WEST KENYA SUGAR COMPANY LTD

ENVIRONMENTAL IMPACT ASSESSMENT STUDY
FOR THE
PROPOSED CONSTRUCTION OF 66KV OVERHEAD TRANSMISSION LINE FROM WEST KENYA SUGAR FACTORY (KAKAMEGA) TO RAI PAPER MILLS (WEBUYE).

Line Coordinates: Start: Latitude, N 00°22'35.3" and Longitude, E 034°50'05.8"
End: Latitude, N 00°35'22.10" and Longitude, E 034°46'55.50"

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SEPTEMBER, 2020

CERTIFICATION

Project Proponent: West Kenya Sugar Company Ltd

Assignment Title: Environmental Impact Assessment Study for the Proposed Construction of 66KV Overhead Transmission Line from West Kenya Sugar Factory (Kakamega) to Rai Paper Mills (Webuye).

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ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED CONSTRUCTION OF 66KV OVERHEAD TRANSMISSION LINE FROM WEST KENYA SUGAR FACTORY (KAKAMEGA) TO RAI PAPER MILLS (WEBUYE)

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LIST OF ACRONYMS AND ABBREVIATIONS

AAAC	All aluminum alloy conductors
ACSR	Aluminum Conductor Steel Reinforced
BS	British Standards
COVID -19	Corona Virus Disease
CSR	Corporate Social Responsibility
DOSHS	Directorate of Occupational Safety and Health Services
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EPRA	Energy & Petroleum Regulatory Authority
ESMP	Environmental and Social Management Plan
FiT	Feed-in Tariff
GDC	Geothermal Development Company
GoK	Government of Kenya
IEC	Electro-technical Commission
IEIA	Integrated Environmental Impact Assessment
IPPs	Independent Power Producers
KACWASCO	Kakamega County Water and Sewerage Company Limited
KCAA	Kenya Civil Aviation Authority
KenGen	Kenya Electricity Generating Company
KeNHA	Kenya National Highways Authority
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KNBS	Kenya National Bureau of Statistics
KNEB	Kenya Nuclear Electricity Board
KRB	Kenya Roads Board
KV	Kilo Volts
KWS	Kenya Wildlife Service
LPG	Liquefied petroleum gas
LVNWSB	Lake Victoria North Water Services Board
MW	Mega Watts
NEMA	National Environment Management Authority
NGOs	Non-governmental Organizations
OSHA	Occupational Safety and Health Act
PCM	Public Consultation Meeting
PPE	Personal Protective Equipment
PWC	PricewaterhouseCoopers
REREC	Rural Electrification and Renewable Energy Corporation
ROW	Right of Way
WHO	World Health Organization
WRA	Water Resources Authority

EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) Study report was prepared as per the provisions of the Environmental Management and Coordination Act No. 8 of 2015, and the Integrated Environmental Impact Assessment Regulations, 2018. It is also in line local and international laws and policies that regulate projects of this nature. This Study gives the findings of the Environmental Impact Assessment undertaken as an integral part of the planning and design process. The Study highlights salient social, economic and environmental issues associated with the design, construction and operational aspects of the Proposed Construction of 66KV Overhead Transmission Line.

The adverse elements notwithstanding, the benefits that will be realized from the construction of the Proposed Construction of 66KV Overhead Transmission Line outweigh most of the inconveniences and negative impacts that have been categorized in this EIA Study as temporary, moderately significant and limited to the project construction phase. The EIA Study determined that if the project construction and operation is implemented with due attention to the mitigation and monitoring measures entailed in this document, most if not all, adverse environmental and social impacts will be manageable. Overall, the Proposed Construction of 66KV Overhead Transmission Line Project is deemed timely, highly beneficial and should therefore be allowed to proceed within the given framework.

It is recommended that for the prevention and mitigation of potentially adverse environmental and socio-economic impacts, the following should be done:

- The operation and maintenance of the proposed project must comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention and precaution
- Ensure the views expressed by the public during the consultation exercise are integrated in the design and implementation plan of the project, especially where aspects of social interest are concerned.
- Regular environmental and social safeguard monitoring and auditing should be undertaken and any identified shortcomings addressed. This will ensure that all projects are in conformance with established laws and regulations for the management of environment, safety and health
- Institute effective communication, education and awareness raising for project workers and neighbours for enhanced acceptability and social harmony
- The proponent should ensure the local community benefits from employment opportunities in each phase of the project that is being executed
- The Contractor should expedite on the works to minimize adverse livelihood impacts and inconveniences to the community.

1. INTRODUCTION

1.1 The Proponent

The Rai group is a Kenyan investor with interests in various sectors in the country and predominantly in the manufacturing sector. The group owns and operates West Kenya Sugar Company Limited, a sugar milling factory located in Malava Constituency, Kakamega County and Rai Paper Mills, a paper factory in Webuye East Constituency of Bungoma County.

At the West Kenya Sugar factory, the company has established a 12MW (15MVA) power generation plant using waste cane fibre (also known as bagasse) as fuel. This generation supplies West Kenya Sugar factory with a power demand of 5MW while the balance of 7MW is unutilized. The company also has a plan to set up a second generator of 12MW thus making a generation capacity of 24MW (30MVA.).

Rai paper mills, which is approximately 30km away from West Sugar factory has a demand of 3.5MW supplied from the national grid. The company has ongoing plans to expand the Rai Paper Mills factory that will increase the demand to 14MW.

1.2 Project Background and Justification

Currently, Kenya's electricity retail tariff stands at approximately US 15 cents per kilowatt hour, which is relatively high compared to other African countries like Zambia, South Africa and Ethiopia which have electricity retail tariffs of US 9 cents per kilowatt hour.

Access to cheap and affordable electricity has been identified as one of the key drivers for Kenya to attain its Vision 2030 goals as well as the Big 4 agenda. Manufacturing stands tall as a key pillar in the Big Four development agenda by the National Government. Manufacturing is seen to be the key to unlocking the success of the other development goals, namely: Universal Healthcare, Affordable Housing, and Food Security. The argument is that manufacturing will create many quality jobs thereby improving the living standards of the workers, elevating them to access proper healthcare and decent affordable housing. The Government has set up numerous development projects in the manufacturing sector that seeks to raise the share of manufacturing in the gross domestic product (GDP) from the current 10% to 15% by 2022.

However, the manufacturing industry in Kenya has been sluggish over the years. The high cost of inputs such as electricity has been a huge hindrance to the manufacturing sector. In a bid to achieve these objectives, the government of Kenya aims to deliver universal access to electricity by 2022 and as such, it has implemented various measures to incentivize private sector investment in the generation of electricity in the country. These incentives include providing letters of support for new investors as well as various tax measures aimed at improving returns for investors (PWC-Kenya, 2020).

The recently-enacted Energy Act, 2019 provides for the liberalisation of both the distribution and transmission subsector in Kenya and is also expected to create an enabling environment for the Government's Big Four Agenda.

The drive for cheaper power to promote manufacturing at Rai Paper Mills has prompted the Proponent having a 24MW generation capacity at West Kenya Sugar Factory to dispatch 14MW from West Kenya Sugar factory to Rai paper Mills in Webuye through the Proposed 66KV 30km long Overhead Transmission Line Project. The ripple effects of the project will be felt through the region in the form of creation of many quality jobs thereby improving the living standards of the workers and improved economic growth.

The Proposed Construction of 66KV Overhead Transmission Line Project and associated components is listed in the EMCA Amended Second Schedule through Legal Notice No 31 of 2019 under High Risk Projects in section (10) Power and infrastructure projects, including—(a) thermal and hydropower development exceeding ten megawatts; and (e) high voltage electrical transmission lines for which a full environmental impact assessment study shall be undertaken.

The proposed project has the potential of causing impacts to the environment. It is against this backdrop that West Kenya Sugar Company Ltd commissioned Gomake Consultancy Company to carry out an Environmental Impact Assessment (EIA) Study for the project.

1.3 Objectives of the EIA study

The main objective of the EIA study is to carry out a systematic examination of the baseline environmental conditions within the project area in order to determine how the project will impact the environment. The specific objectives of the study included, but are not limited to the following:

- Determination of the compatibility of the establishment of the Proposed Construction of 66KV Overhead Transmission Line with the local environmental conditions.
- Identification and evaluation of the significant environmental impacts of the proposed project with special emphasis on:
  - Compatibility with neighboring land uses
  - Landscape alteration
  - Solid and liquid waste management
  - Air and noise pollution
  - Impact on socio-economics and livelihoods
- Assessment and analysis of the environmental and social costs and benefits that may accrue from the proposed projects
- Incorporation of the Environmental and Social Management Plan and Monitoring mechanisms during construction and operation phases of the projects

1.4 Scope of the ESIA Study

The study identified the anticipated and foreseeable impacts on the environment resulting from the implementation of Proposed Construction of 66KV Overhead Transmission Line Project. The physical scope covers the 30km stretch where the project will be sited and the adjacent environment that may be affected by, or which may affect the project. All potential impacts, (localized or delocalized) have been carefully evaluated against the guidelines provided by the Environmental Management and Coordination Act, EMCA 1999 (Amended

2015) and the Integrated Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2018. This report is structured into the following sections:

- Project Description
- Gathering of environmental and socio-economic baseline
- Review of policy, legal and regulatory framework
- Analysis of project alternatives
- Analysis of the potential impacts on the project environment
- Devising of Mitigation Measures and preparation of an Environmental and Social Management Plan

1.5 EIA Study Methodology

Screening was done to determine whether or not the proposed project falls within a category that requires EIA prior to commencement. Other considerations during the screening process included a preliminary assessment of the environmental sensitivity of the areas that will be traversed by the Proposed Construction of 66KV Overhead Transmission Line. This entailed a desk review of information and designs availed by the Proponent. It was determined that the project is listed in the EMCA Amended Second Schedule through Legal Notice No 31 of 2019 under High Risk Projects in section (10) Power and infrastructure projects, including— (a) thermal and hydropower development exceeding ten megawatts; and (e) high voltage electrical transmission lines for which a full environmental impact assessment study shall be undertaken. The Proponent therefore, commissioned this study in line with the provisions of the said Act.

1.5.1 EIA Study Terms of Reference

The project scoping stage which followed the screening stage was done to narrow down to the project issues that require detailed analysis. Terms of Reference for the Study was formulated and submitted to NEMA for approval and is attached in Appendix I. The key issues identified are concerned with effects on neighboring land uses such as residential and business premises, air quality, waste management, noise and vibration disturbances, impacts on soil and water due to pollution and oil spills, public safety as a result of electrocution, impacts on wildlife and vegetation, changes in landscape, social vices, and employment, among others. The process involved having discussions with the Proponent on the key issues and collection of primary and secondary data on the same. The primary data was collected using both qualitative and quantitative methods of data collection through field visits/site walks, public and stakeholders consultation. Secondary data was collected through literature review which included the review of policies, Acts and regulations; County Development Plans; project area maps; previous project area reports among others.

This exercise was designed to meet the requirements of EMCA 1999 (Amended 2015) and the IEIA Regulations of 2018. For the most part, the exercise involved studying the proposed design of the Proposed Construction of 66KV Overhead Transmission Line, the operational mechanisms of each component, the input and outputs of the facility and determining the impacts that may manifest during design and construction. In addition, baseline information was obtained through desk studies, physical investigation of the project areas, public and key

informant consultations. The study adopted an integrated approach whereby a multi-disciplinary team was engaged in the data collection and analysis. Generally, the key activities that fed in to the EIA Study entailed, but are not limited to the following:

- A sit visit to collect baseline information of the project area.
- A comparative analysis of the project with existing land uses in the neighborhood.
- A review of relevant policy and legislation.
- Discussions with the project proponent to obtain information on various project aspects.
- Identification of health and safety concerns that may be occasioned by the project.
- Seeking views and input through discussions and interviews with the public and key informants.
- Assessment of the site to detail the various existing and likely impacts.
- Proposal of mitigation measures to avert or minimize negative impacts.

Both positive and negative impacts of the proposed project have been identified and appropriate measures to abate any adverse effects that may emanate from the proposed transmission line project activities. The Environmental Impact Assessment (EIA) Study determined the inter-relationship between the Proposed Construction of 66KV Overhead Transmission Line, the natural environment and social fabric. This was done with a view of integrating environmental protection measures in the implementation of the project from the design stage through construction, commissioning and eventually long term operation. Upon identification of the impacts from the project, appropriate measures have been drawn to mitigate the impacts. This led to the development of the Environmental and Social Management Plan to guide the project implementation based on project knowledge and information available up to this step of the ESIA process. This will ensure proper integration of the ESMP in various project stages. The Monitoring Plan will serve as a supervisory schedule with respect to the environmental aspects.

The Environmental and Social Management Plan (ESMP) describes a range of environmental issues that may be occasioned by the project and outlines corresponding measures that will be employed to mitigate adverse impacts and enhance positive impacts. A detailed Environmental and Social Management Plan (ESMP) has been prepared to demonstrate how site specific concerns will be addressed during the design, pre-construction, construction and operation phases of the project. As the project progresses, some components of the ESMP might require amending due to variations in the design or changes in site conditions. The ESMP is therefore a working document, which may periodically be reviewed and updated by Lead Experts subject to the approval of the National Environment Management Authority (NEMA).

1.6 The Project Cost

The Proponent avers that the total estimated project cost is *Kenya Shillings Three Hundred and Thirty One (331) million* to set up. The amount to be expended in the different project phases of design, construction and installation of various facilities.

2. PROJECT DESCRIPTION

2.1 Power Generation

Currently the Proponent has a steam turbine generator with an installed a capacity of 15000kva (12MW @ 0.8 p.f.). This is the main generator currently being run at below 50% output to run the 5MW demand at West Kenya Sugar Factory.

2.1.1 Power Consumption

Currently west Kenya Sugar demand is 5MW and the demand is not expected to rise in the medium term plans. On the other hand, Rai Paper has a maximum demand of 3.5MW which is expected to rise to 14MW in the medium term plans. Therefore, the internal demand will be 19MW.

A new steam turbine generator with a capacity of 15000kva (12MW @ 0.8 p.f.) has been proposed. This generator will enhance the overall generation to 30,000kva (24MW @ 0.8 p.f.). The overall power generated from the infrastructure will be used for running the two factories (West Kenya Sugar factory and Rai Paper Mills) and the balance will be exported to the National grid.

2.1.2 Power export to the National Grid

The power balance of 5MW after internal consumption will be exported to the national grid. A plan is in progress at West Kenya Sugar factory to establish the interconnection to the national grid and subsequent purchase of power by the national up taker, Kenya Power.

2.2 Proposed Transmission line

In order to transmit 14MW of power from West Kenya Sugar factory in Kakamega to Rai Paper Mills in Webuye, a 66KV overhead line shall be constructed in 150sqmm ACSR conductor and on wooden poles.

2.2.1 Line route and right of way

Between West Kenya Sugar Factory in Kakamega County to Rai Paper Mills in Webuye, Bungoma County, the main road has a 60m wide wayleave and has adequate space to establish a single circuit 66KV line as proposed. The Proponent shall therefore engage and seek authority from KeNHA to construct the line on the road reserve. Where the road reserve may not be adequate, permission shall be sought from adjacent land owners to grant right of way as may be necessary.

2.2.2 Interactions with the KPLC national grid

The route proposed has in some areas the KPLC national grid. Maximum care shall be taken in design, construction and maintenance to avoid any adverse conflict with the national grid and ensure safety of the lines, operators and the general public. Key among the measures to be undertaken is ensuring that the proposed line is on its own trace and adequately spaced with parallel KPLC grid lines, use of underground cables at crossings and clearly labelling all the poles of the proposed line.

2.3 Progression of Project Implementation Activities

The Proponent is in the process of procuring the services of a competent Contractor to execute the construction works. Typically, as with all projects involving construction and earth moving activities, the following procedure is proposed:

- Securing all approvals, permits and licenses before commencing construction works;
- Procurement by the Contractor of a performance bond to ensure that the works shall not be abandoned midway and, if abandoned, would not suffer as the client would still be able to engage another contractor;
- Mobilizing equipment, machinery, personnel, construction camp including accommodation, securing and fencing of the construction site;
- Recruitment of the labor force;
- Identification of dumping sites for any unsuitable, excavated or demolished waste materials or any other generated waste;
- Provision of sanitation facilities such as a temporary latrine or mobile toilet for the construction workers;
- Construction of storage areas for delivery of construction materials;
- Ground investigations should be done prior to actual construction works, the Contractor will undertake confirmatory ground investigations over and above the one done for the design;
- Site preparation and clearance will involve general site clearance of remnants of material from the current site occupant including the disposal of any arising wastes or debris;
- Utilities such as power lines, water pipes etc. that may interfere with site operations or that may be affected by the operations of the site facility need to be relocated accordingly;
- Earthworks for preparation of foundation of buildings and other structures will include but not be limited to:
    - Scarifying the ground, excavating and dumping or backfilling with excavated earth; and
    - Other works as outlined in the project scope of works including civil works, mechanical works, electrical works

2.4 Project Input during Construction Phase

2.4.1 Environmental Requirements

The Contractor shall undertake to complete all works in accordance with statutory requirements. The Contractor shall take reasonable precautions to avoid damage to land, property, crops, etc. and shall ensure that the work is adequately supervised so that damage is reduced to the minimum. All surplus material shall be removed after erection and site shall be left in a clean and tidy condition, to the satisfaction of the Proponent.

Where it is necessary to provide scaffolding over roads, railways or telecommunication lines in order not to interfere with the passage of traffic, this shall be carried out by the Contractor at such times as may be convenient to the Authority concerned. Flagman and approved types of danger and warning notices shall be provided by the Contractor to ensure safety of the public.

2.4.2 Wayleaves

Wayleaves shall be provided by the Proponent to enable the Contractor to carry out the Works. In order to provide wayleave the Proponent has to obtain approvals from Government and other statutory authorities, and also consents from owners and occupiers of property which may be affected by the line.

2.5 Standards

All materials that shall be used shall be in accordance with the latest amendments of the Standards of the International Electro-technical Commission (IEC) or British Standards (BS) and applicable Kenyan Standards.

2.6 Units of Measurements

SI units (System International) shall be used in all the technical schedules and drawings.

2.7 Materials

Each of the several parts of the line shall be of such construction and design as to give long and continuous service with high economy and low maintenance costs.

All material used and equipment shall be new and of the best quality and workmanship and shall be of the highest class throughout with the designs and dimensions of all parts such that mechanical and electro-mechanical stresses which they are subjected shall not render them liable to distortion or damage under most severe conditions encountered in service.

The detailed design shall be carried out in manner to facilitate inspection, repairs and simplicity of operations and maintenance. All materials shall ensure satisfactory operations under the atmospheric conditions prevailing in the area. Line supports, conductors, insulators and fittings shall be such as to minimize the risk of damage due to deterioration, or damage in service of any part of the line. The design shall incorporate any reasonable precaution and provision for the safety for those concerned in the maintenance of the project.

