone include squirrels, rabbits, dikdiks, and moles amongst others. As you cross Athi river and enter the Yatta plateau, the number of small wild-game increases. The increment is partially attributed to the relatively large landholding in the zone and existence of relatively large natural ecosystem. The plateau stretches from AP15 to the neighbourhood of AP18. The Yatta plateau used to be a home of both large and small game especially when it was a typical savannah grassland however most game moved to Mwea National park in 1970s and 1980s as people settled in the Yatta plateau and land started being fragmented. Eastern black-and-white colobus Monkey (*Colubus guezeras*) were noted to be a major nuisance to local farmers. The riverine habitats of Thika River including Athi River provide safe habitats to the baboons and other monkey species. In farmlands along the proposed transmission line alignment, traps for small wild game such as squirrels were observed.

Envisaged ecological impacts to the small herbivores and their habitats during clearing of the RoW for construction and fixing of pylons include: -

- Destruction of habitats during RoW clearing
- Destruction of feeding areas
- General effects on activities and behaviour of the animals.

This impact will however be moderate hence a value of 2.

6.3.2.17 Destruction of habitats for herpetofauna (reptiles and amphibians)

Incidences of reptiles and amphibians were reported in observation points along the transmission line. Population indices such as droppings, shed skins, nests amongst others were also noted. Common herpetofauna along the transmission line include tortoises, frogs, tadpoles, snakes, lizards, geckos amongst others. For instance, near AP12 at GPS pickings of 0326042, 9854819 and elevation of 1247m a.s.l, a frog was observed. A tortoise was also observed along the proposed transmission line alignment. Habitats for such reptiles are likely to be affected by construction works. Indicators of snake presence such as shed skin were also observed in some sections of the transmission line alignment. The construction activities would potentially affect movement of the species which are common along the proposed transmission line. Most of the species hide in holes, under stones and rock crevices. Disturbance during construction by excavation and movement of cranes might destroy habitats of the species. The speed at which vehicles move along access roads throughout the transmission line will determine occasions of road-kill accidents. Normally the reptiles crawl and they are prone to road kills by vehicles. Species normally affected are snakes, lizards and geckos. This impact will however be moderate hence a value of 2.

6.3.2.18 Occupational safety and health

The Occupational Safety and Health (OSH) issues associated with the construction of the proposed transmission line 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. OSH issues include:

i. Live Power Lines

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

ii. Working at height

Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities.

iii. Electric and magnetic fields (EMF)

Electric utility workers typically have a higher exposure to EMF than the general 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.

iv. 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.

v. 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**.

6.3.2.19 Community health and safety impacts

Community health and safety issues will emerge during construction of the transmission line. Communities close to the wayleave access roads such as those in nearby towns including Kwa Mwau, Makaveti Trading Centre; Kaani; Masii; Mwala town; Mumbuni; Kambi Mawe in Machakos County and Mukundi town in Murang'a County are likely to get impacts as dust, noise, and vibration from construction vehicle movements. Communicable diseases associated with the influx of temporary construction labour work force are also likely to emerge as workers might prefer to reside in the nearby towns. 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.

6.3.2.20 Community access roads traffic incidents / traffic safety risks

Additionally, traffic safety of community and mainly children crossing the roads was raised as a concern by the community. Human accidents are likely to rise in towns centres and market centres (such as Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Mukundi and Kambi Mawe) due to increased traffic by construction vehicles and motorcyclists offering transport services to the influx of workers. Mitigation measures will however be put in place to prevent further direct, indirect adverse effects of the project. The impact scale is moderate hence a value of **2**.

6.3.2.21 Visual Impacts

Power transmission lines and associated accessories are necessary to transport energy from power facilities to residential communities but may be visually intrusive to residents. Changes in landscape views mainly around Murang'a County AP 19 to AP 20 which has existing high transmission lines will negatively impact on visual amenity. Visual intrusion because of the

transmission line and towers was however not a major issue of concern based on the public consultations held with communities in the project areas. Mitigation measures will be documented to mitigate visual impacts hence this impact will be moderate thus a value of 2.

6.3.2.22 Aircraft Navigation Safety

Power transmission lines, if located near an airport or flight paths can impact air safety directly through collision or indirectly through radar interference. Engagement with the Kenya Civil Aviation Authority (KCAA) should be a continuous process throughout the project to ensure installation of the towers / pylons is in line with international and national safety regulations. This impact could be high, hence value of 3 if not well mitigated.

6.4 Environmental impacts during operational phase

6.4.1 Positive environmental impacts

The following are the potential environmental impacts for the proposed transmission line during the operation phase:

6.4.1.1 Reduction in Greenhouse Gas emission

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 Machakos and Murang'a County. The project will further reduce dependence on fuelwood by providing an alternative lighting and cooking source of energy to the residents of both Machakos and Murang'a Counties who are not connected to the National Grid. The reduced reliance on fuelwood would in turn result to more sustainable forests due to reduced logging for wood hence more carbon sink.

The Machakos Mwala Ekalakala transmission line is intended to tap into power generated through clean energy: mainly hydro power. Hydro power is considered green energy because its generation does not involve emission of green-house gases. Improved access to adequate and affordable energy for households in surrounding towns and industrial sectors will help in rolling back the rate of deforestation and thus help in conserving forest resources, biodiversity, soil conservation and water resources. In addition, access to affordable energy can improve efficiency in transportation, industrial production, and farming methods with the potential of reducing global, regional, and local pollutants emissions such as carbon monoxide, carbon dioxide, particulate matter, oxides of nitrogen and sulphur oxides to the atmosphere. This will be a positive stride towards reduction of and management of greenhouse gases emission resulting to climate change mitigation.

6.4.1.2 Reduction of overreliance on fuelwood

The socio-economic survey shows that the dominant energy source in the county is fuelwood at 62.4%. The project will provide alternative energy source to the County and Country at large and thus reduce reliance on fuelwood thereby contributing towards among others, the national goal of meeting the minimum forest cover. According to the World Health Organization, it is estimated that rural women spend an average of three hours a day collecting wood, resulting in widespread deforestation. Wood fuel harvested in most cases tends to be unsustainable, contributing to local forest degradation, greenhouse gas emissions and global warming.

The project is anticipated to ensure transmission of power and enhance distribution of energy at household levels. Provided electricity from the grid is cheaper than other forms of energy. This is anticipated to provide an alternative energy source for the country and reduce over reliance on charcoal production. This will also reduce deforestation activities associated with fuelwood and lighting.

6.4.2 Negative environmental impacts

6.4.2.1 Risk of noise 'buzzing' pollution

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 lines is greater with high voltage power lines and reaches its maximum during periods of precipitation, including rain, as the result of fog. Notably, 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.

Worth noting, the acoustic noise produced by transmission lines is greater with high voltage power lines (400-800 kilo volts [Kv]) and even greater with ultra-high voltage lines (1000 Kv and higher). However, the proposed transmission line has a voltage of 132kV with a 30 meters wayleave hence the acoustic noise is expected to negligible. 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 immediate residents. However, the buzzing noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the allocated wayleave of 30 metres - 15 metres on both sides from centre line. The buzzing noise pollution is expected to be very minimal hence a value of **1**.

6.4.2.2 Avian (Birds) Collisions and Electrocutions

The proposed transmission line may impact migratory birds mainly vultures in the area. The key birdlife fly paths identified along the proposed line are within AP1 -AP4; Kimutwa Location and Nzasu sub-location; and Mamba village within Ndalani Location. The proposed line is also in proximity to Important Bird Areas (IBA) such as Machakos Valleys, Masinga Dam AP 1 -AP4 and Protected areas (AP 16 – AP 19) (Mwea National Reserve and Ol Donyo Sabuk National Park). The boundaries of the Machakos Valleys IBA are presently undefined, but includes sections of the Ikiwe, Kimutwa, Love, Makilu, Mwania, Potha, Syuuni, Wamua and Wamui rivers. Tracking data by Nature Kenya *(Ref; Chapter 3)* shows vulture movement through Machakos and Masinga Dam Important Bird Areas (IBA).

Notably, impacts of electricity transmission lines on birds cannot be overstated with the main danger being death, injury through fatal electrocution and collisions. Nature Kenya (2019) notes impacts on endangered species can be profound where the loss of even one individual species may impact a local population or overall population viability. Key impacts anticipated on birdlife include;

- *Risk of electrocution* – electrocutions occur at poles when a bird completes a circuit by touching two energized parts or an energized and grounded part. 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:
  i). simultaneously touching an energized wire and a neutral wire;
  ii). Simultaneously touching two live wires and;
  iii). Simultaneously touching an energized wire and any other piece of equipment on a tower that is bonded to earth through a ground wire (IFC, 2007).

  Avian collisions with power lines can occur in large numbers if located within daily flyways or migration corridors, or if groups are travelling at night or during low light conditions.

- *Risk of collision and injury* – Power line collisions occur when birds fly into wires/cables. The proposed transmission line passes in areas with water bodies, valleys, permanent / seasonal rivers and several artificial sand dams that are known to attract birdlife; therefore, the line might have significant impacts on these migratory fauna *(ref. Chapter 3)*. Birds are

vulnerable to collisions with a range of fixed structures, such towers, and transmission lines, amongst others (Erickson et al. 2001, Manville 2005).

6.4.2.3 Mammals (including Bats) Collisions and Electrocutions

The proposed transmission line may impact mammals such as bats in the area with the main danger being death, injury through fatal electrocution and collisions. Key impacts anticipated on mammals include; Risk of electrocution – electrocutions occur at poles when a bat completes a circuit by touching two energized parts or an energized and grounded part. The combination of the height of the transmission towers and transmission wires can pose potentially fatal risks bats through collision and electrocutions. Bats may be electrocuted by power lines through simultaneously touching an energized wire and a neutral wire; touching two live wires and; touching an energized wire and any other piece of equipment on a tower that is bonded to earth through a ground wire (IFC, 2007). Primates such as monkeys may also fall victim to electrocution by the proposed high voltage transmission line. Further bats may be exposed to Risk of collision and injury – Power line collisions occur when bats fly into wires/cables. However, mitigation measures have been recommended for this impact.

6.4.2.4 Risk of Fires

Regular maintenance of vegetation within the rights-of-way (RoW) is necessary to avoid disruption to overhead power lines and towers. Unchecked growth of tall trees and accumulation of vegetation within rights-of-way may result in a number of impacts, including power outages through contact of branches and trees with transmission lines and towers; ignition of bush fires; corrosion of steel equipment; blocking of equipment access; and interference with critical grounding 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. During operations, high voltage power may also cause a fire risk in the event of electrical faults with equipment. This impact will be mitigated and therefore is expected to be moderate hence a value of **2**.

6.4.2.5 Disruption and alteration of habitat during RoW maintenance

Regular maintenance of vegetation within the right-of-way must be carried out to avoid disruption to overhead power lines and towers. Regular maintenance may involve the use of mechanical methods (mowing machines) that may disrupt wildlife and their habitats. Excessive vegetation maintenance may also remove unnecessary amounts of vegetation resulting in the continual replacement of succession species and an increased likelihood of the establishment of invasive species. This impact will be high and has a value of **3**.

6.4.2.6 Cumulative Impacts

Cumulative impacts are likely to emerge attributed to interference with migratory routes or wildlife movement which could result to human wildlife conflict. Clearing of vegetation and trees along the RoW 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 wayleave. These impacts on resources such as habitat alteration within the region might arise due to the needs for the periodic clearing of the RoW as part of the maintenance works. The ESMF for KESIP also notes that the potential cumulative impact associated with project including the proposed Machakos Mwala Ekalakala transmission line and substation extensions is the potential loss of biodiversity through a decrease in vegetation and faunal habitat likely to be exacerbated by periodic clearing of the right of way. 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 along the RoW as part of the

maintenance works may result in a decrease in biodiversity and suitable habitat for fauna. During the operational phase, the proposed transmission line and associated substations are likely to exacerbate the loss of biodiversity through enabling the further construction of the ring feed powerlines to provide additional supply of electricity to the area which may facilitate further development initiatives. However, mitigation measures have been recommended hence this impact will be moderate – a value of **2**.

6.4.2.7 Occupational safety and health

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 height; 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 elevation during repairs and maintenance of the towers. Electric utility workers typically have a higher exposure to EMF than the general public due to working in proximity to electric power lines.

Occupational safety and health issues include:

(a) Live Power Lines

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

(b) Working at height on poles and structures

Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities.

(c) Electric and magnetic fields

Electric utility workers typically have a higher exposure to EMF than the general 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 as a result of EMF (McCann, 1993)

(d) 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.

(e) 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**.

6.4.2.8 Community Health and Safety

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

(a) Electrocution

Hazards most directly related to power transmission and distribution lines and facilities occur as a result 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.

(b) 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.

(c) 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 local residents.

(d) Noise and Ozone

Noise in the form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona. Ozone, a colourless gas with a pungent odour, may also be produced. 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 (400-800 kilo volts [Kv]) and even greater with ultra-high voltage lines (1000 Kv and higher) . However, the proposed Machakos Mwala Ekalakala transmission line has a voltage of 132kV with a 30 meters way leave hence the acoustic noise is expected to negligible. 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 of 30 metres - 10 metres on both sides from centre line -the buzzing noise is expected to be very minimal.

6.5 Environmental impacts during decommissioning phase

Due to the national and international significance of this project, the likelihood of decommissioning is minimal, therefore impacts discussed below are almost unlikely.

6.5.1 Positive Environmental Impacts

6.5.1.1 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.

6.5.1.2 Reduced negative environmental impacts of operation

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

6.5.2 Negative environmental impacts

6.5.2.1 Excessive noise and vibration

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

6.5.2.2 Air Pollution due to dust emission

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

6.5.2.3 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.

6.5.2.4 Occupational safety and health

The occupational health and safety hazards may include working at height; electric and magnetic fields (EMF) and exposure to chemicals. Maintenance workers may be exposed to occupational hazards from contact or risk of falling objects.

6.6 Risks and impacts as a result of climate change

The proposed transmission line and substation 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 (Daniel, 2018). Additionally, higher temperatures can result in reduced capacity for power lines to safely carry electricity. Daniel (2018), notes that rising temperatures may impact the transmission power lines 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.

6.7 Characteristics of the Environmental Impacts

The characteristics of environmental impacts vary depending on several typical parameters in addition to the ones discussed in chapters 6.1 to 6.5. These additional parameters were also considered in impact prediction and decision-making during the ESIA study and they include:

- Likelihood (probability, uncertainty);
- Significance (local, regional, global);
- Extent/location (area, distribution);
- Duration (short term, long term, intermittent, continuous) and;

- Reversibility (Reversible, irreversible).

Table 6-2: Environmental Impacts Characteristic Summary

Impacts Characteristic		Likelihood		Significance			Extent/ Location		Duration				Reversibility	
		Probability	Uncertainty	Local	Regional	Global	Area	Distribution	Short term	Long term	Intermittent	Continuous	Reversible	Irreversible
Type of Impacts	**Construction Phase**													
	Noise pollution and excessive vibrations	H		√			Along proposed project area		√					√
	Air pollution due to dust and exhaust emissions	H		√			Along proposed project area		√					√
	Increased generation of solid waste	H		√			Along proposed project area		√				√	
	Increased energy consumption	H		√			Along key towns along proposed line		√					√
	Increased discharge of wastewater, sewage and degradation of water quality	L		√			Along proposed project area		√				√	
	Increased water abstraction and consumption	M		√			Along proposed project area		√				√	
	Modification of hydrology	L			√		Along proposed project area		√				√	
	Aquatic Habitat Alteration	H		√			Near water bodies such as Rivers, streams and dams		√					√

Impacts Characteristic		Likelihood		Significance			Extent/ Location		Duration				Reversibility	
		Probability	Uncertainty	Local	Regional	Global	Area	Distribution	Short term	Long term	Intermittent	Continuous	Reversible	Irreversible
Type of Impacts	Increased generation of storm water and impact on drainage	L		√			Along proposed project area		√				√	
	Increased soil erosion risk and soil quality degradation	M		√			Along proposed project area		√				√	
	Loss of vegetation cover and biodiversity	H				√	Along proposed project area			√				√
	Terrestrial Habitat Alteration	H		√		√	Along proposed project area			√				√
	Pollution from Hazardous materials	M		√			Along proposed project area			√			√	
	Introduction of Alien Invasive Plant Species	M		√			Along proposed project area		√				√	
	Temporary obstruction of movement of wild herbivores	L		√			Along proposed project area		√				√	
	Destruction of habitats for herpetofauna (reptiles and amphibians)	M		√			Along proposed project area		√				√	
Type of Impacts	**Operation Phase**													
	Noise and Ozone pollution	L		√			Along proposed project area					√		√

Impacts Characteristic		Likelihood		Significance			Extent/ Location		Duration				Reversibility	
		Probability	Uncertainty	Local	Regional	Global	Area	Distribution	Short term	Long term	Intermittent	Continuous	Reversible	Irreversible
	Impact on migratory fauna	M			√		Between AP 1 to Ap 6; and between AP17 and AP18					√	√	
	Risk of Fires	L		√			Along proposed project area			√				√
	Fauna Collisions and Electrocutions	H		√			Between AP 1 to Ap 6; and between AP17 and AP18				√			√
	Disruption and alteration of habitat during RoW maintenance	L		√			Along proposed project area				√		√	
	Decommissioning Phase													
	Excessive noise and vibration	H		√			Along proposed project area		√					√
	Air Pollution due to dust emission	H					Along proposed project area		√					√
	Increased solid waste generation	H		√			Along proposed project area		√				√	

Source – AWEMAC

7 CHAPTER SEVEN: SOCIAL IMPACTS IDENTIFICATION AND ANALYSIS

7.1 Introduction

The study has categorized and discussed social impacts into detail as; community impacts, cultural impacts, health impacts, lifestyle impacts, and quality of life impacts. The study identified approximately 651 structures and a total of 591 land parcels that will be affected by the ROW of the proposed transmission line and associated facilities. The line will cause displacement throughout the ROW with significant displacements in the outskirts of various towns (Kwa Mwau Market in Kimutwa Location; Makaveti Trading Centre in Kimutwa Location; Kaani Market Centre in Iveti Location; Masii market in Masii location; Mwala town in Mwala Location; Mumbuni in Mbiuni Location; Sofia Market in Kithimani Location; Mukundi Market in Kakuzi Location, Murang'a County; and Kambi Mawe Market in Mavoloni Location) which underpinned the need for resettlement action plan (RAP). Further, some physical cultural assets such as a graveyard and a few public facilities were observed. This chapter discusses the both the positive and negative social impacts which were studied into detail during the full study.

7.2 Potential social impacts during construction phase

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

7.2.1 Positive social impacts

7.2.1.1 Creation of employment opportunities

The construction phase of the power transmission will offer temporary job opportunities for both semi-skilled and unskilled locals both men and women above 18 years of age in Machakos County and Murang'a County. 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. The disabled and elderly in specific, were optimistic that they will use income generated from the jobs to train and empower themselves so that they become less reliant on others. During stakeholders' consultative meetings, the disabled and elderly were optimistic that they will use income generated from casual jobs to train and empower themselves so that they are less reliant on others. These jobs are expected to improve the economy of the area and improve the livelihoods of the local people residing around the RoW. As per the community members' recommendations, recruitment of workers for the transmission line should be done through the Location offices and Sub-locations Chiefs for purposes of fairness and equity. This impact will be very high hence given a value of **4**.

7.2.1.2 Gains in the local and national economy

The provision of employment to the locals both men and women above 18 years of age, income from the salaries and wages will improve not only the County but the local economy of the trading centres where the RoW passes. Some of the trade centre's include Kwa Mwau Market in Kimutwa Location; Makaveti Trading Centre in Kimutwa Location; Kaani Market Centre in Iveti Location; Masii market in Masii location; Mwala town in Mwala Location; Mumbuni in Mbiuni Location; Sofia Market in Kithimani Location; Mukundi Market in Kakuzi Location, Murang'a County; and Kambi Mawe Market in Mavoloni Location. 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 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**.

7.2.1.3 Transfer of skills

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

7.2.1.4 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 area. This will result into economic benefits to the local hardware shops. Amongst key centres likely to benefit include Kwa Mwau, Makaveti Trading Centre; Kaani; Masii; Mwala town; Mumbuni; Mukundi Market Murang'a County; and Kambi Mawe Market. 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. This impact will be moderate hence a value of **2**.

7.2.1.5 Improvement of local trade and business opportunities

The transmission line will lead to the growth of local trade. In the construction phase, building materials for construction will be purchased both locally and regionally. The surveyed respondents and participants were optimistic that business opportunities will increase during construction and operation of the proposed transmission line and associated facilities. Small scale businesspeople such as food vendors and kiosk owners will benefit greatly during construction stage due to the expected construction workers' influx. The customer base for existing businesses will rise due to an influx of people and activities in the area as a result of the proposed development. Local suppliers of construction materials are likely to benefit from contracts during construction. This impact will be moderate hence value of **2**.

7.2.1.6 Improved security

Security officers during the key stakeholders noted insecurity incidences in the project area mainly targeting power infrastructure such as transformers. Based on this, the proposed power transmission project is anticipated to improve security through deployment of police and private security services along the project RoW and mainly within substation areas such as proposed Mwala substation. This impact will be moderate hence value of **2.**

7.2.1.7 Training and Capacity Building

It is anticipated that the proposed project will lead to training and capacity building of the locals, the employees, project contractors and even KETRACO staff seconded to the project. The locals will benefit from on job trainings including livelihood restoration trainings such as entrepreneurial training for existing small businesses. Additionally, locals will be made aware of the impacts of HIV/AIDs, GBV-SEA/SH etc., and their management protocols; project plans (SEP, GRM etc), among others.

Employees are likely to benefit from health and safety related trainings such as health and safety awareness (use of the available information (such as MSDSs), safe work practices including fall protection program that includes training in climbing techniques and use of fall protection measures and appropriate use of PPE, fire safety trainings, first aid, emergency evacuation, and trainings regarding code of conduct for the workforce, HIV/AIDs and GBV -SEA/SH. Project contractors will attain capacity building to implement both the ESMP and ESMnP. It is anticipated that KETRACO staff seconded to the project will also gain capacity building from on job training skills. Other general training and capacity building will entail creation of awareness through sensitization on COVID-19 prevention strategies such as hand washing, physical distancing, use of masks, adherence to restrictions as per GoK directive. This impact will be high hence a value of 3.

7.2.2 Negative Social Impacts

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

7.2.2.1 Displacement of households and businesses

The field survey noted that there are households, small-scale businesses and temporary structures within the proposed RoW. Households were observed to cut across the ROW but concentrated mainly around trading centres such as Kwa Mwau, Makaveti Trading Centre; Kaani; Masii; Mwala town; Mumbuni; Mukundi Market in Murang'a County; and Kambi Mawe Market. It was noted

that the total number of structures in the 30 metres ROW / corridor is estimated at 651. Some of the temporary structures along the transmission line include dwelling, gates, fences, perimeter walls, water tanks, shallow wells, which mostly utilised by PAPs for various domestic and commercial purposes such as MPESA outlets, food kiosks. Notably, the impact of the proposed transmission line on households will vary as some households will no longer be able to utilize the parcel area in the wayleave for certain farming activities such as growing trees and fruits that grow over 12ft height (3.65m) tall. Some households will only be affected temporary during construction, and afterward they will be able to continue utilizing the portion of land in the area as before, e.g. for crop farming and animal grazing. For households where transmission line towers will be constructed on their land, the affected portion of land will remain unutilized for the entire period of existence of the transmission line. Approximately five (5) small scale business operators will have their businesses permanently displaced. The displacement of households and businesses will occur along the RoW to pave way for construction of the proposed transmission line. Although, it is anticipated that a resettlement action plan (RAP) with compensation will be prepared and implemented, this impact will be high hence a value of **4.**

7.2.2.2 Land (wayleave, contractor facilities sites, workers camp sites, and sub-station sites) acquisition and resettlement

The main negative impacts of the proposed project will arise from the need to put land along the ROW under easement and acquire land for the substation and other associated infrastructure like access roads for use during construction and maintenance. It is estimated that approximately 232.504 Ha or 637.293 Acres will be required for the way leave. An estimated total of 591 land parcels will be affected with Kimutwa, Kithimani and Masii Locations having the majority. Only about 1% (4) of the landowners will have their land parcels fully affected / permanent displacement. The impacts of land acquisition will vary from one affected person or entity to another but may include (in part or full land acquisition):

- The permanent loss of the market value of acquired land and assets;
- The permanent loss of the productive potential of the acquired land and resources and, therefore, the loss of future food supplies or business income (including farming income);
- The permanent loss of recreational, community and other use of acquired land;
- The permanent loss of residential accommodation and business (including farming) premises and structures acquired by the project;
- The temporary loss of land and assets during the construction phase of the project (e.g. damage to property outside the way leaves); and
- The possible loss of social cohesiveness and social networks when affected people or entities are required to move away from the project area.
- The limited use of acquired land along the RoW.

The most extreme impacts will be felt by the 1% of landowners who will have to relinquish all or most of their land and other property and move to other locations which may be some distance away from the affected project area.

Less extreme impacts will be felt by people who the transmission RoW will displace smaller portions of their land, have limited loss of use of land and assets and who will not need to physically relocate. Losses will not only be limited to property owners with legally recognized property rights, but some impacts could possibly be felt by people without ownership rights, such as tenants and informal or itinerant land users.

Although not directly related to the acquisition of land for project purposes it is possible that construction teams may adversely impact on (e.g. damage) land or property located outside the wayleave. This may happen in sections that might require excavations and blasting while erecting the pylons.

The impact on land (wayleave) acquisition and resettlement will require proper mitigation measures to be put in place to prevent further direct, indirect or cumulative adverse effects. This impact has been ranked as high with a value of **3**.

7.2.2.3 Loss of Agricultural land produce, restrictions to access to pasture and Impact on apiculture

The impact of the project on agricultural land produce will vary as some households will be restricted from utilizing the land parcel area in the wayleave for certain farming activities such as growing trees and fruits that grow over (12ft) 3.65 m tall. Some households will only be temporary affected during construction with restriction on activities such as access to pasture / grazing and crop farming; and afterward they will be able to continue utilizing the portion of land in the area as before, e.g. for crop farming and animal grazing. As noted earlier, the proposed project will require a corridor of 30m width. Within the 30m corridor, no structures or (12ft) 3.65m tall trees are allowed. All other forms of land use including grazing and farming will be allowed.

Apart from loss of agricultural land, the residents sited loss of crop farming such as maize farms and fruit crops which serves as a major source of revenue and food. It was pointed out that crops might be affected during laying of the power lines mainly in Kimutwa, Masii, Mwala and Kithimani locations which had high acreage of land being acquired. Residents also highlighted that some of the indigenous trees likely to be affected are sources of fruits, traditional medicine and construction materials. Some of the type of trees that will be affected include mango trees, pawpaw trees Muuku, Mutithi, Mulaa, Kisewa, Kilulwe Kihuku, Msanduku, Mubingu, Ndau, Muthega, muthika, Mgegeta, Mubisya, Msemei, Mukena, Moringa and Neem trees.

Field survey highlighted existence of beehives along the proposed transmission line areas mainly within Mwala sub-county in Kitie and Ikalaasa villages. The beehives are a source of livelihood to the households hence where possible, it will be important to avoid any interference of the beehives if outside the RoW. Studies on bees expounded in section 3.4.9.3 found that transient exposure to EMF reduces a bee's ability to learn, reduces their memory retention, and affects flight and foraging behaviour all of which could potentially reduce their ability to pollinate. This impact will be moderate hence a value of 2.

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

The residents along the proposed project corridor expressed concern that there is likely increase in incidences of health impacts such as sexually transmitted diseases including HIV and AIDS especially during construction of the transmission line due to possible illicit behaviours such as sexual exploitation and prostitution. This impact is mostly anticipated in trade centre's / markets such as Kwa Mwau Market in Kimutwa Location, Makaveti Trading Centre in Kimutwa Location, Kaani Market Centre in Iveti Location, Masii market in Masii location, Mwala in Mwala Location, Mumbuni Market in Mbiuni Location, Sofia Market in Kithimani Location, Mukundi Market in Kakuzi Location (Murang'a County), and Kambi Mawe Market in Mavoloni Location along the RoW. As such, residents claimed the ramifications might result in increased cases of unprotected sex, teenage pregnancies, early marriages, which are key STIs and HIV/AIDS risk factors. Locals observed that pollution from pylons excavations might generate dust that can cause respiratory problems, particularly for persons and households living near the RoW. The stakeholders perceived that the impact would be more hostile on vulnerable persons. 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**.

7.2.2.5 Interference of existing development infrastructure

The field survey noted that the proposed project would temporary interfere with other development infrastructures including public facilities already existing along the proposed RoW. Some of the anticipated public facilities include Mikuyuni Primary School whose playing ground and school gate are affected. In addition is a slaughterhouse, and Akamba Peace Museum in Kyanzasu Although the Museum is privately owned, it is said to benefit the community. Some schools such as Kamweleni Primary and Secondary School, Kyanganga Primary, and Secondary Schools are merely less than 1km away from the project corridor. In this regard, the project contractors should put mechanisms in place that would minimize potential impacts where

possible. The interference of existing development infrastructure will be moderate hence a value of **2**.

7.2.2.6 Insecurity

There were concerns that due to an influx of people estimated at 500 workers inclusive of contractor staff who are expected through the construction cycle, insecurity is likely to increase especially in market trade centres such as Kwa Mwau Market in Kimutwa Location, Makaveti Trading Centre in Kimutwa Location, Kaani Market Centre in Iveti Location, Masii market in Masii location, Mwala in Mwala Location, Mumbuni Market in Mbiuni Location, Sofia Market in Kithimani Location, Mukundi Market in Kakuzi Location (Murang'a County), and Kambi Mawe Market in Mavoloni Location. There might be increased risk of vandalism of electrical facilities and construction equipment along the right of way. This impact will however be low hence a value of **1**.