2.8 Line Supports and Foundations

The network shall be supported on wooden poles.

2.8.1 Physical and Mechanical Properties of Wood poles-

The wood poles (Eucalyptus Saligna) used shall have the following properties:-

Table 1: Properties of wood poles to be used

Nominal length	**10**	**11**	**11**	**12**	**12**	**14**	**14**
Category	**Medium**	**Medium**	**Stout**	**Medium**	**Stout**	**Medium**	**Stout**
H(mm)	1.8	1.8	1.8	1.8	1.8	2.0	2.0
Dc(mm)	220	230	295	240	305	248	310
Dm(mm)	150	160	200	160	200	160	200
Dg(mm)	220	230	295	240	305	270	335
De(mm)	175.9	185.6	234.8	189	238.1	199.4	248.4
F(kN)	5.90	4.94	13.05	4.03	10.37	3.45	8.23
Ultimate load (kN)	8.64	8.73	18.42	8.89	18.24	10.46	20.02
Crippling load (kN)	59.4	58.6	149.8	51.2	128.9	45.9	110.3

H Ground position from butt

dc Critical diameter

dg Minimum groundline diameter (mm)

dm Minimum top diameter (mm)

de Effective diameter

f Load per mm of deflection at point of application of load

Note that the mechanical properties used in the mechanical calculations are those stated in the **Kenya Standard KSO2-516**.

2.8.2 Strength and Species

Wood poles shall be of eucalyptus timber and shall belong to the strength groups Light, Medium or Stout as specified. The treatment shall be creosote pressure-treated wood, or Chromated copper arsenate (CCA).

2.8.3 Pole Caps

Pole caps of approved type shall be used.

2.8.4 Safety

All poles shall have a DANGER/HATARI warning plate, placed at a visible point in the pole at a height of 1.7m and legible from a distance of at least 2m.

2.8.5 Excavation

The hole for the pole shall be excavated to a minimum of 1.8m for the 11m pole. If the base of the hole is not firm ground, the hole shall be excavated until firm ground is reached, otherwise the pole has to be placed on a flat rock block, min. 40 x 40 cm or a timber raft, min 80 x 80 cm, depending on the conditions.

The minimum hole depth for wood poles shall be defined in the table:-

Table 2: Minimum hole depth for wood poles

Pole Height	Size	Hole Depth
10	Medium	1.6
11	Medium	1.8
11	Stout	1.8
12	Medium	2.0
12	Stout	2.0
14	Medium	2.2
14	Stout	2.2
15	Stout	2.4
17	Stout	2.6

The hole shall be dug to the required depth. Any holes left overnight must be covered in such a way that they do not pose any danger to persons or animals. A suitable method of warning shall be used to identify positions of the holes.

2.8.6 Erection

The butt of the pole is laid over the hole with the length in the direction of the line. A skid board is placed against the hole to facilitate the entry of the butt when the pole is raised and prevent earth breaking into the hole during the process of erection.

Erection of the poles shall be done using any of the following methods:

(i) Erection ladders
(ii) Truck mounted hydraulic lifts
(iii) Guy ropes shall be used to prevent accident and to hold pole in a true vertical position.

The pole is gradually raised to the vertical position and the butt guided in to the hole.

2.8.7 Back Filling

After erecting the pole and positioned it vertically, the pole shall be secured in this position by help of stones blocks placed in 2 or 3 layers, one layer at the bottom of the hole, and one to two layers at the top. The stones shall fill out the area between the pole and the wall and will secure that the pole remains vertical during the pole's lifetime.

Between the layers of stone and above the top layer, the excavated soil can be used as backfill material if the origin soil is appropriate for tamping. The soil should be wet and backfilled slowly and each layer thoroughly tamped until the tamp makes a solid sound as the earth is stuck. Each tamping layer should not exceed 150 mm. If small stones or gravel are readily available, these should be mixed with the soil used in backfilling.

2.9 Insulators and Fittings

2.9.1 Insulators

Insulation between conductors and support shall be of both disc, pin and post insulators and shall comply in all respects with IEC 305, 383 and 120, 1109 and 815 or such other standard as may be approved.

2.9.2 Insulator Fittings

Fittings shall comply with BS.3288: Part 1 or such other standard as may be approved and shall be so designed that replacement of string insulator units and the arcing protection system can easily be performed during maintenance or repair under outage or live-line conditions.

All clamps shall be as light as possible and shall be designed to avoid any possibility of deforming the stranded conductors and separating the individual strands.

Bolts and nuts shall be in accordance with an approved specification. Bolt threads shall be coated with approved grease immediately before packing. Split pins for securing attachment of fittings of insulator sets shall be of stainless steel and shall be packed by washers of approved size and gauge.

2.10 Conductor

Phase conductor to be used shall be Aluminium Conductor Steel Reinforced (ACSR) and shall consist of steel strands together with aluminium strands or aluminium alloy strands

only. The outermost layers of the conductors shall be stranded with right hand lay. There shall be no joints in the individual wires of the outer layers of the aluminium wire.

2.10.1 Conductor Stringing

All stringing equipment shall be properly anchored and shall be positioned in such a way that structures, insulators and fittings will not be overloaded.

Every precaution is to be taken to prevent damage to the conductor. Clamps and other devices used for handling the conductor during stringing shall allow no slippage or relative movement of strands or layers and shall not pinch or deform the conductor. Conductor grooves in sheaves and tensioner shall be lined with neoprene or rubber.

Conductors shall be effectively earthed in an approved manner during running out and at all places where men are working on them.

Conductor drums shall be closely examined before conductor pulling commences and all nails and other things that could damage the conductor shall be removed.

2.11 Safety

Personnel shall be required to use necessary protective gear, which conform to applicable codes. Personnel working near high voltage areas shall be required to use non-slip foot wear, gloves, safety glasses, helmets, etc. They shall also be required to observe stipulated safety clearances.

Fire prevention and safety programmes shall also be observed.

2.12 Operation Devices and Protection Systems

Operation devices consisting of single and three pole disconnectors shall be installed at locations specified by the designer. The disconnectors shall be easily accessible during normal conditions. They will be fixed in such a way that they cannot be closed by the action of gravity. Their characteristics shall be capable of meeting the maximum rated current of the circuit.

3. ANALYSIS OF ALTERNATIVES

3.1 Overview

Alternatives with respect to the proposed project, technology and waste management were analyzed with an aim of coming up with the most sustainable project considerations that will ensure optimal benefits are realized from the project. A range of factors were put into consideration including the receiving environment, anticipated impacts and views and concerns gathered from the stakeholder consultations. The alternative options are discussed below.

3.2 No Project Option

West Kenya Sugar Company Ltd indicate that construction of the Proposed Construction of 66KV Overhead Transmission Line and associated infrastructure is to evacuate 14MW of renewable energy from West Kenya Sugar factory to Rai paper Mills in Webuye so as to lower the cost of production through cheaper electricity and lead to greater economic advantages while minimizing the environmental impact that may arise from the bagasse waste being dumped into the environment. The no project option therefore means that the aforementioned benefits are foregone. The only possible advantage of this option is that the environment and the social set up will not be interfered with.

On the flipside, this option will deny the project region and the entire Nation benefits that can only be realized from the Proposed Construction of 66KV Overhead Transmission Line and associated infrastructure. With no project, the expected revival of Rai Paper Mill and manufacturing sector in the country will continue facing constraints and hindrance arising from high cost of electricity. The No Project Option is the clearly the least preferred also due to the following factors:

- The local skills would remain underutilized as no employment opportunities will be created for those who would otherwise have worked in the project;
- The project region area not realize its economic potential and the living standards of the locals and other Kenyans would remain unchanged;
- Limited growth of the manufacturing sector as key pillar in the Big Four development agenda by the National Government; and
- Reduced interaction at the local, regional and national levels that would foster stronger social network.

3.3 Analysis of Alternative Renewable Energy Feed-in-Tariff-System (FiT)

The Energy Act, 2019 provides for a Feed-in Tariff ("FiT") System aimed at catalyzing the generation of electricity through renewable energy sources; encouraging local distributed generation thereby reducing demand on the network and technical losses associated with transmission and distribution of electricity over long distances; encouraging uptake of, and stimulating innovation in, renewable energy technology; and reducing greenhouse gas emissions.

This alternative therefore implies that the excess generated power at West Kenya Sugar Company Factory that will not be utilized at the factory will be dispatched to the national grid without being transmitted to Rai Paper Mill a distance of 30Km away.

Though this option is the most cost effective since no additional infrastructure will be necessary in the form of a transmission line, Rai Paper Mill will continue facing constraints and hindrance arising from high cost of electricity from Kenya Power.

However it should be noted that the power balance of 5MW after internal consumption by the two companies (West Kenya Sugar Company and Rai Paper Mill) will be exported to the national grid. A plan is in progress at West Kenya Sugar factory to establish the interconnection to the national grid and subsequent purchase of power by the national up taker, Kenya Power.

3.4 Analysis of Alternative Construction Materials and Technology

The materials to be used for construction should be locally and internationally acceptable to uphold the highest environmental, health, safety and engineering standards. Energy saving equipment should be prioritized over its non-saving counterparts.

Each of the several parts of the line shall be of such construction and design as to give long and continuous service with high economy and low maintenance costs.

All material used and equipment shall be new and of the best quality and workmanship and shall be of the highest class throughout with the designs and dimensions of all parts such that mechanical and electro-mechanical stresses which they are subjected shall not render them liable to distortion or damage under most severe conditions encountered in service.

The detailed design shall be carried out in manner to facilitate inspection, repairs and simplicity of operations and maintenance. All materials shall ensure satisfactory operations under the atmospheric conditions prevailing in the area. Line supports, conductors, insulators and fittings shall be such as to minimize the risk of damage due to deterioration, or damage in service of any part of the line. The design shall incorporate any reasonable precaution and provision for the safety for those concerned in the maintenance of the project. The Proponent is further urged to adopt international best practices by considering naturally occurring material for construction.

3.5 Right of Way (ROW) Alternatives

Between West Kenya Sugar Factory in Kakamega County to Rai Paper Mills in Webuye, Bungoma County, the main road has a 60m wide wayleave and has adequate space to establish a single circuit 66KV line as proposed. The Proponent shall therefore engage and seek authority from KENHA to construct the line on the road reserve. Where the road reserve may not be adequate, permission shall be sought from adjacent land owners to grant right of way as may be necessary. It is however strongly advised that, the proponent should avoid public institutions such as schools, health facilities and markets that were identified along the line route.

4. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE CONDITIONS

4.1 Bio-Physical Conditions

4.1.1 Location and Size

Kakamega County is located in the Western part of Kenya and borders Vihiga County to the South, Siaya County to the West, Bungoma and Trans Nzoia Counties to the North and Nandi and Uasin Gishu Counties to the East. The County covers an area of 3,051 .3 KM^2 and is the second populous county after Nairobi with the largest rural population.

Bungoma County lies between latitude 0˚ 28' and latitude 1˚ 30' North of the Equator, and longitude 34˚ 20' East and 35˚ 15' East of the Greenwich Meridian. The County covers an area of 3032.4 Km^2. It boarders the republic of Uganda to the North west, Trans-Nzoia County to the North-East, Kakamega County to the East and South East, and Busia County to the North-East, Kakamega County to the East and South East, and Busia County to the West and South West. Map 1 shows the location of Bungoma County in Kenya.

Figure 1: Location of Project Area in Kakamega and Bungoma Counties
Source: GoK Database

The project area covers a stretch of about 30Km from the gate of West Kenya Sugar Company along Shamberere Road to Rai Paper Mill gate in Webuye. The following are the

coordinates that were taken during the environmental sampling along the proposed project route:

Table 3: Transmission Line Coordinates Points

LOCATION/ CORRIDOR	POINT COORDINATES	DESCRIPTION
MP 1	0°22'35.3"N 34°50'05.8"E	West Kenya Sugar main gate opposite PAG church along Shamberere Road
MP 2	0°22'34.50"N 34°51'11.20"E	At the junction of Kakamega –Webuye Road and Shamberere Road
MP 3	0°25'57.10"N 34°51'18.60"E	On Kakamega- Webuye Road at Khumusalaba Stage
MP 4	0°27'37.50"N 34°51'25.80"E	On Kakamega- Webuye Road at Malava Forest
MP 5	0°29'28.20"N 34°50'09.90"E	On Kakamega- Webuye Road at Butali Town
MP 6	0°31'14.60"N 34°49'17.80"E	On Kakamega- Webuye Road at Luyeshe Shopping Center
MP 7	0°33'46.90"N 34°48'18.50"E	On Kakamega- Webuye Road at Matete Market
MP8	0°34'38.80"N 34°48'19.10"E	On the Eldoret- Malaba Highway at Kaburengu
MP 9	0°34'59.40"N 34°48'01.50"E	On the Eldoret- Malaba Highway at Nzoia River
MP 10	0°35'22.10"N 34°46'55.50"E	On the Eldoret- Malaba Highway at Rai Paper entrance

4.1.2 Administrative Units

Kakamega County comprises of twelve Sub-counties, sixty wards, one hundred and eighty seven Village Units and four hundred Community Areas. The county comprises of twelve constituencies with twelve elected Members of Parliament and sixty electoral wards with sixty elected Members of the County Assembly. The project traverses Malava and Lugari Constituencies along the main highway.

Bungoma County is divided into 12 Sub-Counties, 45 Wards and 236 Village Units. Politically, the County has nine (9) constituencies and forty five (45) County Assembly. The Project is located in Bungoma East Sub-County, Maraka Ward.

4.1.3 Climate

Kakamega County annual rainfall ranges from 1280.1mm to 2214.1 mm per year. The rainfall pattern is evenly distributed all year round with March and July receiving heavy rains while December and February receives light rains. The temperatures range from 18˚C to 29˚C. January, February and March are the hottest months with other months having relatively similar temperatures except for July and August which have relatively cold spells. The county has an average humidity of 67 percent. Since the early 1960s both minimum (night) and maximum (day) temperatures have been on a warming trend throughout Kenya. Current projections indicate increases in temperature.

Bungoma County experiences two rainy seasons, the long rains of March to July and short rains - August to October. The annual rainfall in the County ranges from 400mm (lowest) to 1,800mm (highest). The annual temperature in the County vary between 0°C and 32°C due to different levels of altitude, with the highest peak of Mt. Elgon recording slightly less than 0°C. The average wind speed is 6.1 km/hr. In the last decade, the County experienced increasing variability in rainfall and temperature patterns that have influenced changes in agricultural seasons.

4.1.4 Topographic Features

The altitudes of Kakamega County ranges from 1,240 metres to 2,000 metres above sea level. The southern part of the county is hilly and is made up of rugged granites rising in places to 1,950 metres above sea level. The Nandi Escarpment forms a prominent feature on the county's eastern border, with its main scarp rising from the general elevation of 1,700 metres to 2,000 metres. There are also several hills in the county such as Misango, Imanga, Eregi, Butieri, Sikhokhochole, Mawe Tatu, Lirhanda, Kiming'ini hills among others.

The major physical features in Bungoma County include Mt. Elgon, several hills (Chetambe, Sang'alo and Kabuchai), rivers (Nzoia, Kuywa, Sosio, Kibisi and Sio-Malaba/Malakisi), waterfalls such as Nabuyole and Teremi. Mt. Elgon and Sang'alo hill have attractive caves. The altitude of the County ranges from over 4,321m (Mt. Elgon) to 1200m above sea level.

4.1.5 Ecological conditions

Kakamega County has two main ecological zones namely; the Upper Medium (UM) and the Lower Medium (LM). The Upper Medium covers the Central and Northern parts of the county such as Ikolomani, Lurambi, Malava, Navakholo and Shinyalu that practise intensive maize, tea, beans and horticultural production mainly on small scale; and Lugari and Likuyani where large scale farming is practised. The second ecological zone, the Lower Medium (LM), covers a major portion of the southern part of the county which includes Butere, Khwisero, Mumias East, Mumias West and Matungu. In this zone, the main economic activity is sugarcane production with some farmers practising maize, sweet potatoes, tea, ground nuts and cassava production.

Kakamega County has 32,712.60 acres of land under forest. This is mostly in Lugari, Malava, Likuyani, Navakholo, Lurambi, Khwisero and Shinyalu Sub-Counties. The land is owned by the government and it's gazetted for forest use. The Project is expected to traverse through the Malava Forest.

Figure 2: Section of Malava Forest that will be traversed by the Transmission Line
Source: GoK Database

Bungoma County environment supports a complex pattern and balance of relationships between plants, animals, people and manmade features. These complex interactions lead to different selective pressures on organisms, leading to natural selection which causes population of species to evolve. Variation in nutrients and accumulation of toxins due to human activities have affected the ability of the environment to support life systems. Mt. Elgon forest ecosystem supports diverse life systems contributing immense goods (fruits, tubers, medicinal herbs, game meat, timber, logs, poles, firewood, fodder etc) and services (shed, pollination, decomposition, evaporation, absorption of CO_2, nutrient formation, recreation, spiritual and cultural values etc). The expanding County population accompanied by increasing agricultural activities have reduced spaces for fauna and flora. Excessive use of artificial fertilizers for instance has affected soil nutrients, insects and certain bacteria niches thereby affecting nitrogen conversion for plants, leading to variability in yields. These and other related processes have led to co-evolution where species evolve in response to each other as seen from bees and the flowers they pollinate to predators and the prey they eat.

4.1.6 *Flora* and *Fauna*

The Proposed Transmission Line route passes through Malava Forest Reserve an extension of Kakamega Forest. Kakamega forest is the major and the only remnant in Kenya of the once great tropical rainforest stretching from Central Africa, also known as the *Guineo-Congolian* forests. Like other tropical forests, Kakamega is rich in plant and invertebrates specie many of them endemic, including butterflies (Papilionidae, Pieridae, lycaenidae, nymphalidae and hesperiidae family) monkeys, genettes, Debrazzar, giant forest hedgehog, pottos, forest

squirrels, pangolins, giant forest squirrel, hammer-headed fruit bats, bushpig, over 400 species of birds, snakes (the Forest Cobra, Jameson's Mamba, Bush Viper, Gaboon Viper and Rhinoceros Viper) and insects all interconnected and part of supporting the forest's ecosystem itself by spreading the seeds of the trees and pollinating the flowers.

Kakamega Forest is a globally recognized areas of importance and therefore renowned hotspot for avifauna with birds such as Chapin's flycatcher, the red-headed Malimbe, the Blue Headed Bee Eater, Black Billed Turaco, Turner's Eremomela and Grey Parrots. At least forty-five of the species on the Kenya list of birds are to be found only in the Kakamega and nine of the species that occur at Kakamega are found nowhere else in Kenya, and two of its species, Turner's Eremomela (*Eremomela turneri*), Grey Parrot (*Psittacus erithacus erithacus*) and Chapins' Flycatcher (*Muscicapa lendu*), are threatened.

There are about 385 species of plants, including Elgon teak, red and white stink woods, varieties of Croton, *Aniageria Altisima* and several types of orchids. Plantation forest such as Lugari and Turbo provide timber from exotic species such as Pinus Patulla and cypress. The natural forests contribute immensely to provision of food to the community. Traditional fruits, roots and vegetables for example Mondia white (Mukombera, Basella, alba (Inderema), are abundant in the forest. Edible mushroom especially termitomyces mushrooms are frequently harvested from the forest for consumption as well as for sale.

The community around hunt for wild meat including monkeys, antelopes and hedgehog. So many species of trees and shrubs for example *albizzia gummifera*, *erythrina abyssinica* have medicinal value of some tree. This ecosystem has enormous diversity that has not been fully studied. It also presents wonderful opportunity for bird watching, hiking and rock climbing. It is also important to the growing tourism industry and can meet the growing demand for outdoor recreation, nature walks, education and research. Kakamega Forest has many of Africa's most beautiful butterflies providing high potential for butterfly farming and ecotourism.

Plate 1: Cows at the edge of Malava Forest Reserve

In Bungoma County, the expanding population accompanied by increasing agricultural activities have reduced spaces for fauna and flora. Excessive use of artificial fertilizers for instance has affected soil nutrients, insects and certain bacteria niches thereby affecting nitrogen conversion for plants, leading to variability in yields. These and other related processes have led to co-evolution where species evolve in response to each other as seen from bees and the flowers they pollinate to predators and the prey they eat.

4.1.7 Land Use

4.1.7.1 Kakamega County

Kakamega County has 753,745.5 acres of Land. Out of this, the arable land is 545,806.4 acres, non-arable land is 208, 210.9 acres and urban areas takes 63,011.8 acres. Land in the county can be classified into Public Land, Community Land, Private Land, Agricultural/arable land, Non arable land and Forest Land.

Public Land

This is government land registered and set aside for government functions and development. This land includes land for institutions, government offices, open parks dams and road reserves. The county owns these lands parcels though it's crucial to note that some of these institutions don't have title deeds and there's need to have the titles processed in order to avoid grabbing.

Community land

This is land that is lawfully registered in the name of group representatives, transferred to a specific community by any process of law, any other land declared community land by an Act of Parliament, lawfully held, managed or used by specific communities as community forests, grazing areas or shrines, ancestral land and land occupied by traditionally hunter-gatherer communities and) lawfully held as trust land by the county governments. The County has community land for burying the dead in Mumias Sub County.

Private land

This category of land comprises over 95 percent of the total land in the county. It comprises freehold land and land under private leases. It's also important to note that land sub divisions have been done making the land uneconomical for production in some areas of southern parts of the county. Under private ownership, the land owners are at a desecration to use their land as they deem good. There's need for them to process the title deeds which will be used as collateral in securing bank loans.

Agricultural/Arable Land

This category of land is purely used for agriculture i.e. for crop production and livestock production and it measure's approximately 545,806.4 acres. The northern part of the county i.e. Likuyani and Lugari Sub Counties has large farm sizes which are used for large scale farming. The southern region has small land parcels which are used for small scale farming.

Non Arable Land

This category of land in the county measures 208,210.9 acres. This is land that is not productive for agriculture but it's a resource by itself in that it provides building stones and other minerals.

Forest Land

The County has 32,712.60 acres of land under forest. This is mostly in Lugari, Malava, Likuyani, Navakholo, Lurambi, Khwisero and Shinyalu sub-counties. The land is owned by the government and it's gazetted for forest use.

4.1.7.2 Bungoma County

Land is a natural resource which is fixed in supply and yet its demand is ever increasing. The County has 2,880.78 Km^2 of arable land. Land uses include: Agriculture, forestry, mining, human settlements, business, social and public amenities. Land is also used as collateral to obtain credit as well as for aesthetic purposes.

4.1.8 Road, Railway Network and Airports

4.1.8.1 Kakamega County

Road Network

Kenya Vision 2030 recognises the need for seamless road network connectivity to spur economic growth through infrastructure development. According to the Kenya Roads Board, KRB – RICS (Road inventory and Condition survey – 2015 report and the Kakamega county infrastructure status report (2016) the total inventory of roads in the County is at 4,451.3Km.

This includes 2,236.17 Km for gravel, 1,308.90 Km for earth surface and 939.32 Km for narrow unpaved roads.

The bitumen and gravel standard roads in the County stands at 307.5 Kilometres and 2,792.25 Kilometres respectively. The county government has spearheaded the construction of 44.8 km and 1,700 km of bitumen and gravel roads respectively. In addition, a total of 589.5 km have been routinely maintained to ensure efficient road network. The ongoing construction of the Kisumu-Kakamega-Kitale road and the rehabilitated Kisumu – Ebuyangu - Mumias - Bungoma road by the National government will propel the county to a higher level of competitiveness leveraging on this opportunity for growth.

Railway Network

The county has 35 km of railway line with two railway stations namely: Lugari and Butere. However, they are underutilized. There is need for collaboration with the Kenya Railways and other stakeholders to service and operationalize the railway to boost the county's economy.

Airport and airstrips

The county has two air strips, one in Kakamega and the other in Mumias. The strategic position of the county having proximity to the Kisumu and Eldoret International airports which are 60 kilometers and 120 Kilometres respectively presents an opportunity for trade. There is need to upgrade and expand these airstrips.

4.1.8.2 Bungoma County
Road Network

The Mombasa – Nairobi – Eldoret – Webuye – Malaba highway (A104) traverses through the County. It is a major link road for trade and commerce. The Webuye - Kitale highway (A1) has recently undergone re-construction, thereby positioning the County as the desired destination for attracting and retaining investment. Some of the major road works undertaken by the national government in the County include: Webuye-Kitale (59km), Musikoma-Buyofu-Mungatsi (ongoing), Lwakhakha Korosiendet-Tulienge-Sirisia-Namwela-Chwele (ongoing), Musikoma – Sang'alo – Lurambi (ongoing).

Airstrips

The County has two underutilized airstrips in Webuye and Bungoma Towns. It is proposed that the latter airstrip, in consultation with the national government, be converted into a recreational or Small Medium Enterprises (SME) park. The County through the intergovernmental relations committee will work with the national government to upgrade and expand Matulo Airstrip at Webuye into an airport.

Ambient Air Results

The assessment was carried out on 10th August 2020 and involved measurement of concentration of Oxides of Carbon (CO, CO_2), Oxides of Sulphur (SO_x), Nitrogen Dioxide (NO_x) and Particulate Matter (PM_{10}) and ambient Noise.

The measurements were carried out from 10 different points along Shamberere Road, Kakamega-Kaburengu Road and Kaburengu- Rai Paper section of Eldoret –Malaba Road. The points of Air and Noise sampling were determined after site inspection since the proposed project was to traverse the KeNHA road reserve.

Table 4: Ambient Air Results

Location	**Concentration (µg/m^3)**			
	CO	**CO_2**	**SO_2**	**NO_2**
MP 1	<0.5	435	<0.4	<0.5
MP 2	<0.5	369	<0.4	<0.5
MP 3	<0.5	251	<0.4	<0.5
MP 4	<0.5	256	<0.4	<0.5
MP 5	<0.5	316	<0.4	<0.5
MP 6	<0.5	478	<0.4	<0.5
MP 7	<0.5	384	<0.4	<0.5
MP 8	<0.5	281	<0.4	<0.5
MP 9	<0.5	232	<0.4	<0.5
MP 10	<0.5	320		<0.5
EMCA (Air Quality Regulations, 2014 (µg/m^3) 24 hr	**2000 ppm**		**20**	**200**
WHO Limit Guideline Value (µg/m3) 24 hr	**Nil**		**125**	**150**

Results from the ambient air quality measurements above showed that the levels of both carbon monoxide, carbon dioxide, nitrogen dioxide and sulfur dioxide are within the guideline values set by World Health Organization and the EMCA air quality regulations 2014.

Table 5: Summary of Diurnal Noise Levels

Measurement Location	**LAmin dB**	**LAmax dB**	**Obtained Results LAeq dB**	**Maximum Allowed Limits LAeq dB (14h)**
MP 1	49.9	85.4	**76.9**	

Measurement Location	LAmin dB	LAmax dB	Obtained Results LAeq dB	Maximum Allowed Limits LAeq dB (14h)
MP 2	50.7	76.6	**63.1**	
MP 3	48.5	85.5	**63.6**	
MP 4	41.8	63.0	**50.7**	
MP 5	45.2	80.0	**66.7**	
MP 6	54.8	88.8	**70.5**	
MP 7	44.4	86.4	**67.7**	
MP 8	51.0	89.0	**71.9**	
MP 9	44.0	82.0	**68.3**	
MP 10				

Results from noise measurements above showed that all measured points except one point had there noise levels ABOVE the stipulated regulations in the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control Regulations, 2009 and Environmental Noise in a Community (WHO, 1999).

The findings of the analysis are attached in **Appendix II** of this report.

4.2 The Socio-Economic Survey Results of the Project Area

This section looks at the social terrain of the project area. It focuses on the demographic and socio-economic characteristics of people in the project area with a view to providing a picture of the baseline socio-economic situation. The primary data collected during the socio-economic survey has been used to evaluate the baseline status of the proposed project area community. A total of 47 respondents took part in the socio-economic survey with 37 respondents being drawn from Kakamega County which had the major part of the project area while 10 respondents came from Bungoma County which had a smaller part of the project area.

4.2.1 Respondents by Gender

4.2.1.1 Kakamega County

Majority of the respondents in the survey were males at 78% while females were at 22%.

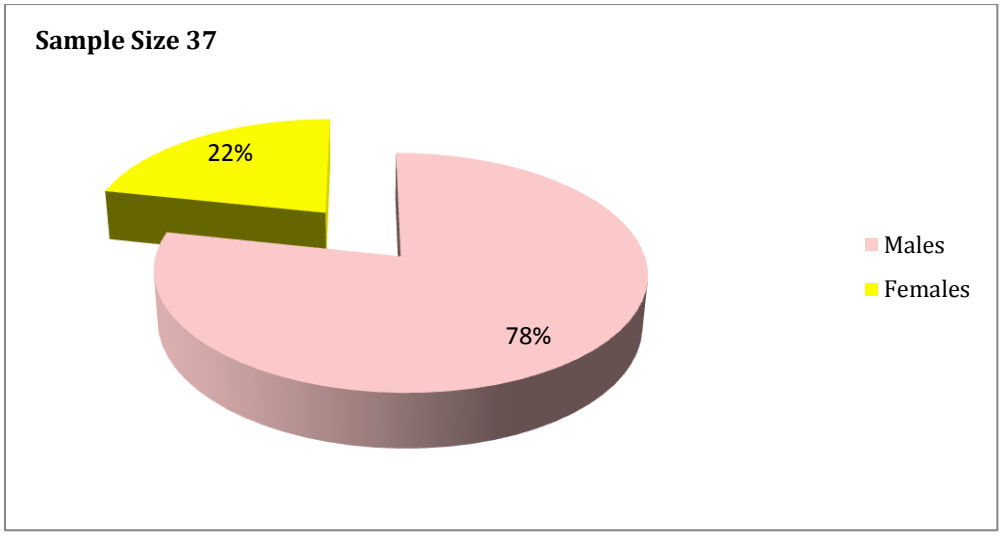

Figure 3: Respondents by gender in Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.1.2 Bungoma County

Majority of the respondents in the survey were males at 70% while females were at 30%.

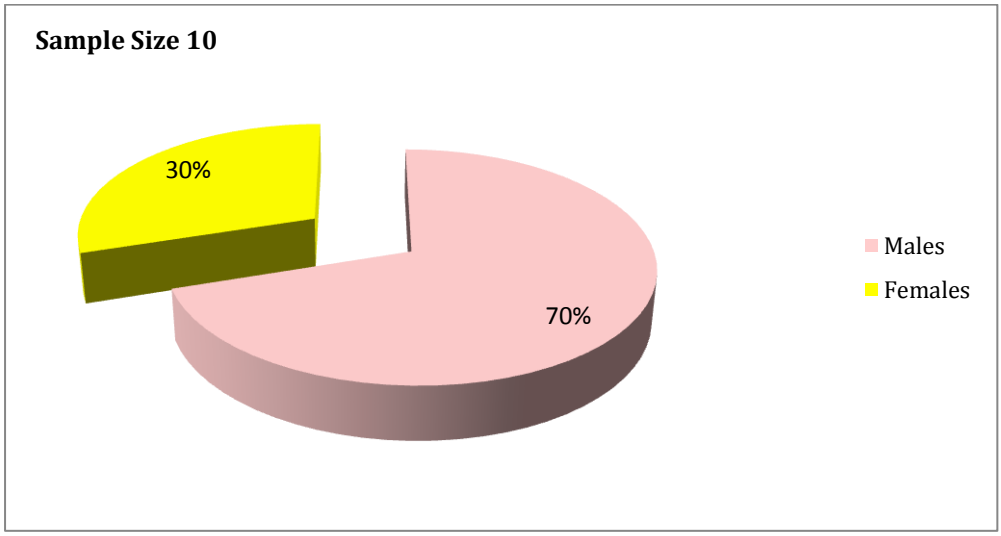

Figure 4: Respondents by gender in Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.2 Respondents by Age

4.2.2.1 Kakamega County

Majority of the respondents are in the age bracket of 51- 70 years at 46%, followed by age bracket of 31 – 50 years at 40%. Those who were below the age of 30 years (11%) and over 71 years (3%) were the minority.

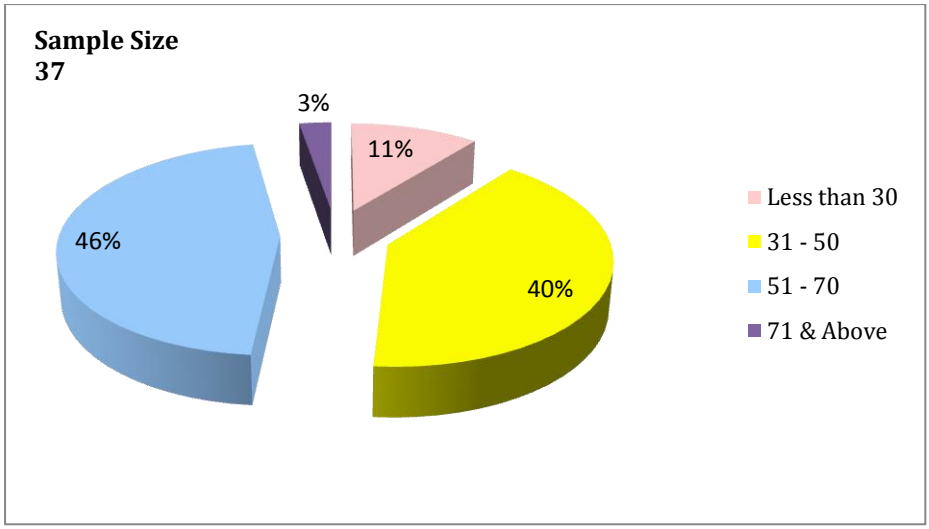

Figure 5: Respondents by age in Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.2.1 Bungoma County

Majority of the respondents are in the age bracket of 51- 70 years at 60%, followed by age bracket of 31 – 50 years at 30%. Those who were over 71 years (10%) were the minority.

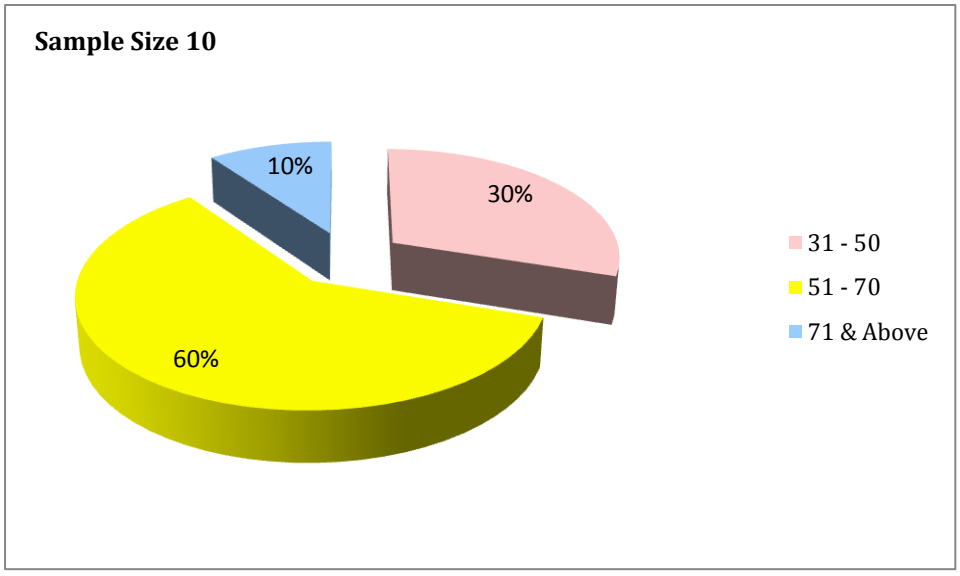

Figure 6: Respondents by age in Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.3 Livelihoods

4.2.3.1 Kakamega County

Agriculture employs over 80 percent of the population in the county mainly in the rural areas. More wage earners are in environmental protection, water, housing, energy, infrastructure and ICT sectors. They mainly rely on casual employment on farms, factories, house construction, water protection and drilling, communal labour, cane weeding and *boda boda* trade. According to the 2009 census report, the number of people employed per sector included 756,711 in the agriculture, 34,052 in other sectors, and 2,554 in wage employment.

The Study team carried out administration of the socio-economic questionnaires to establish the livelihood activities within the project area. The outcome is presented in the figure below.