7.2.2.7 Gender and equality biases

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. The residents and specific Persons living with disabilities (PWLDs) expressed concerns that they might be disowned by their caregivers or denied the chance to benefit from the compensation under a pretext of their community status and physical appearance. The disabled alleged that most members of their community perceive them as a cursed generation. Further, this group was pessimistic that their caregiver might abandon them to take over jobs at construction sites, which might deprive the PLWDs rights to domestic, physical, and social support. The proponent 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 living with disabilities (PLWDs), the elderly and minority and marginalized groups and communities. 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**.

7.2.2.8 Cultural impacts

The proposed transmission line might lead to permanent erosion of shared customs, obligations and values due to displacement, relocations and influx of temporary construction workers especially in culturally rich areas such as Kyanganga Village where shrines were observed and Kyanzasu in Kimutwa location where Akamba Museum exists. Although the shrines and Akamba Museum are not directly affected except for a few trees within the Museum; it is expected the residents in the villages will interact with workers leading to indirect impacts on their cultural values. Participants also claimed that the project would take away their family owned land and cause displacement on places they have settled and known for ages as well. This impact will be moderate thus a value of 2.

7.2.2.9 Quality of life impacts

This will likely result from loss of sense of place, aesthetics and heritage, perception of belonging, security and liveability, and aspirations for the future, especially to permanently displaced and resettled households along the RoW. This impact will be moderate thus a value of 2.

7.2.2.10 Loss of social fabrics

The proposed project would cause breakdown of social ties /fabrics which holds a society together hence weaken family and community ties. Possible permanent land parcels displacement of people from their land will break bonds which locals share forming culturally rich and socially cohesive community. The residents noted such displacements would also take away and interfere with the existing settlements and land of origin. The locals noted that social networks, family structure as well as community ties would be weakened.

However, according to the Draft RAP report for Machakos Mwala Ekalakala only about 1% (4) of the landowners along the RoW will have their land parcels fully affected / totally displaced. Full impact entails land parcels affected more than 70% of the total parcel area. The study further identified that the location of the Transmission line traverses almost 99.9% in rural setting, which is a major advantage in terms of resettlement and land availability. This largely means that although communities have settled along the route, the prospects including adequacy of the land, quality of land and accessibility of resettlement land (where compensation is provided) in the vicinity (cost allowing) will not be a major challenge. This impact will therefore be low hence impact rating value of 1.

7.2.2.11 Illicit behaviour / drug and alcohol abuse

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, 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 behaviors might jeopardise marriages and family wellbeing, and harmonious existence.

7.2.2.12 Domestic Conflicts exacerbated by project

During stakeholders' consultations women generally expressed pessimism that the proposed project resettlement process was likely to degenerate into hostility among relatives and community members. The women claimed spouses might escape with their compensation money while some widows indicated that their relatives, in-laws would be hostile to them overcompensations. This situation would deprive the victims of properties owned and compensation, which might also subject them to abject poverty. The elderly claimed that the project would intensify hostility and jealousness, especially between members that will receive compensation and those that will not. Some claimed the situation would derail harmony with a section of respondents expressing fear of being witched, leading to unexplained illnesses and deaths. The disabled claimed their spouses, assistants, or caregivers might disappear with compensation money, exposing them in perpetual agony. Widows also expressed concerns that the construction phase might not only lead to domestic conflicts but also evictions, which might deprive them of property ownership. They cited that the project might worsen the situation bearing in mind some of them own land which titles are in the hands of their deviant in-laws. Whereas the elderly and the disabled were pessimistic that resettlement activities would result in physical harassment that is orchestrated by young men/sons who might label them as sorcerers to kill or excommunicate them to get their property/land.

7.2.2.13Sexual Exploitation and Abuse (SEA) and Workplace Sexual Harassment (SH) and other forms of Gender-Based Violence (GBV)

The residents and mainly female participants were worried that the construction phase would result to influx of workers from other regions hence increase occurrences of gender-based violence (GBV) such as sexual harassment (SH) and sexual exploitation and abuse (SEA). The large influx of workers may lead to an increase in sexual exploitation and abuse and the demand for prostitution (sex work) —even increase the risk for trafficking of women for the purposes of sex work—or the risk of forced early marriage in the community where marriage to employed men may be seen as the best livelihood strategy for adolescent girls. The men highlighted that labor influx might result to perceived foreigners interacting and engaging in extra-marital affairs with their women. Such could result to domestic violence and sexual exploitation and abuse between project staff and those living in and along the RoW of the project, but also within the homes of those affected by the project i.e. GBV at family and community level. Other forms of GBV mentioned by men and women included inflicting bodily harm, physical assault, verbal abuse and rape. A key informant noted that the most fundamental cause of GBV is the traditional belief in the area about men's dominance over women.

Furthermore, locals noted that perceived project benefits such as higher income for spouses in the community could lead to an increase in 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. For instance, the women noted that child neglect, irresponsible spouses, marriage breaks, and gender-based violence might arise due to perceived 'greener pastures' of spouses from the project. The situation, if not mitigated, would mostly hurt the children and women. The widows stated that land titles are mostly held in the names of their late spouses and hence feared that men might chase them away from marriage or escape with the compensation money while some widows indicated that their relatives, in-laws would be hostile to them over land compensations. Such scenarios are likely to escalate to gender-based violence with women and girls being most at risk. The locals and mainly women expressed concerns over possible risks of sexual exploitation and abuse through request of sexual favors while seeking for employment from the project. There was also highlight of possible risk of sexual exploitation and abuse through unwanted sexual advances to women and men mainly by project workers, contractors, and service providers.

Interviews with key informants also noted the possibility of sexual harassment (SH) between workers / staff working on the project. The key informant stated that unwelcome sexual advances, requests for sexual favours, and other unwanted verbal or physical conduct of a sexual nature might arise at the project workplaces. The informant noted that the potential perpetrators of SH can be any individuals associated with the proposed project including construction workers and other personnel of the contractor, consultants supervising the project or undertaking technical assistance activities relating to the project or even the security personnel hired for the project.

Dimensions of GBV and COVID-19 Pandemic: A policy brief by CARE (2020), noted that during times of crisis such as the current COVID-19 pandemic, women and girls face an increased risk of exposure to gender-based violence (GBV). In light of the COVID-19 physical distancing and movement restrictions that have been put in place across the world to curb the pandemic, women and girls face an increased risk of experiencing violence at the hands of family members, intimate partners or others living within their homes. CARE (2020) notes that in all emergency-affected settings, the majority of cases of GBV are perpetrated by known individuals as opposed to strangers. The risks of experiencing household violence during times of crisis are often exacerbated by factors such as emotional stress, economic strain, and shifting roles and responsibilities among family members. All of these factors are likely to increase within the context of COVID-19, in light of the widespread job loss, economic strain, disruption of normal routines, and ongoing stress associated with actual or potential illness that have resulted in Kenya including Machakos County, Murang'a County and other affected regions across the world. When combined with lockdowns and other movement restrictions, homes within the context of COVID-19 can become potential pressure cookers of GBV, as drivers of violence increase, while survivors and those at risk are more restricted than ever in terms of their ability to seek safety or other necessary forms of support.

In light of the highly contagious nature of COVID-19, GBV survivors are exposed to an increased risk of infection if they experience violence at the hands of individuals who are currently transmitting the disease. In this way, GBV incidents in the context of COVID-19 carry with them an added layer of potential harm in the form of COVID-19-related illness —in addition to the substantial impacts associated with violence itself. In light of the tendency for perpetrators to restrict the freedoms and daily behaviors of survivors, those living in abusive households may also be less likely to have access to necessary hygiene materials, life-saving information, or the ability to take necessary steps to protect themselves from infection. In this way, the circumstances of COVID-19 not only increase the risk of experiencing GBV, but survivors of GBV also face an increased risk of COVID-19 infection—compounding the layers of potential harm experienced by affected women and girls.

In light of the widespread economic uncertainty that has emerged as a result of COVID-19, there is also an increased risk of exposure to sexual exploitation and abuse (SEA), as women, girls and their households are more likely to face shortages of necessary resources such as food. In the Kenyan setting where schools have been closed nationally as a result of the pandemic, girls miss out of the protective elements associated with formal education such as life skills, access to essential information, and connections with existing referral pathways and forms of support. Without the daily routine of education, out-of-school girls are also more likely to experience various forms of violence at the hands of relatives, neighbors, or those within their communities. Girls not in school are also more at risk of resorting to harmful work or falling prey to various forms of exploitation. Families facing limited financial resources are also more likely to place girls in situations of child, early and forced marriage as a possible coping mechanism, an issue itself considered to be a form of GBV, and one that is widely associated with increased rates of violence, restricted access to education, and negative health and developmental outcomes. In light of these circumstances, COVID-19 creates a perfect storm of complications, whereby cases of GBV are likely to rise significantly, while at the same time the ability of survivors to seek help, or the capacity of providers to respond effectively, is more limited than ever. The impact scale of GBV – SEA / SH was considered high hence a value of 3.

7.2.2.14 Livelihood disruptions

The socio-economic baseline study showed that the project is likely to affect activities such as peasant crop farming including small-scale / household irrigation schemes (vegetables, fruits), trees, apiculture (displacement of beehives) and various entrepreneurial activities, with the most prominent being small retail trading. Such include five (5) small retail businesses located in Iveti Location that are affected.

Stakeholders' consultations indicated that the proposed project would destroy locals' livelihoods mainly temporary affecting agriculture during the construction period. In specific, the resident noted that their drip irrigation schemes, pipes, vegetables, and crops mainly mangoes that are in the wayleave would be destroyed. Participants also felt that the project might see their modified landscapes and terracing destroyed, yet they used a lot of resources to construct them. Further, the impact of the project would destroy fruit trees such as grafted lemon, tangerine, and mango, which locals claimed that are of great financial and domestic value.

7.2.2.15Land and property / socio-political disputes exacerbated by the Project

Qualitative sources of information confirmed that most land and property owners in the project area have legal land ownership documents, while a number lack ownership documents. Those without land ownership were attributed to delayed subdivision from inheritance. The key respondent also alleged that land disputes might be common amongst families due to contested land tenure: indications that although they live on the land by history, they do not have formal land ownership documents. This was also echoed during socio-economic survey with locals expressing fear that they do not hold title deeds to their land which might hinder compensation. Land disputes and lack of land ownership documents may pose a challenge of ownership confirmation during RAP implementation which might delay compensation of some of the PAPs. Elderly participants claimed the situation would be too stressful for them to handle, and in some cases, they might experience psychological and health problems such as trauma, stroke, and blood pressure, and mental distress. On the other hand, women alleged that they might be evicted from their lands or deprived of properties they legally own. The property disputes might also escalate into family, community conflicts, and the vulnerable persons will be the most affected. The residents also highlighted possibility of socio-political disputes on certain requirements as political leaders try to portray their influences in the region.

7.2.2.16 Disruption of learning activities

Participants were doubtful that the project might temporary interfere with learning activities, alleging that most pupils might abandon schools to offer labour at project construction sites. The locals noted that female pupils and child-headed families, might be lured to sexual exploitation and abuse under a pretext of earning income.

7.2.2.17Labour influx

Although labour influx of workers (skilled, semi-skilled and unskilled) is likely to result to both negative and positive social benefits, the locals claimed that the temporary influx of non-locals during construction period might expose the project area to illicit behaviours, which might undermine the existing socio-cultural aspects, values, and norms of the locals. The situation would 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 who are already burdened. 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.

Labour influx and exposure to COVID 19

The proposed project may temporary attract migrant workers including skilled, semiskilled and non-skilled from other regions of Kenya. The workers and can be highly exposed to the COVID19 pandemic and its impacts mainly while seeking for accommodation facilities. Notably, migrant workers tend to be younger than the local population, they tend to live and work in crowded conditions that do not permit social distancing, putting them at increased risk of contracting COVID-19. There is also concern that contracted workers are kept safe from being exposed to COVID -19 in the project areas.

7.2.2.18 Community Impacts

Community impacts conceived as being anything linked to the proposed project that might affect or concern the project host community / persons including their cohesion / networks, stability, character, services and facilities. In the context of proposed transmission line, some anticipated impacts likely to affect host community include interference with public facilities such as watering points, water pipelines, existing electricity lines, churches, schools and dilapidation of road infrastructure. Some of the impacts such as interfering with existing power lines and water pipes may be temporary while others such as watering points could be permanent. Impact on such facilities may be viewed as infringement to community rights leading to community tensions, protests and may escalate to resentment including rejection of the project.

7.2.2.19 Community Expectations on CSR

During the stakeholder's engagement and public consultation and participation exercises, the local community highlighted various corporate social responsibility (CSR) proposals detailed in chapter 5 - section 5.7. Some of the expectations varied in sectors such as education, health, water supply, building bridges and rehabilitation of roads. Notably most of the expectations require establishment of infrastructures hence falling short of KETRACO legal mandate. Further constraints brought about by COVID-19 Pandemic may end up exacerbating community expectations on the project including jobs, compensation monies, and high salaries. It is therefore imperative to ensure community expectations are managed throughout the project cycle in order to reduce on level of disappointment and tensions. The impact scale is moderate hence a value of 2.

7.2.2.20 Risks and Impact on Vulnerable populations

The socio-economic survey identified vulnerable persons will be impacted by the proposed project. According to the draft RAP report for the proposed project, vulnerable persons (Widowed, PLWD, Orphans, and Elderly) made up 269 (6.7%) of the total PAPs population. Consultations with vulnerable populations indicated they are faced by various challenges. For instance, PLWDs highlighted discrimination on jobs and feared they might lose their compensation; the elderly cited that the project would cause unnecessary disruptions of their lifestyle, displacement to households and result into hostilities over land compensations. The widows indicated that their relatives, in-laws would be hostile to them over land compensations. They also expressed concerns over possible risks of sexual exploitation and abuse through request of sexual favours while seeking for employment from the project. A key respondent familiar with children matters stated that most orphans in the project area may be exposed to child labour and neglect as caregivers get attracted to employment opportunities in the project.

COVID-19 impacts on vulnerable persons: As the COVID-19 pandemic deepens economic and social stress coupled with restricted movement and social isolation measures, gender-based violence is increasing exponentially. Many women, orphans, widows, the elderly and PLWD are being forced to 'lockdown' at home with their abusers while services to support survivors are being disrupted or made inaccessible.

The pandemic is deepening pre-existing inequalities, exposing vulnerabilities in social, political, and economic systems. Across every sphere, from health to the livelihoods, security to social protection, the impacts of COVID-19 are exacerbated for Vulnerable Individuals and HouseholdsVulnerable individuals and households such as widows, orphans, PLWD and elderly simply by virtue of their vulnerabilities. Compounded economic impacts are felt especially by vulnerable people who are generally earning less, saving less, and holding insecure jobs or living close to poverty. A policy brief by UN (April 2020) on the impact on COVID-19 on women notes that although more men are dying as a result of COVID-19, the health of women generally is adversely impacted through the reallocation of resources and priorities, including sexual and reproductive health services. Further unpaid care work has increased, with children including orphans out-of-school such as in Kenya including the proposed project area, heightened care needs of the elderly persons and PLWD, and overwhelmed health services.

Notably, temporary school closures that have affected Kenya including the proposed project area can have acute negative effects for orphans for whom school can provide a safe space for interaction with peers, psychosocial support, and even a reliable source of food. When schools are closed, the orphan's mental health issues might be exacerbated by the lack of peer support and alternatives for mitigation of risks.

The COVID-19 pandemic is causing untold fear and suffering for older people across the world. Kenya's Centres for Disease Control and Prevention notes that the elderly and people of any age who have serious underlying medical conditions might be at higher risk for severe illness from COVID-19. Across society, COVID-19 presents a range of particular risks for older persons. A policy Brief by UN (2020) on Impact of COVID-19 on the elderly notes that although all age groups are at risk of contracting COVID-19, older persons are at a significantly higher risk of mortality and severe disease following infection, with those over 80 years old dying at five times the average rate. An estimated 66% of people aged 70 and over have at least one underlying condition, placing them at increased risk of severe impact from COVID-19. Older persons may also face age discrimination in decisions on medical care, including development opportunities such as the proposed power project. The pandemic may also lead to a scaling back of critical services unrelated to COVID-19, further increasing risks to the lives of older persons. Older persons who are quarantined or locked down with family members or caregivers may also face higher risks of violence, abuse, and neglect. Furthermore, older persons are also often among the caregivers responding to the pandemic, increasing their risk of exposure to the virus. This is particularly true of older home-based carers, most of them women, who provide care for older persons, especially in contexts such as proposed project area where health system and long-term care provisions are weak. The virus is not just threatening the lives and safety of older persons, it is also threatening

their social networks, access to health services, and livelihood opportunities likely to emerge from developments such as the proposed power transmission project.

COVID-19 is not only a challenge for global health systems, but also a test of our human spirit. Recovery must lead to a more equal world that is more resilient to future crises. It is crucial that the proposed power transmission project place the vulnerable persons - their inclusion, representation, rights, social and economic outcomes, equality, and protection - at their centre to enjoy project benefits and opportunities. To achieve this, the project should ensure that amidst COVID-19, the vulnerable persons should be equally represented in project planning and decision-making. Further there needs to be targeted interventions for vulnerable persons to ensure they benefit from the project opportunities vis-à-vis COVID-19. It will be also important to apply gender lens to the project activities to achieve greater equality, opportunities, and social protection of women.

The project should therefore ensure key measures are established. This should include identifying the individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status to ensure they have access to development benefits and opportunities. Further the compensation process should be managed to ensure the vulnerable especially orphans, PLWD, widows and elderly are clearly identified and receive funds without losing them to care givers.

7.2.2.21Child labour and forced labour

A key respondent in the project area, familiar with children matters stated that most orphans and vulnerable children in the proposed project area are likely to be exposed to child victimisations such as forced child labour as well as child neglect. A key respondent familiar with children matters also stated that most orphans in the project area may be exposed to child labour and neglect as caregivers get attracted to employment opportunities in the project The informant observed that there is need for proper and continuous consultations with the entire community to sensitise on respecting the rights and welfare of children and refrain from violating them. Further, due to perceived temporary increased 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 .

Findings suggest that child labour is apparently more common in rural than in urban settings with commercial agriculture being cited as the greatest consumer of child labour in rural areas while domestic labour demands the use of child labour mainly in urban areas. A key informant in Murang'a noted that in rural areas, poverty drives some families to engage in trafficking children for domestic work in urban centers. Further children in Kenya scavenge dumpsites and streets for scrap material, including metal and glass while often risking injury and exposing themselves to infectious diseases. Although child labour may not be so 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 on child labour and forced labour: COVID-19 pandemic has exacerbated the root causes of child labour and forced labour including poverty, limited access to decent work opportunities for those of legal working age, social marginalization, discrimination, the lack of universal quality education, the prevalence of the informal economy and weak social dialogue (ILO 2020). The COVID-19 pandemic economic and social crisis is expected to hit children particularly hard. With Kenya and the proposed project area being of no exemption in the massive global disruption to education caused by confinement measures and the lack of distance or e-learning solutions could drive child labour numbers up. The closure of schools in Kenya including the project area could lead to households resorting to child labour to cope with job loss and health shocks associated with COVID-19. ILO (2020) notes that Children, and particularly girls in addition to the risk of child labour, might be burdened by increased domestic chores and caring responsibilities. 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.

7.3 Social impacts during operation phase

The following are the potential social impacts for the proposed transmission line during the operation phase:

7.3.1 Positive Social Impacts

7.3.1.1 Creation of employment opportunities

There will be both direct and indirect temporary employment opportunities for men, women and youth above 18 years that will emerge during the operation phase. Vulnerable Individuals and HouseholdsVulnerable individuals and households such as widows, PLWD are also expected to accrue various benefits from the project either directly or indirectly. The disabled and elderly in specific, were optimistic that their caregivers would get employment hence increase income generated from the jobs to support them. 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 transmission line area. Locals, to a greater extent, opined that new jobs such as wayleave officers and vacancies emanating from the new substations would reduce the unemployment rate in the area.

7.3.1.2 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 aim to support mostly grid densification and intensification and some grid expansion to reach about various households. 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. The project will in specific benefit and boost the Big Four Agenda in Kenya on food security, affordable housing, manufacturing and universal healthcare. Construction of more proposed substations such as Mwala would result in a more reliable power supply in the region. Participants claim that the situation will cater to an ever-increasing demand for energy. Also, perceived that the increased energy supply would mean reduced power outages experienced in their households, which will help them save on time, thus increasing the production of goods and services.

7.3.1.3 Increased business opportunities

Participants were pessimistic that upon full operation of the proposed project, power would be easily distributed to their households and local market centres. This would result to income generation avenues and business opportunities could emerge. For instance, the participants cited that refrigeration services, grindings, and querying, irrigation services are stalled because of lower electricity voltage in the region. Therefore, they assert that the project during the operation phase might be the key to distribution of power to revive these economic activities, thus increasing business and job opportunities. Youths claimed that some of the new business ventures would boost not only the informal sector but also introduce new socio-economic activities such as barber shops, salons and welding.

7.3.1.4 Improved standards of living

Participants claimed the project would indirectly trigger physical infrastructural development and increased access to information. They highlighted that building of a substation at Mwala could

result to ease of power distribution in the area. This will make it easy for locals to charge phones, listen to the radio, and watch television. Also, the elderly claimed the improved power will ease the way of doing things, which they term as indicators of improved standards of living.

7.3.1.5 Health benefits of the project

Based on the socio-economic survey, 21% of the respondents both in Machakos and Murang'a use paraffin related lighting (Paraffin Lantern; Paraffin Pressure Lamp and Paraffin Tin Lamp). In addition 62.4% of respondents use firewood as their main source of energy for cooking making it the most popular cooking energy source. 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 liter of kerosene emits PM51 micrograms per hour, above the World Health Organization (WHO) 24-hour mean standard of PM10 of 50 micrograms per cubic meter. But 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 suggest 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.

7.3.1.6 Increased access to information

It is anticipated that that the proposed project would boost power transmission within Machakos County and surrounding Counties. Upon completion, KETRACO would then liaise with Kenya Power through Ministry of Energy to support grid densification, intensification, and grid expansion to reach various households and town centres within the project region. Further, KETRACO will ensure building and operation of a substation at Mwala which will result to ease of power distribution in the area. The project will hence increase access to information as it will make it easy for locals to charge and acquire electronic devices such as phones, radios, and televisions.

7.3.1.7 Training and Capacity Building

It is anticipated that the proposed project will lead to training and capacity building of the locals, the employees, and even KETRACO staff seconded to the project. The locals will benefit from on job trainings including livelihood restoration trainings. Additionally, locals will be made aware of the impacts of HIV/AIDs, GBV-SEA/SH etc., and their management protocols; project plans (SEP, GRM etc), among others.

Employees are likely to benefit from health and safety related trainings such as health and safety awareness (use of the available information (such as MSDSs), safe work practices including fall protection program that includes training in climbing techniques and use of fall protection measures and appropriate use of PPE, fire safety trainings, first aid, emergency evacuation, and trainings regarding code of conduct for the workforce, HIV/AIDs and GBV -SEA/SH. It is anticipated that KETRACO staff seconded to the project will also gain capacity building from on job training skills. Other general training and capacity building will entail creation of awareness through sensitization on COVID-19 prevention strategies such as hand washing, physical distancing, use of masks, adherence to restrictions as per GoK directive.

7.3.2 Negative Social impacts

7.3.2.1 Spread of STD, HIV and AIDS

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**.

7.3.2.2 Theft and Vandalism

There were concerns that due to the installation of transformers mainly in the proposed sub-station. There may be increased risk of vandalism of electrical facilities and equipment. This impact will however be low hence a value of 1.

7.3.2.3 Gender and equality biases

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. Notably, in the construction phase, gender and equality biases may rise during employment if recruitment procedures are not established. In specific Persons living with Disabilities (PWLDs) along then project route may be discriminated on available job opportunities due to their physical limitation. More so, women could also be discriminated over labour intensive assignments over their male counterparts during employment opportunities, and compensation for work done. It will be important for the proponent to apply gender lens to the project activities to achieve greater equality, opportunities, and social protection of women. A special focus on Special Interest Groups, including the women, youth (male and female 18-35 years), persons living with disabilities (PLWDs), and Vulnerable individuals and households should be put in place during operational phase of project activities. The overall goal should be the reduction of gender inequalities and the discrimination against all interest groups during the entire project cycle.

7.3.2.4 Illicit behaviour / drug and alcohol abuse

Illicit behaviours mainly drugs, and alcohol abuse may emerge in the operation phase attributed to presence of maintenance labour force (of both skilled, semi-skilled and unskilled workers) for repair and maintenance of the transmission line including bush and vegetation clearing along RoW. Such job opportunities are likely to result to overindulgence in substance abuse (alcoholism and drugs abuse) which might jeopardise marriages and family wellbeing, and harmonious existence within the society.

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

The operational phase of the project may result to influx of maintenance labour force (of both skilled, semi-skilled and unskilled workers) from other regions hence increase occurrences of gender-based violence (GBV) such as sexual harassment (SH) and sexual exploitation and abuse (SEA). SH may manifest between workers / staff working on the project. This could include unwelcome sexual advances, requests for sexual favours, and other unwanted verbal or physical conduct of a sexual nature at the project workplaces. The potential perpetrators of SH can be any individuals associated with the proposed project including maintenance workers, security team and other personnel undertaking technical repairs and maintenance activities. SEA may manifest in form of demand for prostitution (sex work) between project staff and those living in and along the RoW of the project. It is likely to be even more preferent during times of crisis such as the current COVID-19 pandemic, that has triggered economic strains. The women and girls perceived as caregivers may be at a higher risk to SEA as they face shortages of necessary resources such as food. Families facing limited financial resources are also more likely to place girls in situations of child, early and forced marriage as a possible coping mechanism, an issue itself considered to be a form of GBV, and one that is widely associated with increased rates of violence, restricted access to education, and negative health and developmental outcomes. Furthermore, locals noted that perceived project benefits such as higher income 'greener pastures' for spouses in the community could lead to an increase in prostitution and extra-marital affairs, a situation, if not mitigated

would turn violent and mostly hurt the children and women. In addition, SEA is likely to manifest on both local men and women while seeking employment from the project through request of sexual favors including unwanted sexual advances by project workers, contractors, and service providers. The impact scale of GBV – SEA / SH was considered high hence a value of 3.

7.3.2.6 Labour influx

The operation phase of the project is likely to attract migrant workers including skilled, semiskilled, and non-skilled to nearby towns from other regions of Kenya. Such influx of non-locals during construction period might expose the project area to illicit behaviours, which might undermine the existing socio-cultural aspects, values, and norms of the locals. 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. Speculators and new businesses looking to capitalize on labour influx may create market distortions and force existing suppliers out of business. Notably, labour influx can provoke higher rates of alcohol and drug consumption and sexually transmitted diseases in the local rural population. Labour influx may also negatively affect public infrastructure, utilities such as water, housing, food security and social dynamics in the project area, especially along the RoW which predominantly cuts across rural communities that typically have less absorptive capacity than a large urban environment. Population surges can stretch the capacities of social infrastructure such as housing, schools and health care and lead to additional pressures on waste management, sanitation, water, power, and transport. For instance, housing pressures may lead to overcrowding and inflationary pressures that change the cost of living or lead to effects on housing quality and availability. Lack of adequate housing may also lead to unplanned and controlled development of squatter settlements in the project area.

The job seekers and can be at risk of exposure to the COVID-19 pandemic and its impacts mainly while seeking for accommodation facilities. Notably, migrant workers tend to be younger than the local population, they tend to live and work in crowded conditions that do not permit social distancing, putting them at increased risk of contracting COVID-19. There is also concern that contracted workers are kept safe from being exposed to COVID -19 in the project areas.

7.3.2.7 Community Expectations on CSR

The locals highlighted key expectations during the stakeholder's engagement and public consultation and participation exercises. The expectation varied in sectors such as education, health, water supply, building bridges and rehabilitation of roads. Notably most of the expectations require establishment of infrastructures hence falling short of KETRACO legal mandate. Further constraints brought about by COVID-19 Pandemic may end up exacerbating community expectations during the operational phase of the project including jobs, and higher salaries. It is therefore imperative to ensure community expectations are managed throughout the project cycle including the operation phase to reduce on level of disappointment and tensions. The impact scale is moderate hence a value of 2.

7.4 Social impacts during decommissioning phase

Due to the national and international significance of this project, the likelihood of decommissioning is minimal, therefore impacts discussed below are almost unlikely.

7.4.1 Positive Social Impacts

7.4.1.1 Employment opportunities

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

7.4.1.2 Improvement of local business opportunities

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

7.4.1.3 Gain to the county and national economy

The decommissioning phase will lead to provision of employment to the locals both men and women above 18 years of age, income from the salaries and wages will improve not only the County but the local economy of the trading centres where the RoW passes that will require decommissioning. Some of the trade centre's likely to benefit from decommissioning include Kwa Mwau Market in Kimutwa Location; Makaveti Trading Centre in Kimutwa Location; Kaani Market Centre in Iveti Location; Masii market in Masii location; Mwala town in Mwala Location; Mumbuni in Mbiuni Location; Sofia Market in Kithimani Location; Mukundi Market in Kakuzi Location, Murang'a County; and Kambi Mawe Market in Mavoloni Location.

7.4.1.4 Improved security

Security officers will be engaged to provided security during the decommissioning phase. It is anticipated that this will improve security as police and private security services offer surveillance along the project RoW and mainly within substation areas such as proposed Mwala substation.

7.4.1.5 Training and Capacity Building

It is anticipated that the decommissioning of the project will lead to training and capacity building of the employees, and even KETRACO staff seconded to the project. Employees are likely to benefit from health and safety related trainings such as health and safety awareness (use of the available information (such as MSDSs), safe work practices including fall protection program that includes training in climbing techniques and use of fall protection measures and appropriate use of PPE, fire safety trainings, first aid, emergency evacuation, and trainings regarding code of conduct for the workforce, HIV/AIDs and GBV -SEA/SH. It is anticipated that KETRACO staff seconded to the project will also gain capacity building from on job training skills.

7.4.2 Negative Social impacts

7.4.2.1 Spread of STD, HIV and AIDS

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

7.4.2.2 Theft and Vandalism

Decommissioning phase will entail demolition of concrete joints, removal of conductors, steel and other civil works. Such materials could be at an increased risk of theft due to perceived benefits from sale of scrap metal and electrical facilities. This impact will be high hence a value of 3.

7.4.2.3 Gender and equality biases

Gender and equality biases may rise during the decommissioning phase if recruitment procedures are not established. The vulnerable including Persons living with Disabilities (PWLDs) along the project route may be discriminated on available job opportunities due to their physical limitation. More so, women could also be discriminated over labour intensive assignments over their male counterparts during employment opportunities, and compensation for work done. It will be important for the proponent to apply gender lens to the project activities to achieve greater equality, opportunities, and social protection of women. A special focus on Special Interest Groups, including the women, youth (male and female 18 - 35 years), persons living with disabilities (PLWDs), should be put in place during decommissioning phase of project activities. The overall goal should be the reduction of gender inequalities and the discrimination against all interest groups during the entire project phase.

7.4.2.4 Illicit behaviour / drug and alcohol abuse

Illicit behaviours mainly drugs, and alcohol abuse may emerge in the decommissioning phase attributed to presence labour force (of both skilled, semi-skilled and unskilled workers) for decommissioning works of the transmission line. Such job opportunities are likely to lead to

perceived high incomes and result to overindulgence in substance abuse (alcoholism and drugs abuse) which might jeopardise marriages and family wellbeing, and harmonious existence within the society.

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

The decommissioning phase of the project may result to influx of labour force (of both skilled, semi-skilled and unskilled workers) from other regions hence increase occurrences of gender-based violence (GBV) such as sexual harassment (SH) and sexual exploitation and abuse (SEA). SH may manifest between workers / staff working on decommissioning the project. This could include unwelcome sexual advances, requests for sexual favours, and other unwanted verbal or physical conduct of a sexual nature at the project workplaces. The potential perpetrators of SH can be any individuals associated with the proposed project including maintenance workers, security team and other personnel undertaking decommissioning activities. SEA may manifest in form of demand for prostitution (sex work) between project staff and those living in and along the RoW of the project. Furthermore, perceived project benefits such as higher income 'greener pastures' for spouses in the community could lead to an increase in prostitution and extra-marital affairs, a situation, if not mitigated would turn violent and mostly hurt the children and women. In addition, SEA is likely to manifest on both local men and women while seeking employment in the project decommissioning works through request of sexual favours including unwanted sexual advances by project workers, contractors, and service providers.

7.4.2.6 Labour influx

The decommissioning phase of the project is likely to attract migrant workers including skilled, semiskilled, and non-skilled to nearby towns from other regions of Kenya. Such influx of non-locals during decommissioning period might expose the project area to illicit behaviours, which might undermine the existing socio-cultural aspects, values, and norms of the locals. 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. Notably, migrant workers tend to be younger than the local population, they tend to live and work in crowded conditions that do not permit social distancing, putting them at increased risk of contracting communicable diseases There is also concern that contracted workers are kept safe from being exposed to communicable diseases in the project areas.

7.5 Potential Risks to the project

7.5.1 Community demonstrations in pursuit for employment opportunities

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

7.5.2 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.

7.5.3 Terrorism

According to the project site location, likelihood of terror attacks is minimal, as from previous occurrence, terrorism is mainly experienced at the Kenya-Somali border and the major cities i.e. Nairobi and Mombasa. Nonetheless this being a key government project, security measures will be put in place to ensure safety of the workers and key infrastructure such as the proposed substations.

7.5.4 Speculation for land compensation

The locals such as in Kaani Location expressed fears over possible speculation including rumours and sensational reports on land compensation issues. They for instance highlighted that the line might finally take a different route from the proposed one denying resident the opportunity to be compensated by the project. Others highlighted concerns over inaccurate and false information likely to emerge from conmen and brokers. There was concern on possible emergence of brokers willing to purchase land from the locals with an expectation of hike in prices /value of land. It was also noted that conmen might pretend to be representatives of the project proponent and offer to intervene to negotiate better compensation terms for the affected persons at a fee. Residents who might fall for such tricks end up losing money to the conmen and fraudsters.

7.5.5 Political interference

The residents highlighted possibility of socio-political disputes on projects requirements such as land as political leaders try to portray their influences in the region. Such might result into political interference as leaders try to portray their influences and authority in the region hence a risk for the proposed project.

7.5.6 Lack of land documentation

According to the RAP report (Machakos-Mwala-Ekalakala - Draft RAP) the baseline data showed that about 2% of households did not have prove of land ownership. Although the numbers are low, this might pose a challenge of ownership confirmation during RAP implementation hence delay compensation of some of the PAPs or escalate into disputes.

8 CHAPTER EIGHT: PROPOSED ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES

8.1 Introduction

The proposed construction of Machakos-Mwala-Ekalakala electricity transmission project will have a wide range of impacts on the biophysical environment, health and safety of employees and members of the public, and socio-economic well-being of the local communities and households. It is usually impossible to mitigate all the expected negative environmental and social impacts. This chapter therefore attempts to formulate mitigation measures for the most significant negative environmental and socio-economic impacts. The aim is to ensure that the most significant negative impacts are minimized as much as possible while maximizing on the positive benefits of the project. The mitigation measures will be presented in the environmental management and monitoring plan that is intended to assist the proponent in the management of the adverse environmental impacts associated with the life cycle of the project.

8.2 Mitigation measures for environmental impacts during construction phase

This section provides a discussion on the mitigation measures for environmental impacts that will be undertaken during construction of the project. It is important to note that a special focus has been given to the negative impacts that are considered moderate and significant and that warrant intervention to reduce the level of impact to the local communities and the environment.

8.2.1 Mitigating noise pollution and excessive vibrations

Noise pollution and excessive vibrations in residential areas that are highly populated and are close to the wayleave or close to places that are key candidates for blasting and at workplaces should be mitigated as follows:

- Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used at along the right of way (RoW)
- 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 speed limits within trade centres and high-density areas along RoW such as Massi Location, Kithimani Location, Mbiuni Location and Mwala Location.
- Avoid unnecessary hooting and vehicle acceleration near schools such as Kithianioni primary school, kwandoo primary school, Kitwamba primary school, Kyanganga primary school and Kyanganga secondary school, and Mikiyuni primary school which are located less than 500 metres from the proposed power line RoW.
- Comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009.

8.2.2 Mitigating air pollution due to dust generation and exhaust emissions

This negative impact of dust especially to locals living in villages traversed by the proposed transmission line such as Ithanga, Kasioni, Languni, Kiaoni, Muutu, Utheke, Kalenga, Kamuya, Love, and Mwania should be mitigated as follows:

- Sprinkling of water on dry and dusty surfaces regularly including the access road.
- Add suitable soil stabilizers on access road to control dust.
- Collecting storm water and use to de-dust the access roads
- Comply with personal protective clothing requirement for dusty areas such as dust masks and protective glasses.
- Enforce onsite speed limit regulations for construction vehicles along access routes.
- Sprinkling water along the access routes or earth within the project route

- Slowing the speed of construction vehicles by using clearly marked road signs may contribute to reducing dust levels.
- Erection of dust screens around buildings under construction especially at the workers' camps and substations. Dust control measures should be adopted at any of the concrete batching plants, providing adequate PPE to staffs.
- Re-vegetating exposed areas during the operation phase of the project.
- Covering any heaps and berms of soil.
- Adhere to the Environmental Management and Co-ordination (Air Quality) Regulations, 2014.

To mitigate exhaust emissions, it will be mandatory to:

- Procure machines, equipment and vehicles which are environmentally friendly.
- Ensure machines and vehicles are properly and regularly maintained.
- Discourage plant operators and drivers of construction vehicles from unnecessary revving and idling.
- Limit construction traffic movement and operations to the most necessary activities through adequate site planning.
- Sensitize construction drivers and machinery operators to switch off engines when not being used.
- Ensuring that the construction machines, equipment and vehicles have the requisite inspection certificate.
- Adhere to the Environmental Management and Co-ordination, Air quality regulations of 2014.

8.2.3 Mitigating increased generation of solid waste

All storage and construction sites are to be kept clean, neat, and always tidy. No burying or dumping of any waste materials, metallic waste, litter, or refuse should be permitted. The Contractor must adhere to Environmental Management and Co- ordination (Waste Management) Regulations 2006. Notably, there are no robust solid waste management facilities in both Murang'a and Machakos County which justifies the need for integrated waste management approach for the proposed project. However, there is a proposed sanitary landfill facility at Mitubiri, co-funded by Murang'a County Government and Nairobi Metropolitan Authority (NAMATA). In addition, Machakos County has two dumpsites: Mavoko Dumpsite and Machakos Town Dumpsite.

The Contractor shall implement measures to mitigate increased waste generation and adopt a waste management plan to include the following: -

- Use of an integrated solid waste management system i.e. the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle;
- Accurate estimation of the dimensions and quantities of materials required;
- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time;
- Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage;
- Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste;
- Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site;
- Waste collection bins to be provided at designated points on all active sites;
- Dispose waste more responsibly by contracting a NEMA registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.
- Composting of vegetation waste for reuse as a landscaping fertilizer.

- Develop and implement a Construction Waste Management Plan before start of the project.
- Comply with provisions of the Environmental Management and Co-ordination, Waste Management Regulations 2006.

8.2.4 Mitigating increased energy consumption / fossil fuels

The construction of the proposed Machakos-Mwala-Ekalakala double circuit transmission line is expected to cause an increase in energy consumption especially from construction campsites, and specific work sites. The campsites and worksites (offices) will require energy for lighting and operating electrical equipment. Also traffic due to movement of workers, transportation of construction equipment and machinery. It is expected that this will lead to increased consumption of fossil fuel particularly petrol and diesel in operation of vehicles and construction equipment. Increased fossil fuels are expected to lead to contribution of greenhouse gases (GHGs).

Increased energy consumption should be mitigated as follows:

- Promote the use of solar energy and energy efficient bulbs in camp sites and project offices
- Switch off lights when not in use.
- Installation of pertinent signage at sites and offices on efficient energy consumption.
- Install electricity meters to monitor the consumption of electricity in work site
- Ensure construction machinery and trucks are well maintained.
- Use energy-efficient construction machinery and trucks during construction phase of the project.
- Ensure compliance with Energy Management Regulations of 2012.

Mitigating increased fossil fuels;

- Consider use of renewable energy sources for campsites such as investment in solar for lighting
- Develop a transport management plan with clear schedules to reduce on unnecessary trips
- Partner with relevant agencies such as KFS, local community and schools to support tree planting activities aimed at carbon sequestration.

8.2.5 Mitigating increased discharge of wastewater, sewage and degradation of water quality

The contractor should develop appropriate measures to ensure all wastewater is treated, handled and disposed appropriately to avoid contamination of water bodies (both open and underground), and soils.

No grey water runoff or uncontrolled discharges from any site or working areas (including wash-down areas) to adjacent watercourses and/or water bodies should be permitted. This should be mitigated as follows

- Water containing pollutants such as cements, concrete, lime, chemicals, and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and construction vehicles wash area.
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses; This can be done by use of sediment traps and use of drainage to control the flow and velocity of the runoff
- Potential pollutants of any kind and in any form, shall be kept, stored and used in such a manner that any escape can be contained, and the water table not endangered;
- Promote recycling of wastewater and storm water from the campsites and substations.
- Install meters to monitor consumption rates of water, where possible such as substations and workers campsites
- Provision of mobile toilets on all active sites fitted with water and soap.
- Ensure regular maintenance of plumbing systems to avoid spillage of raw sewage.

- Comply with the Environment Management and Coordination, Waste Management and Water Quality Regulations 2006.

8.2.6 Mitigating increased water abstraction and consumption

The increased water abstraction from both surface drainage systems such as River Athi, River Thika and streams including River Miu, River Muvwana, River Mithini, River Thwake, and River Ikiwe and any dug boreholes may lead to competition of the scarce resource with the locals. This may further reduce availability of water, with possibility of reduction in base flows in rivers and stream. Water abstraction and consumption should be minimized as follows:

- Harness rainwater from campsites roofs, substation offices and storm water whenever possible for use in dust prevention, gardening and other site-specific uses;
- 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;
- Install water conserving taps that turn-off automatically when water is not being used;
- Promote recycling and reuse of water as much as possible;
- Sensitise construction workers to conserve water by avoiding unnecessary wastage and to ensure taps are not running when not in use;
- Develop a leakage detection and repair system for key water user points including substation sites; workers campsites along the RoW
- Ensure all taps and cisterns are optimally working.
- Drilling of borehole for use to reduce over reliance on water from existing community sources.

8.2.7 Mitigating Modification of hydrology

The increased water abstraction from surface drainage systems such as River Athi, River Thika and streams including River Miu, River Muvwana, River Mithini, River Thwake, and River Ikiwe may modify the hydrological characteristics of these water bodies if the abstraction is uncontrolled. Machakos being synonymous with storm water harvesting, some of the sand dams along the proposed transmission route such as Masimbani, Kivandini, and Mbuno may be affected by over abstraction or silt from surface runoff.

This could be mitigated as follows:

- Control excessive abstraction of water from boreholes by ensuring compliance with the prescribed abstraction cubic meters.
- Undertake standalone EIA for each borehole and apply for a permit for all water abstractions (rivers, dams, boreholes etc.).
- Ensure compliance with the boreholes / rivers abstraction permits as issued by WRA.
- Surface runoff should be channelled to areas with gentle slopes to avoid excessive erosion.

8.2.8 Mitigating Aquatic Habitat Alteration

Main aquatic habitats existing along or in the vicinity of the transmission line are permanent rivers e.g. the Athi River, seasonal rivers and streams (Thwake, Muthini, Mukewo, Kamula, Kitulu, Kyalui, Ikiwe, Uvila, Kathuluni) and man-made dams (Mbuno Dam). Envisaged impacts to these water bodies include construction activities of heavy machinery causing soil to be susceptible to run off hence causing siltation of the aquatic systems especially the lacustrine dams and reservoirs. This could be mitigated as follows:

- Ensure power transmission towers / pylons are not anchored on critical aquatic habitat (e.g. watercourses, wetlands, and riparian areas)
- Minimize clearing and disruption to riparian vegetation (along rivers such as River Mwania; River Ikiwe; Athi River, Thika River and Water harvesting dams (such as Mbuno Dam, Kitulu dam, and Masimba dam)
- Adjust tower placements to span wetlands or limit equipment access in wetlands, wherever possible;

- Working in close consultation with line agencies such as the Water Resources Authority in both Machakos and Murang'a County

8.2.9 Mitigating increased generation of storm water and impact on drainage

This should be mitigated through the following mainly along the AP1 to AP7 (outskirts of Masii and Machakos towns) which are characterized by hilly ridges and inherent sloppy nature, will lead to increased generation of surface runoff.

- Use of storm water management practices that slow peak runoff flow, reduce sediment load, and increase infiltration.
- Regular inspection and maintenance of permanent erosion and runoff control features.
- Adopt and implement a storm water management plan.

8.2.10 Mitigating increased soil erosion and soil quality degradation

- Soils excavated for the erection of towers should be used for re-filling and should not be left exposed to wind or water for long periods;
- The contractor should avoid steep terrain during the transportation of construction material by using alternative routes, use light vehicles or existing routes where appropriate;
- Riverine vegetation such as around streams, rivers (River Thika, River Athi etc), dams should be minimally disturbed during the construction phase to reduce soil erosion and safeguard riverbank protection;
- Ensure timely revegetation of disturbed areas with local species common in the area to complement natural vegetation along the RoW to improve ground cover;
- 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 should be designed within substations;
- Apply soil erosion control measures such as levelling of the substation and project site to reduce run-off velocity and increase infiltration of storm water into the soil;
- Ensure that construction vehicles are restricted to use existing graded roads
- Ensure drains maintenance and ripping off compacted areas to reduce run-off especially in mountainous topography of the wayleave in order to avoid soil erosion and soil quality degradation of productive lands along the wayleave
- Ensure construction activities are kept outside the tree and vegetation protection zone, for any trees and vegetation that will be maintained on project work sites

8.2.11 Mitigating loss of vegetation cover and biodiversity

River Athi and River Thika sections which are along the project route have thick bushes and shrubs which will require clearance of vegetation. This should be mitigated as follows:

- Provide adequate protection against scour and erosion; and consider the onset of the rainy season with respect to construction schedules.
- Minimize clearing of indigenous plant species such as Kigelia Africana *(The species is locally referred to as Muatine)*, Dalbergia melanoxylon (*Locally known as Muvingo and is a hardwood)*, Terminalia brownie *(The species is locally known as Muuku and it is a hardwood)*, and ensure replanting of indigenous plant species in disturbed areas.
- Employ vegetation rehabilitation techniques to recover lost plant cover in areas where the RoW will traverse.
- Ensure proper demarcation and delineation of the project area to be affected by construction works;
- Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage;
- Designate access routes and parking within the site;
- Design and implement an appropriate landscaping programme for the Mwala substation site;

- Support community initiatives in tree planting through liaising with respective agencies such as KFS.

8.2.12 Mitigating Terrestrial Habitat Alteration

- Use of existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible to avoid 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 especially by varying tower spans ;
- Avoiding construction activities during the breeding season and other sensitive seasons
- Management of construction site activities by limiting access road gradients to reduce runoff-induced erosion
- Re-vegetation of disturbed areas with native / indigenous plant species such as *Acacia sp.* and *Croton sp.;*
- Working in close coordination with pertinent agencies (KWS and KFS) when undertaking construction of towers .

8.2.13 Mitigating Cumulative Environmental Impacts

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, respective Machakos and Murang'a County Governments 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.

8.2.14 Mitigating Pollution from Hazardous materials

The following should be done

- Use of designated areas of hard standing for repair and maintenance of machinery e.g. garages to avoid fuels and lubricant spills at the RoW construction sites;
- Install oil trapping equipment and remedial measures in areas where there is a likelihood of oil spillage e.g. during maintenance of machines and construction equipment;
- Implement the Spill Prevention & Counter Measures Management Plan (SPCMMP) – *Annex 14 section 3.4* to deal and prevent hazardous material spills
- 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;

- A written 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;
- Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed from site until repaired;
- Spill response kit (e.g. absorbents) to be readily available at the construction site;
- Hazardous substances to be stored only in specialized/labelled containers and designated storage facility with warning signs;
- Hazardous materials storage facilities should be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public;
- Storage and handling facilities of hazardous liquid should be bounded with an impermeable base;
- The personnel involved in the handling of hazardous waste including fuel and used oil should undergo specific training in hazardous material handling procedures and fuel / lubricant and used oil handling procedures;
- Contract a NEMA registered waste handler to dispose hazardous materials including waste oil in designated manner;

8.2.15 Mitigating the Spread of Alien Invasive Plant Species

This should be mitigated as follows:

- Decontamination e.g. washing of equipment to remove soil potentially carrying the invasive species propagules
- Avoid importing soils/gravels to use for level grounds
- Reduce proliferation of the invasive species through active periodic way leave management

8.2.16 Mitigating human - wildlife conflict / Temporary obstruction of movement of wild herbivores

Site management is a key factor in reducing the overall environmental impact of the project, by controlling the risks of environmental contamination, soil compaction, and damage to trees and other natural features intended for retention. It also helps to reduce the risks to wildlife, by controlling the activities on-site that could directly or indirectly harm them. All personnel should be briefed about wild herbivores protection measures at the outset of the project, in order to ensure that these measures are clearly understood and appropriately implemented. The briefing needs to provide an overview of the mitigation measures that are being used at the site, as well as instructions on what do to when wildlife are encountered during the work. It should also include information on any species at risk that may be present, and what to do if one is seen. A laminated handout summarising key information on wildlife protection should always be kept on-site for reference by staff. The handout should be tailored to suit the needs of each specific project, but should address the following subjects:

- ✓ General provisions – e.g., do not harm, feed or unnecessarily harass wildlife / wild herbivores; drive slowly and avoid hitting wildlife where possible; keep site tidy and secure
- ✓ Species at risk – basic identification tips and recommendations (needs to be modified to address species most likely to be encountered at the project route)
- ✓ Contact information for:
    - Project biologist / wildlife service provider
    - Ministry of Natural Resources and Forestry, KFS (for species at risk)
    - Wildlife rehabilitators (KWS) and veterinarians (for orphaned or injured wildlife)

The management of the project route needs to specifically address how to avoid attracting wildlife to the workspace. Although on-site activities will generally discourage wildlife from entering the workspace during the day, they may be drawn to the site at night (or on weekends) if it appears to provide sources of food, water or shelter. The following common attractants should be controlled or eliminated:

- Food wastes and other garbage – effective mitigation measures include waste control (prevent littering); keeping all trash secured in wildlife-proof containers, and prompt removal from the site (especially in warm weather).

- Water – effective mitigation measures include ensuring proper site drainage to limit standing pools of water; fencing off temporary storm ponds and other waterbodies within the work space (and not permitting wildlife access to any potentially contaminated waterbodies); and, use appropriate sediment and erosion control measures to protect the quality of surface water adjacent to or downstream of the work space.
- Shelter – effective mitigation measures include covering or containing piles of soil, fill, brush, rocks and other loose materials; capping ends of pipes where necessary to keep wildlife out; ensuring that trailers, bins, boxes, and vacant buildings are secured at the end of each work day to prevent access by wildlife.

While all personnel need to be aware of the wildlife protection measures, one or more people should be specifically tasked with ensuring that those measures are properly implemented, by performing the following duties:

- Checking the work site (including previously cleared areas) for wildlife, prior to beginning work each day;
- Regularly inspecting protective fencing or other installed measures to ensure their integrity and continued function; and,
- Monitoring construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements.

8.2.17 Mitigating Destruction of habitats for herpetofauna (reptiles and amphibians)

This should be mitigated as follows including other measures in 8.2.16

- Active avoidance by construction workers during construction
- Reforestation to restore habitats

8.2.18 Mitigating Occupational safety and health risks

The following should be undertaken;

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; ▪ . Rope safety belts should be replaced before signs of aging or fraying of fibers 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; ▪ No drunk worker should be allowed on site to reduce risk falling from height and ensuring proper communication on site.
Electric and magnetic fields	▪ 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; ✓ 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; ▪ 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.
Exposure to chemicals	▪ 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	▪ 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	▪ 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	• 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

8.2.19 Mitigating Risks on Community health and safety

The following should be undertaken:

- Proponent to engage local persons as Wayleave Officers / Community Liaison Officers (CLOs) to work with the contractor on local engagements. They act as the focal point for communications between 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;

On Electrocution:

- Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding substations, particularly in Mwala sub-stations.
- 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.

On Electromagnetic Fields (EMF):

- Ensure the recommended wayleave of 30m (15m on both sides of the centreline) is observed for the proposed 132kv transmission line. The EMF decays very rapidly with distance from source and there should be no potential health risks for people living outside the 30 m wide wayleave corridor.

On Noise / Corona effect

- The recommended wayleave of 30m (15m on both sides of the centreline) to be observed for the proposed 132kv transmission line.
- The acoustic noise produced by transmission lines is only greater with high voltage power lines of above 400-800 kilo volts [kV] whereas the proposed Machakos Mwala Ekalakala is 132KV hence expected to be negligible
- The buzzing noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the 30 m wide wayleave corridor

On Access to active construction sites

- Limit community access to active sites through barricades, fencing etc.;
- Barricade all inactive excavations to prevent falls and injuries especially at night;
- Having warning signs on all active sites deterring community interaction or entrance;
- Community sensitization on safety in towns centres and market centres such as Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Mukundi and Kambi Mawe.

8.2.20 Mitigating community access roads traffic incidents / traffic safety risks

The following should be undertaken to mitigate **community access roads traffic incidents / enhance traffic safety Access**

- 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;
- Emphasizing safety aspects among drivers
    - Improving driving skills and requiring licensing of drivers
    - Adopting limits for trip duration and arranging drivers
    - 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
    - Minimizing pedestrian interaction with construction vehicles
- 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;
- Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accident;
- 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

8.2.21 Mitigating Visual Impacts

To mitigate the visual impact of power distribution project, the following should be implemented:

- Restore excavated site area through proper backfilling
- Removal of any overburden ripped material along the RoW
- Explore the form, colour, or texture of the line and pylons to minimize aesthetic impacts and mimic / blend in the surrounding;
- Implement an appropriate landscaping programme especially for substation
- Ensure planting of indigenous short growing shrubs and grass on the open spaces to re-introduce visual barriers along RoW

8.2.22 Mitigating Aircraft Navigation Safety Risks

- Continued engagement with regulatory air traffic authorities such as KCAA prior and during construction of pylons for safety purposes and to acquire prerequisite permits;
- Installation of flight (aviation) colored balls and infrared lighting to enhance visibility of masts
- Adherence to Civil Aviation Act No. 21 of 2013 and subsequent regulation for compliance with aviation safety guidelines

8.2.23 Mitigating Risks and impacts as a result of climate change

Adaptation options to deal with these risks and impacts include:

- Ensuring higher installation of power lines within 33.5metres to 46 metres to keep away from foreign objectives blown by winds during storms
- Installing conductors with hotter operating limits or implementing the use of 'low-sag' conductors.
- Technology implementations such as developing a software tool to optimise overhead line ratings.
- Use more heat-resistant materials to mitigate reduced carrying capacity of lines and transformers caused by increase temperatures
- Implement more effective cooling for transformers such as air efficient chillers for cooling down the transformers during high temperatures
- Develop and implement a storm water management plan to ensure flood protection of equipment at ground level in substations
- Use covered and/or insulated conductors to prevent erosion
- Include lightning protection (e.g., earth wires, spark gaps) in the distribution network to prevent lighting damages
- Raise structure levels at substations to prevent flooding or spillage of fuel from transformers.
- Implement more rigorous structural standards such as concrete-sided buildings and pylons
- Implement porous materials for better wind flow to prevent damaged infrastructure
- Schedule construction work in dry months to prevent delays during construction works

8.3 Mitigation measures for negative environmental impacts during operation phase

8.3.1 Mitigating risk of noise 'buzzing' pollution

This should be mitigated as follows:

- Ensure the recommended wayleave of 30m (15m on both sides of the centreline) is observed throughout the proposed 132kv transmission line. The acoustic noise produced

by transmission lines is only greater with high voltage power lines of above 400-800 kilo volts [kV] whereas the proposed TL is 132KV hence expected to be negligible.
- Ensure no households encroach within the project 30m RoW. The buzzing noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the 30 m wide wayleave corridor.

8.3.2 Mitigating Avian (Birds) Collisions and Electrocutions

The following should be undertaken especially on the bird flight section where bats and migratory birds fly from Konza area to Machakos town and between Machakos Valley and Masinga Dam Reservoir. This should also mitigate Avian and Bat Collisions and Electrocutions;

- Engineering solutions including installing visibility enhancement objects such as wire marker balls, bird perch deterrents, or diverters; especially within Kimutwa Location and Nzasu sub-location; and Mamba village within Ndalani Location. Other key areas that require to be considered include sections of the Ikiwe, Kimutwa, Love, Mwania, Wamua and Wamui areas to alert birds to the presence of power line, allowing them time to avoid the collision;
- Building raptors platforms on top of towers for roosting and nesting;
- Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware;
- Insulation through covering energised parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered;
- Installing elevated perches, insulating jumper loops, placing obstructive perch deterrents (e.g. insulated "V's") on the transmission line.
- Working with line agencies such as NMK, KWS and relevant NGOs such as Birdlife International and Nature Kenya for expert opinion and specialized monitoring studies (ornithological studies).

8.3.3 Mitigating impact on Mammals (including Bats) Collisions and Electrocutions

The following should be undertaken.

- Implementation of an integrated vegetation management approach (IVM) during repairs and maintenance of RoW. The selective removal of tall-growing tree species and the encouragement of low-growing grasses and bushes to avoid alteration and disturbance to critical natural habitats such as bat foraging corridors, roosting and breeding areas.
- Provision of engineering solutions such as wire-marking through installing visibility enhancement objects such as marker balls
- Ensuring towers / pylons are insulated to act as bats roosting places.
- Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware;
- Insulation: covering energised parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to bats. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered;
- Work with line agencies such as KWS and relevant NGOs such as Nature Kenya for expert opinion and specialized bat survey. The data acquired may inform other studies in future and document which bat species exist in the area.

8.3.4 Mitigating Risk of Fires

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 trainings and fire drills for the operation and maintenance employees both at the line and substation;
- Removing blow down and other high-hazard fuel accumulations;
- Time thinning, slashing, and other maintenance activities to avoid forest fire seasons
- Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access.
- Create fire breaks (ploughed strips) on strategic areas of the proposed RoW to prevent fire spreading to other pasture or agricultural lands or to substations.
- 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.

8.3.5 Mitigating Disruption and alteration of habitat during RoW maintenance

The recommended mitigation measures are as below including those presented in section 8.2.12 above.

- Implementation of an integrated vegetation management approach (IVM). The selective removal of tall-growing tree species and the encouragement of low-growing grasses;
- Removal of invasive plant species, whenever possible, cultivating native plant species;
- Scheduling activities to avoid breeding and nesting seasons
- Observing manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response;
- Avoiding clearing in riparian areas;

8.3.6 Mitigating Cumulative Impacts

The recommended mitigation measures are similar as those presented in section 8.2.13.

8.3.7 Mitigating Occupational safety and health risks

The recommended mitigation measures are similar as those presented in section 8.2.18 above.

8.3.8 Mitigating Risks on Community health and safety

The recommended mitigation measures are similar as those presented in section 8.2.19 above.