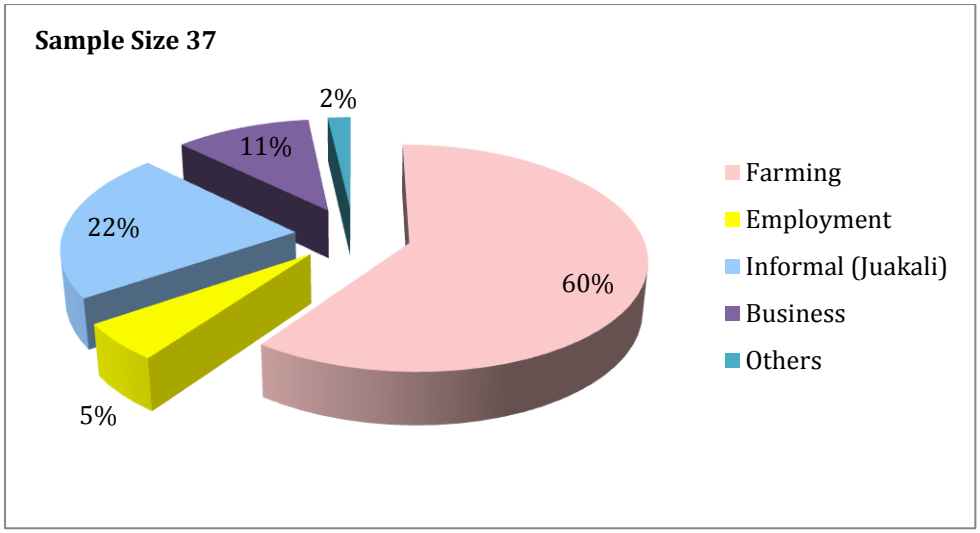

Figure 7: Livelihood in the Project Area for Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

Majority of the respondents (60%) are engaged in farming and agriculture while 22% are casual labour including the Jua kali sector. 11% are engaged in commercial and business enterprises, 5% in the formal employment while about 2% of the respondents are unemployed.

4.2.3.2 Bungoma County

Agriculture employs over 50 percent of the population in the county mainly in the rural areas. In Bungoma County, 14% of the residents are with no formal education, 10% of those with primary education and 19% of those with secondary or above level of education are working for pay.

The Study team carried out administration of the socio-economic questionnaires to establish the livelihood activities within the project area. The outcome is presented in the figure below.

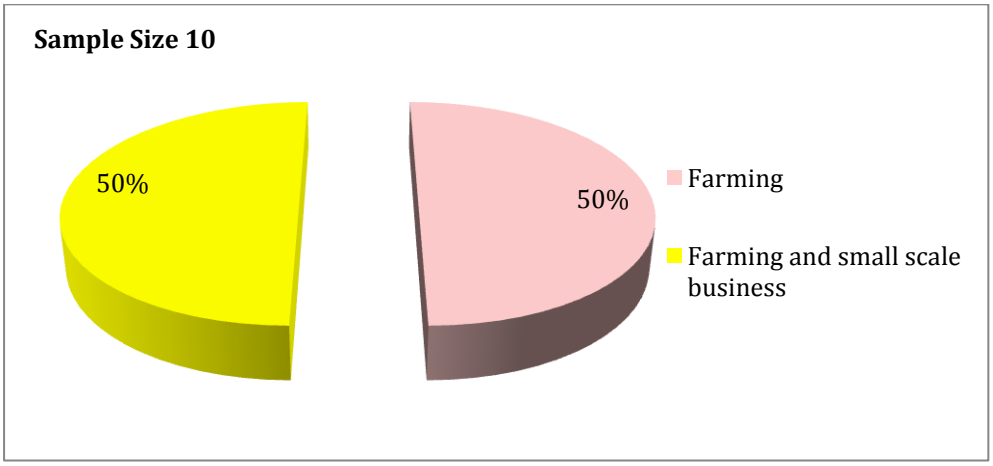

Figure 8: Livelihood in the Project Area for Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

All of the respondents are engaged in agricultural activities with (50%) engaged in farming alone while another 50% practicing agriculture and small scale business.

4.2.4 Quality of Housing Structures of the Residents

4.2.4.1 Kakamega County

Kakamega County has semi-permanent houses in rural areas with a few permanent houses. Households in urban areas have permanent houses with few houses in informal settlement being semi-permanent and temporary. The temporary houses are made of mud and cow dung in walling while roofing is done using grass and iron sheets. Permanent houses are constructed using bricks and iron sheets.

Majority of the project area respondents live in semi-permanent houses (49%) while 43% live in permanent houses. This shows that the project area communities mixed rural and urban. Other housing structures only form 8% of the housing structures found in the Project area.

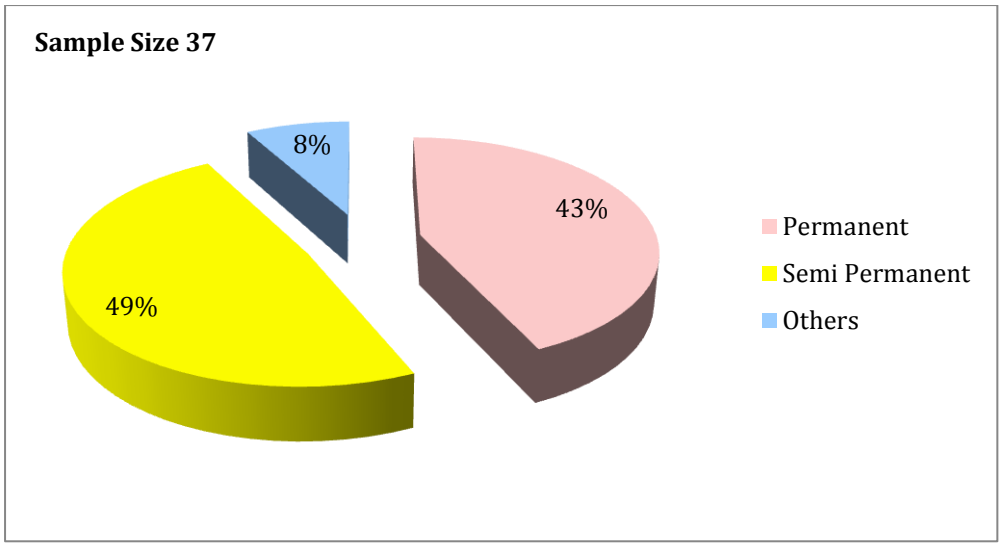

Figure 9: Housing type in the Project Area for Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.4.2 Bungoma County

The County housing is composed of a mix of units differentiated by cost, usage and material types. The dominant construction materials for floor are earthen, walls is mud and roofs corrugated iron sheets. Locally available construction materials include; sand, bricks, stones, timber, logs, nails and corrugated iron sheets. The demand for housing in the County outstrips the supply.

Majority of the project area respondents live mostly in permanent and semi-permanent houses with both tying at 50%.

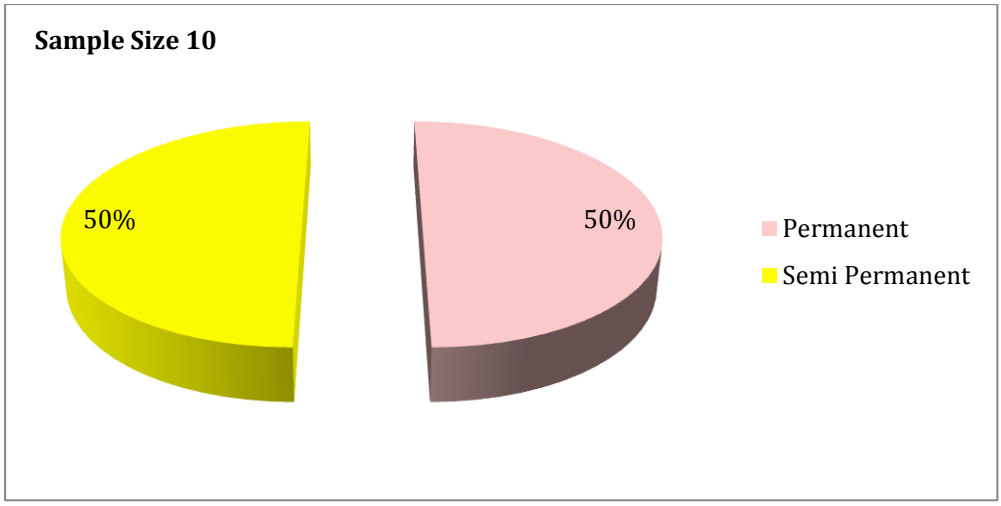

Figure 10: Housing type in the Project Area for Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.5 Respondents on Domestic Water Sources

4.2.5.1 Kakamega County

Kakamega County relies on both surface and ground water sources for its supply. It has the following main sources of water exclusive of the boreholes and springs, Rivers: Yala, Isiukhu, Nzoia, Firatsi, Sasala, Lusumu and Kipkaren. These form the major sources of water for domestic use and irrigation. The quality of water in the county is good for domestic use however, the land use practices including increase in use of chemicals in agriculture sector as well as waste water by industries tend to pollute the water as it flows downstream.

The main water service provider in the county is Kakamega County Water and Sewerage Company Limited (KACWASCO), which is a County Corporation. The Company supplies water to Kakamega Town, Mumias, Navakholo, Butere, Malava and Lumakanda. Currently the water company supplies approximately 78% of the consumers mainly in the peri-urban and small towns of the county. The rural areas are mainly supplied by community water projects, NGO's, private sector actors as well as self-supply through hand dug wells and so on. The rural water sub-sector is marred by low un-functionality rates due to poor management of the water supply projects and schemes, inefficient technologies and weak governance. As per LVNWSB Reports in 2016, rural water coverage in the county is at 30%.

When the study turned to the respondents' sources of drinking water within the project area, the results obtained were as shown in the figure below**.** Majority of them had access to borehole water source (51%), followed by drawing directly from the river at 19%, hand dug wells at 16%. Few had access to piped water source at 14%.

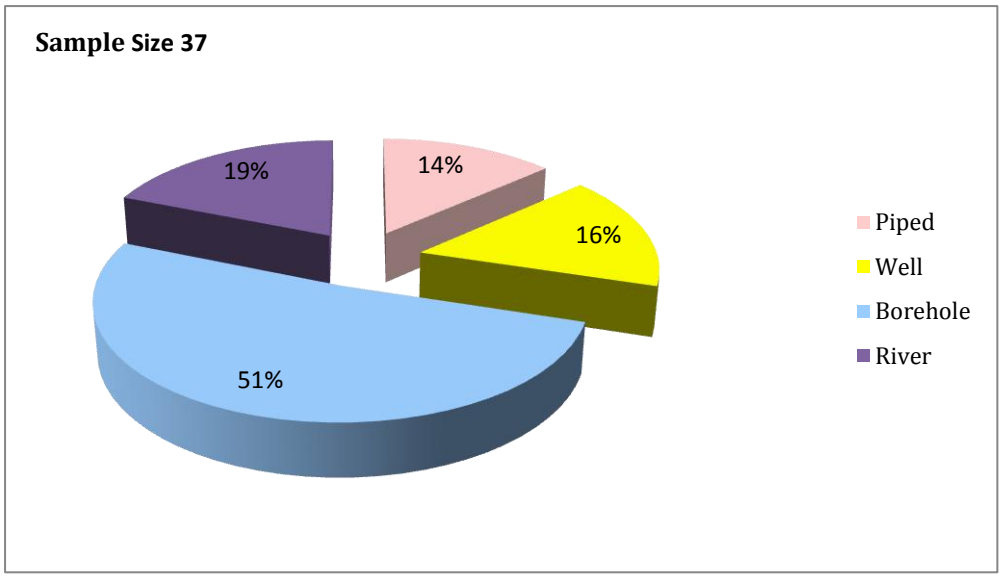

Figure 11: Sources of domestic water in the Project Area for Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.5.2 Bungoma County

Access to safe drinking water is a basic necessity for human wellbeing. The County water resources are predominantly rivers and underground water sources. Water harvesting is gradually being scaled up through efforts of development partners. In the medium term the County will prioritize investment in water resource conservation, preservation and sustainable utilization.

There are four urban and six rural water supply schemes in the County. Urban schemes are mainly piped and are operated by Lake Victoria North Water Services Board through the water service provider - Nzoia Water and Sanitation Company. Rural water schemes are operated by the County Water Department through its field water officers. The water service provider relies on expensive pumping systems to distribute water to customers. The overhead costs of these systems reduce the efficiency and effectiveness in water service provision.

Water Quality Test Results

Water sample from River Nzoia was collected during the study and submitted to NEMA registered lab for analysis against Water Quality Regulation Third Schedule. Results showed that the River water had elevated Biological Oxygen Demand, Chemical Oxygen Demand, Colour, Flouride, Total Coliforms and Escherichia coli and therefore was not suitable for drinking without treatment. The findings of the analysis are attached in **Appendix II** of this report.

When the study turned to the respondents' sources of domestic water within the project area, the results obtained were as shown in the figure below**.** Majority of them had access to piped water source and borehole water source in equal measure (50%).

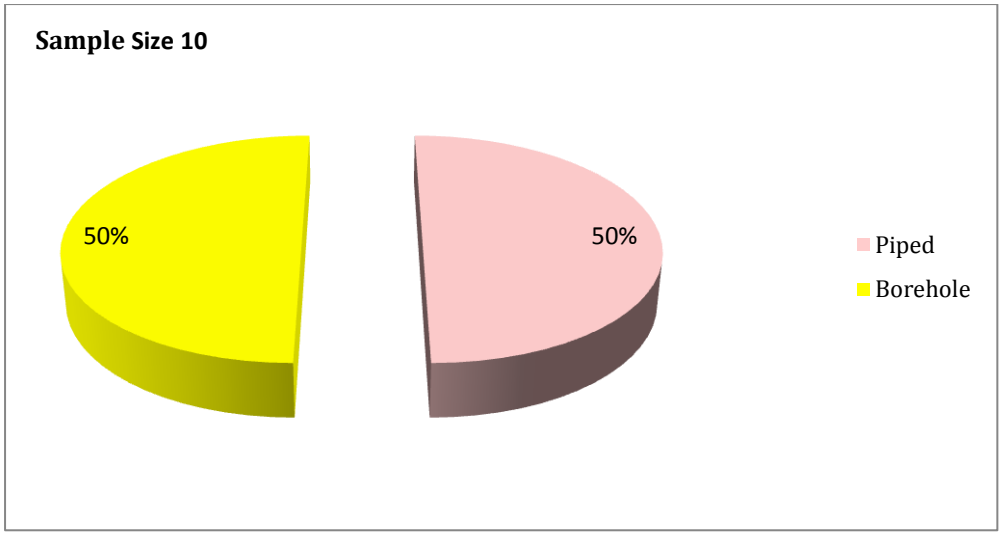

Figure 12: Sources of domestic water in the Project Area for Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.6 Respondents on Sources of Energy for Cooking

4.2.6.1 Kakamega County

Wood is the main source of solid fuel for cooking in the county. According to the Kakamega Multiple Indicator Cluster Survey report 2013/14, 79.2 % of the county population use wood as their main source of energy, 1.1 % use LPG, 0.6 % use biogas, 13.8 % use charcoal and 1.2 % use grass/shrub while cooking as alternative sources of solid fuel.

When the study turned to the respondents' sources of energy for cooking within the project area, the results obtained were as shown in the figure below**.** Majority of them use either firewood or charcoal for cooking at 97% while a paltry 3% use LPG as fuel for cooking.

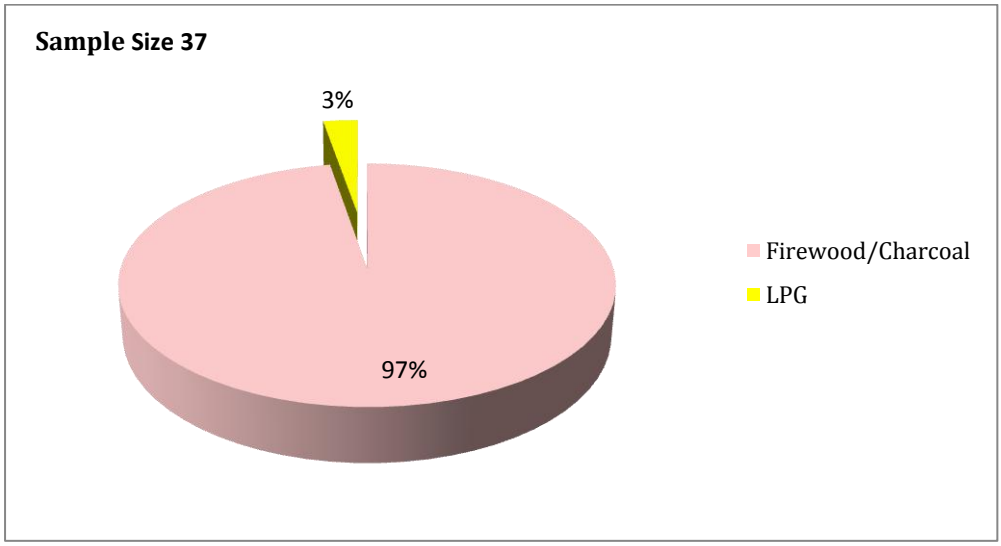

Figure 13: Sources of energy for cooking in the Project Area for Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.6.2 Bungoma County

According to Kenya National Bureau of Statistics (KNBS) 2013, 1% of County residents use liquefied petroleum gas (LPG), 2% use paraffin, 85% use firewood and 11% use charcoal as cooking fuel. Firewood is the most common cooking fuel by gender at 85% of male headed households and 86% of female headed households. Reforms in the LPG sector have increased access and utilization of gas for cooking. The trend is expected to continue as more people in the County become aware of cleaner sources of cooking energy.

When the study turned to the respondents' sources of energy for cooking within the project area, the results obtained were as shown in the figure below**.** Majority of them use firewood for cooking at 60%, others supplement firewood with charcoal and LPG at 30% while those using mainly LPG for their cooking needs stand at 10%.

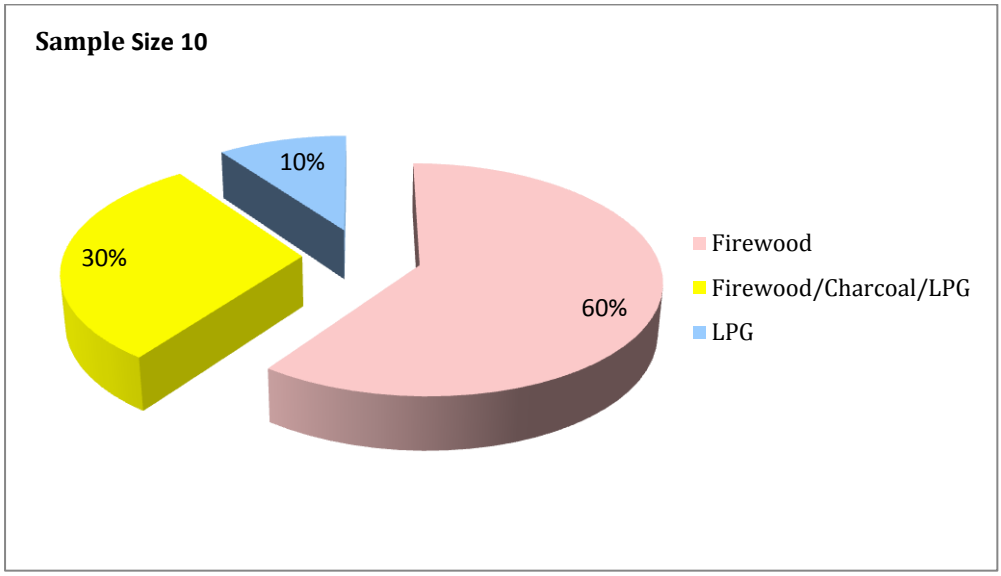

Figure 14: Sources of energy for cooking in the Project Area for Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.7 Respondents on Sources of Energy for Lighting

4.2.7.1 Kakamega County

About 18 percent of the households have electricity (29 % urban and 6 % rural areas) and a total of 37 electric high masts lights in major trading centres such as Kakamega, Mumias urban areas have been erected. Renewable energy is gaining prominence and is being used by some sectors in their solar powered projects.