8.4 Mitigation measures for negative environmental impacts during decommissioning phase

8.4.1 Mitigating increased noise and vibration

The recommended mitigation measures are similar as those presented in section 8.2.1 above.

8.4.2 Mitigating air pollution due to dust generation and exhaust emission

The recommended mitigation measures are similar as those presented in section 8.2.2 above.

8.4.3 Mitigating increased solid waste generation

The recommended mitigation measures are similar as those presented in section 8.2.3 above.

8.4.4 Mitigating Occupational safety and health risks

The recommended mitigation measures are similar as those presented in section 8.2.18 above

8.5 Mitigation Measures for Negative Social Impacts during construction

8.5.1 Mitigating risks and impacts from displacement of households and businesses

The location of the Transmission line is almost 99.9% in a rural setting, which is a major advantage in terms of resettlement. This largely means that although communities have settled along the route, the prospects of getting resettlement land (where compensation is provided) in the vicinity (cost allowing) will not be a major challenge. This means social support systems and networks will

not be greatly disrupted, affected persons can still consider themselves as part of their current communities and still access the same services and advantages from the original areas. Since the project is rural, coupled with its inherent nature that only requires wayleave instead of land acquisition to pave the way for the transmission line, no significant resettlement is envisaged.

- Apply RAP compensation procedures in a transparent and consistent way to all communities and persons;
- Provide compensation for loss of assets at current replacement cost in accordance to project RPF;
- Apart from cash compensation, consider other alternatives such as in-kind or land to land compensation especially for vulnerable people such as orphans, PLWD, widows and elderly
- Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status, and put measures in place to ensure they have access to development benefits and opportunities;
- Provide a choice of options to affected individuals and consult with communities over community assets and resources;
- Provide opportunities to displaced communities and persons to derive development benefits from the project;
- Provide transitional support for a reasonable period of the time to enable people 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. compensation, GRM.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to engage host communities as well, in addition to PAPs where appropriate.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.
- Where possible avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement.
- Displacement and compensation of squatters, absentee landlords, tenants, those without formal land rights are potential risks, which will be guided by provisions within the RPF developed under this project.
- Resettlement to adhere to the provisions within the RPF prepared under this project.

8.5.2 Mitigating Land acquisition (Way-leave, contractor facilities sites, workers camp sites, and sub-station sites) and resettlement disputes

World Bank provides for guidance on where to apply resettlement and relocation while in all cases, the options available must be discussed and agreed on with the community. As obtained during consultations, PAPs preferred cash compensation instead of in-kind replacement.

Measures to be taken will be as follows;

- Resettlement and compensation of PAPs to align to the RPF developed under this project.
- A project Grievances Redress Mechanism (GRM: Annex 14 in chapter 7) including a GRM committee 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. If the Locational Grievance Redress Committee is not able to reach a resolution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters.
- Loss of land and crops will be compensated; the amount of compensation to be paid for private land will be as per the Machakos County and Murang'a County land registry rates provided by National Land Commission (NLC). However, the rates will be in line with the RPF developed for the project.
- A Resettlement Action Plan (RAP) study has been commissioned for the proposed project. The RAP has been carried out in accordance with the legal framework of the Government

of Kenya, the requirements of the World Bank's OP 4.12 (Involuntary Resettlement) and RPF developed for this project for compensation purposes.
- 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 including valuation to ensure compensation for displaced structures.
- Where possible avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication, community buy in and ownership of the project. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks in public and Limiting gatherings as per GoK directive

8.5.3 Mitigating Agricultural produce loss, restrictions to access to pasture and impacts on apiculture

- Enumeration of destroyed farm crops including those under irrigation schemes through a Crop destruction Register in the presence of crop owner.
- Identify, address, and document concerns such as agricultural produce loss, restrictions to access to pasture and impacts on apiculture before construction begins.
- Using transmission structures with longer spans to avoid clearing the agricultural fields and impacting on 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)
- Sensitise contractors / workers / local community to avoid any interference of the beehives if outside the RoW
- Ensure relocation of beehives that are directly on the proposed transmission line RoW
- Identify and ensure compensation of the beehives, restriction on access to pasture for affected households as per RAP, and RPF developed for the project.
- Adopt and implement the livelihood restoration plan (LRP) to improve the lives of those affected and ensure they benefits from the project.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.

8.5.4 Mitigating Health Impacts such as Spread of STD, HIV and AIDS

- 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 through the use of educative posters, offering free HIV/AIDS testing services and HIV/AIDS counselling in main towns situated along the RoW. Such towns include, Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Kambi Mawe in Machakos County and Mukundi town in Murang'a County.

- 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 (Machakos County and Murang'a County) (Ministry of Health, National AIDS Control Council (NACC)), including NGOS (AHF Kenya), and CBOs (youth, men and women groups) on awareness creation
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) and 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 prepared under this project. Such sensitizations or trainings should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and limiting gatherings as per Gok directive.
- 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 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. Labour influx impacts will be managed through a labour management plan – *Annex 14 section 3.12*.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.

8.5.5 Mitigating Interference of existing development infrastructure

a) Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) for effective communication to host community.
b) Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the host community.
c) Impact on road usage
   - Construction contractor to prepare Road Use Restriction Management Plan in case of such (five (5) major road crossings which include C97, C98, C 99, C 100 and A3 roads) and inform the local government and community in advance;
   - Liaison with the pertinent road agencies in case of any partial closure during transmission line construction phase;
d) Impact on Kenya Power utility lines
   - Liaison with Kenya Power on planned shutdowns;
   - Construction contractor to prepare Kenya Power utility line shut-down management plan

8.5.6 Mitigating Insecurity

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;
- vehicle scanning systems;
- 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's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure project ownership, and mitigate the risk of insecurity-theft, and vandalism.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.

8.5.7 Mitigating Gender equality biases

- Applying all Kenyan Constitutional requirements on gender throughout the project.
- Apply all guidelines under the National Gender and Equality Commission Act, 2011.
- Adhere to Gender Strategy (FY16-23).
- 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 contractors will be expected to implement Labour Management Plan section 3.13 of annex 14 and uphold equal treatment of men and women during recruitment.
- 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.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication for both men and women.
- Adopt and implement a Gender Mainstreaming Plan (Annex 14 – section 3.23) to ensure that both men and women have equal opportunities to participate in and benefit from the proposed power transmission project
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from both men and women.

8.5.8 Mitigating Cultural impacts

The following should be undertaken:

- Avoid constructing substations or tower spotting by design changes. This can be attained by changing tower spans to avoid spotting pylons in areas of archaeological or cultural heritage importance; in this case are six (6) burial sites (five (5) within Mwala Location in Kitie village and one (1) in Kimutwa Location– Machakos County and Akamba Peace Museum along the proposed RoW.
- Avoid spotting towers by designs changes - such as changing tower spans to avoid spotting pylons - on shrines locally known as 'Mathembos' common in Mwala Sub-County and noted in Mithumo village about 500m off the proposed RoW; Kwa Mbule shrine in Kyoimbi village near Muvwana River, and sacred trees (*species include Terminalia brownii, Balanite aegyptica, Erythrina abysinnica, Ficus sycomorus, Olea africana),* graves and other areas of cultural importance.
- Work together with local elders to establish and map any other shrines, graves, and other areas of cultural heritage importance.
- Avoid any interference with all existing graves through design changes of the tower spans or using other appropriate alternative access routes either during construction works or clearing access routes, since the graves hold cultural values and social ties to the bereaved.
- Use exist 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 in chance finds procedure if unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication in relation to cultural resources with the host community

- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from host community.

8.5.9 Mitigating Quality of life and lifestyle impacts

The following should be undertaken for **quality of life impacts**:

- Ensure a fair process of compensation and livelihood replacement / RAP and enhancement;
- Provide benefits to affected communities;
- Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status, including women headed households, minority groups, OVCs, widows, and PLWD, and put measures in place to ensure they have equal access to development benefits and opportunities;

The following should be undertaken to mitigate **lifestyle related impacts**:

- Resettlement and compensation to be implemented in line with the RPF develop under this project;
- Adopt and implement Livelihood Restoration Plan (Annex 14 – Section 3.22)
- Improve the livelihoods and standards of living of displaced persons by providing transitional support for a reasonable period of the time to enable people to restore their income-earning capacity, production levels, and standards of living.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication

8.5.10 Minimizing Loss of social fabrics

The following should be undertaken;

- Where possible, avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement
- Consider the prospects of getting resettlement land for the 1% (4) landowners who are permanently displaced in the vicinity (cost allowing) to deter disruption of social support systems and networks.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with PAPs

8.5.11 Mitigating illicit behaviour / drug and alcohol abuse

Women cited that their men, 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 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.
- Community members and Contractors to behave in a culturally appropriate manner

- The contractor and proponent to establish a code of conduct to ensure workers conduct at site as well as within the project area adheres to set rules and regulations e.g. on drug use and alcohol, interactions with locals and Gender Based Violence (GBV) – Sexual Exploitation and Abuse (SEA) / sexual harassment (SH).
- Civic and health education on HIV/AIDS and STIs
- 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
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address illicit behaviour / drug and alcohol abuse complaints before escalating to pressing social problems
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with the host community.
- Adhere to and implement the HIV and AIDS Prevention and Control Act, 2006 and the Sexual Offences Act, 2006 and its amendment 2012.

8.5.12 Mitigating Domestic Conflicts exacerbated by Project

The following should be undertaken:

- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with the host community and PAPs where appropriate.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address domestic conflicts exacerbated by project.
- Grievances should be received and recorded at the Sub-location level by Community Liaison Officers (CLOs) and handled by the Grievance Redress Committees (GRC).
- If the Grievance Redress Committee is not able to provide a solution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters.
- Involve CLOs and GRCs to ensure protection of rights of the vulnerable especially orphans, PLWD, widows and elderly.
- The project to slowly engage the elderly and Social workers to guide and mediate case of domestic violence
- Encourage the spouse to open a joint bank account to avoid mistrust.

8.5.13 Mitigating Gender-Based Violence (GBV) – Sexual exploitation & Abuse (SEA) / Sexual Harassment (SH) (GBV-SEA/SH)

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 within the context of the COVID-19 pandemic
- Adopt and implement a grievance redress mechanism (GRM) and referral mechanism to address all emerging complaints including risks such as COVID 19 related to Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH).

- Implement the GBV-SEA/SH Management Plan (Annex 14 section 3.19) and Labour Influx Management Plan (Annex 14 section 3.13)
- Ensure establishment and Implementation of a GBV-SEA/SH Action Plan by the contractor which should reflect the unique dimensions of COVID-19.
- Ensure separate sanitation and hygiene facilities (toilets, utility rooms and changing rooms) for men and women in the workers' camps / workplaces are provided.
- Prioritize GBV -SEA/SH prevention, response, and risk mitigation approaches as essential parts of COVID-19- related measures.
- 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.
- Apply all Kenyan Constitutional / legal requirements on gender and sexual based violence throughout the project.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication on GBV-SEA/SH. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive

8.5.14 Mitigating Livelihood disruptions

The socio-economic baseline by shows that the project is likely to affect activities such as peasant crop farming including small-scale / household irrigation schemes (vegetables, fruits), trees, apiculture and various entrepreneurial activities, with the most prominent being small retail trading. Such include five (5) small retail businesses located in Iveti Location that are affected.

The following should be implemented to deal with livelihood disruption and ensure livelihood restorations:

- Implement the Livelihood Restoration Plan *(Annex 14 section 3.22)* for the proposed project.
- Implement Crop based Livelihoods by regeneration of food crops – such as household irrigation schemes, and cash crops including fruits (such as mangoes, tangerines), and vegetables through better extension services in partnership with the County Ministry of Agriculture.
- Implement tree planting to reclaim forestry by liaising with KFS to train farmers and offer seedlings on sustainable tree planting and management in all the 8 Locations / Settlements
- Implement Enterprise Based Livelihoods by maximizing the available project-based opportunities. The livelihood restoration plan recommends:
  - A Local Buying Program during the construction period to assist in building capability and capacity in the local supply chain. Local businesses in the region of the project are prioritized as suppliers of various materials, goods, and services.
  - Offering Micro Loans/Small Business Grants by liaising with Government agencies such as Ministry of Trade to support small business enterprises such as green grocers. Such initiatives could lead to increased access to quality services.
  - Apiculture – Linking farmers with Ministry of Agriculture for training in commercial oriented beekeeping enterprises.
- Implement Financial Literacy Training / Entrepreneurial training by liaising with relevant County and National Government agencies to cushion against loss of existing retail

businesses. Small grants could be offered to identified Vulnerable Individuals and HouseholdsVulnerable individuals and households to sustain their livelihoods.

- Brings to the attention of the community the existence/availability of National Safety Net programs /projects, their cycles and application process and requirements.
- Link Vulnerable persons with National Safety Net programs / Government support programs by liaising with respective county departments/ministries of Social Services to come to project Location levels to register the vulnerable persons. Some of the National Safety Net programs for Vulnerable persons include Cash Transfer for Orphans and Vulnerable Children; Cash Transfer for Persons With Severe Disabilities (PWSD-CT); Older Persons Cash Transfer (OPCT) program and Hunger Safety Net Programme (HSNP)
- Provision of employment: semi-skilled and unskilled jobs should be reserved for project affected persons and the community in general, by implementing a local recruitment plan through liaising with local administration at location levels.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address PAPs and host community complaints.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication on livelihood restoration. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive.

8.5.15 Mitigating Land and property / Socio- Political disputes

The following should be undertaken:

- Full implementation of the Resettlement Action Plan (RAP) for the proposed project.
- Where possible, avoid involuntary resettlement; and where avoidance is not possible, minimize involuntary resettlement
- Carry out timely (before project commencement), fair / just and adequate compensation as per the provisions in the RPF developed under this project, the Kenyan law, WB guideline and provide assistance (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 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;
- Map vulnerable households and individuals such as orphans, PLWD, widows and elderly in the project area and implement specific interventions as appropriate to ensure equal benefits sharing.
- Grievances should be received and recorded at the Sub-location level by Community Liaison Officers (CLOs) and handled by the Grievance Redress Committees.
- If the Grievance Redress Committee is not able to provide a solution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters.
- Ensure all stakeholders and the public are involved in the planning process as per SEP.
- Obtain necessary permissions and approvals from the County Governments.
- Ensure EIAs are conducted for specific project activities such as campsites.
- Proponent to engage local persons as Wayleave Officers to work with the contractor, to ensure the project is implemented smoothly.
- KETRACO to engage affected persons as outlined in the Stakeholder Engagement Plan (SEP) (Annex 14 section 3.16 – SEP).

- 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. The proponent will ensure that information regarding interest earning escrow account is timely disseminated to all PAPs in subsequent consultation forums, to avoid project delays and compensation disputes.
- Ensure relocation and compensation is in accordance to provisions within RPF developed under this project.
- Stakeholder engagement and full information disclosure to PAPs as well as host communities where appropriate. Information disclosure should be done in line with Ministry of Health COVID-19 prevention and mitigation measures including but not limited to; physical / social distancing protocols (1.5metres), provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks and limiting gatherings as per GoK directive.
- A project Grievances Redress Mechanism *(GRM: Annex 14 in chapter 7)* including a GRM committee 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.
- Acquisition of land for contractor's camp and worker accommodation, will require a land use and restoration agreement between community and contractor.

8.5.16 Mitigating disruption of learning activities

The following should be undertaken:

- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication to avert disruption of learning
- Strictly mitigate noise and vibration activities, and air pollution due to dust emission near learning facilities as prescribed in this report.
- Grievances should be received and recorded at the Sub-location level by Community Liaison Officers (CLOs) and handled by the Grievance Redress Committees.
- Strictly ensure no underage (below 18 years) employed
- Comply with labour Relations Act 2007, and Employment Act 2007

8.5.17 Mitigating Labour influx

The following should be undertaken:

- Establish a recruitment policy to employ local populace for all unskilled labour / casual labourers to reduce on population influx in search of jobs including creating slots for locals on semi-skilled employment if available. 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 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 communicable 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.
- All 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 immigrates by the local communities. Discuss issues, risks and opportunities linked to in-migration; Understand the concerns of local communities; Raise awareness of risk and opportunities; and Identify solutions to issues relating to in-migration
- Ensure implementation of a livelihood restoration plan (LRP) that create alternative economic opportunities for the locals
- To minimize exposure to COVID-19, the following should be undertaken
    - Develop and communicate to all employees (skilled, semi-skilled and unskilled), a COVID-19 Preparedness management plan that addresses all aspects of COVID-19 readiness including but not limited to Policy, Planning and Organizing project activities vis-à-vis COVID-19.
    - Sensitize all workers (skilled, semi-skilled and unskilled) on COVID-19 risk mitigation measures with sufficient information to keep them and local community safe.
    - Establish prevention and mitigation measures against COVID-19 and arrangements for dealing with suspected and confirmed COVID-19 cases. The measures should include but not limited to;
        - ✓ Infection control plans,
        - ✓ Ensuring social distancing of not less 1.5 meters between employees in all directions,
        - ✓ Hygiene promotion through suitable hand sanitizing facility or handwashing soap and water
        - ✓ Strict and proper use of face masks throughout all working hours and public places.
        - ✓ Implement Ministry of Health guidelines for staff safety and health, including daily temperature checks for everyone in the workplace
        - ✓ Increase frequency of cleaning commonly touched surfaces / objects

8.5.18 Mitigating Community impacts

The following should be undertaken:

- Site transmission and distribution rights-of-way, lines, towers, and substations to avoid cultural sites, communal watering points, churches and water pipelines
- Provide opportunities to displaced communities and persons to derive development benefits from the project;
- Ensure proper risk management and benefits to host communities and relocated persons;
- Provide Corporate Social Responsibility (CSR) / a social return on investment to improve the well-being of the host community. Such could include provision of support for supplies and movable items for institutions or sector needs identified by the community; donation

to community of any facilities used by the contractor at the conclusion of the project such as buildings, and boreholes.

- Ensure stakeholders engagement on CSR implementation (further consultations on priority projects and implementation plans guided by SEP) are done in line with Ministry of Health COVID-19 prevention and mitigation measures including but not limited to; physical / social distancing protocols (1.5metres), provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks and limiting gatherings as per GoK directive.
- Provide training programmes to the community to cope with changes brought by establishment of transmission line
- Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly.
- 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.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) as early as possible in the project development to receive and address complaints from host community.

8.5.19 Mitigating impacts of community Expectations on CSR

The following should be undertaken:

- Adopt and implement a CSR plan (Annex 14 section 3.20 CSR) targeting activities within KETRACO's mandate for implementation during the project
- 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's 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
- Ensure implementation of plans in Annex 14 such as vulnerable peoples plan, local recruitment plan, labour management plan, gender mainstreaming plan, Labour influx Management Plan, Social Impacts Management Plan, Livelihood Restoration Plan to ensure host community accesses the project benefits.
- Ensure engagement on the project and CSR implementation (further consultations on priority projects and implementation plans) are done in line with Ministry of Health COVID-19 prevention and mitigation measures including but not limited to; physical / social distancing protocols (1.5metres), provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks and limiting gatherings as per GoK directive.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from host community

8.5.20Mitigating risks and Impacts on Vulnerable populations

The following should be undertaken to cushion the vulnerable populations such as the elderly, orphans, PLWD, and widows amidst COVID-19 pandemic from the project risks:

- Amidst COVID-19, clearly identify / map vulnerable households and individuals such as orphans, PLWD, widows and elderly to ensure they have access to development benefits and opportunities.
- Apart from cash compensation, consider other alternatives such as in-kind or land to land compensation especially for vulnerable people such as orphans, PLWD, widows and elderly to cushion them from projects impacts that are likely to be exacerbated by COVID 19 pandemic
- Implement livelihood restoration plan (LRP) with specific targeted interventions for vulnerable persons to respond to the project impacts and COVID-19 pandemic effectively
- Establish and implement targeted interventions / support for Vulnerable Individuals and HouseholdsVulnerable individuals and households during RAP. 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.
- Establish and implement a GBV -SEA/SH action plan for the project to mitigate GBV that has been exacerbated by COVID-19 against the vulnerable population.
- 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
- In the context of COVID-19 and various vulnerabilities, offer transitional assistance in consultations with vulnerable persons / households to cushion them from displacement / relocation hardships.
- Involve Grievance Redress Committees (GRCs) and Community Liaison Officers (CLOs) to ensure protection of rights of the vulnerable especially orphans, PLWD, widows and elderly.
- Implement the Stakeholders Engagement Plan while ensuring adequate, meaningful, and continued consultation with Vulnerable Individuals and HouseholdsVulnerable individuals and households. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive.
- Implement a Local Recruitment Plan and while at it prioritise and reserve certain employment opportunities for Vulnerable PAPs such as, PLWDs and widows.
- 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.
- Implement the Gender Mainstreaming Plan to cushion vulnerable women including widows and PLWD from discrimination in project opportunities and COVID 19 impacts.
- 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 and COVID 19 impacts. Such could include:
    - Orphans: Link up orphans with government scholarship opportunities by liaising with County Government; and with county government for registration under Cash Transfer for Orphans and Vulnerable Children to cushion them from both project impacts and COVID-19 impacts.

- PLWD: Liaise with County Government Social protection department to register PLWD with Cash Transfer for Persons With Severe Disabilities (PWSD-CT) to cushion them from project impacts and the impacts exacerbated by COVID-19
- Elderly: Link up the elderly (65 years and above) with Social protection department at County level for registration with Older Persons Cash Transfer (OPCT) program to cushion them from both project impacts and the health impacts exacerbated by COVID-19
- Link up the extremely impoverished households with Hunger Safety Net Programme (HSNP) via social protection department and vulnerable households' children to County / constituency scholarships program to cushion them from both project impacts and impacts exacerbated by COVID-19.

8.5.21 Mitigating Child labour and forced labour

The following should be undertaken to protect the rights of children and elimination of 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 a labour management plan – *Annex 14 section 3.12* to promote fair and equitable labour practices during the COVID 19 pandemic including the project cycle for the fair treatment, protection of workers' rights, non-discrimination and equal opportunity of workers
- Implement a local recruitment plan - *Annex 14 section 3.14* – to create opportunities for local employment and to adopt a fair and consistent approach to the recruitment, assessment and selection of local employees during the COVID 19 pandemic including the project cycle.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from host community during the COVID 19 pandemic including the project cycle.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 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.
- Adopt and implement livelihood restoration plan (Annex 14 -section 3.22 LRP) to ensure host community and particularly vulnerable persons have access to livelihood interventions including access to National Safety Net programs for Vulnerable persons / Government support programs
- Implement the Vulnerable Persons Plan to ensure that vulnerable persons including women and girls are cushioned from the project impacts and have equal opportunities to participate in and benefit from the proposed project.

8.6 Mitigation Measures for Negative Social Impacts during operation

8.6.1 Mitigating spread of STD, HIV and AIDS

The recommended mitigation measures are similar as those presented in section 8.5.4.

8.6.2 Mitigating theft and vandalism

- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community.
- Minimize overcrowding at the construction site so as to prevent double handling of materials and equipment.
- Provision of proper management of materials by allocation to specific persons involved.
- Advanced tracking of on-site construction machinery which facilitate an improvement in the safety performance job site layout and prevent theft
- Optimize the utilization of construction equipment.
- Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly
- 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.
- Liaise with law enforcement in the project area to ensure theft and vandalism perpetrators are held to account.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community. Acts of vandalism and theft are less likely to happen if the project has demonstrated a genuine interest in the well-being of the host community.

8.6.3 Mitigating Gender and equality biases

The recommended mitigation measures are similar as those presented in section 8.5.7.

8.6.4 Mitigating Illicit behaviour / drug and alcohol abuse

The recommended mitigation measures are similar as those presented in section 8.5.11.

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

The recommended mitigation measures are similar as those presented in section 8.5.13.

8.6.6 Mitigating Labour influx

The recommended mitigation measures are similar as those presented in section 8.5.17.

8.6.7 Mitigating Community Expectations on CSR

The recommended mitigation measures are similar as those presented in section 8.5.19.

8.7 Mitigation Measures for negative social impacts during decommissioning phase

8.7.1 Mitigating spread of STD, HIV and AIDS

The recommended mitigation measures are similar as those presented in section 8.5.4.

8.7.2 Mitigating theft and vandalism

The recommended mitigation measures are similar as those presented in section 6.2.3.

8.7.3 Mitigating gender and equality biases

The recommended mitigation measures are similar as those presented in section 8.5.7.

8.7.4 Mitigating illicit behaviour / drug and alcohol abuse

The recommended mitigation measures are similar as those presented in section 8.5.11.

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

The recommended mitigation measures are similar as those presented in section 8.5.13.

8.7.6 Mitigating labour influx

The recommended mitigation measures are similar as those presented in section 8.5.17.

8.8 Mitigating potential risks to the project

8.8.1 Mitigating community demonstrations in pursuit for employment opportunities

- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from PAPs and host community.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs
- Ensure implementation of plans in Annex 14 such as local recruitment plan, labour management plan, gender mainstreaming plan, Labour influx Management Plan, Livelihood Restoration Plan to ensure host community accesses the project benefits.
- 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 to ensure direct employment opportunities such as wayleave officers, community liaison officers (CLOs) and vacancies emanating from the project are recruited locally in a fair, consistent, and transparent process.

8.8.2 Mitigating Theft and Vandalism

The recommended mitigation measures are similar as those presented in section 8.6.2.

8.8.3 Mitigating Terrorism

- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from PAPs and host community.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs.
- Thoroughly screen workers, suppliers and distributors to ensure security enhancement.
- Provide vehicle scanning systems.
- Ensure 24-hour surveillance by engaging the Administration Police services during the day and night;
- Install CCTV cameras in strategic locations in workers' camps, offices, and substation areas.
- Ensure close liaison with the local Police officers.

8.8.4 Mitigating Speculation for land compensation

- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from PAPs and host community
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs

On false information:

- KETRACO to engage affected persons as outlined in the Stakeholder Engagement Plan (SEP) (Annex 14 section 3.16 – SEP).
- The planning and implementation of the transmission line remains as publicly shared.
- Any changes necessitated by unforeseen circumstances should be communicated and a new census of affected persons conducted.

On hike in prices / value of land:

- KETRACO to adopt compensation rates established by the RAP as per cut-off date Compensation to be made to bonafide landowners with official land documents

8.8.5 Mitigating Political interference

- 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 Machakos county and Murang'a county.
- Obtain necessary permissions and approvals from the County Governments.

- Ensure EIAs are conducted for specific project activities such as campsites, quarries, materials sites, campsites, boreholes etc
- Full and proper implementation of the Resettlement Action Plan (RAP) for the proposed project.
- Ensure relocation and compensation is in accordance to provisions within RPF developed under this project.
- Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly
- 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.
- 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.
- Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure all stakeholders and the public are involved during the project cycle.

8.8.6 Mitigating Lack of land documentation

- Full and proper implementation of the Resettlement Action Plan (RAP) for the proposed project, guided by the provisions of the KESIP RPF.
- Ensure relocation and compensation is in accordance to provisions within RPF developed under this project.
- KETRACO should deposit compensation monies on an interest earning escrow account until cases such as lack of documentation and formal land rights are resolved. The proponent will ensure that information regarding interest earning escrow account is timely disseminated to all PAPs in subsequent consultation forums, to avoid project delays and compensation disputes.
- A project Grievances Redress Mechanism (GRM: Annex 14 in chapter 7) 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. If the Grievance Redress Committee is not able to provide a solution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters.
- Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs.

9 ANALYSIS OF PROJECT ALTERNATIVES

9.1 Introduction

This section analyses the project alternatives with respect to the project route and no project alternatives. It also involved studying the design alternatives based on their respective environmental cost. The Environmental and Social Impact Assessment study also sought to assess the alternatives to the proposed project. The following alternatives were considered /studied into detail.

9.2 Transmission line route options

Relocation of the transmission line route to a different site is an option available for the project implementation. At present, the developer has the following options as the transmission routes for the Project: -

9.2.1 Option 1

A double circuit 132 Kv transmission line to be established between Machakos 132/33Kv substation and a Tee-off point (Ekalakala area) on Kindaruma – Mangu 132Kv transmission line with a substation extension of 132 Kv substation at Machakos to introduce two 132Kv line bays.