When the study turned to the respondents' sources of energy for lighting within the project area, the results obtained were as shown in the figure below**.** It is pleasant to note that a good percentage of the community are now using clean source of energy for lighting - Solar 43%. A large number of the project area respondents use electricity (30%) since the area is significantly urbanised. However, we still note that a significant number still use kerosene lamp (27%) as shown in the figure below. Use of kerosene lamps is unsafe health-wise and may contribute to respiratory and eye related diseases due to smoke emission.

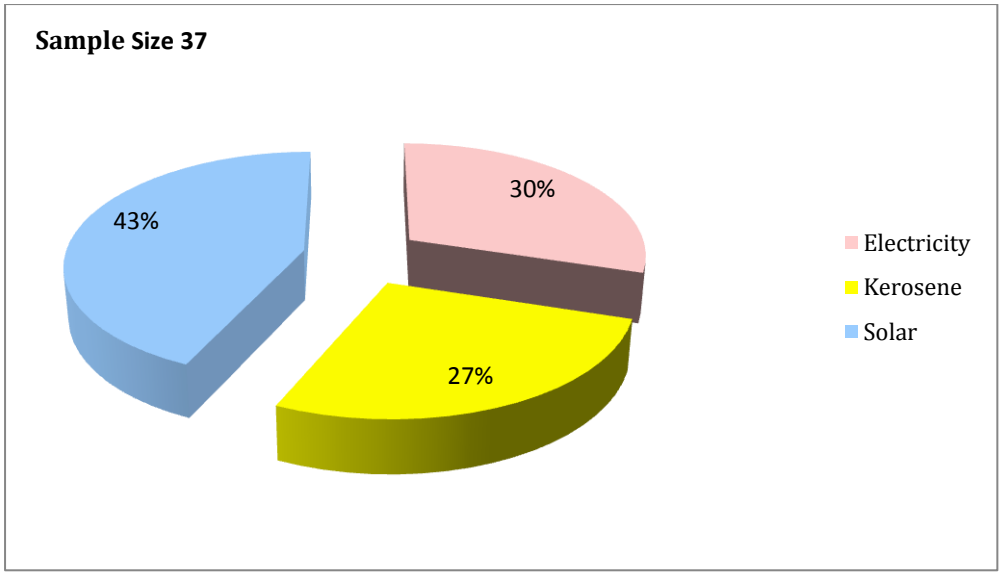

Figure 15: Sources of energy for lighting in the Project Area for Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.7.2 Bungoma County

Since 2013, 46,520 additional households and 520 additional primary schools have been connected to electricity under the last mile connectivity programme. As for lighting, about 95% of institutions and 20% of households in Bungoma County use electricity as their main source of lighting. A further 27% use lanterns, 67% use tin lamps, and 1% use wood fuel.

When the study turned to the respondents' sources of energy for lighting within the project area, the results obtained were as shown in the figure below**.** A large number of the project area respondents use electricity (50%) since the area is significantly urbanised. It is pleasant to note that a good percentage of the community are now using clean source of energy for lighting - Solar 30%.However, we still note that a significant number still use kerosene lamp (20%). Use of kerosene lamps is unsafe health-wise and may contribute to respiratory and eye related diseases due to smoke emission.

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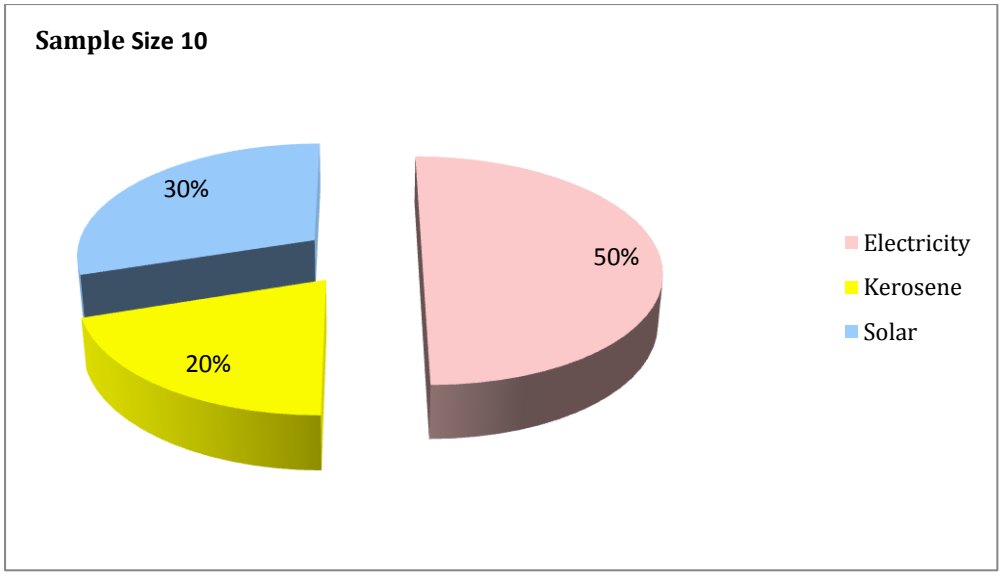

Figure 16: Sources of energy for lighting in the Project Area for Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.8 Sanitation Facilities within the project area

4.2.8.1 Kakamega County

Sanitation refers to the provision of facilities and services for the safe disposal of human urine and faeces as well as the treatment and proper disposal of sewage and waste water. An improved sanitation facility is one that hygienically separates human excreta from human contact and includes: a flush or pour/flush facility connected to a piped sewer system, a septic system or a pit latrine; pit latrines with a slab; composting toilets or ventilated improved pit latrines.

Findings from a study conducted in Kakamega County by KNBS in conjunction with UNICEF (MICS) in 2013/2014 indicate that 65 % of the population are living in households using improved sanitation facilities. This proportion represents 68 % in urban areas (46 % use improved pit latrines with slabs while 31 % use pit latrines without slab/open pit) and 63 % in rural areas (55 % use pit latrines with slabs while 37 % use unimproved pit latrines without slab/open pit). Other improved sanitation facilities such as flush/pour flush facilities (12 %) and ventilated improved pit latrine (9 %) are less commonly used.

The study further points out that about 1 % of the population have no toilet facilities and practice open defecation. The data indicates use of sanitation facilities as Piped Sewer (4.0 %), Septic Tank (1.9 %), Ventilated Improved Pit Latrine (7.9 %), Pit latrine with Slab (51.2 %), Pit Latrine without Slab/Open Pit (34.0%) and Open Defecation (1 %).

When the study turned to the respondents' access to sanitation facility within the project area, the results obtained were as shown in the figure below**.** Majority of the respondents (92%) use pit latrines. About 5% have access to flush toilet facilities while about 3% have other types of sanitary facility to answer the call of nature.

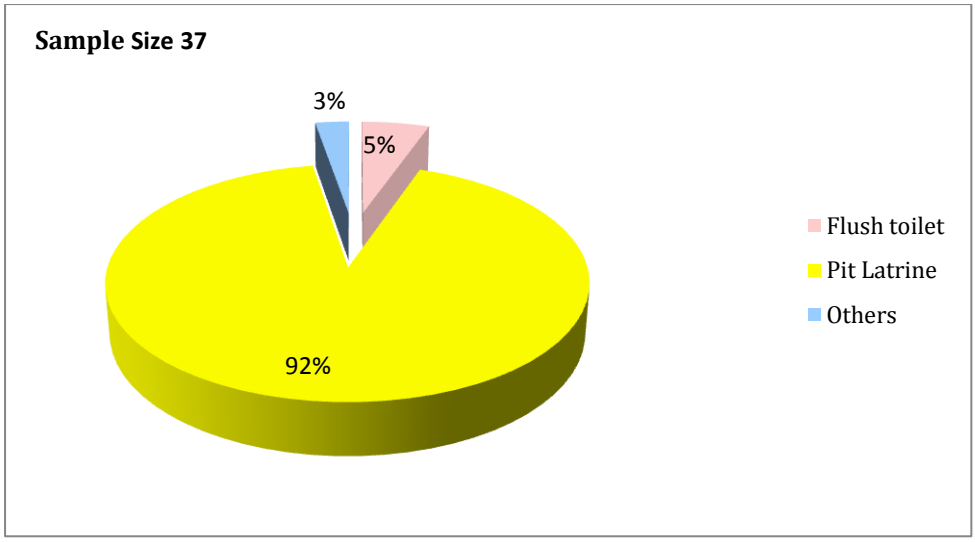

Figure 17: Sanitation Facilities within the project area for Kakamega County
Source: *ESIA Study Socio-economic Survey, 2020*

4.2.8.2 Bungoma County

In Bungoma County, 67 percent of the population has improved sanitation facilities. This percentage is 79 in urban areas and 57 percent in rural areas. Overall, half of the population use an improved sanitation facility. Improved sanitation can reduce diarrheal disease by more than a third, and can significantly lessen the adverse health impacts of other disorders responsible for death and disease among thousands of children in the County.

When the study turned to the respondents' access to sanitation facility within the project area, the results obtained were as shown in the figure below**.** Majority of the respondents (90%) use pit latrines and about 10% have access to flush toilet facilities to answer the call of nature.

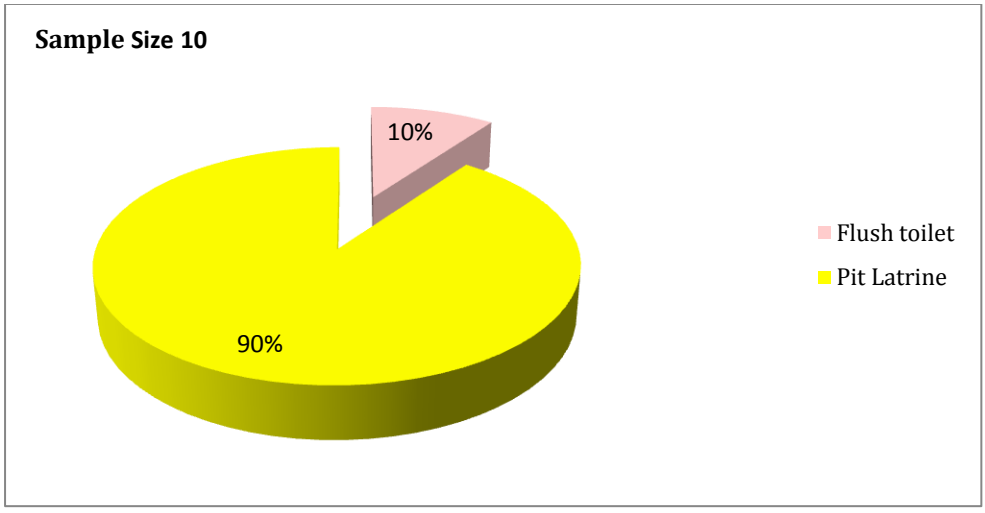

Figure 18: Sanitation Facilities within the Project Area for Bungoma County
Source: *ESIA Study Socio-economic Survey, 2020*

5. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Legal Framework

5.1.1 The Constitution of Kenya, 2010

Article 42 of the constitution provides for a right to a clean and healthy environment to every person. Article 69-72 of the Constitution of Kenya 2010 provides for the management of natural resources and the environment; and enforcement of environmental rights.

The proponent is expected to comply with the provisions of Constitution of Kenya, 2010 on environmental management during all phases of the project.

5.1.2 EMCA, 1999 (Revised 2015)

Part II of EMCA 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to partly ensure this is achieved, Part IV of the act directs that any new programme, activity or operation should undergo EIA Study and a report prepared for submission to NEMA who in turn may issue a license as appropriate. Under EMCA, a set of regulations have been developed to address management and compliance in special aspects of the environmental. Some of the regulations are listed here below:

5.1.2.1 Waste Management Regulations, 2006 (Legal Notice No. 121)

The regulations are formed under sections 92 and 147 of the Environmental Management and Coordination Act, 1999. Under the regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling, packaging, treatment, conditioning, storage and disposal of waste. The regulations requires a waste generator to collect, segregate and dispose each category of waste in such manners and facilities as provided by relevant local authorities.

Regarding transportation, licensed persons shall operate transportation vehicles approved by NEMA and will collect waste from designated areas and deliver to designated disposal sites.

5.1.2.2 Noise and Excessive Vibration Pollution Control Regulations, 2009

Part II section 3(I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 states that: except as otherwise provided in these Regulations, no person shall:

(i) Make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment;
(ii) Cause to be made excessive vibrations which exceed 0.5cm per second beyond any source property boundary or 30m from any moving source.

Part III, Section 11(1) states that any person wishing to:

(i) Operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device;

(ii) Engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence.

Section 13(1) states that except for the purposes specified in sub-Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations. These purposes include emergencies, those of a domestic nature and /or public utility construction. Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying sites, and states that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding machinery that may be used and the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

The project traverses a sensitive Malava Forest Reserve however other areas do not qualify as sensitive receptors since their activities generate noise. Nonetheless, the proponent has carried out a baseline noise survey within the project ROW against which he will monitor the noise emissions from his activities during construction and operation. The results are annexed to this report under Appendix II.

5.1.2.3 EMCA, 1999; Environment Co-ordination (Air Quality) Regulations, 2014

The government has gazetted the Environmental Management and Co-ordination (air quality Regulations). The regulation has provisions with prohibitions of priority air pollutants associated with machine operations and burning activities (general sources, mobile sources and greenhouse gasses) outlined under the second schedule of the regulations. Tolerable air quality limits are provided under the first schedule of the regulation while lists specific limited for emissions from controlled and non-controlled facilities by sector. An operator of a site or equipment is required to obtain a license under the regulations and stipulated regulations. A compliance is also required as part of the emission license.

The proponent has carried out baseline air assessment of the project ROW and will use the results to monitor the emissions from his activities during construction and operation. The results are annexed to this report under Appendix II.

5.1.2.4 Integrated Environmental Impact assessment and Audit Regulation, 2018

EIA is a tool for environmental conservation and has been identified as a key component in on-going project execution. Section 58 of the EMCA no.8 of 1999, second schedule 9 (i) and environmental (impact assessments and audits) regulation 203, stipulate that both new and old projects must undergo EIA and audits. This is necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment. There are many environmental problems and challenges in Kenya today for instance, land degradation, water management and environmental pollution. This is aggravated by lack of awareness and inadequate information amongst the public on the consequences of interaction with the

environment. The policy recommends the need for enhanced reuse/recycling of residues including waste water and use of non-waste technologies. It recommends participation of stakeholders in the management of waste within their locality. It encourages better planning in both urban and rural areas and provision of basic needs such as water, drainage and waste disposal facilities.

This study was in conformance with this regulation. Emphasis was put on stakeholder participation, especially for institutions with a regulatory role over activities such as those that may be carried out by the proponent.

5.1.2.5 EMC (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009

The Objectives of these Regulations include:

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

The Proponent shall comply with the provisions of these regulations

5.1.2.6 EMC (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006.

The regulations observe that;

(1) A person shall not engage in any activity that may have an adverse impact on any ecosystem;

b. lead to the introduction of any exotic species;

c. lead to unsustainable use of natural resources,

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

The Proponent shall comply with the provisions of these regulations considering the project shall traverse the road reserve passing through Malava Forest Reserve.

5.1.2.7 EMC (Controlled Substances) Regulation, 2007, Legal Notice No. 73

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. The regulations stipulate that controlled substances must be clearly labelled with among other words, "Controlled Substance-Not ozone friendly'' to indicate that

the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer." Persons handling controlled substances are required to apply for a permit from NEMA.

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

5.1.3 The Energy Act, 2019

Came into effect on 28 March this year, repealing the Energy Act, 2006, the Kenya Nuclear Electricity Board Order No. 131 of 2012 and the Geothermal Resources Act, 1982. The Energy Act, 2019 was enacted in response to calls to consolidate the laws relating to energy; promote renewable energy; promote exploration, recovery and commercial utilization of geothermal energy; regulate midstream and downstream petroleum and coal activities, among others. It is expected to create an enabling environment for the Government's Big Four Agenda.

Local Content Requirements

The Energy Act, 2019 imposes local content requirements on energy projects and states that *"every person carrying out any undertaking of works under the Act shall comply with local content requirements in all of its operations"*.

EPRA is required to issue guidelines and format for the preparation of local content plans. In addition, the Energy Act, 2019 requires that the local content plan should ensure that: (i) first consideration is given to services provided within the County and goods manufactured in Kenya, where the goods meet the relevant specifications; (ii) qualified and skilled Kenyans are given first consideration with respect to employment at all levels of the value chain; and (iii) adequate provision is made for the training of Kenyans on the job.

The proposed project shall comply with the requirements of the Energy Act, 2019.

5.1.4 Physical Planning Act (Cap 286)

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used. Section 29 of the physical Planning Act gives the county power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions.

The proposed project shall comply with the zoning requirements set out by the Physical Planning Department of the County Governments.

5.1.5 Occupational Safety and Health Act No. 15 of 2007

This Act provides for safety, health and welfare of workers and all persons who are lawfully present at work places. Part VI provides for general health provisions while Part X provides for the general welfare of the workers with respect to supply of drinking water, washing facilities and first aid among other aspects. Section 53 of this Act requires that for workers employed in a facility involving exposure to any injurious or offensive substances, suitable protective clothing and appliances (gloves, footwear, goggles, and head coverage) shall be provided.

Workers at the construction site may be exposed to various risks including risk of tripping, getting knocked over, noise, inhaling dust and equipment exhausts. The proponent should provide necessary protective clothing and appliances during construction and operation of the Line.

5.1.6 Work Injury Benefit Act, 2007

This Act provides for compensation of employees on work related injuries and diseases contacted in the course of employment and for connected purposes. The act includes compulsory insurance for employees. The act defines an employee as any worker on contract of service with employer.

The proponent will need to register for workmen's compensation for his employees.

5.1.7 Water Act, 2016

Section 36 of the Act states that a permit is required for any of the following purposes—

(a) any use of water from a water resource, except as provided by section 37;

(b) the drainage of any swamp or other land;

(c) the discharge of a pollutant into any water resource; and

(d) any other purpose, to be carried out in or in relation to a water resource, which is prescribed by Regulations made under this Act to be a purpose for which a permit is required.

Section 45 states that a permit shall specify, as far as practicable, the particular portion of any land, or the particular undertaking to which the permit is to be appurtenant, and on its grant the permit shall, subject to the provisions of this section, during the period for which it remains in force. Section 63 states that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution. Section 74. (1) A person shall not be licensed as a water service provider unless such person makes an application under this section to the Regulatory Board and submits a copy of the application to the county government within whose area of jurisdiction it intends to provide water services.

The proponent will be required to obtain water use permit and utilize the available water resources in a manner that does not conflict or pollute water resources associated with the water needs of other users.

5.1.8 Public Health Act (Cap. 242)

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

Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin. On the responsibility of local authorities, Section 129 of the Act states in part "It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes…". Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in the manner provided by this Act.

The proponent shall conduct operations in manner that does not cause nuisance or jeopardize the health of the public.

5.1.9 Penal Code Act (Cap. 63)

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution is dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

5.1.10 the Standards Act Cap 496

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

The Proponent shall ensure that commodities and codes of practice utilized in the project adhere to the provisions of this Act.

5.1.11 the Civil Aviation Act, Cap 394

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

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

5.2 Institutional Framework

5.2.1 National Environment Management Authority (NEMA)

NEMA is the supreme regulatory and advisory body on environmental management in Kenya. It is mandated by EMCA to assess EIA reports and EAs and issue licenses of compliance.

5.2.2 Kakamega and Bungoma County Governments

The tow County Governments are empowered by two key acts of parliament to carry out physical planning and development control within its area of jurisdiction. The County has by-laws that enable it to carry out daily operations. Besides the approvals of plans and developments of the proponent's development plans, the Machakos County Government will also be responsible for ensuring that the terminal is built in accordance with the approved designs.

5.2.3 County Environment Committees

According to EMCA, 1999 No. 8, the Minister by notice in the gazette appoints County Environment Committees of the Authority in respect of every former province and district respectively.

5.2.4 Public Complaints Committee

The Public Complaints Committee consists of: Chairman, a representative of the Attorney General, (AG), Law Society of Kenya (LSK), Non-governmental Organizations (NGOs), business community, and two members appointed by the Minister for their active role in environmental management. The 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 Environmental Council.

5.2.6 Kenya National Highways Authority (KeNHA)

The proponent intends to construct the Proposed Transmission Line alongside the existing Kakamega – Webuye Road for purposes of evacuating power from West Kenya Sugar Factory to Rai Paper Factory in Webuye. This development will definitely happen within the road reserve. KeNHA will execute their mandate of approving and managing developments within the road reserve and ensuring it is done within the required standards.

5.2.7 Parastatals

The Proposed Construction of 66KV Overhead Transmission Line and Associated projects are likely to attract key interest of parties with interests in the power sector. Key among them are:

Energy and Petroleum Regulatory Authority (EPRA)

It was established under Energy Act 2019 in place of the Energy Regulatory Commission ("ERC").

Rural Electrification and Renewable Energy Corporation (REREC)

It was established under Energy Act 2019 in place of the Rural Electrification Authority ("REA"). In addition to overseeing the implementation of the Rural Electrification Program, REREC's extended mandate includes developing and updating the renewable energy master plan; establishing energy centers in the Counties; developing, promoting and managing use of renewable energy (excluding geothermal); coordinating research in renewable energy; developing appropriate local capacity for renewable technologies; offering clean development mechanisms such as carbon credit trading, among others.

Kenya Electricity Transmission Company Limited (KETRACO)

It is the main body mandated to develop transmission lines.

Kenya Power and Lighting Company Limited (KPLC)

It is the main body mandated to distribute electricity to consumers.

Kenya Civil Aviation Authority (KCAA)

KCAA has to authorize and approve the height of the poles for the purpose of ensuring the safety of flying aircraft over the proposed project area.

6. CONSULTATION AND PUBLIC PARTICIPATION

6.1 Overview

The need for public involvement in development projects is in the Constitution. This is further set out in EMCA 1999 (Amended 2015), and the Integrated Environmental (Impact and Audit) Regulations of 2018. Community consultation and participation ensures that project stakeholders are part and parcel of the proposed development and in so doing ensures the sustainable management of resources. Evidence shows that projects that are subjected to a consultative and public participation process acquire higher level of acceptance and accrue benefits to a wider section of the society.

6.2 Aim of the Stakeholder Consultations

The aim of the public consultation process was to:

- Inform all the stakeholders about the proposed project and carry out public sensitization on the project, provide information on the potential impacts and proposed mitigation measures to eliminate or reduce these impacts;
- Collect additional socio-economic baseline data/information on the project area environment;
- Provide an opportunity to all the stakeholders in the project area to give comments, raise issues and concerns pertaining to the proposed project and allow for the identification of project alternatives, mitigations and implementation strategies and recommendations;
- Emphasize the importance of having all stakeholders being involved in the project implementation process.

6.3 Consultation Methodology

Questionnaires were prepared and administered to the public and to institutions identified during mapping of stakeholders. Stakeholder consultations were carried out between Tuesday 11th August, 2020 and Friday 21st August, 2020. Sample copies of the filled questionnaires are annexed to this report under Appendix V.

The study employed three main methods of consultations to get the data presented in this report. These are:

- Meetings and discussions with Key Stakeholders;
- Questionnaire administration and interviews;
- Convening of Public Consultation Meeting within the project area.

6.4 Public Consultation Meetings (PCMs)

Due to the COVID -19 pandemic, the consultant had put in place safety and precautionary measures to ensure the safety of both experts and the project stakeholders. This was guided by the NEMA guidelines on conducting of public consultation for EIA, EA and SEA during the pandemic.

The venues of the meetings were identified along the project area; where a total of 5 controlled public consultation meetings were carried out during the study process as shown in the table below:

Table 6: PCM's schedule

#	Venue	Sub County	Date
1.	Kivaywa Friends Church, Matete	Lugari, Kakamega	Thurs, 13th August 2020
2.	Chief's Office, Muchi Location	Webuye East, Bungoma	Tue, 18th August 2020
3.	Kakunga Salvation Army Hall, Mahira Location	Kakamega North	Wed, 19th August 2020
4.	Butali Market, Matioli Location	Kakamega North	Thurs, 20th August 2020
5.	Malava CDF Boardroom	Kakamega North	Fri, 21st August 2020

The meetings were facilitated by the Chiefs and Assistant Chiefs of the area where the project was to be implemented.

6.4.1 The PCM Agenda

The Agenda of the PCMs convened were as follows:

1. Arrival of Guests/Participants
2. A word of prayer by one of the participants.
3. Introduction of the participants.
4. Project brief and purpose of conducting the Sensitization Meeting with the Project Area Community.
5. Views of the Participants on the Project - Comments, Question and Answer - Open Session
6. Closing Remarks
7. Filling of the questionnaires
8. Closing Prayer.

The attendance of the PCM was good and the community showed a lot of interest and support for the project, however due to the Ministry of Health Regulations, attendance to the meetings were restricted only to a number that could be accommodated while observing the MOH protocols.

Minutes of the discussions at the PCM were recorded and form part of this ESIA Project Report. During the PCM, the proposed project was elaborated to the participants through a presentation that was conducted in Kiswahili to ensure participants understood all the issues related to the project. An interactive questions and answers session took place during the PCM immediately after the presentation on the proposed project. Participants finally filled in feedback forms/questionnaires. The questionnaires have been included in **Appendix V** while Minutes of Public Consultation Meeting and attendance register are provided in **Appendix IV**.

Plate 2: Participants at Kivaywa Friends Church, Matete PCM

Plate 3: Participants at Chief's Office, Muchi Location PCM

Plate 5: Participants at Butali Market, Matioli Location PCM

Plate 6: Participants at Malava CDF Boardroom PCM

6.4.2 Consulted Parties

The respondents were identified through simple random sampling technique. Most of those interviewed had no prior knowledge of the proposed project. The public survey focused around economic, social, safety, health, environmental and welfare issues. Those interviewed were welcoming of the project since in their opinion, the project will create employment for skilled and unskilled labourers especially bearing in mind that the area relies heavily on casual employment from a number of sugar factories and farming activities in the area.

6.4.3 Summary of Responses

This section presents a brief compilation of the responses obtained from those interviewed.

6.4.4 Perceived Positive Impacts

Respondents acknowledged that the project will have some positive impacts which they enumerated as below:

- Respondents mentioned that the project will provide cheap and affordable supply of energy, a prerequisite for the revival of Rai Paper Factory
- The proposed project will make use of the waste bagasse thereby reducing environmental pollution due to transportation and accumulation of bagasse.
- The project will create additional employment in both the two factories and more so at Rai Paper Mill due to low cost of production as a result of cheaper power
- Local economy will be boosted and revival of business in Webuye town and surrounding areas will become a reality.
- Improved standard of living due to boosted business environment.

6.4.5 Perceived Negative Impacts

Majority of the people whose opinion was obtained during the ESIA consultations had no objection to the implementation of the project but agreed that the project has potential gains and costs. The negative impacts perceived by respondents have been highlighted in the subsequent section.

- Forced resettlements and reduced farm lands due to acquisition of wayleave on adjacent private properties;
- Visual impact due to changes in landscape;
- Noise pollution during construction;
- Air pollution from the operations of Rai Paper Mills;
- Loss of the biodiversity;
- Injuries and safety issues during construction;
- It may bring diseases to the residents like HIV/AIDS due to the immigrant communities;
- Population will increase due to available employment opportunities resulting in overcrowding and social ills including insecurity; and
- Insecurity is likely to increase because of the newcomers.

The respondents urged the proponent to look into the following issues to mitigate the negative impacts of the project:

- Avoid going through forested areas and plant trees in the affected areas;
- Reroute the proposed Transmission Line away from people's homes;

- In the event the Line passes on private properties and land carry out Resettlement Action Plan and effectively resettle the Project Affected Persons including carrying out compensation of property before project commences;
- Have regular sensitization meetings to educate people on the project and consider local employment during the project implementation;
- Implement CSR projects to mitigate impacts.

The table overleaf presents an analysis of some of the Key Stakeholder Questionnaires and PCM Feedback Forms. The Key Stakeholders and Feedback Forms filled in by PCM respondents are placed in **Appendix V.**

Table 7: Analysis of Stakeholder and PCM Participant's Feedback

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
1.	Patrick Likavo	County Government of Kakamega		0722714137	Chief Officer - Works	**Positive Aspects** • Increased supply of Energy and employment creation **Concerns** • Reduced farm lands due to wayleave for powerlines **Suggestions** • Compensation of lands and provide alternative resettlement
2.	Peter Mathia	County Government of Kakamega		0797682771	Chief Environment Officer	**Positive Aspects** • Reduction of solid waste in the factory • Employment creation **Concerns** • Impact on nature due to clearing of vegetation and affect the biodiversity. • Visual impact due to the change in landscape **Suggestions** • Avoid going through forested areas
3.	Dr. Saul Kibe	Water Resources Authority (WRA)		0720382685	Water Rights Officer	**Positive Aspects** • Employment creation **Concerns** • Loss of biodiversity due to clearing of trees

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Risk of electrocution by electromagnetic fields **Suggestions** • Plant trees in the affected areas • The powerlines should not be close to people's homes
4.	Silas Waluvengo	Nguvuli Kakoi	4177632	0726607601	Stakeholder	**Positive Aspects** • Employment creation **Concerns** • Electrocution **Suggestions** • Compensation of lands to be done before project commencement
5.	Benjamin Nanjendo	Fuvale Sub location	13345422	0729216672	Asst. Chief Fuvale Sub location	**Positive Aspects** • Youths will be employed • Local economy will be boosted • Reduced Bagasse pileup **Concerns** • Power accidents will increase • Population increase will bring social ills and pollution **Suggestions** • Public awareness on safety

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
6.	Rebah Mudasia	Lwanda Sub location	11736164	0723356420	Assistant Chief – Lwanda S-Location	**Positive Aspects** • Employment opportunity creation • Boost to local business **Concerns** • Social issues i.e. insecurity • Safety issues **Suggestions** • Have regular barazas to educate people on the project
7.	Wilson Jairo	Mahira Location Lumusiati B	20322876	0714076056	Village Elder	**Positive Aspects** • Employment creation • Increased market for local produce **Concerns** • Safety issues during construction **Suggestions** • Compensation of lands before project commencement
8.	Stella Lutubula	Mahira Location, Mutingongo village	10164993	0718270210	Asst. Chief	**Positive Aspects** • Employment of community members • Economic expansion through business **Concerns**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Will affect the biodiversity • Safety issues during construction **Suggestions** • The transmission lines should be high enough to avoid accidents
9.	Ezekiel Shitanda	Chesero Location	11738299	0723692169	Area Chief	**Positive Aspects** • Increased employment in the two factories • Low cost of production for Rai paper • Revival of business in Webuye town. **Concerns** • Electricity accidents • Negative social impacts • Prohibition of construction along the wayleave **Suggestions** • Advance compensation • Sensitization of residents along the line
10.	Moses Mulefu	Mahira Location	4176925	0719155971	Area Cheif	**Positive Aspects** • Increased employment • Economic benefits **Concerns** • Prohibition of construction along the wayleave

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • Advance compensation
11.	Jacktone Ambulwa	Kakunga Sub location	14659026	0725025153	Asst. Chief	**Positive Aspects** • Increased employment to locals • Local economy will be uplifted **Concerns** • Electricity accidents • Insecurity • Diseases and infections **Suggestions** • Employ locals
12.	Rebman Musimbi	Mukhonje Sub location	9989004	0726847629	Asst. Chief	**Positive Aspects** • Locals will benefit from compensation money • Temporary employments for locals • **Concerns** • Electricity accidents • Loss of land to way leaves. **Suggestions** • Set up CSR projects that will benefit locals where this transmission line will pass.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
13.	Nechesa Makanga	Malava Township	7349418	0727012868	Area Chief	**Positive Aspects** • Increased employment in the two factories • Revival of business in Webuye town and along the line. **Concerns** • Electricity accidents **Suggestions** • Advance safety education to locals
14	Vitalis Mbasu	Malava Township	8008931	0711178429	Stakeholder	**Positive Aspects** • Community employment • Low cost of production for Rai paper **Concerns** • Electricity accidents **Suggestions** • Equip Malava health facility with medicine
15.	Moses Kataka	Malava Township	16001931	0711201198	Stakeholder	**Positive Aspects** • This will bring employment **Concerns** • Electricity accidents **Suggestions** • Advance compensation

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
16.	Lazarus Kataka	Malava Township	6098889	0722993653	Stakeholder	**Positive Aspects** • Increased employment in Rai Paper • Low cost of production for Rai paper **Concerns** • Disposal of waste from the power generation **Suggestions** • Control waste appropriately
17.	Isaya Ndeche	Malava Township	0473833	0792370033	Stakeholder	**Positive Aspects** • Employment **Concerns** **Suggestions** • Local labour to be given first priority • Educate the community on safety measures
18.	Oliver Mutali	Malava Township	20035254	0722179266	Stakeholder	**Positive Aspects** • Creation employment for the youth • Less air pollution from bagasse **Concerns** • Reduced farm land

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Resettlement of people **Suggestions** • Advance compensation
19.	Ndunde Mwera	Malava Township				**Positive Aspects** • Improved economy for the people **Concerns** • Electricity accidents **Suggestions** • Take precaution when constructing the transmission line.
20.	Mulupi Wanakacha	Butali Sublocation	3504893	0721998792	Stakeholder	**Positive Aspects** • None **Concerns** • None **Suggestions** • Advance compensation • Do proper valuation of land
21.	Harun Jumba	Tande Sublocation	1948561	0720489224	Stakeholder	**Positive Aspects** • Increased power to national grid

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Concerns • Accidents during construction • Houses along the wayleave will be affected **Suggestions** • Advance and proper compensation
22.	Francis Murambi	Tande Sub location	10071442	0722803400	Stakeholder	**Positive Aspects** • Casual employment • Value addition to private property **Concerns** • Environmental damage • Negative social impacts i.e. prostitutes **Suggestions** • Enhanced public participation • CSR projects to mitigate impacts • Contractual engagement between West Kenya Sugar and the community.
23.	Reuben Kwalanda	Mukavakava Sub-location	9370324	0723838932	Stakeholder	**Positive Aspects** • Employment for the locals • Compensation money • Boost business. **Concerns**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Relocations will affect people along the way leave • Prohibition of construction along the wayleave **Suggestions** • Advance mutually agreed compensation
24.	Caleb Wadongo	Chebwai	20412742	0712348343	Stakeholder	**Positive Aspects** • Creation of employment • Low cost of production for Rai paper **Concerns** • Accidents during construction • Displacement of people **Suggestions** • Advance compensation • Do more community education and awareness
25.	John Chisembe	Tande	22097478	0713513259	Stakeholder	**Positive Aspects** • Creation of employment opportunities • Provide market for local produce **Concerns** • Electricity accidents • Negative social impacts - insecurity • Destruction of property along the line

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • Advance compensation • Company to assist the community by purchasing 4 transformers
26.	Peter Kemei	Matete Township	22103663	0722204942	Assistant County Commissioner, Lugari	**Positive Aspects** • Short term employment • Low cost of production for Rai paper **Concerns** • Relocation of residents • Changes in landscape and restrictions on land use **Suggestions** • Advance compensation for affected people • Ensure public participation and awareness before project begins.
27.	Nicholas Chikamai	Kivaywa	5105926	0723880797	Stakeholder	**Positive Aspects** • Increased employment for skilled and unskilled youth • Market for local farm produce • CSR projects by West Kenya Sugar **Concerns** • Unplanned relocations **Suggestions**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Advance compensation for affected families
28.	Hudson Simiyu		1978668	0726143149	Stakeholder	**Positive Aspects** • Employment for the locals **Concerns** • Displacement of people **Suggestions** • Advance and timely compensation
29.	Zedekiah Omido	Lukusi	3346113	0711627937	Stakeholder	**Positive Aspects** • Employment • Compensation money • Improvement of infrastructure **Concerns** • Loss of property **Suggestions** • Timely and advance compensation for those affected
30.	Joab Okinda	Lukusi	0548555	0715752525	Opinion Leader	**Positive Aspects** • Proposed CSR projects **Concerns** • Will affect farm land

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Radiation for those near the power lines • Demolition of structures along the line **Suggestions** • Advance compensation of affected locals • Construct proposed CSR projects
31.	Timona Handa	Namarambi	7885771	0707866915	Stakeholder	**Positive Aspects** • Improved standard of living due to boosted business environment • Improved security **Concerns** • Demolition of structures along the line • Late compensation payment **Suggestions** • Advance compensation • Keenly address safety matters
32.	Abdi Swaleh	Matete Township		0728780045	Supkem – Western region	**Positive Aspects** • Employment for the youths • Market for local produce • CSR Projects to assist the locals **Concerns** • Displacement of people