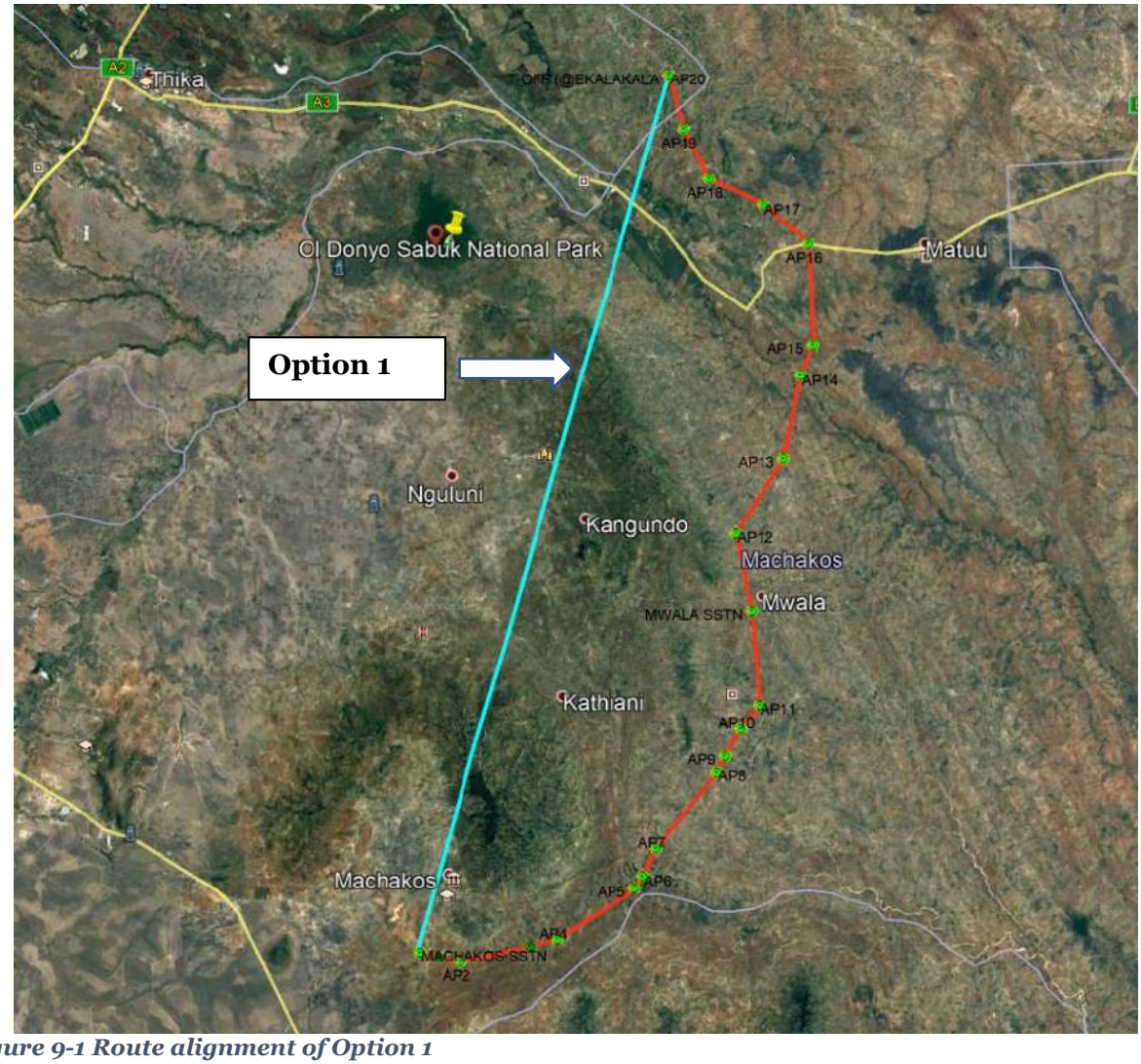

Figure 9-1 Route alignment of Option 1
Source: AWEMAC

This option is short in terms of distance covered therefore; it will be cheaper to construct as an

advantage. However, its disadvantages are more pronounced. One of the major disadvantages of this option is that it traverses the biodiversity rich Kiima Kimwe Hill and Iveti Hills Forest. This will result to adverse impacts on the environment due to great losses in the diverse flora and fauna found in these ecosystems. The mass destruction of trees in Iveti Hills Forest that will result from the proposed project will be devastating and unsustainable. This will go against the Machakos County initiatives to fight climate change and against the national target of 10% forest cover. This option will also result in a high number of resettlements. The densely populated areas of Machakos town and Kangundo Constituency (especially Tala and Katheka localities) will be affected. Many households and institutions such as Machakos University will be affected. To add on the above negative impacts, this option also traverses Ol Donyo Sabuk National Park dispersal area. Many species of animals, birds and trees will be affected through disturbance and destruction of their habitats.

9.2.2 Option 2

A double circuit 132 Kv transmission line to be established between Machakos 132/33Kv substation and a Tee-off point (Ekalakala area) on the Kindaruma – Mangu 132Kv transmission line, with establishment of a new 132Kv switching substation at Ekalakala, and Extension of 132 Kv substation at Machakos to introduce two 132Kv bays. This option will have the same impacts as that of the proposed development but with additional fauna and flora impacts on the proposed site for a new 132KV switching substation at Ekalakala.

9.2.3 Option 3

A double circuit 132 Kv transmission line to be established between Machakos 132/33Kv substation and a Tee-off point (Ekalakala area) on the Kindaruma – Mangu 132Kv transmission line and; Extension of 132 Kv substations at Machakos and Malaa to introduce two 132Kv line bays in each of the substations.

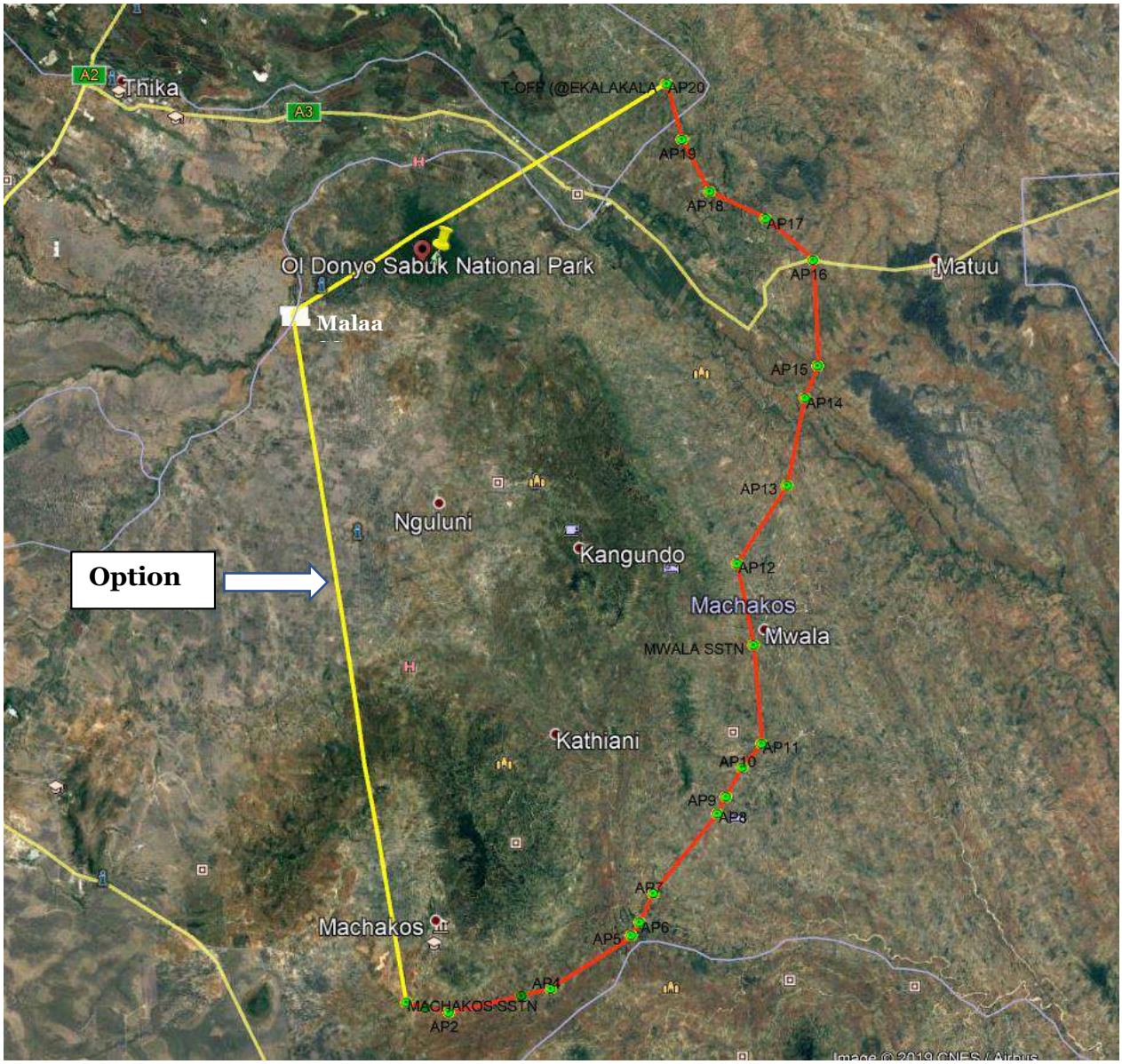

Figure 9-2 Route alignment of option 3
Source: AWEMAC

This option avoids the ecological rich Kiima Kimwe Hill, Iveti Hill Forest and Mavoloni Hills as an advantage. However, it has a greater impact on Ol Donyo Sabuk National Park since it traverses it right in the middle. The park being a wildlife protected area will be adversely affected if such a project is constructed through it. A lot of indigenous species of both plants and animals will be lost. This could result to an increase in endangered species in the Park. This option will also lead to a high number of resettlement cases. It traverses the densely populated Machakos town, Kangundo and Matungulu Constituency.

9.3 Laying of Underground Transmission Cables

High voltage electricity transmission lines can be laid underground instead of overhead transmission lines. The most common types of underground electric power transmission cables include the following.

i). HPFF (High-Pressure Fluid Filled Pipe)
ii). HPGF (High-Pressure Gas Filled Pipe)
iii). SCFF (Self Contained Fluid Filled)
iv). XLPE (Solid Cable Cross-Linked Polyethylene)

Generally, the step by step procedure of installing underground electric power transmission lines includes the following series of events.

- Row Clearing
- Blasting (or) Trenching
- Welding Pipe (or) Arranging
- Installation of Vault & Duct Bank
- Backfilling
- Installation of Cable
- Adding gas (or) Fluids
- Restoration of land

In urban areas, this type of transmission line is enclosed/shielded with dielectric liquid and a metal pipe that is either fixed or spread through pumps.

Advantages

(a) Post-construction issues such as aesthetics, concerns regarding electric and magnetic fields (EMF), and property values are usually less of an issue for underground electricity transmission lines. Underground electricity transmission lines are not visible after construction and have less impact on property values and aesthetics.
(b) The underground electric power transmission cables are very safe to the environment, public, animals, etc. These cables are not impacted and affected by the weather conditions as well as trees, accidents, animals, storms, physical interference etc.
(c) The underground electric power transmission cables have less voltage drop since these cables are much larger in diameter than overhead cables for the same power delivery.
(d) Underground electricity transmission lines don't interfere with proximity communication lines, television frequencies, radio frequencies and corona discharge.
(e) The underground electric power transmission cables are beneficial in terms of noise reduction.
(f) Additionally, these cables have low loss of transmission, reduced harm, and accidents.

Disadvantages

(a) Underground lines generally cause greater soil disturbance due to trenching requirements, while overhead lines disturb the soil primarily at the location of the transmission poles.
(b) Trenching an underground line through farmlands, forests, wetlands, and other natural areas causes significant land disturbances. The ROW for underground transmission lines must be kept clear of trees and bushes, while small trees and bushes are allowed within the ROW under overhead lines.
(c) The underground electric power transmission cables are limited by the costly construction and dissipation of heat. Due to these reasons, an underground cable transmits up to 33-kilovolts.
(d) It is complicated to recognize the faults in underground electric power transmission. It takes much more time as well to repair the underground transmission cables.
(e) The lifespan of underground electric power transmission cables is low compared to overhead cables.
(f) The installation of underground transmission lines costs more per foot than most overhead lines. Costs of underground construction can range from four to ten times as much as an equivalent length of overhead line. However, generalized cost ratios of underground to overhead options should not be used because costs are site-specific. The cost of constructing underground transmission lines is determined by the local environment and the distances between splices and termination points. But, the cost of these cables is high and laying process is time-consuming as compared to overhead transmission lines.
(g) Challenges of right-of-way access and maintenance (accessibility),
(h) construction limitations in urban areas which includes conflicts with other utilities (this may be complicated by another type of value services like pipelines of gas, oil, and sewer lines),

(i) trenching construction issues which may include blasting due to hard rock surfaces encountered in the RoW. This attracts other construction related impacts such as noise and vibrations; faulting of nearby structures; increased health and safety hazards from fly rocks as a result of blasting.
(j) Challenges of crossing natural or manmade barriers, and
(k) the potential need for forced cooling facilities.

From the analysed advantages and disadvantages of laying an underground electricity transmission line, the disadvantages outweigh the advantages. This is therefore not a viable option at this stage.

9.4 No Project Alternative

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 proponent, government and the society. The No Project Option is the least preferred from the socio-economic and partly environmental perspective. It is apparent that the No Project Option is no alternative to the proponent, local people, Kenyans, and the government of Kenya.

9.5 The Proposed Development Option

The proposed alternative highlights a double circuit 132 Kv transmission line to be established between Machakos 132/33Kv substation and a Tee-off point (Ekalakala area) on the Kindaruma – Mangu 132Kv transmission line with establishment of a new 132/33kv substation at Mwala, 40 km from Tee-off point and Extension of 132 Kv substation at Machakos to introduce two 132Kv line bays.

This option avoids the ecological sensitive areas such as Kiima Kimwe Hill, Iveti Hill Forest, Ol Donyo Sabuk Forest and Mavoloni Hills. As result, most of the negative environmental impacts have been avoided making it a sustainable option. The ESIA study findings also showed that the line has not traversed areas of ecological importance. The project also avoids the densely populated areas of Machakos County; Machakos town, Kangundo Constituency and Matungulu Constituency. This is good in the sense that displacement of households will be greatly minimized as the locations it traverses in general have a scattered population structure.

Under the Proposed Development Option, 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 of the Project, provided all environmental 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 impacts to the maximum extent practicable.

9.6 Analysis of Alternative Construction Materials and Technology

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

9.7 Multicriteria evaluation of TL development options

A multi-criteria analysis based on the anticipated impacts (environmental, social as well as economic impacts), and cost of implementation was used to score the above alternatives (Table 9-1). The option with significant/highest positive impact was given a score of 5, where no change was

anticipated, a score of 0 was given while the most adverse/negative impact was given a score of -5.

Table 9-1 Multicriteria evaluation of TL development Options

Impact	Project Alternatives					
	Transmission Route			Under ground TL	No Project	Proposed Development Option
	Option 1	Option 2	Option 3			
Environmental Impacts						
Aquatic and Habitat Alteration	-3	-1	-3	-5	2	-1
Loss of vegetation cover and biodiversity	-5	-2	-5	-5	3	-2
Terrestrial Habitat Alteration	-5	-2	-5	-5	-2	-2
Impact on migratory birds	-2	-2	-5	5	5	-2
Social Impacts						
Displacement of households and businesses / Impact on livelihoods	-1	-1	1	-5	5	-1
Employment Opportunities	3	3	4	5	-5	5
Economic impacts						
Power transmission reliability / stability in distribution	-4	3	2	2	-5	5
Gain in Local and National Economy	2	4	2	2	-5	5
Project Cost	-4	2	-3	-5	0	2
Score	-19	4	-12	-11	-2	9

Option 2 scored relatively well (score of 4) since it will have the same impacts as that of the proposed development but with additional fauna and flora impacts on the proposed site for a new 132KV switching substation at Ekalakala. The No project alternative had a score of (-2) but still has higher impacts compared to the proposed development option. It's worth noting that despite not having direct impact on biodiversity, need for energy will continue to instill pressure on the biodiversity from cutting down of trees for energy production. Such will result to habitat alteration hence denying the no project alternative a chance to attain maximum scores. Option 1 which is the shortest route of having the Transmission route traverse directly through rich Kiima Kimwe Hill and Iveti Hills Forest was found to be the most detrimental (score of -19) on biodiversity. Option 3 (score -12) would pass through Ol-donyo Sabuk National Park hence creating adverse impacts on loss of vegetation cover and biodiversity including terrestrial habitat alteration. Underground Transmission line followed closely with high adverse impact (score of -11) cutting across, biodiversity impacts, costs and displacement of households. Overall, the proposed development was considered the most suitable option from this study with a score of 9.

10 CHAPTER TEN: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

10.1 Introduction

KETRACO acknowledges that the proposed project activities will have some impacts on the biophysical environment, health and safety of its employees and members of the public, and socio-economic wellbeing of the residents. Thus, the focus was on reducing the negative impacts and maximizing the positive impacts associated with the project activities through a continuous improvement programme. An environmental and social management plan (ESMP) including a monitoring plan has been developed to assist the proponent in mitigating and managing environmental impacts associated with the life cycle of the project – a detailed ESMP is illustrated in table 10-1.

The ESMP table 10-1 consists of section A and section B. Section A highlights the potential positive impacts and gives recommendations to enhance the impacts including respective responsibility for enhancement, timelines and cost overlay. Section B highlights the negative impacts and gives proposed mitigation measures for the negative impacts including respective responsibility for mitigation, timelines and cost overlay. The ESMP was 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 should be subjected to a regime of periodic review for continuous improvement.

The ESIA study has further established detailed environmental and social management plan (ESMP); a comprehensive Environmental and Social Monitoring Plan (ESMmP); including standalone management plans (Annex 14) for various aspects with mitigation measures for negative impacts and enhancement measures for the anticipated positive impacts. Some of the management plans are as follows;

- Atmospheric Emissions Management Plan
- Hazardous Substances Management Plan
- Spill Prevention and Countermeasures Management Plan
- Fire Risk Management Plan
- Noise Management Plan
- Surface Water Management Plan
- Waste Management Plan
- Biodiversity Management Plan
- Occupational Health and Safety Management Plan
- Emergency Preparedness and Response Management Plan
- Labour Management Plan
- Labour influx management plan
- Local Recruitment Plan
- Associated Facilities Management Plan
- GBV-SEA/SH action management plan
- Stakeholder Engagement Plan
- Grievance Redress Mechanism
- CSR plan.
- Resettlement Action Plan
- Livelihood Restoration Plan
- Gender mainstreaming plan
- Chance Finds Procedure
- Resource Efficiency and Pollution Prevention and Control Plan
- External Communication Mechanism on Environmental Issues
- Community Health and Safety Plan

Taking into cognisant COVID-19 pandemic that has affected all sectors globally, it is recommended that all project activities be carried out in line with the Ministry of Health COVID-19 prevention and mitigation measures / issued government protocols where viable including but not limited to:

- Physical / social distancing protocols (1.5 metres),
- Provision of handwashing facilities (soap and water) or hand sanitizing facilities,
- Wearing of masks in public and,
- Limiting gatherings as per GoK directive.

10.2 Environmental and Social Management Plan

Table 10-1 Environmental and Social Management Plan

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
Enhancement of Environmental Impacts during construction & operation Phase				
Reforestation	▪ Compensate the PAPs for the lost trees to enable them to re-plant outside the RoW. ▪ As a corporate social responsibility (CSR) the proponent to collaborate with KFS to replant trees in protected forest areas / gazetted areas through purchasing seedlings and nurturing the trees for a period of 3 years	KETRACO Environmental & Social Safeguards Team	Throughout construction phase	As per RAP budget
Control of invasive species	▪ Contractor to ensure only indigenous tree species / vegetation is re-planted after clearance of the right of way ▪ Preference be given to exotic tree species such as *Kigelia Africana* (The species is locally referred to as Muatine), *Dalbergia melanoxylon* (Locally known as Muvingo and is a hardwood), *Terminalia brownie* (The species is locally known as Muuku and it is a hardwood), *Acacia tortilis* (Locally known as Mulaa), *Acacia mellifera*, *Acacia drepanolobium, Acacia xanthophloea, Balanites aegyptica, Commiphora holticiana*, Ficus sycomorus (Fig tree) ▪ Employ vegetation rehabilitation techniques such as planting grass to recover lost plant cover mostly in areas where the RoW will traverse	Contractor Site Manager, & Environmental Team	Throughout construction phase	200,000
Reduction in Greenhouse Gas emission	▪ KETRACO to ensure reliability in the provision of electricity through a routine repairs and maintenance program. This 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 Machakos and Murang'a County ▪ KETRACO to liaise with Kenya Power at agency level to distribute ensure the residents of both Machakos and Murang'a Counties are connected to the National Grid. This will reduce dependence on fuelwood by providing an alternative lighting and cooking source of energy to the residents. Further it will improve access to	KETRACO Engineering Department	Throughout Operation phase	Operational & maintenance costs

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	adequate and affordable energy for households in surrounding towns and industrial sectors hence help in rolling back the rate of deforestation and thus conserving forest resources, biodiversity, soil conservation and water resources. Notably access to affordable energy will improve efficiency in transportation, industrial production, and farming methods with the potential of reducing global, regional, and local pollutants emissions such as carbon monoxide, carbon dioxide, particulate matter, oxides of nitrogen and sulphur oxides to the atmosphere.			
Reduction of overreliance on fuelwood	▪ KETRACO to liaise with Kenya Power at agency level to distribute and connect both Machakos and Murang'a Counties households, industries to the grid. This will reduce reliance on fuelwood and reduce overreliance on charcoal production thereby contributing towards among others, the national goal of meeting the minimum forest cover	KETRACO Engineering Department	Throughout Operation phase	Minimal costs
Enhancement of Social Impacts during construction & Operation Phase				
Creation of employment opportunities	▪ KETRACO to ensure that contractors adopt and develop a Local Recruitment Plan *(Annex 14 section 3.14)* to enhance creation of employment opportunities, training, and skills. Specific enhancement measures include: ➢ A procedure for a fair, consistent, and transparent recruitment of both semi-skilled and unskilled locals including men and women above 18 years of age in Machakos County and Murang'a County. ➢ Locals within the settlements along the transmission line be given priority for unskilled jobs such as vegetation clearance, cleaning, etc. ➢ Maximising capacity enhancement and transfer of knowledge and skills to local employees, through on-the-job trainings to the extent possible.	KETRACO Environmental & Social Safeguards Team / Procurement Contractor Social safeguards Team / Human Resource / Site Managers	Throughout construction & Operation phase	Livelihood restoration – As per RAP budget Local recruitment plan – Institutional costs

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	▪ The Local Recruitment Plan to outline conditions of employment – earnings and benefits to avert unequal remuneration for the selected employees. ▪ Contractor to ensure non-discrimination and equal opportunity during selection of project workers. This to be attained through; ➢ *Eligibility*: All locals seeking employment be required to be 18 years of age and provide a National Identity (ID) card ➢ *Sourcing potential employees*: Recruitment of workers for the transmission line be done via adverts through the offices of Locational and Sub-locational Chiefs hence ease of access to all community members. ▪ KETRACO to ensure the contractor takes measures to prevent and address harassment, intimidation, and/or exploitation, especially in regard to women. The principles of non-discrimination should apply to all workers. ▪ Contractors to develop a code of conduct and ensure its signed by all workers with physical presence on site. 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. ▪ Contractor to ensure non-discrimination of Vulnerable Individuals and HouseholdsVulnerable individuals and households such as PLWD, and widows. ▪ Where possible, contractor should prioritize and reserve certain employment opportunities for Vulnerable persons such as, PLWDs and widows ▪ KETRACO to ensure Contractors adopt, develop & implement a Labour Influx Management Plan *(Annex 14 section 3.13)* as part of C-ESMP to ensure reduction of labour influx by tapping into the local workforce. ▪ KETRACO to ensure implementation of a livelihood restoration plan (LRP) *(Annex 14 section 3.22)* that create alternative economic / job opportunities for the locals. Such include; (a) Crop based Livelihoods; through regeneration of food crops and cash crops by better extension services in partnership with			

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	the County Ministry of Agriculture; forestry through liaising with KFS to train farmers and offer seedlings on sustainable tree planting (b)Enterprise Based Livelihoods; ➢ A local buying program during the construction period hence more jobs to locals, ➢ Micro Loans/Small Business Grant to ensure enhanced social investment by KETRACO in the community ➢ Financial Literacy Training Entrepreneurial training: for existing small businesses and support with small grants for the identified Vulnerable Individuals and HouseholdsVulnerable individuals and households ➢ Apiculture – Linking farmers with Ministry of Agriculture for training in commercial oriented beekeeping enterprises ▪ KETRACO to ensure direct employment opportunities such as wayleave officers, community liaison officers (CLOs) and vacancies emanating from the new substations are recruited locally in a fair, consistent, and transparent process.			
Gains in the local and national economy	▪ KETRACO to ensure contractors adopt, develop and implement a Local Recruitment Plan *(Annex 14 section 3.14)* as part of C-ESMP to provide employment to the locals both men and women above 18 years of age, hence income from the salaries and wages will improve not only the County but the local economy of the trading centres where the RoW passes. Some of the trade centre's include Kwa Mwau Market in Kimutwa Location; Makaveti Trading Centre in Kimutwa Location; Kaani Market Centre in Iveti Location; Masii market in Masii location; Mwala town in Mwala Location; Mumbuni in Mbiuni Location; Sofia Market in Kithimani Location; Mukundi Market in Kakuzi Location, Murang'a County; and Kambi Mawe Market in Mavoloni Location ▪ As part of the tendering process, KETRACO should ensure contractors develop a purchasing plan that stipulates how national	KETRACO Social Safeguards Team / Procurement	Throughout construction & operation phase	Institutional costs

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	and local purchase of goods and services will be optimised. It is expected that contractors should purchase some of the materials such as sand from the project area and as such contribute positively to the local and national economy. ▪ KETRACO to liaise with other line agencies such as Kenya Power to ensure achievement of project development objectives aimed to increase the capacity / adequacy of the transmission system and access to electricity in the project area which will lead to gain to the national economy from revenue generation. ▪ KETRACO to liaise with Kenya Power through Ministry of Energy to support grid densification, intensification and grid expansion to reach about various households within the project region. 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. Such will boost industrialization, education and manufacturing sectors.			
Transfer of skills	▪ KETRACO to ensure Contractors maximise on capacity enhancement and transfer of knowledge and skills to local employees, through on-the-job trainings to the extent possible. This can be attained through ensuring contractors adopt, develop and implement a Local Recruitment Plan *(Annex 14 section 3.14)* and Labour Management Plan *(Annex 14 section 3.12)* as part of C-ESMP a Local Recruitment Plan. The Labour Management Plan will ensure promotion of fair and equitable labour practices for the fair treatment, non-discrimination and equal opportunity of workers. ▪ Semi-skilled labour should be sourced from within and where un-available outside the project area, as such, the local Machakos County and Murang'a County people will learn new skills from the transferred skills and knowledge.	KETRACO Social Safeguards Team / Procurement	Throughout construction & operation phase	Institutional costs

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
Training and Capacity Building	▪ KETRACO environmental and social safeguards departments to conduct training and build the capacity of the contractor to implement both the ESMP and ESMnP. This should include project staff, and implementing partners. ▪ Through implementation of Livelihood Restoration Plan *(Annex 14 – Section 3.22)*. KETRACO should consider; ➢ *Financial Literacy Training / Entrepreneurial training*: for existing small businesses and support with small grants for the identified Vulnerable Individuals and HouseholdsVulnerable individuals and households ➢ *Apiculture Training* – Linking farmers with Ministry of Agriculture for training in commercial oriented beekeeping enterprises\ ▪ As part of health and safety implementation KETRACO should ensure training is conducted on; ➢ Regular fire safety trainings /fire drills for employees and contractors ➢ The personnel involved in the handling of hazardous waste including fuel and used oil should undergo specific training in hazardous material handling procedures and fuel / lubricant and used oil handling procedures; ➢ Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; ➢ Training workers in the identification of occupational EMF levels and hazards; ➢ Training workers in the use of the available information (such as MSDSs), safe work practices, and appropriate use of PPE. ➢ Set up a health and safety committee and undertake training ▪ KETRACO to ensure contractor develops 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.	KETRACO Environmental and Social Safeguards Team / Safety Team Contractor Social and Environmental Safeguards Team	Throughout construction & operation phase	As per Training & institutional Costs

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	▪ KETRACO to ensure the contractor provides mandatory trainings regarding GBV -SEA/SH to all project workers including temporary and casual workers. ▪ KETRACO to ensure the contractor provides training and awareness raising on the code of conduct for the workforce about refraining from unacceptable conduct toward local community members, specifically women.			
Provision of market and supply for building materials	▪ As part of the tendering process, KETRACO should ensure contractors develop a purchasing plan that stipulate local purchase of goods and services including provision of market and supply for building materials. ▪ It is expected that contractors should purchase building materials such as sand, cement etc. from suppliers including hardware shops in key centres such as Kwa Mwau, Makaveti Trading Centre; Kaani; Masii; Mwala town; Mumbuni; Mukundi Market Murang'a County; and Kambi Mawe Market.	KETRACO Social Safeguards Team / Procurement	Throughout construction phase	Administrative costs
Improvement of local trade and business opportunities	▪ As part of the tendering process, KETRACO should ensure contractors develop a purchasing plan that stipulate local and regional purchase of goods and services including provision of market and supply for building materials ▪ A Purchasing Plan should ensure that contractors engage local suppliers for purchase of building materials such as sand, cement etc. from suppliers including hardware shops in key centres such as Kwa Mwau, Makaveti Trading Centre; Kaani; Masii; Mwala town; Mumbuni; Mukundi Market Murang'a County; and Kambi Mawe Market. ▪ KETRACO to ensure implementation of a livelihood restoration / enhancement plan (LRP) *(Annex 14 section 3.22)* that create alternative economic / business opportunities for the locals. Such include; ➢ A local buying program during the construction period hence local suppliers of construction materials can benefit from contracts during construction.	KETRACO Social Safeguards Team / Procurement	Throughout construction phase	Administrative costs

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	➢ Enhancement of skills on small scale businesses such as food vendors and kiosk owners who can benefit greatly during construction stage due to the expected construction workers. ▪ KETRACO to liaise with Kenya Power through Ministry of Energy to support grid densification, intensification and grid expansion to reach about various households and town centres within the project region. 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. Such would result to income generation avenues and business opportunities could emerge. For instance, the participants cited that refrigeration services, grindings, and querying, irrigation services are stalled because of lower electricity voltage in the region. Therefore, they assert that the project during the operation phase might be the key to distribution of power to revive these economic activities, thus increasing business and job opportunities.			
Improved security	▪ KETRACO to liaise with relevant security agencies including Kenya Police for deployment of police or private security services along the project RoW and mainly within substation areas such as proposed Mwala substation	KETRACO Procurement	Throughout construction & operation phase	Administrative costs
Increased access to information	▪ KETRACO to liaise with Kenya Power through Ministry of Energy to support grid densification, intensification and grid expansion to reach about various households and town centres within the project region. ▪ With improved power distribution, the project would indirectly trigger physical infrastructural development and increased access to information. ▪ KETRACO to ensure building and operation of a substation at Mwala which will result to ease of power distribution in the area. This will make it easy for locals to charge phones, listen to the radio,	KETRACO Engineering team	Throughout construction & operation phase	Project cost as per BoQ