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Social ills by new comers – pregnancies, insecurity **Suggestions** • Have an agreement with the contractor and have all the workers identified to help in security issues
33.	Paul Tali	Chevaywa	14553655	0729383396	Market rep.	**Positive Aspects** • Employment for the locals **Concerns** • Accident during construction of the transmission lines **Suggestions** • Advance and timely compensation
34.	Ben Wekesa	Matete	6502635	0711277583	Stakeholder	**Positive Aspects** • Employment for the locals • CSR projects **Concerns** • Displacement of people • Destruction of structures and crops **Suggestions** • Advance compensation before construction
35.	Edward	Lukhoba	9916946	0732319253	Stakeholder	**Positive Aspects**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
	Wangamati					• Cheap electricity • Higher earnings and economic change **Concerns** • Environmental deformation • Forced resettlement **Suggestions** • Advance compensation before construction
36.	Mable Makuto	Lukusi - Matete	10320273	0728777645	Stakeholder	**Positive Aspects** • Employment for the locals • Provide market for local produce **Concerns** • Displacement of people • Will affect farm land **Suggestions** • Advance compensation before construction • Resettle all affected homes
37.	Mary Wasilwa	Matete	11330978	0720880316	Stakeholder	**Positive Aspects** • CSR projects **Concerns** • Destruction of the environment - trees

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Destruction of structures **Suggestions** • Advance compensation before construction
38.	Isabella Otwera	Lukusi	8343147	0722642154	Stakeholder	**Positive Aspects** • Employment opportunities • CSR projects **Concerns** • Compensation problems **Suggestions** • Proper survey to be carried out to minimise negative impacts
39.	Grace Khaemba	Lukhova	1946303	0723636833	Stakeholder	**Positive Aspects** • Employment for the locals • Will provide markets for local produce **Concerns** • Displacement of people • Destruction of structures **Suggestions** • Advance compensation before construction involving the affected people.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
40.	Rhoda Wamocha	Musemwa	21844482	0703831946	Kaburengu Community Administrator	**Positive Aspects** • Employment for the locals • CSR projects **Concerns** • Displacement of people • Destruction of structures • Social ills will increase **Suggestions** • Advance compensation before construction
41.	Beatrice Aluoch			0727151326	Area MCA Representative	**Positive Aspects** • Employment for the locals • Will boost business activities in Webuye **Concerns** • Air pollution once Rai paper resumes **Suggestions** • None
42.	Mr Wamalwa	Maraka ward		0792904906	Opinion Leader	**Positive Aspects** • Employment for the locals • Market for local produce **Concerns**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Air and water pollution at Rai paper • Destruction of structures and resettlement of people **Suggestions** • Advance compensation before construction
43.	Moses Lukorito	Sango B	20399114	0711176099	Stakeholder	**Positive Aspects** • Employment for the locals • Generation of new businesses • Lighting of the area around Rai paper **Concerns** • Rai may pollute the air, soil or water • Accidents from the transmission lines **Suggestions** • Rai paper should use less harmful chemicals • Recycle waste products
44.	Titus Wanyonyi	Generation	5614535	0727790602	Stakeholder	**Positive Aspects** • Employment for the locals • Business will be boosted • Landlords will benefit when Rai resumes **Concerns** • Pollution from waste when Rai paper resumes • Accidents during construction

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • None
45.	Fredrick Mung'anyo	Nangeni Sub-Location	13718545	0712210822	Stakeholder	**Positive Aspects** • Social and economic growth • Employment opportunities • Enhanced security from lighting **Concerns** • Pollution form Rai paper • Accidents during the project **Suggestions** • NEMA should help in mitigation measures
46.	Fred Shihundu	Sango A	21512923	0714796495	Stakeholder	**Positive Aspects** • Employment for the locals • Revenue collection will increase • The economy will be increased **Concerns** • Displacement of people • Air and water pollution • Social ills will increase **Suggestions**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Advance compensation before construction • Have mitigation measures for air and water pollution
47.	Edward Kasaya	Sango B	2093080	0722262922	Stakeholder	**Positive Aspects** • Direct and Indirect employment • Cottage Industry will spring up • Social amenities will improve **Concerns** • Water and Air pollution • Accidents during the project **Suggestions** • Advance compensation before construction • Follow NEMA to combat pollution
48.	Raphael Waweru	Sango A Muchi Location	4144563	0722647582	Stakeholder	**Positive Aspects** • Skilled and Unskilled employment for the locals • Boost for local business • Increased revenue for KRA **Concerns** • None **Suggestions** • Do CSR projects i.e. repair feeder roads

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
49.	Jesse Matanda	Lukhoba	5792579	0721424113	Stakeholder	**Positive Aspects** • Creation of employment for the locals • CSR projects • There will be market for local produce **Concerns** • Displacement of people • Destruction of structures • Accidents during construction • Air pollution from Rai paper once it resumes **Suggestions** • Advance compensation for the affected before construction • Protect water sources from pollution
50.	Roseline Wakwabubi	Sango A	13315775	0702580389	Stakeholder	**Positive Aspects** • Employment for the local youth • Boost to local business **Concerns** • None **Suggestions** • Make sure the project benefits the locals
51.	Samuel Kisuya	Muchi Location	11656687	0723062469	Area Chief	**Positive Aspects** • Improved standard of living

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Intermarriage between different communities • Improved education standards **Concerns** • Environment degradation • Social ills will increase **Suggestions** • Follow the rule of law when implementing this project
52.	Imelda Kisaka	Sango B	04481009	0716300031	Stakeholder	**Positive Aspects** • Employment for the locals **Concerns** • Increased accidents • Increased air pollution • Use of private land **Suggestions** • Follow all the laid protocols to minimise adverse effects of the project.
53.	Joyce Wegesa	Sango B	0267886	0725370355	Stakeholder	**Positive Aspects** • Employment for the locals • CSR projects **Concerns**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Water and air pollution once Rai paper resumes **Suggestions** • Advance compensation before construction
54.	Munala Wycliffe	KeNHA	-	0721387953	Inspector (Roads)	**Positive Aspects** • Cheaper power for Rai Paper • Employment • Bagasse waste management **Concerns** • Resettlement issues • Inconveniences during road construction or expansions **Suggestions** • Alternative route from the road reserve and from highly settled areas

7. IMPACT ANALYSIS AND PROPOSED MITIGATION MEASURES

7.1 Introduction

This section outlines the potential negative and positive impacts associated with the construction of the proposed transmission line. The impacts are related to activities carried out during construction, operation, maintenance, commissioning and decommissioning phases of the projects.

7.2 Categorization of Impacts

The possible impacts can be categorized in various ways depending on the following factors:

- Type of impact: whether positive or negative;
- Significance: whether low, intermediate or high;
- Intensity: whether low, intermediate or high;
- Magnitude: whether localized or widespread;
- Its effects: whether direct, indirect or cumulative;
- Duration: whether permanent, or temporary; short term or long term; and
- Reversibility: reversible or irreversible

7.3 Analysis of Project Impacts

The table below illustrates the category of potential environmental and social impacts. A positive sign "+" denotes a positive impact and a negative sign "-" denotes a negative impact. The types of impacts to be considered include primary impacts, secondary impacts (those occurring away from the primary source) and cumulative impacts. The results of the analysis indicate that most of the impacts from the project will be site-specific, negative, temporary, and direct, of low intensity, reversible and of moderate significance.

Table 8: Impact Classification Matrix

KEY:					
Type of Impact	**Symbol**	**Significance of Impact**	**Symbol**	**Effect of Impact**	**Symbol**
Major negative impact	(- -)	Slightly significant	SS	Direct impact	DI
Minor negative impact	(-)	Moderately significant	MS	Indirect impact	II
Major positive impact	(++)	Highly significant	HS	Cumulative impact	CI
Minor positive impact	(+)	Insignificant	IN		
Neither positive nor negative	X				

Table 9: Impact Scoring Matrix

Aspect	Anticipated Impact	Project Phase	Nature of Impact	Significance of Impact	Effect of Impact
Environmental and Safety Aspects					
Noise Pollution	- Noise and vibrations from vehicles and machinery	Construction and decommissioning	(-)	MS	DI
Generation of Exhaust Emissions	- Emissions from motored equipment	Construction and decommissioning	(-)	MS	DI
	- Emissions from operations of Rai Paper Factory	Operation	(--)	HS	CI
Dust Emissions	- Dust emission during the site clearance and excavation	Construction and Decommissioning	(-)	MS	DI
Waste Management	- Solid and liquid waste generation	All phases	(--)	HS	DI
	- Reduced heaping of waste bagasse used for energy production	Operation	(++)	HS	CI
Oil Spill Hazards	- Soil and water pollution	Construction	(-)	MS	DI
Destruction of Existing Vegetation and Habitats	- Interference with biodiversity	Construction	(-)	SS	DI
Disturbance of Faunal Species	- Interference with biodiversity	Construction	(-)	SS	DI
Avifauna Mortalities	- bird electrocution or bird strikes	Operation	(-)	MS	DI
Health and Safety	- Occupational and community hazards	Construction and operation	(-)	MS	DI
Soils	- Susceptibility to erosion during rainy season	Site preparation and construction	(-)	MS	DI
Visual and Aesthetic	- Presence of the Line	Operation	(x)	IN	II
Incidences of Electrocution	- Fear of the community being electrocuted	Operation	(x)	IN	II

Aspect	Anticipated Impact	Project Phase	Nature of Impact	Significance of Impact	Effect of Impact
Socio-Economic Aspects					
Reliable and Secure Electricity Power Supply	- Adequacy, reliability, and security of electricity power supply at Rai Paper Mill	Operation	(++)	HS	DI
Cost of electricity	- Reduced Cost of electricity at Rai Paper Mill	Operation	(++)	HS	DI
Employment Creation	Employment creation for skilled and unskilled workers	Construction and operation	(++)	HS	DI
	Skills transfer	Construction and operation	(+)	HS	CI
Economic growth	For the country through revenue collection	Construction and operation	(++)	HS	DI
	Promotion of investment in the paper and sugarcane factories and farming	Operation	(++)	HS	CI
Influx of people in the area	Inter-cultural exchanges	Construction and operation	X	SS	II
Land take	- Resettlement and Loss of Use	Construction	(--)	HS	DI
HIV/AIDs and STIs	Risk of contracting STD's by project workers and host community	Construction and operation	(--)	HS	CI

7.4 Analysis of Project Impacts

7.4.1 Potential Positive Impacts

7.4.1.1 Reliable and Secure Electricity Power Supply

The project will enhance the adequacy, reliability, and security of electricity power supply at Rai Paper Mill and West Kenya Sugar Factory. West Kenya Sugar currently has the capacity to produce 12MW of electricity and with enhanced capacity up to 24MW. With a heavy power use industry such as Rai Paper the need for adequate, reliable, and secure power cannot be overemphasized. The project will also help meet the increasing demand for power supply and minimize the frequency of power outages (blackouts) since the excess power shall be fed into the national grid through the yet to be negotiated Feed in Tariff.

7.4.1.2 Contribute towards lowering the cost of electricity

The project as stated above will help reduce cost of electricity for Rai Paper Mill. This will translates into reduced cost of production and as a consequence improve competitiveness of the local products manufactured at Rai Paper.

7.4.1.3 Employment Opportunities

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

7.4.1.4 Contribution towards reduction of environmental pollution

Studies show that accumulation of waste from sugar cane crushing commonly known as bagasse has become an eye sow in the region. Bagasse is transported in open trucks to places where they are heaped away from the sugar factory. This has caused air pollution by bagasse during transportation. The heaped bagasse is exposed to weather including rain which causes acidic leaching into the soil and eventually water systems that may affect downstream users. Implementation of the project will make maximum use of bagasse thereby reducing environmental degradation due to bagasse in the environment.

7.4.1.5 Gains in the Local and National Economy

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

7.4.1.6 Informal Sector Benefits

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

7.4.1.7 Development of Other Sectors

Increase in reliability and security of power supply at Rai Paper Mill and the region will enhance efficiency and productivity of other sectors including health, education, water supply, agriculture and livestock production and other industries.

7.4.2 Potential Negative Impacts

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

7.4.2.1 Noise Pollution

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

7.4.2.2 Generation of Exhaust Emissions

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

7.4.2.3 Dust Emissions

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

7.4.2.4 Solid and Liquid Waste Generation

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

7.4.2.5 Oil Spill Hazards

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

7.4.2.6 Destruction of Existing Vegetation and Habitats

The project will require a way-leave of 10 meters width for the 30km mainly on the road reserve. Within the way-leave, selective clearing of vegetation may be necessary to (1) remove any tall trees that pose a risk to the transmission line, (2) give way for the construction of the wooden poles; and (3) give room for workers to do survey work and stringing of the transmission line.

7.4.2.7 Disturbance of Faunal Species

The potential impacts to faunal species are restricted to disturbance of their habitats, their feeding, breeding and general movements. Disturbance could also be caused by presence of

labour force, noise and vibration especially along the Malava Forest Reserve. Overall, the impact on wildlife during construction is considered low to insignificant since the project is proposed to pass through the existing road reserve.

7.4.2.8 Avifauna Mortalities

During the assessment, various types of avifauna were recorded. The transmission line therefore, is quite likely to have impacts on the birds. Avifauna mortality by power lines can either be due to bird electrocution or bird strikes by the conductors. Bird strike by the conductors is likely and in a few circumstances may lead to mortality.

7.4.2.9 Impacts on Workers' and Community Health and Safety

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

7.4.2.10 Soil Erosion

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

7.4.2.11 Visual and Aesthetic Impacts

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

7.4.2.12 Incidences of Electrocution

Various stakeholders were concerned by the fact that, the project may lead to members of the community being electrocuted. While it is true that the proposed project will be dealing with electricity, the safety design of the project leaves very little chance of electrocution. The conductors are over 15m high and the poles have clear danger warnings to deter people from climbing, and should a pole collapse or a conductor snap, a signal is sent in seconds which results in an immediate shut down.

7.4.2.13 Increase in Social Vices

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

7.4.2.14 Cultural Heritage and Archaeological Finds

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

7.4.2.15 Land take – Resettlement and Loss of Use

As mentioned earlier, the proposed project will require a corridor of 10m width along the road reserve. However the final design might encroach private lands and property through the Transmission Line alignment and therefore within the 10m corridor, no structures or tall trees are allowed. All other forms of land use including grazing and farming are allowed. Resettlement and loss of land use for this particular project is therefore, highly likely.

7.4.3 Proposed Mitigation Measures

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

7.4.3.1 Noise Pollution

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

7.4.3.2 Generation of Exhaust Emissions

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

7.4.3.3 Dust Emissions

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

7.4.3.4 Solid and Liquid Waste Generation

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

- Use of an integrated solid waste management system i.e. the 3 R's: Reduction at source, Reuse and Recycle; accurately estimate the dimensions and quantities of materials required;
- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time;

- Providing facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage;
- Use of building materials that have minimal or no packaging to avoid the generation of excessive
  packaging waste;
- Providing waste collection bins at designated points on site;
- Disposing waste more responsibly by contracting a registered waste handler who will dispose the waste at designated sites or landfills only and in accordance with the existing laws.
- Drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations;
- Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a regular basis proper procedures for the management of human waste will be put in place in order to prevent outbreak of diseases;
- Place in strategic places signs against littering and dumping of wastes;
- Audits waste generation and develop Waste Reduction Action Plans (WRAP).

7.4.3.4 Oil Spill Hazards

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

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

7.4.3.5 Destruction of Existing Vegetation and Habitats

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

- Conduct selective clearing of vegetation on the way-leave corridor. Avoid unnecessary vegetation clearing; only tall trees that pose a danger to the transmission line and vegetation on the foot plinth of the wooden poles to be removed.
- Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage;
- With assistance from community, KeNHA, KFS and KWS, the Proponent to initiate a tree planting exercise. School Greening Programmes in schools that are along the Proposed Transmission Line would be very useful

7.4.3.6 Disturbance of Faunal Species

To minimize effects on faunal species;

- Ensure no worker engage in acts of poaching
- Restrict construction to day time
- Observe applicable Forest Reserve regulations
- Bush clearing to be selective. Only tall trees on the wayleave corridor or vegetation on the footprints of the poles to be removed

7.4.3.7 Avifauna Mortalities

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

7.4.3.8 Impacts on Workers' and Community Health and Safety

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

7.4.3.9 Soil Erosion

To reduce soil erosion, the proponent will:

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

7.4.3.10 Visual and Aesthetic Impacts

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

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

7.4.3.11 Incidences of Electrocution

To reduce incidences of electrocution, the proponent will;

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

7.4.3.12 Perceived Danger of Electrostatic and Magnetic force

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

7.4.3.13 Increase in Social Vices

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

- Conduct periodic sensitization forums for employees on ethics, morals, general good behavior and the need for the project to co-exist with the neighbours;
- Offer guidance and counseling on HIV/AIDS and other STDs to employees;
- Provide condoms to employees; and
- Ensure the Proponent formulate and enforce a policy on sexual harassment and abuse of office.

7.4.3.14 Cultural Heritage and Archaeological Finds

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

7.4.3.15 Land take – Resettlement and Loss of Use

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

8. OCCUPATIONAL HEALTH AND SAFETY (OHS) MANAGEMENT

8.1 Overview

Occupational Health and Safety is a broad and holistic practice of protecting the workers, the workplace, the tools / equipment and the biotic environment. It is an essential tool in determining the ESIA study. The objective of incorporating OHS Management during construction and the operation phases of the proposed project is to:

- Prevent avoidable incidents and accidents;
- Ensure prompt and appropriate response to unavoidable incidents or accidents;
- Provide a safe and healthy working environment so as to enhance maximum output;
- Control loss of working time and damages to machinery, equipment, materials and other items; and
- Enhance environmental sustainability by developing sound health and safety practices measures.

8.2 OHS Guiding Principles

The project will be guided by the following principles:

- It will be a project consciously committed to the promotion and maintenance of high standards of health and safety for its employees, the neighboring institutions and the public at large;
- Ensuring that Health and Safety activities are implemented to protect workers and public;
- The management shall demonstrate commitment and exercise constant vigilance in order to provide employees, neighbors of the project and the environment, with the greatest health and safety safeguards; and
- Employees will be expected to take personal responsibility for their safety, that of their colleagues and of the general public as relates to H&S management procedures.

8.3 Health and Safety Management

The following strategies will help to achieve the above objectives:

- Maintaining an effective reporting procedure for all incidents/accidents;
- Providing appropriate tools and personal protective devices to site workers; and
- Encouraging, motivating and rewarding employees who take personal initiatives and commitment on OHS.

8.4 Requirements in the Project during Construction Period

8.4.1 Registration of Construction Site

The Proponent shall carry out his operations in accordance with the requirements of the Occupational Safety and Health Act 2007. The proponent will be required to register the site as a work place with the Directorate of Occupational Health and Safety Services (DOSHS).

8.4.2 Give Notice Engineering Construction

The 'Building Operations and Works of Engineering Construction Rules of 1984 Rule No. 6 (1) states that:

'A main contractor shall, within seven days of commencing or undertaking building operations or works of engineering construction, notify the Chief Inspector in writing of:

- The occupiers name and postal address;
- The address or location of the site of the operations or works;
- The date of commencement;
- The expected date of completion;
- Whether mechanical power is used or not; and
- The number of persons expected to be employed.

8.4.3 Appointment of a Safety Supervisor

The Building Operations and Works of Engineering Construction Rules of 1984 Rule No. 7 (1) states: 'Every contractor who employs more than twenty persons shall, for every site on which he is the contractor appoint one or more persons experienced in the operations or works carried out at the site and suitably qualified for the purposes to:

Advise the proponent as to the observance of the safety, health and welfare requirements under the Act and under these Rules; and Supervise and ensure the observance of those requirements and promote the safe conduct of work generally at the sites.'

8.4.4 Lifting

Rule No 53 of the Building and works of engineering construction rules, 1984 on lifting of excessive weights states that: ' A person shall not be employed to lift, carry or move a load so heavy as to be likely to cause injury to him'. This should be observed.

8.4.5 Provision of Lighting at Work

During construction, effective steps shall be taken to provide lighting for the works to be carried out safely .The Occupational safety and Health Act, 2007 section 50 (1) states; 'An occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing'.

Rule No 47 of Building and Works of Engineering Construction, Rules, 1984 on lighting of workplaces states that; 'There shall be adequate and suitable lighting in:

a) every working place and approach thereto;
b) every work place where here is lowering and raising operations with the use of lifting appliances are in progress; and
c) All openings dangerous to persons employed'.

8.4.6 Sanitary Conveniences

The proponent is responsible for providing sanitary conveniences for his workers and visitors. Section 52 (1) of the Occupational Safety and Health Act, 2007 states that: 'Sufficient and suitable sanitary conveniences for the persons employed in the workplace

shall be provided, maintained and kept clean, and effective provision shall be made for lighting the conveniences; and, where persons of both sexes are or are intended to be employed (except in the case of workplaces where the only persons employed are members of the same family dwelling there), such conveniences shall afford proper separate accommodation for persons of each sex'.

8.4.7 Supply of Drinking Water

Workers and site visitors should be able to have access to safe and clean drinking water. Section 91 of OSHA, 2007 states: 'Every occupier shall provide and maintain an adequate supply of wholesome drinking water at suitable points conveniently accessible to all persons employed'.

8.4.8 Dust and Exhaust Fumes

Rule Number 20 of the Building and Works of Engineering Construction Rules, 1984 states that;

'In any building operation or works of engineering construction where dust or fumes is likely to be injurious to the health of persons employed are given off, all reasonably practicable measures be taken to prevent the inhalation of the dust or fumes by the persons employed by ensuring adequate ventilation or providing suitable respirators at the place where the operation or work is carried on'.

8.4.9 Excavations

Precautions shall be made to prevent persons falling into excavated areas during construction. Rule No. 8 (1) of Building and Works of Engineering Construction Rules, 1984 deals with prevention of danger in excavations. It states that 'The walls and roofs of any excavation, shaft, earthwork or tunnel, deeper than 1.2 metres shall be reinforced with timber of suitable quality or with other suitable material to prevent, so far as is reasonably practicable danger or injury resulting from a fall or dislodgement of earth, rock or other matter from the walls or roof, to any person employed or making the inspection or examination under rule 9'.

Rule No. 13 further states that: 'An occupier shall ensure that any excavation, shaft, pit or opening in the ground more than two metres in depth shall be securely covered, fenced or otherwise provided with a suitable barrier when access by workmen, plant and equipment or material to it or from it is not necessary'.

8.4.10 Fire prevention

In the execution of works the proponent will adhere to 'The Factories and Other Places of Work (Fire Risk Reduction) Rules of 2007 (Legal Notice No. 59 of 2007) OSHA, 2007.

Section 78**,** (1) states that: 'All stocks of highly inflammable substances shall be kept either in a fire-resisting store or in a safe place outside any occupied building: Provided that no such store shall be so situated as to endanger the means of escape from the workplace or from any part thereof in the event of a fire occurring in the store'.

Section 81 (1) 'In every workplace or workroom there shall be:(a) Provided and maintained, and conspicuously displayed and free from any obstruction so as to be readily accessible,

means for extinguishing fire, which shall be adequate and suitable having regard to the circumstances of each case; and Present, persons trained in the correct use of such means of extinguishing fire during all working hours. Every workplace shall be provided with adequate means of escape, in case of fire, for the persons employed therein, having regard to the circumstances of each case.

All the means of escape referred to in subsection (2) shall be properly maintained and kept free from obstruction'.

8.4.11 Hygiene

Section 92 of OSHA, 2007 on washing facilities states that: Every occupier shall provide and maintain for the use of persons employed, adequate and suitable facilities for washing, which shall be conveniently accessible and shall be kept in a clean and orderly condition. The Contractor will be required to ensure and maintain cleanliness on his part, employees and site visitors'.

8.5 Emergency Response Procedures

The Proponent will develop an Emergency Response Plan that outlines the potential risks/ hazards in the project and how to eliminate, prevent or respond to injury, incidents and accidents. The Plan will include an illustration of incident/accident reporting structure as well as show the responsibilities assigned to various personnel. In addition, the Plan should indicate the emergency contacts such as those of the police, hospital/ ambulance, fire brigade and the Health and Safety Officer.

In addition to the measures laid out in the Emergency Response Plan, the workers shall:

- Alert other persons exposed to danger;
- Inform the Health and Safety Officer;
- Do a quick assessment on the nature of emergency; and
- Employees who have been trained and skilled in first aid administration skills will assist the Health and Safety coordinator in situations where first aid will be necessary.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

9.1 Scope and Objectives of the Proposed ESMP

9.1.1 Scope

The Proposed ESMP identifies the potential impacts of the proposed project on the environment and proposes how to mitigate the adverse impacts. The mitigation measures have been devised in line with various legal and regulatory requirements that are relevant to the project. This ESMP is a dynamic document that can be updated with changing project conditions.

9.1.2 Objectives of the Proposed ESMP

The objectives are to:

- Enable detection of changes in environmental conditions by highlighting anticipated impacts;
- Prescribe preventive measures that the proponent should institutionalize to mitigate adverse environmental and social impacts;
- Respond to adverse changes during construction and operation of the project through monitoring and control programmes in consultation with NEMA;
- Ensure that corrective actions are implemented appropriately and in a timely manner;
- Bring the project into compliance with applicable legal environmental policies and procedures, more so EMCA, 2015;
- Outline the mitigating and monitoring measures required to enhance the positive project impacts;
- Prescribe procedures that cause minimum environmental degradation, especially implementation of best environmental practice in the sector;
- Spell out practices to ensure all personnel engaged in the works comply with the prescriptions of the ESMP;
- Ensure that no change is made to the ESMP without the prior written permission of West Kenya, or its nominated representative(s);
- To ensure environmental mainstreaming during the implementation of the project;
- To enable for a systematic and proactive approach to addressing environmental and social issues during the project's implementation;
- Ensure compliance with, among others: NEMA regulations, County By-laws; and
- Provide guidelines for record keeping on site.

This ESMP framework constitutes attendant sub-plans that will be responsive to the prevailing environmental and social circumstances at the time of construction. The ESMP will therefore remain an active document that can be continuously upgraded.

9.2 Implementation and Monitoring of the ESMP

In executing its responsibilities of construction and maintenance of the Transmission Line, West Kenya remains committed to environmental management. The proponent and any sub contactors are bound to comply with legal and regulatory environmental requirements of Kenya.

This ESMP implementation covers pre-construction, project construction, operation and decommissioning. Even though other parties may be brought on board to attend to various project aspects, the oversight and responsibility for implementation of this ESMP in accordance with best industry practices as well as workplace health, safety and environmental (HSE) standards still remains with the proponent.

The proponent will allocate adequate budget and a proper implementation schedule for all mitigation measures specified in the ESMP. In addition, the specific roles and responsibilities will be assigned to project personnel, such as safety and health management roles.

9.3 Implementation of Corrective Action(s)

There are several mechanisms for implementing corrective action, both during the construction and operational phases. The main mechanisms to address non-conformances include verbal instruction (in the event of minor deviation from established procedure, usually following a site inspection); written instruction (identifying sources of problems, usually following an audit) and issuance of contract notice (following possible breach of contract).

9.4 Environmental and Social Management Plan Matrix

This matrix presents the proposed measures comprising individual sub-plans to address specific environmental and social concerns. The information provided in this chapter and summarized in the matrix constitutes the ESMP. The implementation of this ESMP should be carried out within the provisions of the law and for the ultimate benefit of all project stakeholders. The effectiveness of this ESMP shall be monitored and assessed during periodic checks, inspections and at the end of the Project when an overall audit shall be carried out.

Table 10: Environmental and Social Management Plan Matrix

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
Environmental and Safety Aspects					
Air Quality	Dust generation	- Watering of all construction sites with appreciable dust should be mandatory; - Observing set speed limits among other measures; and - Workers in dusty areas on the site should be issued with appropriate PPE, according to their nature of work and working area.	Proponent	Construction	1,500,000
	Gaseous emission	- Use of well serviced machinery to reduce exhaust smoke levels; - Limiting idling time of vehicles and equipment, and encourage workers to switch off vehicle engines whenever possible is important; and - Regularly inspect and service company vehicles. Un-roadworthy vehicles should not be allowed on the road.	Proponent	Construction and Operation	2,000,000 Best environmental practice
Liquid Waste Management	Increased liquid waste generation	- Ensuring there is no grey water runoff or uncontrolled discharges from the site/working areas; - Prevent runoff loaded with sediment and other suspended materials from the site/working areas; - 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; and - Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted.	Proponent	Construction and operation	1,000,000
Solid Waste Management	Increased solid waste generation	- Contract a licensed garbage collecting company to manage waste;	Proponent	Construction and Operation	2,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
		- Properly labelled and strategically place waste disposal containers within the sites; and - Construction waste should be properly collected, stored, recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses.			Best Environmental Practice
Noise, Vibration Disturbances	Increased noise and vibration levels	- As a general rule, workers operating equipment that generate noise should be equipped with noise protection gear including ear muffs and plugs; - Observance of strict working hours (preferably 8am-5pm) during construction; - Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of site and nearby communities; and - Unnecessary hooting and revving by project vehicles not be allowed. Signs prohibiting such actions should be erected at all times	Proponent	Construction and operation	200,000 Best Environmental Practice
Oil Spill Hazards	Pollution of soil and water resources	- Install oil trapping equipment in areas where there is a likelihood of oil spillage; - Collect the used oils and re-use, re-sell, or dispose of appropriately using expertise from licensed waste handlers; - Prepare a written substations response plan and display it on strategic areas and train workers on specific procedures to be followed in the event of a spill; and - Immediately institute clean up measures in case of an oil spill.	Proponent	Construction and operation	2,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
Public Safety	Risk to public and increased risk of accidents	- Cordon off the construction site and only allow access to authorized personnel; - Place warning signs on strategic places; - Conduct education and awareness campaigns to dispel fear among community on the effects of electrostatic and magnetic forces.	Proponent	Construction and operation	As per BoQ rates
Soils	Soil erosion	- Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil; - Ensure that construction vehicles are restricted to use existing graded roads; - Implement a storm water management plan that minimizes impervious area infiltration by use of recharge areas; and - Use of detention and/or retention with graduated outlet control structure will be designed; - Overburden removed during excavation to be used to fill or landscape the project area or in other areas; - Immediate re-vegetation and landscaping works to be carried out after the works to protect soils that have been exposed; and - Compact soils to reduce susceptibility to erosion.	Proponent	Construction and operation	2,000,000 Best Environmental Practice
Occupational Health and Safety	Increased risk of workplace incidents of electrocution and accidents	- Ensure strict adherence to the safety designs established; - Put in place a maintenance system to ensure physical integrity of project components; - Ensure that access to the live sections of the project should only be by authorization and trained personnel; - The proponent shall comply with all standard and legally required health and safety regulations as promulgated by Factories and Other Places of Work Act, OSHA 2007 and its subsidiary legislation and also the ILO Guidelines on Safety and Public Health in, the construction activities;	Proponent and Contractor	Construction and operation	6,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
		- The proponent shall set up a standard first aid station on site; - There should be a Safety Officer on site who has relevant training and knowledge of safety procedures; - The Contractor shall provide the appropriate Personal Protective Equipment for staff; and - The contractor must have insurance cover for the workmen.			
Vegetation	Loss of vegetation comprising grasses and sporadic shrubs	- Conduct selective clearing of vegetation on the way-leave corridor. Avoid unnecessary vegetation clearing; only tall trees that pose a danger to the transmission line and vegetation on the foot plinth of the wooden poles to be removed. - Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage; and - With assistance from community, KeNHA, KFS and KWS, initiate a tree planting exercise.	Proponent	Pre-construction, Construction and operation	2,000,000
Wildlife	Disturbance of Faunal Species and avifauna mortalities	- Ensure no worker engage in acts of poaching; - Restrict construction to day time; - Observe applicable Forest Reserve regulations; - Only tall trees on the wayleave corridor or vegetation on the footprints of the poles to be removed; and - Undertake wire marking to alert birds of the presence of power lines.	Proponent	Construction and operation	2,000,000
Changes in landscape	Visual and Aesthetic impact	- Undertake extensive public consultation during the planning of the project; - Design structures at the site in such a way as to improve the beauty of the surroundings; - Restore site areas through backfilling, landscaping and planting of trees, shrubs and grass on the open spaces to re-introduce visual barriers;	Proponent	Pre-construction, Construction and Operation	2,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
		- Design and implement an appropriate landscaping programme.			
Socio-Economic Aspects					
Land take and Resettlement	Disruption of livelihoods	- Conduct a detailed and elaborate RAP where necessary; - Conduct consultation meetings with Project Affected Persons; - Ensure timely compensation for loss of property and land use; and - Ensure adherence to country legal legislations and World Bank Safeguard Policy 4.12 on Involuntary Resettlement.	Proponent	Pre-construction and Construction	As indicated by the RAP report
Hiring of Labourers	Bias in recruitment	- To avoid conflicts with the local people on employment it is proposed and important that the proponent employs the locals in liaison with local leaders and administration in unskilled and semi-skilled duties; - To promote the livelihood of vulnerable groups such as the women-headed households, the proponent should make deliberate efforts to include and retain women in the project; - Make deliberate efforts to include at least 33% of women as employees within the project; and - Contractor to put in place a code of conduct to prevent sexual harassment / exploitation of female employees.	Proponent	Construction and operation	No additional costs required
Social Vices	Increase in Social Vices	- Conduct periodic sensitization forums for employees on ethics, morals, general good behaviour and the need for the project to co-exist with the neighbours; - Offer guidance and counselling on HIV/AIDS and other STDs to employees; - Provide condoms to employees; and - Ensure the Proponent formulate and enforce a policy on	Proponent	Construction and operation	2,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
		sexual harassment and abuse of office.			

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

Access to cheap and affordable electricity has been identified as one of the key drivers for Kenya to attain its Vision 2030 goals as well as the Big 4 agenda. Manufacturing stands tall as a key pillar in the Big Four development agenda by the National Government. Manufacturing is seen to be the key to unlocking the success of the other development goals, namely: Universal Healthcare, Affordable Housing, and Food Security. The argument is that manufacturing will create many quality jobs thereby improving the living standards of the workers, elevating them to access proper healthcare and decent affordable housing.

The drive for cheaper power to promote manufacturing at Rai Paper Mills has prompted the Proponent having a 24MW generation capacity at West Kenya Sugar Factory to dispatch 14MW from West Kenya Sugar factory to Rai paper Mills in Webuye through the Proposed 66KV 30km long Overhead Transmission Line Project. The ripple effects of the project will be felt through the region in the form of creation of many quality jobs thereby improving the living standards of the workers and improved economic growth.

Views gathered from stakeholders point to the anticipation that the establishment of the facility will help to absorb the work force in a region that has suffered recently from Rai Paper scaling down operations due to reduced manufacturing owing to the high cost of doing business. Many people have lost jobs and thus their livelihoods which has increased crime and reduced demand for houses and commodities. Respondents mentioned that the project will provide cheap and affordable supply of energy, a prerequisite for the revival of Rai Paper Factory in addition to the utilization of the waste bagasse thereby reducing environmental pollution due to transportation and accumulation of bagasse. In spite of the consulted parties airing a few concerns and suggestions over how certain aspects of the project should be handled, they indicated support for the proposed development and look forward to its implementation.

The adverse elements notwithstanding, the benefits that will be realized from the construction of the Proposed Construction of 66KV Overhead Transmission Line outweigh most of the inconveniences and negative impacts that have been categorized in this EIA Study as temporary, moderately significant and limited to the project construction phase. The EIA Study determined that if the project construction and operation is implemented with due attention to the mitigation and monitoring measures entailed in this document, most if not all, adverse environmental and social impacts will be manageable. Overall, the Proposed Construction of 66KV Overhead Transmission Line Project is deemed timely, highly beneficial and should therefore be allowed to proceed within the given framework.

10.2 Recommendations

It is recommended that for the prevention and mitigation of potentially adverse environmental and socio-economic impacts, the following should be done:

- The operation and maintenance of the proposed project must comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention and precaution;
- Ensure the views expressed by the public during the consultation exercise are integrated in the design and implementation plan of the project, especially where aspects of social interest are concerned;
- Regular environmental and social safeguard monitoring and auditing should be undertaken and any identified shortcomings addressed. This will ensure that all projects are in conformance with established laws and regulations for the management of environment, safety and health;
- Institute effective communication, education and awareness raising for project workers and neighbours for enhanced acceptability and social harmony;
- The proponent should ensure the local community benefits from employment opportunities in each phase of the project that is being executed; and
- The Contractor should expedite on the works to minimize adverse livelihood impacts and inconveniences to the community.

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APPENDICES

APPENDIX I: APPROVED TERMS OF REFERENCE

APPENDIX II: SAMPLING ANALYSIS RESULTS

APPENDIX III: PROPONENT DOCUMENTS

APPENDIX IV: PCM MINUTES AND ATTENDANCE REGISTER

APPENDIX V: SAMPLE OF FILLED QUESTIONNAIRES

APPENDIX VI: SITE LAYOUT PLANS