Section A – Positive Impacts				
Potential Positive Impact	**Recommendations to enhance Positive Impacts**	**Responsibility for enhancement**	**Timeline**	**Cost (Kshs)**
	and watch television which was termed as indicator of improved standards of living.			
Health benefits of the project	▪ KETRACO to liaise with Kenya Power through Ministry of Energy to support grid densification, intensification and grid expansion to reach about various households and town centres within the project region. ▪ This will result in many families replacing kerosene lamps for lighting with electricity thereby reducing disease burden at the family level and on the government due to paraffin related lighting (Paraffin Lantern; Paraffin Pressure Lamp and Paraffin Tin Lamp); and use of firewood, attributed to indoor air pollution.	KETRACO Engineering team	Operation phase	Administrative costs

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Construction phase				
Minimization of Environmental Impacts				
Terrestrial Habitat Alteration	▪ Use of existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible to avoid 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 especially by varying tower spans; ▪ Avoiding construction activities during the breeding season and other sensitive seasons ▪ Management of construction site activities by limiting access road gradients to reduce runoff-induced erosion ▪ Re-vegetation of disturbed areas with native / indigenous plant species such as Acacia sp. and Croton sp.;	Contractor Civil Engineer & Environmental Team KETRACO Civil Engineer & Environmental Safeguards Team	Continuous during construction and operation	1,350,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Working in close coordination with pertinent agencies (KWS and KFS) when undertaking construction of towers.			
Loss of vegetation Cover and biodiversity	▪ Minimize clearing of indigenous plant species such as Kigelia Africana (The species is locally referred to as Muatine), Dalbergia melanoxylon (Locally known as Muvingo and is a hardwood), Terminalia brownie (The species is locally known as Muuku and it is a hardwood), and ensure replanting of indigenous plant species in disturbed areas. ▪ Provide adequate protection against scour and erosion; and consider the onset of the rainy season with respect to construction schedules. ▪ Employ vegetation rehabilitation techniques such as planting grass to recover lost plant cover mostly in areas where the RoW will traverse ▪ Ensure proper demarcation and delineation of the project area to be affected by construction works; ▪ Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage; ▪ Designate access routes and parking within the site; ▪ Design and implement an appropriate landscaping programme for the Mwala substation site; ▪ Support community initiatives in tree planting through liaising with relevant agencies such as KFS.	KETRACO Site Manager / Civil Engineer & Environmental Safeguards Team Contractor Site Manager, Civil Engineer & Environmental Team	Continuous during construction and operation phase	600,000
Risk of fire	▪ Conduct a fire risk assessment along RoW; ▪ Conduct regular trainings and fire drills for employees; ▪ Removing blow down and other high-hazard fuel accumulations; ▪ Time thinning, slashing, and other maintenance activities to avoid forest fire seasons; ▪ Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access. ▪ Create fire breaks (ploughed strips) on strategic areas of the RoW to prevent fire spreading to other pasture lands or from pasture lands to the substation project sites.	KETRACO Health & Safety Team Contractor Health & Safety Team	Continuous during construction and operation phase	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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 and install all pertinent fire safety equipment.			
Avian (Birds) collisions and electrocutions	The following should be undertaken especially on the bird flight section where bats and migratory birds fly from Konza area to Machakos town and between Machakos Valley and Masinga Dam Reservoir. This should also mitigate Avian and Bat Collisions and Electrocutions; ▪ Engineering solutions including installing visibility enhancement objects such as wire marker balls, bird perch deterrents, or diverters; especially within Kimutwa Location and Nzasu sub-location; and Mamba village within Ndalani Location. Other key areas that require to be considered include sections of the Ikiwe, Kimutwa, Love, Mwania, Wamua and Wamui areas to alert birds to the presence of power line, allowing them time to avoid the collision; ▪ Building raptors platforms on top of towers for roosting and nesting; ▪ Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware; ▪ Insulation through covering energised parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; ▪ Installing elevated perches, insulating jumper loops, placing obstructive perch deterrents (e.g. insulated "V's") on the transmission line. ▪ Working with line agencies such as NMK, KWS and relevant NGOs such as Birdlife International and Nature Kenya for expert	KETRACO Civil Engineer & Environmental Safeguards Team Contractor Civil Engineer & Environmental Team	Throughout operation phase	15,250,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	opinion and specialized monitoring studies (ornithological studies).			
Mammals (including Bats) Collisions and Electrocutions	The following should be undertaken. ▪ Implementation of an integrated vegetation management approach (IVM) during repairs and maintenance of RoW. The selective removal of tall-growing tree species and the encouragement of low-growing grasses and bushes to avoid alteration and disturbance to critical natural habitats such as bat foraging corridors, roosting and breeding areas. ▪ Provision of engineering solutions such as wire-marking through installing visibility enhancement objects such as marker balls ▪ Ensuring towers / pylons are insulated to act as bats roosting places. ▪ Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware; ▪ Insulation: covering energised parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to bats. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; ▪ Work with line agencies such as KWS and relevant NGOs such as Nature Kenya for expert opinion and specialized bat survey. The data acquired may inform other studies in future and document which bat species exist in the area.	KETRACO Civil Engineer & Environmental Safeguards Team Contractor Civil Engineer & Environmental Team	Throughout operation phase	5,000,000
Aquatic Habitat Alteration (Wetlands)	▪ Ensure power transmission towers / pylons are not anchored on critical aquatic habitat (e.g. watercourses, wetlands, and riparian areas) ▪ Minimize clearing and disruption to riparian vegetation (along rivers such as River Mwania; River Ikiwe; Athi River, Thika River and Water harvesting dams (such as Mbuno Dam, Kitulu dam, and Masimba dam) ▪ Adjust tower placements to span wetlands or limit equipment access in wetlands, wherever possible;	KETRACO Civil Engineer & Environmental Safeguards Team Contractor Civil Engineer & Environmental Team	Throughout construction and operation phase	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Working in close consultation with line agencies such as the Water Resources Authority in both Machakos and Murang'a County			
Human - wildlife conflict / **Temporary obstruction of movement of wild herbivores** **/** **Destruction of habitats for herpetofauna (reptiles and amphibians)**	All personnel should be briefed about wild herbivores protection measures at the outset of the project, in order to ensure that these measures are clearly understood and appropriately implemented. The briefing needs to provide an overview of the mitigation measures that are being used at the site, as well as instructions on what do to when wildlife are encountered during the work. It should also include information on any species at risk that may be present, and what to do if one is seen. A laminated handout summarizing key information on wildlife protection should always be kept on-site for reference by staff. The handout should be tailored to suit the needs of each specific project, but should address the following subjects: ✓ General provisions – e.g., do not harm, feed or unnecessarily harass wildlife / wild herbivores; drive slowly and avoid hitting wildlife where possible; keep site tidy and secure ✓ Species at risk – basic identification tips and recommendations (needs to be modified to address species most likely to be encountered at the project route) ✓ Contact information for: ➢ Project biologist / wildlife service provider ➢ Ministry of Natural Resources and Forestry, KFS (for species at risk) ➢ Wildlife rehabilitators (KWS) and veterinarians (for orphaned or injured wildlife) ▪ The management of the project route needs to specifically address how to avoid attracting wildlife to the workspace. Although on-site activities will generally discourage wildlife from entering the workspace during the day, they may be drawn to the site at night (or on weekends) if it appears to provide sources of food, water or shelter. The following common attractants should be controlled or eliminated:	KETRACO Site Manager / & Health and Safety Team Contractor Site Manager, and Health & Safety Team	Throughout project period	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	✓ Food wastes and other garbage – effective mitigation measures include waste control (prevent littering); keeping all trash secured in wildlife-proof containers, and prompt removal from the site (especially in warm weather). ✓ Water – effective mitigation measures include ensuring proper site drainage to limit standing pools of water; fencing off temporary storm ponds and other waterbodies within the work space (and not permitting wildlife access to any potentially contaminated waterbodies); and, use appropriate sediment and erosion control measures to protect the quality of surface water adjacent to or downstream of the work space. ✓ Shelter – effective mitigation measures include covering or containing piles of soil, fill, brush, rocks and other loose materials; capping ends of pipes where necessary to keep wildlife out; ensuring that trailers, bins, boxes, and vacant buildings are secured at the end of each work day to prevent access by wildlife. ▪ While all personnel need to be aware of the wildlife protection measures, one or more people should be specifically tasked with ensuring that those measures are properly implemented, by performing the following duties: ✓ Checking the work site (including previously cleared areas) for wildlife, prior to beginning work each day. ✓ Regularly inspecting protective fencing or other installed measures to ensure their integrity and continued function; and, ✓ Monitoring construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements. ▪ Active avoidance by construction workers of all herpetofauna (amphibian and reptiles) during construction			

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Spread of Alien Invasive Plant Species	▪ Decontamination e.g. washing of equipment to remove soil potentially carrying the invasive species propagules ▪ Avoid importing soils/gravels to use for level grounds ▪ Reduce proliferation of the invasive species through active periodic way leave management	KETRACO Site Managers & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	200,000
Pollution from Hazardous Materials	▪ Use of designated areas of hard standing for repair and maintenance of machinery e.g. garages to avoid fuels and lubricant spills at the RoW construction sites; ▪ Install oil trapping equipment and remedial measures in areas where there is a likelihood of oil spillage e.g. during maintenance of machines and construction equipment; ▪ Implement the Spill Prevention & Counter Measures Management Plan (SPCMMP) – Annex 14 section 3.4 to deal and prevent hazardous material spills ▪ 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; ▪ A written 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; ▪ Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed from site until repaired; ▪ Spill response kit (e.g. absorbents) to be readily available at the construction site; ▪ Hazardous substances to be stored only in specialized/labelled containers and designated storage facility with warning signs; ▪ Hazardous materials storage facilities should be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public; ▪ Storage and handling facilities of hazardous liquid should be bounded with an impermeable base;	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	2,500,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ The personnel involved in the handling of hazardous waste including fuel and used oil should undergo specific training in hazardous material handling procedures and fuel / lubricant and used oil handling procedures; ▪ Contract a NEMA registered waste handler to dispose hazardous materials including waste oil in designated manner;			
Increased Soil erosion risk and Soil quality degradation	▪ Soils excavated for the erection of towers should be used for re-filling and should not be left exposed to wind or water for long periods; ▪ The contractor should avoid steep terrain during the transportation of construction material by using alternative routes, use light vehicles or existing routes where appropriate; ▪ Riverine vegetation such as around streams, rivers, dams should be minimally disturbed during the construction phase to reduce soil erosion and safeguard riverbank protection; ▪ Ensure timely revegetation of disturbed areas with local species common in the area to complement natural vegetation along the RoW to improve ground cover; ▪ 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 should be designed within substations; ▪ Apply soil erosion control measures such as levelling of the substation and project site to reduce run-off velocity and increase infiltration of storm water into the soil; ▪ Ensure that construction vehicles are restricted to use existing graded roads ▪ Ensure drains maintenance and ripping off compacted areas to reduce run-off especially in mountainous topography of the wayleave in order to avoid soil erosion and soil quality degradation of productive lands along the wayleave ▪ Ensure construction activities are kept outside the tree and vegetation protection zone, for any trees and vegetation that will be maintained on project work sites	KETRACO Environmental Safeguards Team Contractor Environmental Team	Throughout project period	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Minimization of Air pollution				
Increased Dust Emissions	▪ Avoid excavation works in extremely dry weather; ▪ Ensure strict enforcement of construction vehicles on-site speed limit regulations; in villages traversed by the proposed transmission line such as Ithanga, Kasioni, Languni, Kiaoni, Muutu, Utheke, Kalenga, Kamuya, Love, and Mwania ▪ Sprinkle water on graded access routes when necessary to reduce dust generation by construction and vehicles; ▪ Ensure stockpiles of earth are enclosed / covered / watered during dry or windy conditions to reduce dust emissions; ▪ Provide appropriate PPE to employees and ensure proper and constant use. ▪ Add suitable soil stabilizers on access roads to control dust. ▪ Collecting storm water and use to de-dust the access roads ▪ Slowing the speed of construction vehicles by using clearly marked road signs may contribute to reducing dust levels. ▪ Adhere to the Environmental Management and Co-ordination (Air Quality) Regulations, 2014.	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	2,000,000
Increased Exhaust Emissions	▪ Sensitise truck drivers and machine operators to switch off engines when not in use; ▪ Regular servicing of engines and machine parts to reduce exhaust emission generation; ▪ Alternative non-fuel construction equipment shall be used where feasible. ▪ Ensure machines and vehicles are properly and regularly maintained. ▪ Discourage plant operators and drivers of construction vehicles from unnecessary revving and idling. ▪ Limit construction traffic movement and operations to the most necessary activities through adequate site planning. ▪ Ensuring that the construction machines, equipment and vehicles have the requisite inspection certificate. ▪ Adhere to the Environmental Management and Co-ordination, Air quality regulations of 2014	KETRACO Site Manager and Environmental Safeguards Team Contractor Site Manager, & Environmental Team	Throughout project period	2,000,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Waste Management				
Increased generation of Solid Waste	▪ Use of an integrated solid waste management system i.e., the 3 R's: 1. Reduction at source 2. Reuse 3. Recycle; this should apply to plastics, wood pellets, metallic, glass and paper waste or any other materials. ▪ Accurate estimation of the dimensions and quantities of materials required; ▪ Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time; ▪ Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage; ▪ Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste; ▪ Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site; ▪ Waste collection bins to be provided at designated points on all active sites; ▪ Dispose waste more responsibly by contracting a NEMA registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws. ▪ Composting of vegetation waste for reuse as a landscaping fertilizer. ▪ Develop and implement a Construction Waste Management Plan before start of the project. ▪ Comply with provisions of the Environmental Management and Co-ordination, Waste Management Regulations 2006.	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Continuous throughout project period	1,500,000
Increased discharge of wastewater, sewage and	▪ Provide means for handling sewage generated at the construction sites along the RoW; ▪ No grey water runoff or uncontrolled discharges from any site or working areas (including wash-down areas) to adjacent	KETRACO Site Manager & Environmental Safeguards Team	Continuous throughout project period	550,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
degradation of water quality	watercourses and/or water bodies should be permitted. This should be mitigated as follows ▪ Water containing pollutants such as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and construction vehicles wash area. ▪ The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses; This can be done by use of sediment traps and use of drainage to control the flow and velocity of the runoff ▪ Potential pollutants of any kind and in any form, shall be kept, stored and used in such a manner that any escape can be contained, and the water table not endangered; ▪ Promote recycling of wastewater and storm water where possible. ▪ Install meters to monitor consumption rates of water, where possible such as substations and workers campsites ▪ Provision of mobile toilets on all active sites fitted with water and soap. ▪ Ensure regular maintenance of plumbing systems in areas such as campsites, portable / mobile toilets and office sites to avoid spillage of raw sewage. ▪ Comply with the Environment Management and Coordination, Waste Management and Water Quality Regulations 2006.	Contractor Site Manager & Environmental Team		
Minimization of Noise and Vibration				

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Noise pollution and excessive vibration	▪ Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used at along the right of way (RoW) ▪ 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 speed limits within trade centres and high-density areas along RoW such as Massi Location, Kithimani Location, Mbiuni Location and Mwala Location. ▪ Avoid unnecessary hooting and vehicle acceleration near schools such as Kithianioni primary school, kwandoo primary school, Kitwamba primary school, Kyanganga primary school and Kyanganga secondary school, and Mikiyuni primary school which are located less than 500 metres from the proposed power line RoW. ▪ Comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009. ▪ All construction equipment and machinery to be used must be tested and calibrated to verify if they are compliant with Kenya Bureau of Standards (KEBS) and the internationally acceptable standards of noise.	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	2,000,000
Increased energy Consumption / fossil fuels	Minimizing increased energy consumption ▪ Ensure electrical equipment, appliances and lights are switched off when not being used; ▪ Install energy saving bulbs/tubes at all lighting points instead of incandescent bulbs which consume higher electric energy; ▪ Plan well for transportation of materials to ensure that fossil fuels (diesel, transformer oil, petrol) are not consumed in excessive amounts;	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Monitor energy use during construction and set targets for reduction of energy use. Minimizing fossil fuels; • Consider use of renewable energy sources for campsites such as investment in solar for lighting • Develop a transport management plan with clear schedules to reduce on unnecessary trips • Partner with relevant agencies such as KFS, local community and schools to support tree planting activities aimed at carbon sequestration.			
Increased Water abstraction and consumption	▪ Harness rainwater from campsites roofs, substation offices and storm water whenever possible for use in dust prevention, gardening and other site-specific uses; ▪ 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; ▪ Install water conserving taps that turn-off automatically when water is not being used; ▪ Promote recycling and reuse of water as much as possible; ▪ Sensitise construction workers to conserve water by avoiding unnecessary wastage and to ensure taps are not running when not in use; ▪ Develop a leakage detection and repair system for key water user points including substation sites; workers campsites along the RoW ▪ Ensure all taps and cisterns are optimally working. ▪ Drilling of borehole for use to reduce over reliance on water from existing community sources.	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	500,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Modification of hydrology	▪ Control excessive abstraction of water from boreholes by ensuring compliance with the prescribed abstraction cubic meters. ▪ Undertake standalone EIAs for each borehole and apply for a permit for all water abstractions (rivers, dams, boreholes etc.). ▪ Ensure compliance with the boreholes / rivers abstraction permits as issued by WRA. ▪ Surface runoff should be channeled to areas with gentle slopes to avoid excessive erosion.	Contractor Site Manager & Environmental Team KETRACO Site Manager & Environmental Safeguards Team	Throughout project period	2,000,000
Increased generation of storm water and impact on drainage	This should be mitigated through the following mainly along the AP1 to AP7 (outskirts of Masii and Machakos towns) which are characterized by hilly ridges and inherent sloppy nature, will lead to increased generation of surface runoff. ▪ Use of storm water management practices that slow peak runoff flow, reduce sediment load, and increase infiltration. ▪ Regular inspection and maintenance of permanent erosion and runoff control features. ▪ Adopt and implement a storm water management plan.	KETRACO Site Manager & Environmental Safeguards Team Contractor Site Manager & Environmental Team	Throughout project period	500,000
Risks and Impacts as a result of Climate Change	Adaptation options to deal with these risks and impacts include: ▪ Ensuring higher installation of power lines within 33.5metres to 46 metres to keep away from foreign objectives blown by winds during storms ▪ Installing conductors with hotter operating limits or implementing the use of 'low-sag' conductors. ▪ Technology implementations such as developing a software tool to optimise overhead line ratings. ▪ Use more heat-resistant materials to mitigate reduced carrying capacity of lines and transformers caused by increase temperatures ▪ Implement more effective cooling for transformers such as air efficient chillers for cooling down the transformers during high temperatures ▪ Develop and implement a storm water management plan to ensure flood protection of equipment at ground level in substations	KETRACO Civil Engineer & Environmental Safeguards Team Contractor Civil Engineer & Environmental Team	Throughout project period	1,000,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Use covered and/or insulated conductors to prevent erosion ▪ Include lightning protection (e.g., earth wires, spark gaps) in the distribution network to prevent lighting damages ▪ Raise structure levels at substations to prevent flooding or spillage of fuel from transformers. ▪ Implement more rigorous structural standards such as concrete-sided buildings and pylons ▪ Implement porous materials for better wind flow to prevent damaged infrastructure ▪ Schedule construction work in dry months to prevent delays during construction works			
Aircraft Navigation Safety Risks	▪ Continued engagement with regulatory air traffic authorities such as KCAA prior and during construction of pylons for safety purposes and to acquire prerequisite permits; ▪ Installation of flight (aviation) colored balls and infrared lighting to enhance visibility of masts ▪ Adherence to Civil Aviation Act No. 21 of 2013 and subsequent regulation for compliance with aviation safety guidelines	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	1,000,000
Cumulative Impacts	▪ 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, respective Machakos and Murang'a County Government and local community to participate in tree replanting program activities (plant in alternative public places such as schools, water towers in Kenya,	KETRACO Site Manager & Environmental Safeguards Team	Throughout project period	1,000,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	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			
Minimization of Occupational Health and Safety				
Electrocution from live power lines	▪ Deactivating and properly grounding live power distribution lines before work is performed on, or in proximity, to the lines; ▪ Allowing only trained and certified workers to install, maintain, or repair electrical equipment; ▪ Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards. ▪ Ensuring workers do 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; the energized part is properly insulated from the worker and any other conductive object; the worker is properly isolated and insulated from any other conductive object. ▪ Ensuring workers not directly associated with power transmission and distribution activities adhere to local legislation, standards, and guidelines relating to minimum approach distances for excavations, tools, vehicles, pruning, and other activities;	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	100,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Working at heights on poles and structures	▪ 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; ▪ Installation of fixtures on tower components to facilitate fall protection systems; ▪ An approved tool bag should be used for raising or lowering tools or materials to workers on structures; ▪ Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects; ▪ Ensuring all rope safety belts are replaced before signs of aging or fraying of fibers show up; ▪ When operating power tools at height, workers should use a second (backup) safety strap.	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	50,000
Exposure of electric magnetic fields to workers	▪ Identifying potential exposure levels in the workplace; ▪ Training workers in the identification of occupational EMF levels and hazards; ▪ Establishing 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; ▪ 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)	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Exposure to chemicals	▪ 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.	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	200,000
Risk of occupational accidents and diseases/physical hazards	▪ 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 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.	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	200,000
Ergonomics, Repetitive Motion, Manual Handling	▪ 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 ·	KETRACO Site Manager and Health & Safety Team	Throughout project period	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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	Contractor Site Manager and Health & Safety Team		
Risks on Community Health and Safety	The following should be undertaken: ▪ Proponent to engage local persons as Wayleave Officers / Community Liaison Officers (CLOs) to work with the contractor on local engagements. They act as the focal point for communications between 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; **On Electrocution:** ▪ Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding substations, particularly in Mwala sub-stations. ▪ 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. **On Electromagnetic Fields (EMF):** ▪ Ensure the recommended wayleave of 30m (15m on both sides of the centreline) is observed for the proposed 132kv transmission line. The EMF decays very rapidly with distance from source and there should be no potential health risks for people living outside the 30 m wide wayleave corridor. **On Noise / Corona effect**	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	2,000,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ The recommended wayleave of 30m (15m on both sides of the centerline) to be observed for the proposed 132kv transmission line. ▪ The acoustic noise produced by transmission lines is only greater with high voltage power lines of above 400-800 kilo volts [kV] whereas the proposed Machakos Mwala Ekalakala is 132KV hence expected to be negligible ▪ The buzzing noise decays very rapidly with distance from source hence no potential noise nuisance is expected for people living outside the 30 m wide wayleave corridor **On Access to active construction sites** ▪ Limit community access to active sites through barricades, fencing etc.; ▪ Barricade all inactive excavations to prevent falls and injuries especially at night; ▪ Having warning signs on all active sites deterring community interaction or entrance; ▪ Community sensitization on safety in towns centres and market centres such as Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Mukundi and Kambi Mawe.			
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 (Mikuyuni Primary School, Kamweleni Primary and Secondary School, Kyanganga Primary, and Secondary Schools) or other locations where children may be present; ▪ Using locally sourced materials, whenever possible, to minimize transport distances.	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	250,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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			
Minimization of Social Impacts				
Risks and impacts from displacement of households and businesses	▪ Apply RAP compensation procedures in a transparent and consistent way to all communities and persons; ▪ Provide compensation for loss of assets at current replacement cost in accordance to project RPF; ▪ Apart from cash compensation, consider other alternatives such as in-kind or land to land compensation especially for vulnerable people such as orphans, PLWD, widows and elderly ▪ Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status, and put measures in place to ensure they have access to development benefits and opportunities; ▪ Provide a choice of options to affected individuals and consult with communities over community assets and resources; ▪ Provide opportunities to displaced communities and persons to derive development benefits from the project; ▪ Provide transitional support for a reasonable period of the time to enable people 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. compensation, GRM.	KETRACO via Social Safeguards team	Pre-construction	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 - section 3.16 SEP) to engage host communities as well, in addition to PAPs where appropriate. ▪ Where possible avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement. ▪ Displacement and compensation of squatters, absentee landlords, tenants, those without formal land rights are potential risks, which will be guided by provisions within the RPF developed under this project. ▪ Resettlement to adhere to the provisions within the RPF prepared under this project.			
Land acquisition (way leave contractor facilities sites workers camp sites, and sub-station sites) and resettlement disputes	▪ Resettlement and compensation of PAPs to align to the RPF developed under this project. ▪ A project Grievances Redress Mechanism (GRM: Annex 14 in chapter 7) including a GRM committee 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. If the Locational Grievance Redress Committee is not able to reach a resolution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters. ▪ Loss of land and crops will be compensated; the amount of compensation to be paid for private land will be as per the Machakos County and Murang'a County land registry rates provided by National Land Commission (NLC). However, the rates will be in line with the RPF developed for the project. ▪ A Resettlement Action Plan (RAP) study has been commissioned for the proposed project. The RAP has been carried out in accordance with the legal framework of the Government of Kenya, the requirements of the World Bank's OP 4.12	KETRACO via Social Safeguards team	Pre-construction phase	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	(Involuntary Resettlement) and RPF developed for this project for compensation purposes. ▪ 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 including valuation to ensure compensation for displaced structures. ▪ Where possible avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 - section 3.16 SEP) to ensure effective communication, community buy in and ownership of the project. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks in public and Limiting gatherings as per GoK directive.			
Livelihood disruptions	The following should be implemented to deal with livelihood disruption: • Implement the Livelihood Restoration Plan *(Annex 14 section 3.22)* for the proposed project. • Implement Crop based Livelihoods by regeneration of food crops – such as household irrigation schemes, and cash crops including fruits (such as mangoes, tangerines), and vegetables through better extension services in partnership with the County Ministry of Agriculture. • Implement tree planting to reclaim forestry by liaising with KFS to train farmers and offer seedlings on sustainable tree planting and management in all the 8 Locations / Settlements • Implement Enterprise Based Livelihoods by maximizing the available project-based opportunities. The livelihood restoration plan recommends: ➢ A Local Buying Program during the construction period to assist in building capability and capacity in the local supply	KETRACO via Social Safeguards team	Pre-construction phase	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	chain. Local businesses in the region of the project are prioritized as suppliers of various materials, goods, and services. ➢ Offering Micro Loans/Small Business Grants by liaising with Government agencies such as Ministry of Trade to support small business enterprises such as green grocers. Such initiatives could lead to increased access to quality services. ➢ Apiculture – Linking farmers with Ministry of Agriculture for training in commercial oriented beekeeping enterprises. • Implement Financial Literacy Training / Entrepreneurial training by liaising with relevant County and National Government agencies to cushion against loss of existing retail businesses. Small grants could be offered to Vulnerable Individuals and HouseholdsVulnerable individuals and households to sustain their livelihoods. • Brings to the attention of the community the existence/availability of National Safety Net programs /projects, their cycles and application process and requirements. • Link Vulnerable persons with National Safety Net programs / Government support programs by liaising with respective county departments/ministries of Social Services to come to project Location levels to register the vulnerable persons. Some of the National Safety Net programs for Vulnerable persons include Cash Transfer for Orphans and Vulnerable Children; Cash Transfer for Persons With Severe Disabilities (PWSD-CT); Older Persons Cash Transfer (OPCT) program and Hunger Safety Net Programme (HSNP) • Provision of employment: semi-skilled and unskilled jobs should be reserved for project affected persons and the community in general, by implementing a local recruitment plan through liaising with local administration at location levels. • Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address PAPs and host community complaints.			

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	• Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication on livelihood restoration. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive			
Land and Property/ Socio-Political Disputes exacerbated by the Project	▪ Full implementation of the Resettlement Action Plan (RAP) for the proposed project. ▪ Where possible, avoid involuntary resettlement; and where avoidance is not possible, minimize involuntary resettlement ▪ Carry out timely (before project commencement), fair / just and adequate compensation as per the provisions in the RPF developed under this project, the Kenyan law, WB guideline and provide assistance (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 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; ▪ Map vulnerable households and individuals especially orphans, PLWD, widows and elderly in the project area and implement specific interventions as appropriate to ensure equal benefits sharing. ▪ Grievances should be received and recorded at the Sub-location level by Community Liaison Officers (CLOs) and handled by the Grievance Redress Committees. ▪ If the Grievance Redress Committee is not able to provide a solution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters. ▪ Ensure all stakeholders and the public are involved in the project as per SEP.	KETRACO via Social Safeguards team	Pre-construction and operation phase phases	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Obtain necessary permissions and approvals from the County Governments. ▪ Ensure EIAs are conducted for specific project activities such as campsites. ▪ Proponent to engage local persons as Wayleave Officers to work with the contractor, to ensure the project is implemented smoothly. ▪ KETRACO to KETRACO to engage affected persons as outlined in the Stakeholder Engagement Plan (SEP) (Annex 14 section 3.16 – SEP). ▪ 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. The proponent will ensure that information regarding interest earning escrow account is timely disseminated to all PAPs in subsequent consultation forums, to avoid project delays and compensation disputes. ▪ Ensure relocation and compensation is in accordance to provisions within RPF developed under this project. ▪ Stakeholder engagement (as per stakeholder engagement plan (SEP) prepared under this project) and full information disclosure to PAPs as well as host communities where appropriate. Information disclosure should be done in line with Ministry of Health COVID-19 prevention and mitigation measures including but not limited to; physical / social distancing protocols (1.5metres), provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks and limiting gatherings as per GoK directive. ▪ A project grievances redress mechanism, including a GRM committee to be established, 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.			

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Acquisition of land for contractor's camp and worker accommodation, will require a land use and restoration agreement between community and contractor.			
Gender Inequality	▪ Applying all Kenyan Constitutional requirements on gender throughout the project. ▪ Apply all guidelines under the National Gender and Equality Commission Act, 2011. ▪ Adhere to Gender Strategy (FY16-23). ▪ 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 contractors will be expected to implement Labour Management Plan section 3.13 of annex 14 and uphold equal treatment of men and women during recruitment. ▪ 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. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication for both men and women. ▪ Adopt and implement a Gender Mainstreaming Plan (Annex 14 – section 3.23) to ensure that both men and women have equal opportunities to participate in and benefit from the proposed power transmission project ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from both men and women.	KETRACO via Social Safeguards team	Throughout project period	RAP Budget
HIV/AIDS and other Sexually transmitted diseases	▪ Review activities of the proposed electric power transmission and distribution project to integrate with HIV/AIDS campaigns.	KETRACO Site Manager and Health & Safety Team	Throughout project period	500,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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 through the use of educative posters, offering free HIV/AIDS testing services and HIV/AIDS counselling in main towns situated along the RoW. Such towns include, Kwa Mwau, Makaveti, Kaani, Massi, Mwala, Mbiuni, Ndalani, Kambi Mawe in Machakos County and Mukundi town in Murang'a County. ▪ 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 (Machakos County and Murang'a County) (Ministry of Health, National AIDS Control Council (NACC)), including NGOS (AHF Kenya), and CBOs (youth, men and women groups) on awareness creation ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) and 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 trainings should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and limiting gatherings as per Gok directive.	Contractor Site Manager and Health & Safety Team		

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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 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/labor influx. Labour influx impacts will be managed through a labour management plan – Annex 14 section 3.12. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.			
COVID-19 Transmissions/ Infections	The following should be undertaken ▪ Develop and communicate to all employees (skilled, semi-skilled and unskilled), a COVID-19 Preparedness management plan that addresses all aspects of COVID-19 readiness including but not limited to Policy, Planning and Organizing project activities vis-à-vis COVID-19. ▪ Sensitize all workers (skilled, semi-skilled and unskilled) on COVID-19 risk mitigation measures with sufficient information to keep them and local community safe. ▪ Establish prevention and mitigation measures against COVID-19 and arrangements for dealing with suspected and confirmed COVID-19 cases. The measures should include but not limited to; ✓ Infection control plans, ✓ Ensuring social distancing of not less 1.5 meters between employees in all directions, ✓ Hygiene promotion through suitable hand sanitizing facility or handwashing soap and water ✓ Strict and proper use of face masks throughout all working hours and public places.	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project period	500,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	✓ Implement Ministry of Health guidelines for staff safety and health, including daily temperature checks for everyone in the workplace ✓ Increase frequency of cleaning commonly touched surfaces / objects ▪			
Insecurity	▪ 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's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure project ownership, and mitigate the risk of insecurity-theft, and vandalism. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.	KETRACO Site Manager, Social Safeguards team and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project Period	500,000 Per Annum
Quality of life and lifestyle impacts	The following should be undertaken for quality-of-life impacts: ▪ Ensure a fair process of compensation and livelihood replacement / RAP for benefits to affected communities; ▪ Adopt and implement Livelihood Restoration Plan (Annex 14 – Section 3.22) ▪ Identify individuals and groups who might be disproportionately impacted due to their disadvantaged or vulnerable status, including women headed households, minority groups, OVCs, widows, and PLWD, and put measures in place to ensure they have equal access to development benefits and opportunities; The following should be undertaken to mitigate lifestyle related impacts: ▪ Resettlement and compensation to be implemented in line with the RPF develop under this project; ▪ Improve the livelihoods and standards of living of displaced persons by providing transitional support for a reasonable period of the time to enable people to restore their income-earning capacity, production levels, and standards of living.	KETRACO via Social Safeguards team	Pre-construction	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication			
Loss of social fabrics	• Where possible, avoid involuntary resettlement and where avoidance is not possible, minimize involuntary resettlement • Consider the prospects of getting resettlement land - for the 1% (4) landowners who are permanently displaced - in the vicinity (cost allowing) to deter disruption of social support systems and networks. • Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs. • Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with PAPs	KETRACO via Social Safeguards team	Pre-construction	RAP Budget
Illicit behaviour / drug and alcohol abuse	▪ 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. ▪ Community members and Contractors to behave in a culturally appropriate manner ▪ The contractor and proponent to establish a code of conduct to ensure workers conduct on site as well as within the project area, adheres to set rules and regulations e.g. on drug use and alcohol, interactions with locals and Gender Based Violence (GBV) – Sexual Exploitation and Abuse (SEA) / sexual harassment (SH). ▪ Civic and health education on HIV/AIDS and STIs ▪ Ensure an adequate and accessible provision of condoms to workers both male and female. ▪ Elderly and social protection officers can be used to uphold	KETRACO via Social Safeguards team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	moral standards and dignity in the affected community ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address illicit behaviour / drug and alcohol abuse complaints before escalating to pressing social problems ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with the host community. ▪ Adhere to and implement the HIV and AIDS Prevention and Control Act, 2006 and the Sexual Offences Act, 2006 and its amendment 2012.			
Domestic Conflicts exacerbated by project	▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with the host community and PAPs where appropriate. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address domestic conflicts exacerbated by project. ▪ Grievances should be received and recorded at the Sub-location level by Community Liaison Officers (CLOs) and handled by the Grievance Redress Committees. ▪ If the Grievance Redress Committee is not able to provide a solution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters. ▪ Involve Grievance Redress Committees (GRCs) and Community Liaison Officers (CLOs) to ensure protection of rights of the vulnerable especially orphans, PLWD, widows and elderly. ▪ The project to slowly engage the elderly and Social workers to guide and mediate case of domestic violence ▪ Encourage the spouse to open a joint bank account to avoid mistrust.	KETRACO via Social Safeguards team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Gender-based violence (GBV) - Sexual Exploitation and Abuse (SEA) / 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. ▪ 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 within the context of the COVID-19 pandemic ▪ Adopt and implement a grievance redress mechanism (GRM) and referral mechanism to address all emerging complaints including risks such as COVID 19 related to Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH). ▪ Implement the GBV-SEA/SH Management Plan (Annex 14 section 3.19) and Labour Influx Management Plan (Annex 14 section 3.13) ▪ Ensure establishment and Implementation of a GBV-SEA/SH Action Plan by the contractor which should reflect the unique dimensions of COVID-19. ▪ Ensure separate sanitation and hygiene facilities (toilets, utility rooms and changing rooms) for men and women in the workers' camps / workplaces are provided. ▪ Prioritize GBV -SEA/SH prevention, response, and risk mitigation approaches as essential parts of COVID-19- related measures. ▪ Adopt a policy to cooperate with law enforcement agencies in investigating complaints about GBV-SEA/SH should a survivor	KETRACO via Social Safeguards team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	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. ▪ Apply all Kenyan Constitutional / legal requirements on gender and sexual based violence throughout the project. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication on GBV-SEA/SH. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive			
Disruption of learning activities	▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication to avert disruption of learning ▪ Strictly mitigate noise and vibration activities, and air pollution due to dust emission near learning facilities as prescribed in this report. ▪ Grievances should be received and recorded at the Sub-location level by Community Liaison Officers (CLOs) and handled by the Grievance Redress Committees. ▪ Strictly ensure no underage (below 18 years) employed ▪ Comply with labour Relations Act 2007, and Employment Act 2007	KETRACO via Social Safeguards team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Speculation for land compensation *(spread of false information and Hike in prices /value of land)*	• Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from PAPs and host community • Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs On false information: ▪ KETRACO to engage affected persons as outlined in the Stakeholder Engagement Plan (SEP) (Annex 14 section 3.16 – SEP). ▪ The planning and implementation of the transmission line remains as publicly shared. Any changes necessitated by unforeseen circumstances should be communicated and a new census of affected persons conducted. On hike in prices / value: ▪ KETRACO to adopt compensation rates established by the RAP as per cut-off date ▪ Compensation to be made to bonafide landowners with official land documents	KETRACO via Social Safeguards team	Pre-construction phase	RAP Budget
Impacts on community facilities	▪ Site transmission and distribution rights-of-way, lines, towers, and substations to avoid cultural sites, communal watering points, churches and water pipelines. ▪ Provide opportunities to displaced communities and persons to derive development benefits from the project; ▪ Ensure proper risk management and benefits to host communities and relocated persons; ▪ Provide Corporate Social Responsibility (CSR) / a social return on investment to improve the well-being of the host community. Such could include provision of support for supplies and movable items for institutions or sector needs identified by the community; donation to community of any facilities used by the contractor at the conclusion of the project such as buildings, and boreholes. ▪ Ensure stakeholders engagement on CSR implementation (further consultations on priority projects and implementation plans guided by SEP) are done in line with Ministry of Health	KETRACO via Social Safeguards team Contractor Social safeguards Team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	COVID-19 prevention and mitigation measures including but not limited to; physical / social distancing protocols (1.5metres), provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks and limiting gatherings as per GoK directive. ▪ Provide training programmes to the community to cope with changes brought by establishment of transmission line ▪ 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. ▪ Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) as early as possible in the project development to receive and address complaints from host community.			
Community Expectation on CSR	▪ Adopt and implement a CSR plan (Annex 14 section 3.20 CSR) targeting activities within KETRACO's mandate for implementation during the project ▪ 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's 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	KETRACO via Social Safeguards team Contractor Social safeguards Team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Ensure implementation of plans in Annex 14 such as vulnerable peoples plan, local recruitment plan, labour management plan, gender mainstreaming plan, Labour influx Management Plan, Social Impacts Management Plan, Livelihood Restoration Plan to ensure host community accesses the project benefits. ▪ Ensure engagement on the project and CSR implementation (further consultations on priority projects and implementation plans) are done in line with Ministry of Health COVID-19 prevention and mitigation measures including but not limited to; physical / social distancing protocols (1.5metres), provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks and limiting gatherings as per GoK directive. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from host community			
Risks on Vulnerable populations	The following should be undertaken to cushion the vulnerable populations such as the elderly, orphans, PLWD, and widows amidst COVID-19 pandemic from the project risks: ▪ Amidst COVID-19, clearly identify / map vulnerable households and individuals such as orphans, PLWD, widows and elderly to ensure they have access to development benefits and opportunities. ▪ Apart from cash compensation, consider other alternatives such as in-kind or land to land compensation especially for vulnerable people such as orphans, PLWD, widows and elderly to cushion them from projects impacts that are likely to be exacerbated by COVID 19 pandemic ▪ Implement livelihood restoration plan (LRP) with specific targeted interventions for vulnerable persons to respond to the project impacts and COVID-19 pandemic effectively ▪ Establish and implement targeted interventions / support for Vulnerable Individuals and HouseholdsVulnerable individuals and households during RAP. Such could include protection	KETRACO via Social Safeguards team	Throughout project Period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	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. ▪ Establish and implement a GBV -SEA/SH action plan for the project to mitigate GBV that has been exacerbated by COVID-19 against the vulnerable population. ▪ 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 ▪ In the context of COVID-19 and various vulnerabilities, offer transitional assistance in consultations with vulnerable persons / households to cushion them from displacement / relocation hardships. ▪ Involve Grievance Redress Committees (GRCs) and Community Liaison Officers (CLOs) to ensure protection of rights of the vulnerable especially orphans, PLWD, widows and elderly. ▪ Implement the Stakeholders Engagement Plan while ensuring adequate, meaningful, and continued consultation with Vulnerable Individuals and HouseholdsVulnerable individuals and households. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, Wearing of masks in public and Limiting gatherings as per GoK directive. ▪ Implement a Local Recruitment Plan and while at it prioritise and reserve certain employment opportunities for Vulnerable PAPs such as, PLWDs and widows. ▪ 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.			

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Implement the Gender Mainstreaming Plan to cushion vulnerable women including widows and PLWD from discrimination in project opportunities and COVID 19 impacts. ▪ 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 and COVID 19 impacts. Such could include: ➢ Orphans: Link up orphans with government scholarship opportunities by liaising with County Government; and with county government for registration under Cash Transfer for Orphans and Vulnerable Children to cushion them from both project impacts and COVID-19 impacts. ➢ PLWD: Liaise with County Government Social protection department to register PLWD with Cash Transfer for Persons With Severe Disabilities (PWSD-CT) to cushion them from project impacts and the impacts exacerbated by COVID-19 ➢ Elderly: Link up the elderly (65 years and above) with Social protection department at County level for registration with Older Persons Cash Transfer (OPCT) program to cushion them from both project impacts and the health impacts exacerbated by COVID-19 ➢ Link up the extremely impoverished households with Hunger Safety Net Programme (HSNP) via social protection department and vulnerable households' children to County / constituency scholarships program to cushion them from both project impacts and impacts exacerbated by COVID-19.			
Interference of existing development infrastructure	• Implement the stakeholder's engagement plan (SEP) (Annex 14 - section 3.16 SEP) for effective communication to PAPs and host community. • Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community. • On road usage:	KETRACO Site Manager / Social Safeguards team Contractor Site Manager / Social Safeguards Team	Throughout project period	350,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	➢ Construction contractor to prepare Road Use Restriction Management Plan in case of such needs (five (5) major road crossings which include C97, C98, C 99, C 100 and A3 roads) and inform the local government and community in advance; ➢ Transmission towers should not be spotted near road networks; ➢ Liaison with the pertinent road agencies at design stage as well as in case of any partial closure during construction phase; • On Kenya Power utility lines ➢ Liaison with Kenya Power at design stage and on planned shutdowns; ➢ Construction contractor to prepare Kenya Power utility line shut-down management plan.			
Labour influx / Pressure on social infrastructure	▪ Establish a recruitment policy to employ local populace for all unskilled labour / casual labourers to reduce on population influx in search of jobs including creating slots for locals on semi-skilled employment if available. 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 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.	KETRACO Site Manager / Social Safeguards team Contractor Site Manager / Social Safeguards Team	Throughout project Period	According to the wage rate

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ All 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 immigrates by the local communities. Discuss issues, risks and opportunities linked to in-migration; Understand the concerns of local communities; Raise awareness of risk and opportunities; and Identify solutions to issues relating to in-migration ▪ Ensure implementation of a livelihood restoration plan (LRP) that create alternative economic opportunities for the locals.			
Child labour and forced labour	The following should be undertaken to protect the rights of children and elimination child labour and forced labour: ▪ The following should be undertaken to protect the rights of children and elimination of 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 a labour management plan – Annex 14 section 3.12 to promote fair and equitable labour practices during the COVID 19 pandemic including the project cycle for the fair treatment,	KETRACO via Social Safeguards team Contractor Site managers and Social safeguards Team	Throughout project Period	As per recruitment policy

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	protection of workers' rights, non-discrimination and equal opportunity of workers ▪ Implement a local recruitment plan - Annex 14 section 3.14 – to create opportunities for local employment and to adopt a fair and consistent approach to the recruitment, assessment and selection of local employees during the COVID 19 pandemic including the project cycle. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from host community during the COVID 19 pandemic including the project cycle. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 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. ▪ Adopt and implement livelihood restoration plan (Annex 14 - section 3.22 LRP) to ensure host community and particularly vulnerable persons have access to livelihood interventions including access to National Safety Net programs for Vulnerable persons / Government support programs ▪ Implement the Vulnerable Persons Plan to ensure that vulnerable persons including women and girls are cushioned from the project impacts and have equal opportunities to participate in and benefit from the proposed project.			
Minimization of Economic Impacts				
Impact on loss of Agricultural produce, restrictions to access pasture	▪ Enumeration of destroyed farm crops including those under irrigation schemes through a Crop destruction Register in the presence of crop owner. ▪ Identify, address, and document concerns such as agricultural produce loss, restrictions to access to pasture and impacts on apiculture before construction begins.	KETRACO via Social Safeguards team	Pre-construction phase	As per the agreed cost by the farm owner.

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
and Impact on Apiculture	▪ Using transmission structures with longer spans to avoid clearing the agricultural fields and impacting on 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) ▪ Sensitise contractors / workers / local community to avoid any interference of the beehives if outside the RoW ▪ Ensure relocation of beehives that are directly on the proposed transmission line RoW ▪ Identify and ensure compensation of the beehives, restriction on access to pasture for affected households as per RAP, and RPF developed for the project. ▪ Adopt and implement the livelihood restoration plan (LRP) to improve the lives of those affected and ensure they benefits from the project. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication. This should be done in line with the Ministry of Health COVID-19 prevention and mitigation measures / government protocols including but not limited to: Physical / social distancing protocols (1.5metres), Provision of handwashing facilities (soap and water) or hand sanitizing facilities, wearing of masks in public and Limiting gatherings as per GoK directive ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from the PAPs and host community.			
Minimization of Visual Impacts				
Visual Impact	▪ Restore excavated site area through proper backfilling ▪ Removal of any overburden ripped material along the RoW	KETRACO Civil Engineer / Environmental safeguards team	Throughout project period	50,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ Explore the form, colour, or texture of the line and pylons to minimize aesthetic impacts and mimic / blend in the surrounding; ▪ Implement an appropriate landscaping programme especially for substation ▪ Ensure planting of indigenous short growing shrubs and grass on the open spaces to re-introduce visual barriers along RoW	Contractor Civil Engineer Team		
Minimization of Archaeological and Cultural Heritage Impacts				
Archaeological and Cultural Heritage Impacts	▪ Avoid constructing substations or tower spotting by design changes. This can be attained by changing tower spans to avoid spotting pylons in areas of archaeological or cultural heritage importance; in this case are six (6) burial sites (five (5) within Mwala Location in Kitie village and one (1) in Kimutwa Location– Machakos County and Akamba Peace Museum along the proposed RoW. ▪ Avoid spotting towers by designs changes - such as changing tower spans to avoid spotting pylons - on shrines locally known as *'Mathembos'* common in Mwala Sub-County and noted in Mithumo village about 500m off the proposed RoW; Kwa Mbule shrine in Kyoimbi village near Muvwana River, and sacred trees (*species include Terminalia brownii, Balanite aegyptica, Erythrina abysinnica, Ficus sycomorus, Olea africana*), graves and other areas of cultural importance. ▪ Work together with local elders to establish and map any other shrines, graves, and other areas of cultural heritage importance. ▪ Avoid any interference with all existing graves through design changes of the tower spans or using other appropriate alternative access routes either during construction works or clearing access routes, since the graves hold cultural values and social ties to the bereaved. ▪ Use exist utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible.	KETRACO Civil Engineer / Social safeguards team Contractor Civil Engineer / Social Safegurds Team	Throughout project period	200,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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 in chance finds procedure if unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication in relation to cultural resources with the host community ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from host community.			
Mitigating Potential risks to the project				
Community demonstrations in pursuit for employment opportunities	▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from PAPs and host community. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs ▪ Ensure implementation of plans in Annex 14 such as local recruitment plan, labour management plan, gender mainstreaming plan, Labour influx Management Plan, Livelihood Restoration Plan to ensure host community accesses the project benefits. ▪ 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 to ensure direct employment opportunities such as wayleave officers, community liaison officers (CLOs) and vacancies emanating from the project are recruited locally in a fair, consistent, and transparent process.	KETRACO Social safeguards team Contractor Social Safeguards Team	Throughout project period	As per project ESMP budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Terrorism	▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address grievances from PAPs and host community. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs. ▪ Thoroughly screen workers, suppliers and distributors to ensure security enhancement. ▪ Provide vehicle scanning systems. ▪ Ensure 24-hour surveillance by engaging the Administration Police services during the day and night; ▪ Install CCTV cameras in strategic locations in workers' camps, offices, and substation areas. ▪ Ensure close liaison with the local Police officers.	KETRACO Social safeguards team Contractor Social Safeguards Team	Throughout project period	As per security budget
Political Interference	▪ 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 Machakos County and Murang'a County ▪ Obtain necessary permissions and approvals from the County Governments. ▪ Ensure EIAs are conducted for specific project activities such as campsites, quarries, materials sites, campsites, boreholes etc ▪ Full and proper implementation of the Resettlement Action Plan (RAP) for the proposed project. ▪ Ensure relocation and compensation is in accordance to provisions within RPF developed under this project. ▪ Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly ▪ 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 Social safeguards team	Throughout project period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
	▪ 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. ▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure all stakeholders and the public are involved during the project cycle.			
Lack of land documentation and formal land rights	▪ Full and proper implementation of the Resettlement Action Plan (RAP) for the proposed project, guided by the provisions of the KESIP RPF. ▪ Ensure relocation and compensation is in accordance to provisions within RPF developed under this project. ▪ KETRACO should deposit compensation monies on an interest earning escrow account until cases such as lack of documentation and formal land rights are resolved. The proponent will ensure that information regarding interest earning escrow account is timely disseminated to all PAPs in subsequent consultation forums, to avoid project delays and compensation disputes. ▪ A project Grievances Redress Mechanism (GRM: Annex 14 in chapter 7) 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. If the Grievance Redress Committee is not able to provide a solution, the grievance is escalated to the KETRACO RAP Implementation Unit at the KETRACO Headquarters. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community and PAPs.	KETRACO Social safeguards team	Throughout project period	RAP Budget

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Operational phase				
Terrestrial habitat alteration	▪ The selective removal of tall-growing tree species and the encouragement of low growing grasses and shrubs in transmission line rights-of-way. ▪ Re-vegetation of disturbed areas with native plant species; ▪ Removal of alien invasive plant species; ▪ Cultivating native plant species; ▪ Ensuring that vegetation management should not eradicate all vegetation;	KETRACO Environmental Safeguards Team	Continuous during operation phase	1,000,000
Electrocution from live wires	▪ 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; the energized part is properly insulated from the worker and any other conductive object; the worker is properly isolated and insulated from any other conductive object (live-line work). ▪ Sensitize local communities and school going children from possible climbing of towers / pylons	KETRACO health and safety team	Continuous during operation phase	250,000
Working at heights	▪ 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; ▪ Installation of fixtures on tower components to facilitate fall protection systems; ▪ An approved tool bag should be used for raising or lowering tools or materials to workers on structures; ▪ Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects.	KETRACO health and safety team	Throughout during operation phase	1,000,000

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
Rights of way maintenance	▪ Provision of appropriate PPE to the workers clearing the way leave (vegetation clearing activities which will involve use of machetes and/or power saws) ▪ Observing manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response	KETRACO health and safety team	Continuous during operation phase	300,000
Theft and Vandalism	▪ Adopt and implement a Grievances Redress Mechanism (Annex 14 in chapter 7-GRM) to receive and address complaints from PAPs and host community. ▪ Minimize overcrowding at the construction site so as to prevent double handling of materials and equipment. ▪ Provision of proper management of materials by allocation to specific persons involved. ▪ Advanced tracking of on-site construction machinery which facilitate an improvement in the safety performance job site layout and prevent theft ▪ Optimize the utilization of construction equipment. ▪ Proponent to engage local persons as Wayleave Officers to work with the contractor, in order to ensure the project is implemented smoothly ▪ 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. ▪ Liaise with law enforcement in the project area to ensure theft and vandalism perpetrators are held to account. ▪ Implement the stakeholder's engagement plan (SEP) (Annex 14 -section 3.16 SEP) to ensure effective communication with host community. Acts of vandalism and theft are less likely to happen if the project has demonstrated a genuine interest in the well-being of the host community.	KETRACO Site Manager and Health & Safety Team Contractor Site Manager and Health & Safety Team	Throughout project Period	500,000 Per Annum
Mitigation measures for below operation phase social impacts are same as those of construction phase already presented in this EMP. • ***Spread of STD, HIV and AIDS*** • ***Gender and equality biases*** • ***Illicit behavior / drug and alcohol abuse*** • ***Sexual Exploitation and Abuse (SEA) and Workplace Sexual Harassment (SH) and other forms of Gender-Based Violence (GBV)***				

Section B – Negative Impacts				
Potential Negative Impact	**Proposed Mitigation Measures**	**Responsibility for Mitigation**	**Timeline**	**Cost (Kshs)**
• ***Labour influx*** • ***Community expectations on CSR***				
Decommissioning phase				
Noise Pollution (Vehicles &compressors)	▪ Control of vehicles speed within the site; ▪ Provision of hearing protection devices for workers.	KETRACO Site Managers / health and safety team	Throughout during decommissioning phase	100,000
Physical Hazards	▪ Adopting ergonomic workflow designs that tend to fit the physical tasks to the workers and not vice-versa while maintaining a balance with expected productivity.	KETRACO Site Managers / health and safety team	Throughout decommissioning phase	0
Air pollution Cement dust & (Vehicle emissions)	▪ Provide appropriate hand, respiratory and body protective devices; ▪ Proper service of project vehicles.	KETRACO Site Managers / health and safety team	Throughout during decommissioning phase	300,000
Mitigation measures for below decommissioning phase social impacts are same as those of construction phase already presented in this EMP. • ***Spread of STD, HIV and AIDS*** • ***Theft and vandalism*** • ***Gender and equality biases*** • ***Illicit behavior / drug and alcohol abuse*** • ***Sexual Exploitation and Abuse (SEA) and Workplace Sexual Harassment (SH) and other forms of Gender-Based Violence (GBV)*** • ***Labour influx***				

11 CHAPTER ELEVEN: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

11.1 Introduction

Monitoring will be a continuous process essential for identification of impacts unforeseen during the ESIA study. Monitoring parameters/indicators have been identified and programmes developed for their observation and action.

11.2 Monitoring Guidelines

Monitoring programmes were developed taking into cognizant the following; frequency of monitoring; personnel; recording; equipment; baseline information and data analysis and review. The environmental indicators to be monitored during the project phases namely the construction; operation and decommissioning are described in table 11.1. The monitoring parameters will be revised as the project development proceeds to enable incorporate and foreseen indicators. On environmental and social monitoring, both KETRACO and the Contractor will have monitoring responsibilities. For instance, KETRACO will require that contractors monitor, keep records, and report environmental and social issues. In general, monitoring for the project will include the following: -

(a) Pre – construction phase

- Monitor RAP implementation
- Monitor compensation for loss of assets at current replacement cost in accordance to project RPF
- Groups who might be disproportionately impacted due to their disadvantaged or vulnerable status, and put measures in place to ensure they have access to development benefits and opportunities

(b) Construction phase

- Monitor to ensure that occupational health and safety measures are carried out in accordance with the established ESMP
- Monitor the impacts from construction such as terrestrial habitat alteration, solid waste disposal, hazardous materials (including fuels and lubricants) management, are being mitigated in accordance with the ESMP
- If applicable, monitor that any cultural heritage that may be found or affected during construction is treated in accordance chance find procedures and the WB OP 4.11 on physical cultural resources;
- Monitor habitat and species impact in accordance with the ESMP, and /or the Project's biodiversity management plan;
- Monitor Community, Health and Safety issues in accordance with the ESMP and Community, Health, Safety Plan

(c) Operation phase

- Monitor for all potential impacts i.e. social, cultural, archaeological, visual, cumulative, biodiversity, health and impacts on environmental quality (i.e. air quality, water quality and noise levels)
- Ensure that restoration of any disturbance during construction has occurred.

(d) Decommissioning phase

- Ensure that restoration of any disturbance during construction, operation and demolition has occurred.

Table 11-1: Environmental and Social monitoring plan for the proposed project

Key Component	Parameters to be monitored	Points to be monitored	Frequency of monitoring	Sampling Points	Total samples	Cost per sample	Total Cost	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	Along major river crossings (such as River Mwania; River Ikiwe; Athi River, Thika River and Water harvesting dams (such as Mbuno Dam, Kitulu dam, Masimba dam)	Quarterly during operation and decommissioning phases	8	8	12,000.00	96,000.00	Sampling bottles, cooler box, Access to a NEMA accredited laboratory	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Air Quality	TSP, NO_x, SO_2, CO, Dust particles, particulate matter etc.	Construction, campsites, towns (and villages (such as Ithanga, Kasioni, Languni, Kiaoni, Muutu, Utheke, Kalenga, Kamuya, Love, and Mwania)	Continuous, with quarterly air quality measurements during construction and decommissioning phase	8	8	50,000.00	400,000.00	Air sampling equipment	KETRACO Health and safety team / Contractor health and Safety team
Solid Waste Generation	Slag, domestic refuse, metallic scraps, sludge, waste composition, treatment methods	Construction sites, campsites	Monthly during construction, operation and decommissioning phases	N/A				Waste inventory	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards 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 government restrictions as per GoK directive..)	Campsites, construction sites, towns, villages (such as Ithanga, Kasioni, Languni, Kiaoni, Muutu, Utheke, Kalenga, Kamuya, Love, and Mwania),	Quarterly throughout the project cylce	N/A				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	Excavated areas, sloppy areas along the RoW	Continuous throughout the project cylce	N/A				Camera, field vehicle	KETRACO Environmental Safeguards Team / Contractor

						Environmental Safeguards Team
Storm Water Drainage	Rainfall volume, topography	Flood prone areas, culverts, water ways, low lying areas	Continuous throughout the project cylce	N/A	Rain-gauge, field survey maps	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Environmental Risks	Fire outbreak, floods etc.	Possible hazardous areas only	Continuous throughout the project cylce	N/A	Field inspections and information from lead agencies	KETRACO Environmental Safeguards Team
Terrestrial Habitat Alteration	Existence of vegetation Type and number of species	Terrestrial areas	Continuous throughout the project cylce	N/A	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	Key birds flight paths (such as AP1 -AP4; Kimutwa Location and Nzasu sub-location; and Mamba village within Ndalani Location. Sections Machakos Valley that include Ikiwe, Kimutwa, Love, Makilu, Mwania, Potha, Syuuni, Wamua and Wamui rivers.	Continuous during project operation	N/A	Field inspections and information from lead agencies	KETRACO Environmental Safeguards Team / Contractor Environmental Safeguards Team
Health and Safety Issues						
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	Campsites, construction sites, Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani,	Continuous throughout the project cycle	N/A	Field inspections and information from EHS Personnel	KETRACO Health & Safety Team and Contractor Health and Safety team

		Mavoloni, Kakuzi) towns, and villages along RoW,				
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.)	Campsites, construction sites, Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) towns, villages along RoW	Continuous throughout the project cylce	N/A	Field surveys and information from EHS Personnel	KETRACO Health & Safety Team
Reforestation	- No. of PAPs compensated for lost trees - Corporate social responsibility (CSR) by KETRCO on tree planting initiatives / seedlings disturbed to PAPs - No. of planted tress	Throughout the RoW	Continuous throughout the project cycle	N/A	Field surveys and information from EHS Personnel	KETRACO environmental & social safeguards Team
Social Impacts						
Risks and impacts from displacement of households and businesses **/** **Compensation and Livelihood restoration** **/** **Livelihood Disruptions**	To be implemented through RAP monitoring; Key aspects include; - Number and amounts of payments made to PAPs / Vulnerable Populations especially orphans, PLWD, widows and elderly - Number of PAPs / Vulnerable Populations especially orphans, PLWD, widows and elderly with restored assets disaggregated by type of structure - Number of PAPS / Vulnerable Populations especially orphans, PLWD, widows and elderly with restored livelihood enterprises - Average income level by source - Number of people/groups/ Vulnerable Populations with improved livelihoods - Number of people/groups/ Vulnerable Populations with improved livelihoods	PAPs. Locations , towns, villages along RoW	Continuous during pre-construction and operation phases	N/A	Field surveys	KETRACO social safeguards Team

	- 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, crop-based livelihoods such as irrigation schemes and average monthly income - 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 Persons linked with National Safety Net programs /projects - Number of locals in employment: semi-skilled and unskilled jobs disintegrated by gender - A number of livelihoods specific training held by type, gender, and thematic areas covered.					
Training and Capacity Building / Transfer of Skills	- 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 -COVID 19 prevention strategies in place during trainings and capacity building (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive.)	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW Project site	Continuous throughout the project cycle.	N/A	Field surveys and information from EHS Personnel	KETRACO social safeguards Team
Grievance management	-Number & type of grievances received and recorded in the grievances log	Locations (including Katheka Kai. Kimutwa, Iveti, Masii,	Continuous throughout project cycle	N/A	Field surveys; grievances log / acknowledgement and information from EHS Personnel	KETRACO social safeguards Team /

	-Number & type of grievances resolved promptly (within the duration allowed in the grievance redress mechanism) -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	Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW				Contractor social safeguards team.
Gender Based Violence (GBV) - Sexual Exploitation and Abuse / Sexual Harassment (SH)	- implementation of agreed GBV - SEA/SH Prevention and Response Action 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 - Implementation of Labour influx Management Plan - Percentage of workers that have attended CoC training.	Campsites, construction sites, towns villages along RoW	continuous throughout project cycle	N/A	Field surveys; grievances log / acknowledgement and information from EHS Personnel	KETRACO social safeguards Team / Contractor social safeguards team
Land and property disputes	- Established interest earning escrow accounts - No. of PAPs not compensated	RoW	Continuous during pre-construction and operation phases	N/A	Field surveys; grievances log / acknowledgement	KETRACO via social safeguards Team
Vulnerable populations;	- Assistance to Vulnerable 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 PAPs especially orphans, PLWD, widows and elderly not assisted and reasons	RoW	Continuous during pre-construction and operation phases	N/A	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team

	- Number of meetings attended by vulnerable representatives - 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 - COVID 19 prevention strategies in place during sensitization / training (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive..)					
Cultural Aspects / Impacts	- -Cultural appropriateness of the methods adopted on avoidance of spotting Pylons on the shrines, church grounds, six (6) burial sites (five (5) within Mwala Location in Kitie village and one (1) in Kimutwa Location– Machakos County and Akamba Peace Museum along the proposed RoW. - Cultural appropriateness of the methods, modes used in consultation etc. - Assessing relevant cultural institutions engaged in Stakeholders Engagement Plan (SEP) - Change in social-cultural setting of the permanently displaced PAPs triggered by RAP	RoW	Continuous during pre-construction and operation phases	N/A	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team
Gender inequality;	- Participation of women, men in ESMP and RAP implementation - Changes to the status of women and men - Gender violence cases related to ESMP and RAP implementation	RoW	Continuous throughout project cycle	N/A	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team / Contractor social safeguards team.
Stakeholder engagement and	- Disclosure of ESIA report on KETRACO and World Bank websites.	RoW / Project area (Buffer zone of 1km)	Continuous throughout project cycle	N/A	Field surveys / information from EHS Personnel	KETRACO via social safeguards Team / Contractor

information disclosure;	- Availability of ESIA report at the county level. - Disclosure of ESIA report summary at in a language, understood by the stakeholders - 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 stakeholder's 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..)					social safeguards team.
Impacts on community facilities.	- Restored access to and functioning communal services, for instance, water, electricity - Number, type, and size of public structures affected - Number of community facilities affected and replaced - COVID 19 prevention strategies in place (Hand washing facilities, physical distancing, use of masks,	construction sites, towns, villages along RoW	Continuous throughout project cycle	N/A	Field surveys / information from CLO / PIC	KETRACO via social safeguards Team / Contractor social safeguards team.

	adherence to restrictions as per GoK directive..)					
Assets Acquisition including Land (wayleave, contractor facilities sites, workers camp sites, and sub-station sites) acquisition and resettlement	To be monitored during ESMP and RAP implementation - 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	Continuous during pre-construction phases	N/A	Field surveys / information from CLO	KETRACO via social safeguards Team
Local recruitment / Creation of employment / Labour Influx	- 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 employess and immigrant workers (labour influx)- actual against planned - Industrial relations incidents - stoppages go slows, threats, damage to property, violence - Lost hours by category - Absenteeism, sick leave and late arrivals - Issues raised by camp committees and action taken	RoW	Continuous throughout project cycle	N/A	Field surveys / PIC	KETRACO Site Managers social safeguards Team / Contractor Site Managers , social safeguards team

	- Workers Camp numbers by local and foreign workers - actual against planned - Camp incidents - -COVID 19 prevention strategies in place for all workers – skilled, semi-skilled and non-skilled (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive..) - Existence of COVID 19 preparedness management action plan for all workers					
HIV/AIDs and other STDs;	- 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 - -COVID 19 prevention strategies in place during sensitization / training (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive..)	RoW	Continuous throughout project cycle	N/A	Field surveys / PIC	KETRACO Site Managers social safeguards Team / Contractor Site Managers , social safeguards team

Child and forced labour	- 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 / worksite along RoW	Continuous throughout project cycle	N/A	CLO observation / PIC	KETRACO Site Managers, social safeguards Team / Contractor Site Managers, social safeguards team
Community Expectation on CSR	- Implementation of CSR plan - Number, type, amount spent on CSR initiatives per location - Sustainability, transparency and accountability of CSR initiatives - 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 progams - 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 - -COVID 19 prevention strategies put in place (Hand washing facilities, physical distancing, use of masks, adherence to restrictions as per GoK directive..)	construction sites, towns, villages along RoW	Continuous throughout project cycle	N/A	Field surveys / CLO observation / PIC	KETRACO Site Managers social safeguards Team / Contractor Site Managers , social safeguards team

Quality of life and lifestyle impacts	- Number and amounts of payments made to PAPs / Vulnerable Populations especially orphans, PLWD, widows and elderly - Compensation by Number of PAP disintegrated by gender - Full implementation of RAP in line with the RPF - Implement of Livelihood Restoration Plan - Type of assistance provided to vulnerable PAPs especially orphans, PLWD, widows and elderly - Improvements on livelihoods and standards of living - Implementation of a Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP)	construction sites, towns, villages along RoW	Continuous throughout project cycle	N/A	Field surveys / CLO observation / PIC	KETRACO via social safeguards Team
Encroachment of RoW	- 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 areas. - Number of identified hotspots areas - Spatial variation in bush encroachment - No. of structures built households along RoW	RoW	Continuous throughout project cycle	N/A	Field surveys / CLO observation / PIC	KETRACO via Social safeguards team
Gains in the local and national economy	- Implementation of a Local Recruitment Plan - No. of employed locals both men and women above 18 years of age - Development of contractors purchasing plan that stipulates how national and local purchase	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani,	Continuous throughout project cycle	N/A	Field surveys /PIC	KETRACO via Social safeguards team

	of goods and services will be optimised - Implementation of Livelihood Restoration Plan - Improvements on livelihoods and standards of living	Mavoloni, Kakuzi) / Towns, villages along RoW				
Increased access to information	- Grid densification, intensification and grid expansion - Physical infrastructural development heighted by power distribution - Building and operation of Mwala Substation - Connection of locals to power - Locals access to phones, radio, and television -	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	During operation phase	N/A	Field surveys	KETRACO via Social safeguards team
Health benefits of the project	- Grid densification, intensification and grid expansion for various households and town centres within the project region - Use of electricity for lighting by local community	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	During operation phase	N/A	Field surveys	KETRACO via Social safeguards team
Community demonstrations in pursuit for employment opportunities	- Implementation of a Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP) - Implementation of plans in Annex 14 such as local recruitment plan, labour management plan, gender mainstreaming plan, Labour influx Management Plan, Livelihood Restoration Plan - No of engaged Community Liaison Officers (CLOs) - No. of direct employment opportunities disintegrated by gender such as wayleave officers,	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	Continuous throughout project cycle	N/A	Field surveys	KETRACO via Social safeguards team / Contractor social safeguards team.

	community liaison officers (CLOs) and project vacancies					
Terrorism	- Implementation a Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP) - Existence of screening for workers, suppliers and distributors - Vehicle scanning systems in place at substation and construction sites - Existence of 24-hour surveillance by Administration Police services - Installation of CCTV cameras in strategic locations in workers' camps, offices, and substation areas.	-Campsites / Worksites along RoW construction sites,	Continuous throughout project cycle	N/A	Field surveys / CLO observation / PIC	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Political Interference	- Sensitizations conducted on projects benefits - Approvals from the County Governments - EIAs conducted for specific project activities such as campsites, quarries, materials sites, campsites, boreholes etc - Full and proper implementation of the Resettlement Action Plan (RAP) - No of engaged local persons disintegrated by gender as Wayleave Officers - Involved community leaders - Engagement of Community Liaison Officers (CLOs) - Implementation of Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP)	--Campsites / Worksites along RoW construction sites	Continuous throughout project cycle	N/A	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team
Lack of land documentation	- Full and proper implementation of the Resettlement Action Plan (RAP) - Established interest earning escrow accounts	-RoW	Pre-construction phases	N/A	Field surveys; grievance log / acknowledgement form	KETRACO via social safeguards Team

	- No. of PAPs not compensated/with stalemates - Timely dissemination of information regarding interest earning escrow accounts is timely disseminated - Established Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP)					
Land acquisition (wayleave contractor facilities sites, workers camp sites, and sub-station sites) and resettlement disputes	- Area of private land to be acquired or put under easement - Area of public land to be acquired or put under easement - Total area of Land Acquired - Implementation a Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP) - The amount of compensation to paid for private land - Resettlement Action Plan (RAP) study for the proposed project - Surveys conducted to establish which properties (land and buildings) lie within the RoW - The exact number of PAPs affected and the types of properties affected.	-Row, Campsites / Worksites along RoW construction sites,	During pre-construction and operation phases	N/A	Field surveys	KETRACO via Social safeguards team / Contractor social safeguards team.
Provision of market and supply for building materials	- Existence of a purchasing plan that stipulate local purchase of goods and services including provision of market and supply for building materials. - Receipts and LPOs on purchase of building materials such as sand, cement etc. from suppliers including hardware shops in key centres such as Kwa Mwau, Makaveti Trading Centre; Kaani; Masii; Mwala town; Mumbuni; Mukundi Market Murang'a County; and Kambi Mawe Market.	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	During construction phase	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Improvement of local	- Contractors purchasing plan that stipulate local and regional	Locations (including Katheka	Throughout construction	N/A	Field surveys	KETRACO via Social safeguards

trade and business opportunities	purchase of goods and services including provision of market and supply for building materials such as sand, cement etc. - Implementation of a livelihood restoration / enhancement plan (LRP) - A local buying program. - Enhancement of skills on small scale businesses such as food vendors and kiosk owners - Grid densification, intensification, and grid expansion to reach about various households and town centres within the project region	Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	and operation phases			team / Contractor Social Safeguards Team
Insecurity incidences in the project area	- Insecurity incidences in the project area - Deployment of police or private security services along the project RoW and mainly within substation areas such as proposed Mwala substation -	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	Throughout the project cycle	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Impact on loss of Agricultural produce, restrictions to access pasture and Impact on Apiculture	- Enumeration of destroyed farm crops - A Crop destruction Register - Documented concerns such as agricultural produce loss, restrictions to access to pasture and impacts on apiculture - Use of existing roads or lanes utilized - Scheduledling construction after crop harvesting - Avoidance of any interference of the beehives if outside the RoW - Relocated beehives that are directly on the proposed transmission line - Implementation of the livelihood restoration plan (LRP) - Implementation of the stakeholder's engagement plan (SEP) (	RoW	Pre-construction and construction phases	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team

	- Adoption and implementation of a Grievances Redress Mechanism					
Interference of existing development infrastructure	- Implementation of the stakeholder's engagement plan (SEP) (- Adoption and implementation of a Grievances Redress Mechanism - Preparation of a Road Use Restriction Management Plan for major road crossings - Liaison with Kenya Power at design stage and on planned shutdowns; - Kenya Power utility line shut-down management plan.	major road crossings which include C97, C98, C 99, C 100 and A3 roads), RoW	During construction phase	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Insecurity / Theft and Vandalism	- Insecurity incidences in the project area - Deployment of police or private security services along the project RoW and mainly within substation areas such as proposed Mwala substation - Implementation of a Grievances Redress Mechanism - Implementation of the stakeholder's engagement plan (SEP) - Existence of screening for workers, suppliers and distributors - Vehicle scanning systems in place at substation and construction sites - Existence of 24-hour surveillance by Administration Police services - Installation of CCTV cameras in strategic locations in workers' camps, offices, and substation areas.	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW	Throughout the project cycle	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Land and Property/ Socio-Political Disputes exacerbated	- Full implementation of the Resettlement Action Plan (RAP) - timely (before project commencement), fair / just and adequate compensation as per the provisions in the RPF	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni,	Pre-construction, and operation phases	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team

by the Project	- Implement internal and external monitoring in collaboration with PAPs and other stakeholders - Mapping of vulnerable households and individuals especially orphans, PLWD, widows and elderly in the project area and implement specific interventions - Engagement of local persons as Wayleave Officers - Relocation and compensation in accordance to provisions within RPF - Implementation of Stakeholder engagement plan (SEP) - Implementation a Grievances Redress Mechanism - Signed land use and restoration agreement between community and contractor on land for contractor facilities such as campsites	Kithimani, Ndalani, Mavoloni, Kakuzi) / Towns, villages along RoW				
Loss of social fabrics	- Settling of 1% (4) landowners who are permanently displaced - in the vicinity (cost allowing) to deter disruption of social support systems and networks. -	Along RoW	Pre-construction and construction phase	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Illicit behaviour / drug and alcohol abuse	- Existence of a code of conduct to ensure workers conduct - Trainings on civic and health education on HIV/AIDS and STIs - Accessible provision of condoms to workers both male and female - Implementation of Stakeholder engagement plan (SEP) - Implementation a Grievances Redress Mechanism	-Row, Campsites / Worksites along RoW construction sites,	Throughout project cycle	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team
Domestic Conflicts exacerbated by project	- Resettlement and compensation to aligned to the RPF - Involvement of CLOs and GRCs to ensure the vulnerable especially orphans, widows and elderly. access project benefits and opportunities.	Locations (including Katheka Kai. Kimutwa, Iveti, Masii, Mango, Mwala, Mbiuni, Kithimani, Ndalani,	Throughout project cycle	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team

	- Joint bank account by spouces to avoid mistrust - Implementation of Stakeholder engagement plan (SEP) - Implementation a Grievances Redress Mechanism	Mavoloni, Kakuzi) / Towns, villages along RoW				
Disruption of learning activities	- Mitigation of Noise and vibration activities, and air pollution due to dust emission near learning facilities - Policy on no underage (below 18 years) employed - Compliance with labour Relations Act 2007, and Employment Act 2007 - Implementation of Stakeholder engagement plan (SEP) - Implementation a Grievances Redress Mechanism	RoW	Throughout project cycle	N/A	Field surveys	KETRACO via Social safeguards team / Contractor Social Safeguards Team

12 CHAPTER TWELVE: CONCLUSION AND RECOMMENDATION

12.1 Public Review and disclosure of the ESIA Report

Upon submission of the ESIA report to NEMA; Within fourteen (14) days of having received the ESIA study report NEMA will review the report and prepare a summary of the report (advert) and invite the public to make oral or written comments on the report. NEMA will, at the expense of the proponent:

a. Publish an advert in the Kenya Gazette and
b. Newspaper that has a nationwide circulation
c. Announce Over the Radio in both official and local languages in a radio with a nationwide coverage for at least once a week for two consecutive weeks;

The invitation for public comments or 'the advert' will state -

- The nature of the project;
- The location of the project;
- The anticipated impacts of the project and the proposed mitigation measures to respond to the impacts;
- The times and place where the full report can be inspected (In this case, NEMA Headquarters, NEMA website – www.nema.go.ke , Permanent Secretary (PS) Office Ministry of Environment and Forestry, KETRACO, and NEMA County Offices); and
- The period within which the authority shall receive comments. (Not more than 60 days

The purpose of the adverts is to allow all stakeholders to read and understand how they would be affected by the project. Upon receipt of both oral and written comments NEMA may hold a public hearing. The date and venue of the public hearing will be publicized at least one week prior to the meeting;

- In at least one daily national newspaper & local newspaper
- At least two announcements in the local and National language through radio with a nation-wide coverage.

Presiding officer shall present the public hearing report to NEMA within fourteen (14 days) from the date of the public hearing. The public review period will last a minimum of 60 days. After expiry of the public review period, NEMA will collate the comments submitted from the public and hand them over to the proponent highlighting which key issues require to be addressed. The proponent in liaison with the ESIA expert will prepare written responses either into an additional chapter or an addendum to the ESIA report. This chapter will clearly explain how each of the comments and concerns raised by the public have been addressed and resolved. Once NEMA is satisfied that the revised ESIA Study report addresses all the issues raised by stakeholders it would decide on issuance of an ESIA/EIA license.

World Bank safeguard policies including the proposed project KETRACO KESIP frameworks (ESMP, RPF and VMGF) require that environmental reports for projects are made available to project affected groups, local NGOs, and the public at large. KETRACO should therefore disclose summaries of ESIAs and all project frameworks/plans to PAPs in culturally appropriate languages and in accessible locations. Public disclosure of EIA reports is also a requirement of the national EIA procedures in line with the provisions of EMCA, Cap 387 as elaborated in the Environmental Impact Assessment and Audit Regulations, 2003 and amendments 2019

Disclosure of EIA study reports prepared in line with EMCA provisions should follow the same procedure. The approved version of the ESIA report should be posted at NEMA websites. KETRACO Website as well as WB Info Shop to ensure all interested parties can access it.

In addition to the environmental documentation requirements described above, the proposed project ESMF notes that the following consultation and disclosure requirements be utilized for all

Category A subprojects: KETRACO will be expected to consult and make the ESIA findings about the project's environmental and social aspects available to project affected persons (PAPs), other stakeholders including local NGOs, and take their views into account. The disclosure of ESIA findings to PAPs will be undertaken in culturally appropriate languages, using feasible techniques such as FGDs, public barazas, in easily accessible locations, and in a timeframe that enables meaningful consultations. Such engagements should be in line with the Stakeholders Engagement Plan (SEP) – Annex 14 section 3:16. KETRACO should initiate the consultations as early as possible. Consultations with stakeholders should take place only once after a draft EA report is prepared. In addition, KETRACO should consult with such groups throughout project implementation as necessary to address EA-related issues that affect them. For meaningful consultations, the KETRACO should apply the following disclosure requirements:

- KETRACO should provide relevant material in English and/or the local language (as appropriate) in a timely manner and language that are understandable and accessible to the groups being consulted.
- KETRACO should make the draft ESIA/EIA report including a detailed summary of the ESIA/EIA conclusions available at a public place accessible to groups affected by the project and local NGOs.

Once the borrower officially transmits the Category A EA report to the Bank, the Bank distributes the summary (in English) to the executive directors (EDs) and makes the report available through its InfoShop.

12.2 Budget for ESMP and ESMmP

The costs of incorporating the recommended mitigation measures are defined in the ESMP matrix, most of which will be passed to the contractor and overseen by the KETRACO Project Manager. The environmental and social department – social safeguards team, valuation and survey department along with assistance from the KETRACO Technical department will oversee and manage the cost and recommended mitigation measures within the field of expertise including compensation for property, crops and relocation activities. These costs are presented in the proposed project Resettlement Action Plan (RAP). A budget overview of implementing the ESMP & ESMmp has been summarized below:

Table 12-1 ESMP & ESMmp Implementation estimate costs

Item	Cost
RAP costs	807,462,531.40
Environmental and social management costs	30,600,000.00
Environmental and social monitoring costs	1,400,000.00
Costs to be included in contractor's BoQ	12,150,000.00
Costs that should be part of routine or periodic maintenance	4,200,000.00
Total	**959,982,531.36**
Training/institutional costs 2% of total cost	**19,199,650.63**
Grand total	**875,012,182.03**

12.3 Conclusion and Recommendation

The ESIA study indicated that the proposed transmission line and substations are a worthwhile investment. The project will contribute significantly to the power stability, provide reliability, enhance security of supply to the existing demand hubs in Machakos County, Murang'a County and the country at large which by extension will spur economic development; expand transmission capacity necessary to enhance electrification initiatives. This will reduce technical losses in areas currently served by long medium voltage lines.

The water quality parameters analysed along the right of way (RoW), showed that some samples had variations from the NEMA standards/guideline values and World Health Organization standards (WHO). Several parameters such as pH range, chloride, fluoride, nitrite, sulphate and total dissolved solids were within the acceptable levels in the samples collected. Nonetheless, the sources of samples collected from River Mwania; River Ikiwe; Kwa Mbuno Dam; Thika River and Athi River did not conform to EMCA (Water Quality) Regulations, of 2006 standards for Sources of Domestic Water, Effluent Discharge into The Environment and Irrigation Water. This is due to being coloured, turbid water with high Iron content and; bacteriologically contaminated with E.Coli, Legionella ssp and total coliforms.

Noise measurements obtained from sample areas along the RoW indicated that apart from Kithendu Sub-location near AP 16, other levels were within the allowable limits as provided by the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the World Bank IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines - Environmental Noise Management. The sample point for Kithendu was in proximity to A3 highway which had passenger and commercial vehicles plying that route. The high noise recorded was attributed to the vehicular movement. The lowest measurements were recorded in Kathuma and Mwenyea villages. The areas were generally silent comprised of vast farms and scattered settlements.

The baseline study and survey conducted established that there were no current air polluting activities within the project RoW. For instance, vehicle traffic within the project RoW is low hence does not pose air quality risk. Further, there are no industries along the project RoW which could otherwise pose air quality risks. The geology of the project area suggests that the Machakos-Mwala-Ekalakala double circuit transmission line will also, not trigger any known radiological impacts. However, should any radionuclides be detected along the project area RoW due diligence should be followed as per existing legal requirements.

The ESIA study identified approximately 651 structures - Permanent (88), Semi-permanent (418), Temporary (134), Services (watering points) (3), Burial sites (6) and Wells (1). The proposed transmission line will also affect five (5) busines structures located in Iveti. The study also established that a total of 591 land parcels with a total of approximately 232.504 Ha or 637.293 Acres will be required for the way leave. Only about 1% of the landowners will have their land parcels fully affected. Full impact entails land parcels affected more than 70% of the total parcel area. The most extreme impacts will be felt by the approximate 1% of landowners who will have to relinquish all or most of their land and other property and move to other areas away from the affected project area. Nonetheless, the study identified that the location of the Transmission line traverses almost 99.9% in rural setting, which is a major advantage in terms of resettlement and land availability. This largely means that although communities have settled along the route, the prospects including adequacy, quality of land and accessibility of resettlement land (where compensation is provided) in the vicinity (cost allowing) will not be a major challenge. This asserts that social support systems and networks will not be greatly disrupted, since affected persons can still consider themselves as part of their current communities and still access the same services and advantages from the original areas. Nonetheless, the highlighted social -cultural and economic issues underpins the recommendation for a comprehensive resettlement action plan (RAP) that would ensure compensation and livelihood restorations for projected affected persons.

The proposed transmission line may impact birdlife fly paths identified along the proposed line area such as within AP1 -AP4; Kimutwa Location and Nzasu sub-location; and Mamba village

within Ndalani Location. The proposed line is also in proximity to Important Bird Areas (IBA) such as Machakos Valleys (approximately 3.2 Km near Machakos SS), Masinga Dam approximately (5.2 Km near Ekalakala) and Protected areas (Mwea National Reserve (32Km Northwest of Ekalakala) and Ol Donyo Sabuk National Park (17 Km near Mavoloni). Comprehensive mitigation measures have been suggested including provision of engineering solutions such as installations of bird diverters especially identified fly paths, installing visibility enhancement objects such as marker balls, bird deterrents, or diverters; building raptors platforms on top of towers for roosting and nesting; and maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, insulating energized parts and hardware. It is also recommended that the proponent should work with line agencies such as NMK, KWS and relevant NGOs such as Birdlife International and Nature Kenya for expert opinion and specialized studies (ornithological studies).

Amongst some of the key impacts anticipated by the proposed project include;

Environmental Impacts

- Terrestrial habitat alteration
- Avian /Bird and Bat collisions and electrocutions
- Aquatic Habitat Alteration (Wetlands)
- Increased generation of solid waste

Occupational Health and Safety

- Live power lines
- Working at height
- Risk of occupational accidents and diseases/physical hazards
- Community Health and Safety
- Electrocution

Social -economic Impacts

- Displacement/relocation of persons, structures, trees due to land easement/acquisition
- Land / Property/ Disputes /Socio-Political Disputes exacerbated by the Project
- Loss of social fabrics
- Increased Spread of HIV/AIDS and other Sexually transmitted diseases
- Cumulative Impacts such as displacement of communities with consequent increases in urban poverty

It's worth to note that the proposed project is especially designed to avoid densely populated areas, towns, and market centers. In addition, the proposed transmission route also follows existing roads as closely as possible. These design measures minimises negative environmental, social and economic impacts.

The ESIA study has established detailed environmental and social management plan (ESMP); a comprehensive environmental and social monitoring plan (ESMmP); including standalone management plans for various aspects with mitigation measures for the anticipated impacts. The ESIA has recommended the need to ensure stakeholder engagement and grievances management is undertaken post ESIA (applicable to the pre-construction, construction, operations, and decommissioning phases). This should be attained through full implementation of the SEP (Annex 14 -section 3.16 SEP) and GRM (Annex 14 - chapter 7-GRM) which provides aspects post the ESIA, including principles, processes, and procedures to guide the project in engaging stakeholders and managing grievances throughout the project cycle. This ESIA also recommends that the proponent to disseminates the correct information on KETRACO CSR policy and the cap for trees and crops allowed under the RoW guided by the RPF provisions to PAPs in consecutive stakeholder engagement sessions e.g., during the disclosure of the RAP and ESIA. An approximate budget to implement the ESMP and ESMmP has been calculated at **Kshs. 875,012,182.03**. Some of the management plans are as follows;

- Atmospheric Emissions Management Plan
- Hazardous Substances Management Plan
- Spill Prevention and Countermeasures Management Plan
- Fire Risk Management Plan
- Noise Management Plan
- Surface Water Management Plan
- Waste Management Plan
- Biodiversity Management Plan
- Occupational Health and Safety Management Plan
- Emergency Preparedness and Response Management Plan
- Labour Management Plan
- Labour influx management plan
- Local Recruitment Plan
- Associated Facilities Management Plan
- GBV-SEA/SH action management plan
- Stakeholder Engagement Plan
- Grievance Redress Mechanism
- CSR plan.
- Resettlement Action Plan
- Livelihood Restoration Plan
- Gender mainstreaming plan
- Chance Finds Procedure
- Resource Efficiency and Pollution Prevention and Control Plan
- External Communication Mechanism on Environmental Issues
- Community Health and Safety Plan

KETRACO has established a dedicated Project Implementation Team (PIT) to implement the Project. The PIT will include a project engineer, three site managers, one civil engineer, one accountant, one procurement expert, one socio-economist and one environmentalist. The PIT will be assisted by a consultant with experience in undertaking similar projects in the region. The PIT reports to the KETRACO Board Committee that will oversee project implementation, including the review of annual work plans and budgets. The consultant will prepare the technical specification and draft bid documents for transmission lines and substations. KETRACO will at all times remain responsible for the overall performance of all ESMPs. Currently, KETRACO has 7 NEMA and Environmental Institute of Kenya (EIK) registered professionals, 12 socio-economists, 14 land surveyors, 3 safety officers and 14 land valuers/economists. The Environmental and Social division of KETRACO will monitor compliance of the project to applicable environmental and social standards whereas the KETRACO safety unit ensure safe work management and support the E&S unit to carry out contractor inductions. Its worth, noting that the KETRACO E&S department is well trained and capable to ensure monitoring of the project. From the consultant perspective KETRACO has the capacity to monitor implementation of the Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMnP) developed for the project. The department also has the capacity to undertake training and build the capacity of the contractor to implement both the ESMP and ESMnP.

The proponent is committed to putting in place the proposed measures to mitigate the potential negative environmental, safety, health and social impacts associated with the life cycle of the proposed project. Taking into cognizant the anticipated project benefits to the Country on power stability, reliability and spur on economy; and the adequate mitigation measures provided for the impacts, it is within our expert opinion that the project be approved with full implementation of the established ESMP, ESMmP and respective management plans.

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